



Ural (Урал) - Dnepr (Днепр) Russian Motorcycle Part 3A: 2WD Locking versus non-Locking Differential

(MT-12 / MT-16 / MB-750 / MB-750M / MB-650 / MB-650M / MB-650M1 / Ural "Sportsman")

(See Also Part 3B: 2WD with non-Locking Differential,
Part 3C: 2WD with Locking Differential
and Part 3D: 1WD with Locking non-Differential)

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1 / 2013

Locking versus Non-Locking Differentials

- **Locking versus Non-Locking Differentials**
 - Shift Linkage on Final Drive Hub is a Dead Give-Away of a Selectable Locking Differential
 - Not to Be Confused with Modern Urals with Engageable (Non-Diff) Locking for 2WD
- **Non-Locking Differential (Diff)**
 - Dnepr: Full-Time Two-Wheel Drive (2WD) with Differential, No Engageable Locking Lever
 - Ural: Not a True Differential (1WD and Engageable 2WD, Both Wheels Locked Together)
- **Locking Differential (Diff)**
 - Dnepr: Full-Time 2WD with Differential, Engageable Locking (Both Wheels Locked Together)
 - Ural: Not a True Differential (1WD and Engageable 2WD, Both Wheels Locked Together)
- **Conclusions:**
 - MT-12 and MT-16 Only Had Non-Locking Differential
 - MB-750 Originally Had Locking Differential and Later Dropped
 - MB-750M Originally Had Locking Differential and Later Dropped
 - MB-650 Originally Had Locking Differential and Later Dropped
 - MB-650M Had Non-Locking Differential
 - MB-650M1 Had Non-Locking Differential
- **Notes**
 - Dnepr 2WD Rear Drive Casings Are the Same for MB-750, MT-12, MT-16, MB-650, MB-750M, MB-650M
 - Early MB-750s and MB-650s Had an Engageable Locking Mechanism on the Rear Drive Housing
 - In Use for about 2 years, Subsequently Outlawed Due to Accidents and Removed from Service
 - Replaced by Full-Time Differential, without Locking Mechanism
 - Only External Difference between the Locking Casing and the Non-Locking Differential Casing Is That the Non-Locking Casing Does Not Have the Hole Machined into the Casing for the Locking Lever

Even though the MB-750, MB-750M and MB-650 originally had locking differentials, it appears they were later dropped for all the military (MB) versions.

Ural (Урал) / Dnepr (Днепр) *Locking vs. Non-Locking Diff's*

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

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

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

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 (Part3B)**
 - 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 (Part3C)**
 - Dnepr MB-750 (1964-1973)
 - Dnepr MB-650 (1968-1984)
 - Dnepr MB-750M (1973-1977)
- 4. Full-Time, One-Wheel Drive (1WD) with Engageable (non-Diff) Locking 2WD**
 - 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)

True-Differential: 2-Wheel Drive in the MT-12 / MT-16

- **Dnepr MT-12 / MT-16 Differential Action**
 - **Rear Differential Hub Supported on Swing-Arm Suspension**
 - **Differential Mechanism Includes an Asymmetric (uneven) Cylindrical Gear Transmission**
 - **Unlike Automotive Differentials, Which Consists of Bevel Gears Distributing Torque to the Wheels Evenly (symmetrically)**
 - **Sidecar Wheel Has 30-40% of the Load with the Main (pusher) Wheel 60-70%**
 - **Selected Skewness Differential, Where the Gear Ratio Is 19:11**
 - **Torque Ratio Determined by Number of Teeth In the Gear: 11 Teeth and 19 Teeth**
 - **64% $((19/(11+19)) \times 100\%)$ of Effort Supplied to Main (pusher) and Only 36% $((11/(11+19)) \times 100\%)$ to Sidecar Wheel**
- **Pendulum Sidecar Wheel Gear Reducer**
 - **Sidecar Wheel Supported on Pendulum Suspension**
 - **Pendulum Attached to Sidecar Frame in Same Manner as Dnepr MT-10.36**
 - **Differential Rotation of Transverse Shaft by Passing Under Sidecar Carriage**
 - **Gear Reducer Has Two Gear Shafts: Master and Slave, with a Pair of Cylindrical Gears**
 - **Slotted Hub-Driven Gear Protruding from Gear Cover and Interfaces with Internal Splines of Wheel Hub**
 - **Connected to Sidecar Shock Absorber**
- **No Need to Set Camber and Toe-In Angles**
 - **Sidecar Doesn't "pull" Like a Conventional Sidecar Motorcycle**
 - **Planes of Wheels Parallel to Each Other and Perpendicular to Road Surface**
 - **Reduces Rolling Resistance, Compared to Conventional Motorcycle, Up to 25%**
 - **Increased Tire Mileage and Reduced Fuel Consumption**

Lock vs. Non-Lock: Differing Views from Different Sources

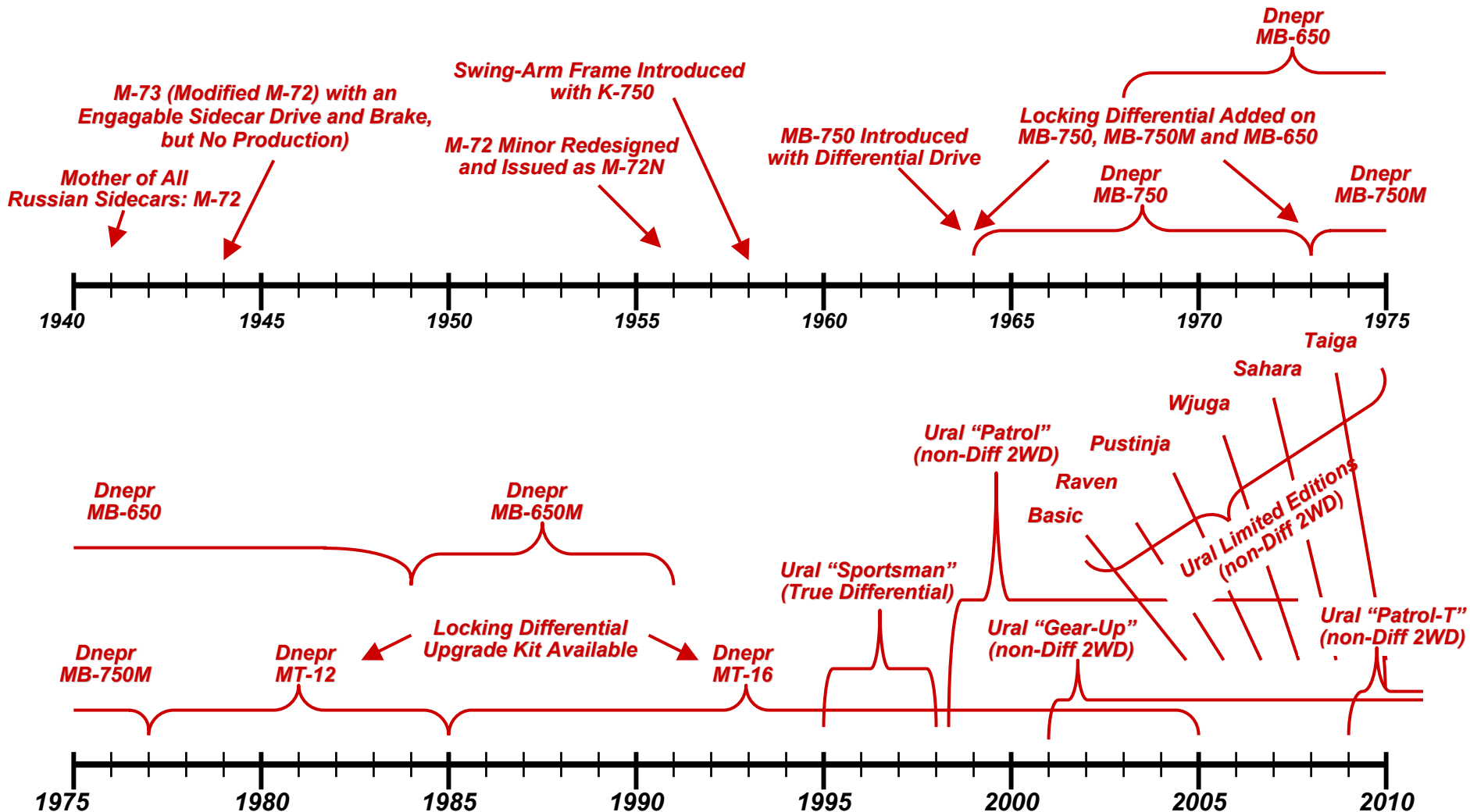
- ***Very Confusing!***
- ***Sources of Data***
 - ***MB-750 Maintenance Manual, Published in 1976***
 - ***Motorcycle MB-750, Published 1967: МОТОЦИКЛ МВ-750***
 - ***Repair Guide for Army Motorcycle K-750 and MB-750, Published 1967***
 - ***РУКОВОДСТВО ПО ВОЙСКОВОМУ РЕМОНТУ МОТОЦИКЛОВ К-750 И МВ-750***
 - ***MB-750 Illustrated Parts Breakdown, Published in 1973***
 - ***Interview with KMZ Worker Factory Worker Michajłowiczowi Nicholas***
 - ***Kiev Motorcycle Plant (Kievski Mototsikletnyi Zavod (KMZ: Home of Dnepr***
 - ***Rear Drive Casing for MB-750 Has Provision for Adding Locking Kit***
 - ***Component Vendor Information***
- ***Rank Sources in Importance***
 - ***Dated Maintenance Manuals Have the Greatest Value***
 - ***Illustrated Part Break-Downs Are Second in Importance***
 - ***Interviews with Dnepr Factory Workers Concerning Changes***
 - ***Descriptions from Reputable Re-Furbishers Is Third***
 - ***Descriptions from Reputable Parts-Suppliers Is Fourth***
- ***Reasons for Changing between Locking and Non-Locking***
 - ***Russians Have Been Known to Change Mid-Stream***
 - ***Some Non-Locking Bikes Have Been Changed to Locking Using the Up-Grade Kit from Old Timer Garage, etc.***
- ***"B" in the Model Name Signifies a Military Designation***
 - ***Early Military Models (M-72) Didn't Need a Military Designation, Because All Bikes Went to the Military***
 - ***MB-750 / MB-750M / MB-650 / MB-650M (sometimes translated as MV or MW depending on country)***

Based on interviewing the KMZ factory worker, the MB-750 initially had a locking differential, but it was later dropped.

MB-750, MB-650, MB-750M Locking?

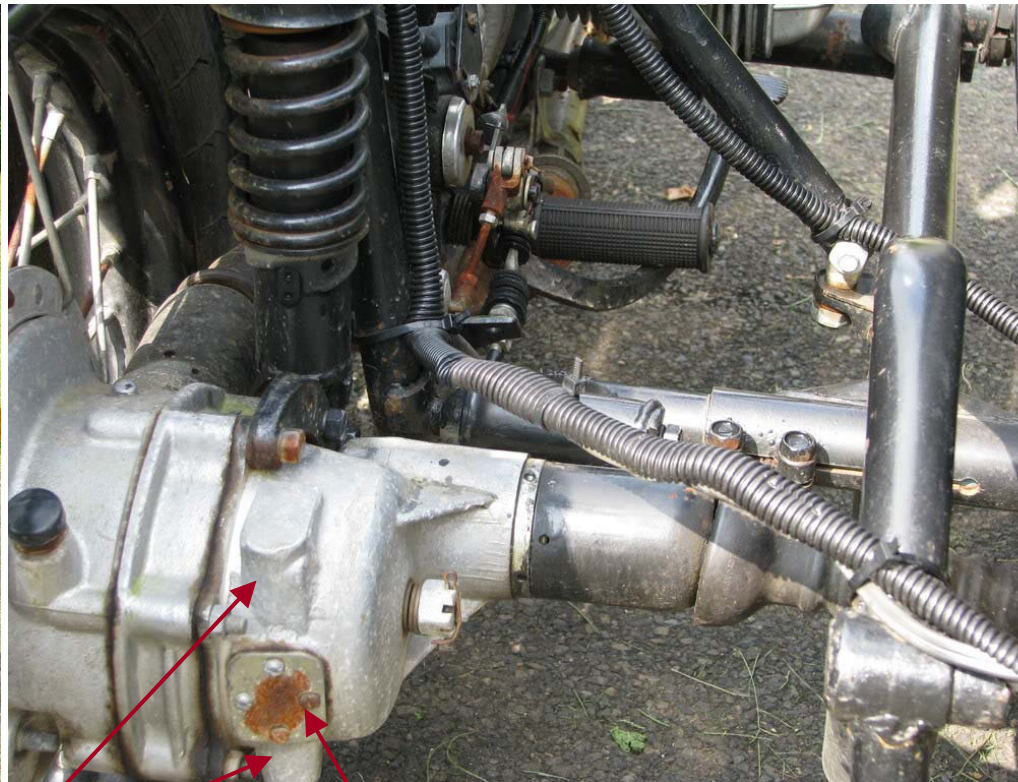
- ***Dilemma: Which of the Military Dneprs Has Locking or Non-Locking Differentials?***
 - ***Various Sources Report Differing Views***
- ***Chronology Based on Interview with KMZ Michajłowiczowi Nicholas***
 - ***MB-750 Derived in Direct Line from K-750B to Satisfy the Military***
 - ***After Introduction of Production of K-750 in Military Version in 1958, Decided to Construct a New Variety of Driven Sidecar Wheel***
 - ***In 1964, KMZ Developed the First Version of the MB-750: Locking Differential***
 - ***Locking Diff Later Removed***
 - ***Reason for Abandoning Production of Differential Lock:***
 - ***Huge amount of Complaints from the Army to the Plant***
 - ***Often used by Commander to go to the training ground for tanks and personally supervise the exercise tankers.***
 - ***However, often used by inexperienced soldier, who was able to take on board their ten colleagues and forget to switch off the lock.***
 - ***Such Fun lead straight to failure, and the plant overwhelmed complaints resigned from the lock of the Differential.***
 - ***MB-750M Locking Removed***
 - ***MB-650 made further changes***
 - ***650cc OHV Engine: MT801***
 - ***gearbox with reverse: MT8204***
 - ***Future versions of this design and development: MW-650M and MW-650M1***
 - ***1968 to 1991 made 6,687 pieces of motorcycle MW-650 and MW-650M1***

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 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.

1985 Dnepr MT-16 650cc 2WD (sovietsteeds.com)



**Notice the Place on the Casing,
Originally Designed for the Locking Mechanism!**

Grease Filling Cover

Simply looking at the casing for a MT-12 or MT-16, we can see that it was originally designed for a lockable solution for the military.

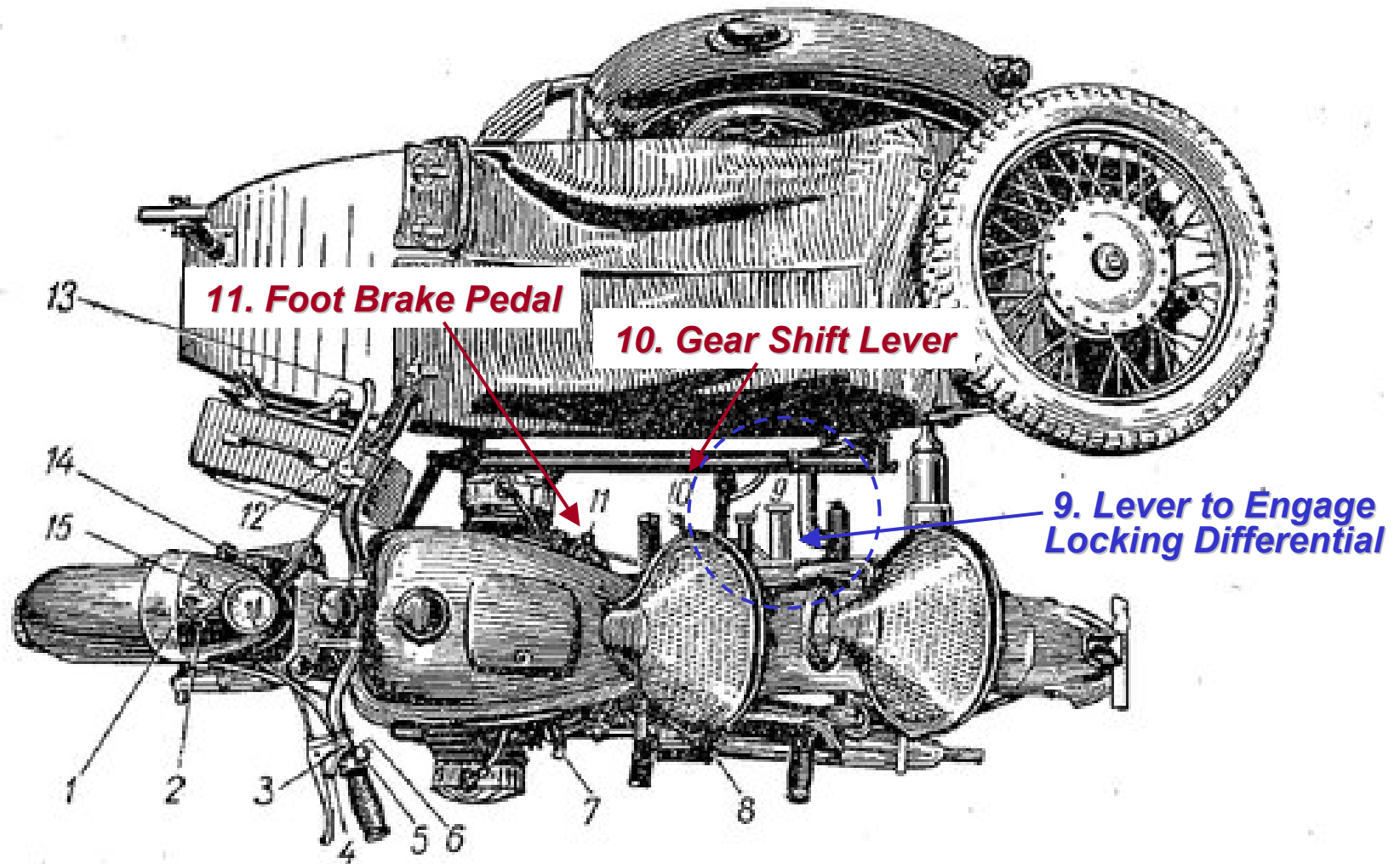
MB-750 with Locking / Non-Locking Differential?

- ***MB-750 with Non-Locking Interpretation***
 - ***MB-750 with Non-Locking Differential***
 - ***www.ebay.com***
- ***MB-750 with Locking Interpretation***
 - ***Repair Guide for Army Motorcycle K-750 and MB-750 , Published 1967***
 - ***РУКОВОДСТВО ПО ВОЙСКОВОМУ РЕМОНТУ МОТОЦИКЛОВ К-750 И МВ-750***
 - ***MB-750 Illustrated Parts List, 1973***
 - ***КАТАЛОГ УЗЛОВ И ДЕТАЛЕЙ МОТОЦИКЛА МВ-750***
 - ***MB-750 with Locking Differential***
 - ***МОТОЦИКЛ МВ-750, Published 1967***
 - ***1968 Dnepr MB-750 with Locking Differential***
 - ***databikes.com***
 - ***MB-750 with Locking Diff***
 - ***www.oldtimergarage.eu***
 - ***MB-750 with Locking Diff***
 - ***www.konsulavto.ru and www.araon.by***
 - ***MB-750 Locking Diff***
 - ***moscow.olx.ru***
 - ***MB-750 with Locking Differential***
 - ***bcozz.multiply.com***
 - ***MB-750, MB-750M and MB-650 with Locking Differential. MB-750M and MB-650 Locking Mechanism Removed as a Result of Transmission MT-804 (Dnepr Gearbox with Reverse)***
 - ***white.metal-forever.com***

***Most of the evidence points toward a locking differential for the MB-750,
but there is a little more to the story.***

MB-750 with *Locking Differential*

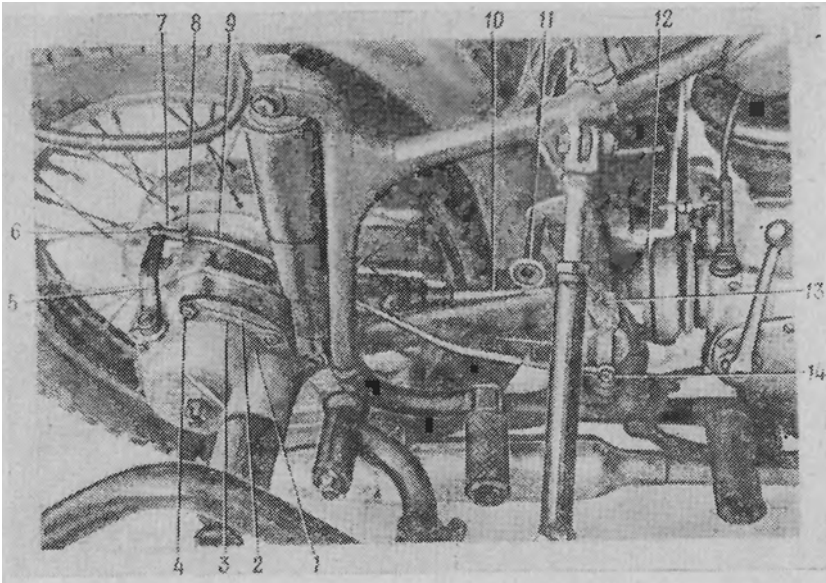
(bcozz.multiply.com and МОТОЦИКЛ MB-750, Published 1967)



9. Рычаг включения механизма бЛокировки дифференциала = 9. Engaging Lever Differential Lock

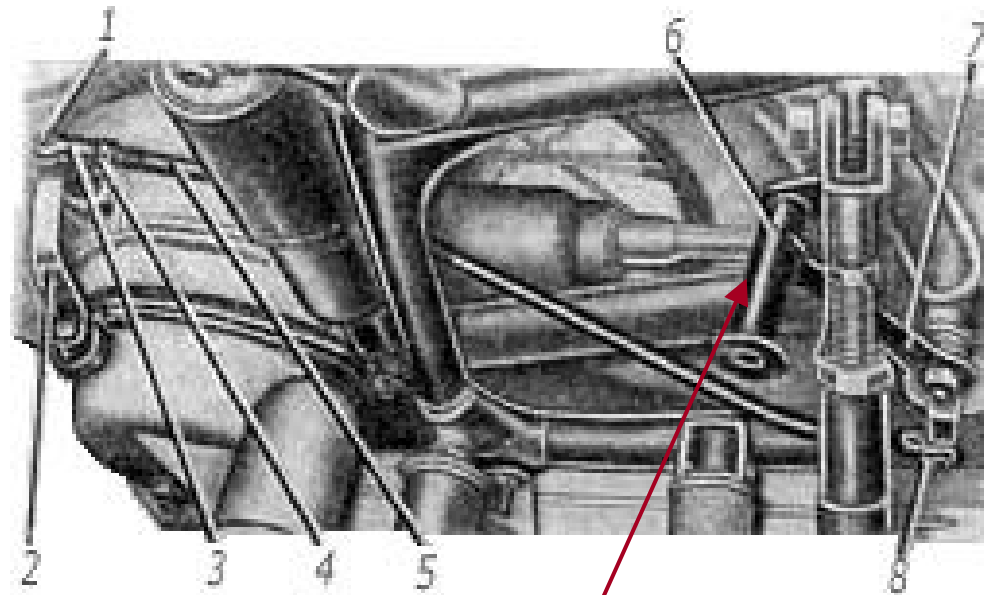
The MB-750 (1964-1973) had a full-time differential with a *manually engageable locking mechanism*.

MB-750: 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

Lock Lever Assembly



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. 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).

MB-750 Illustrated Parts List, 1973

(КАТАЛОГ УЗЛОВ И ДЕТАЛЕЙ МОТОЦИКЛА МВ-750)

**ВП48310 Locking Fork
(Outside Rear Differential)**

Lever for Locking Differential

**Locking Differential
(Lever Shown)**

**ВП48323 Locking Fork
(Inside Rear Differential)**

**ВП48310 Locking Fork
(Outside Rear Differential)**

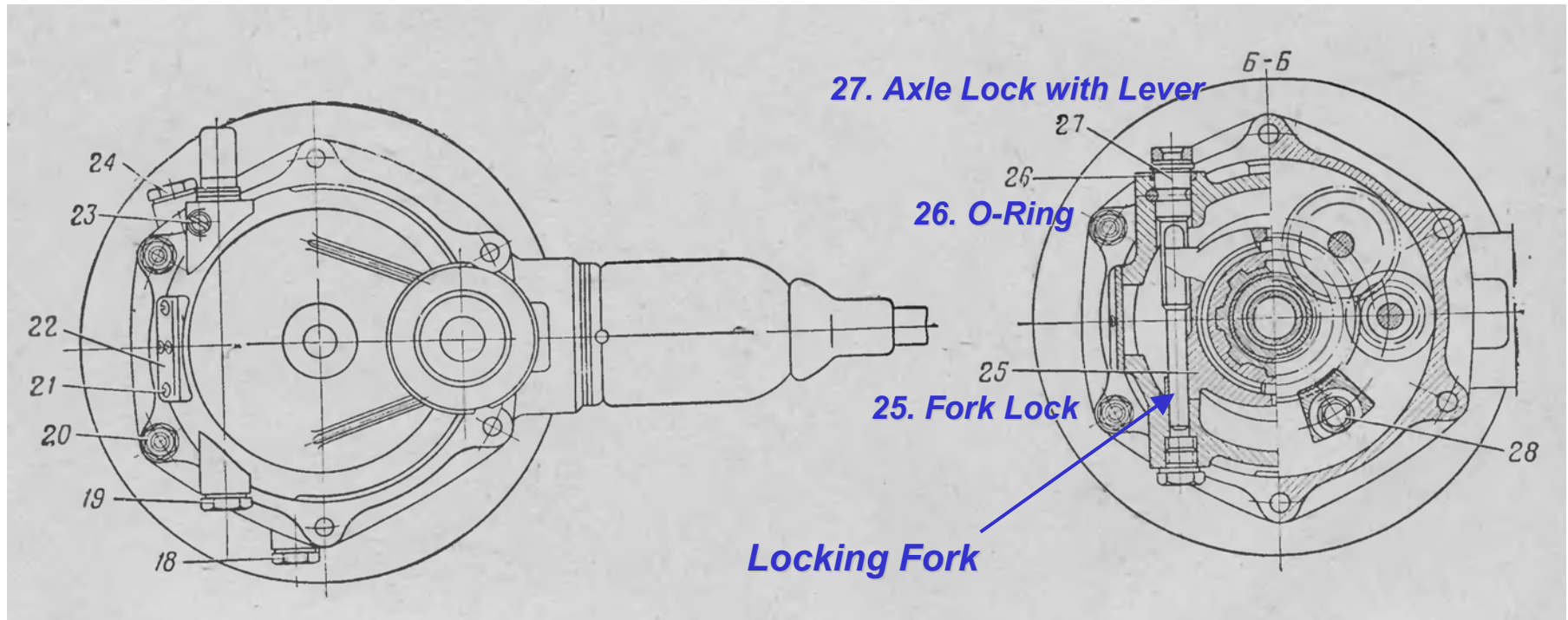
**ВП00301 Locking Control Rod
(Near Motorcycle Driver)**

**ВП48121 Differential Cup
(Inside Rear Differential)**

The illustrated parts breakdown for the MB-750 clearly shows the **locking control rod** connected to the **locking lever** on the rear drive.

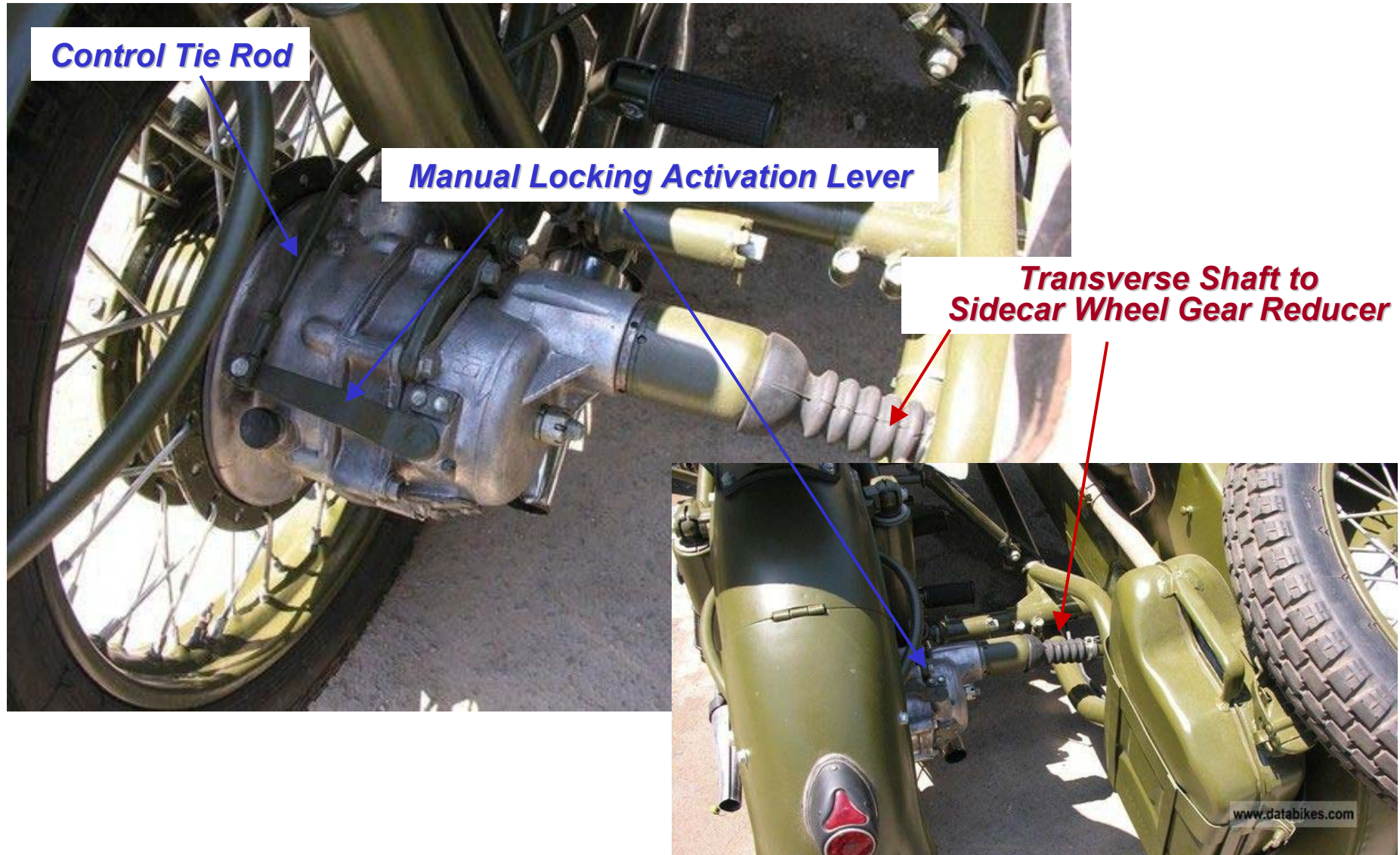
Rear Drive for MB-750

Repair Guide for Army Motorcycle K-750 and MB-750 , Published 1967
(РУКОВОДСТВО ПО ВОЙСКОВОМУ РЕМОНТУ МОТОЦИКЛОВ К-750 И МВ-750)



The outline drawing for the MB-750 rear drive clearly shows the lever for activating the **locking differential**.

1968 Dnepr MB-750 with **Locking Differential** (databikes.com)

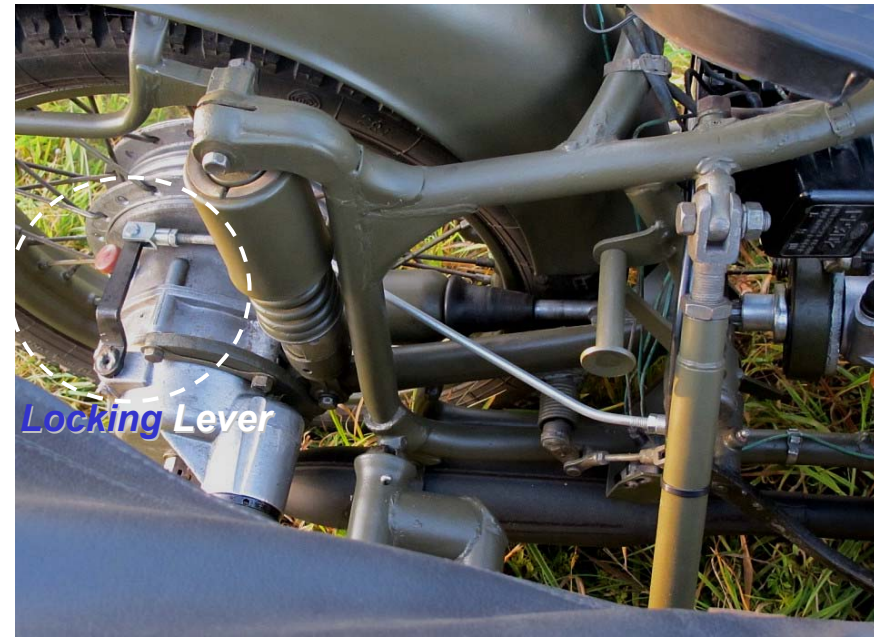


Dnepr's MB-750 has a true differential 2WD, with a manual activation lever. A shift linkage on the final drive hub indicates that it is a selectable **locking differential.**

MB-750 with **Locking Differential** (www.oldsimergarage.eu)



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



MB-750 with **Locking Differential**



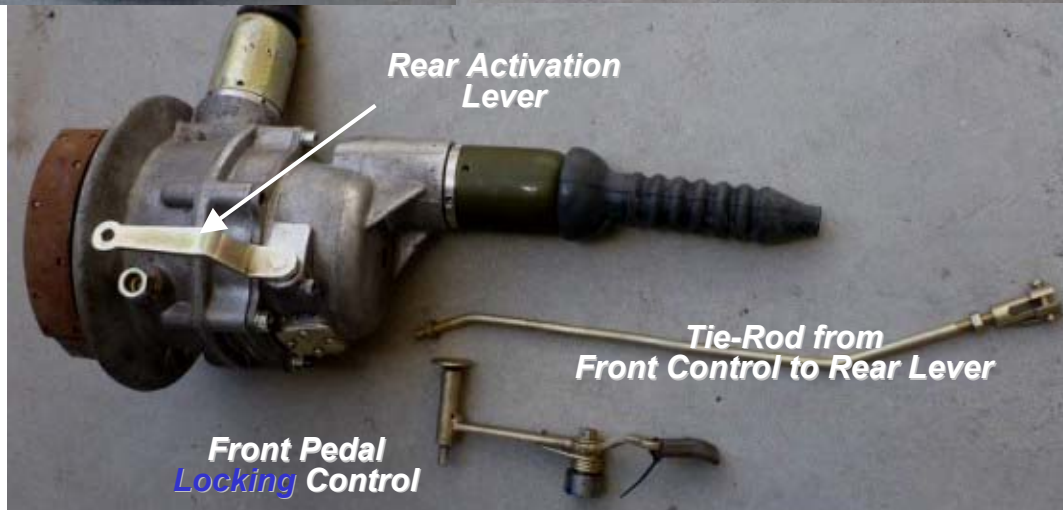
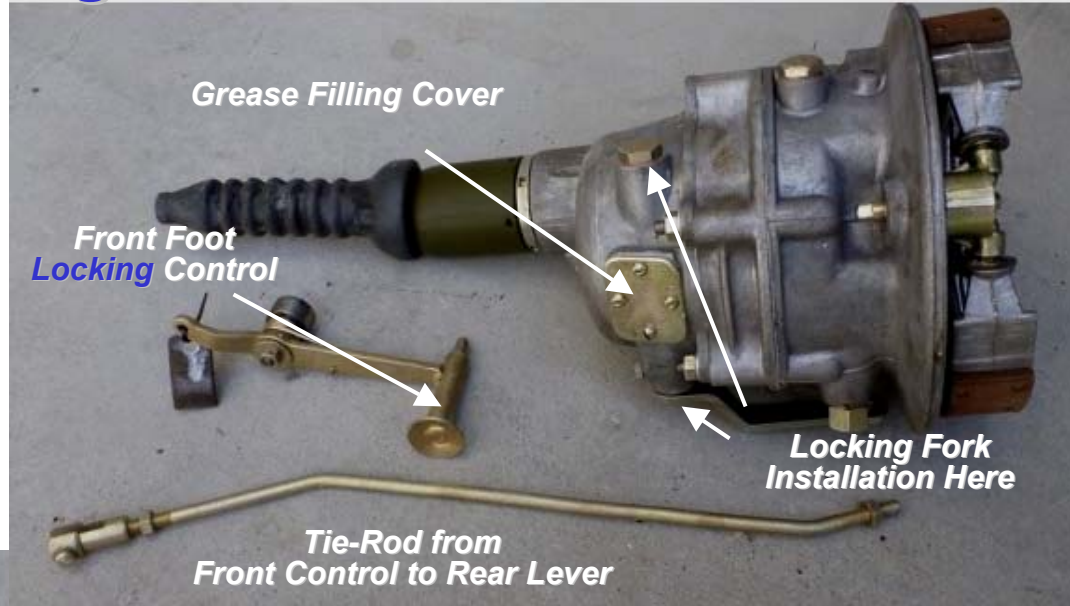
The presence of a manually-engageable mechanism on the rear drive indicates that MB-750 had a **locking differential**.

MB-750 with **Non-Locking Differential**



Examination of the differential shows the absence of any manually-engageable **locking mechanism on later production of the MB-750.**

MB-750 with **Locking Differential Kit Added**

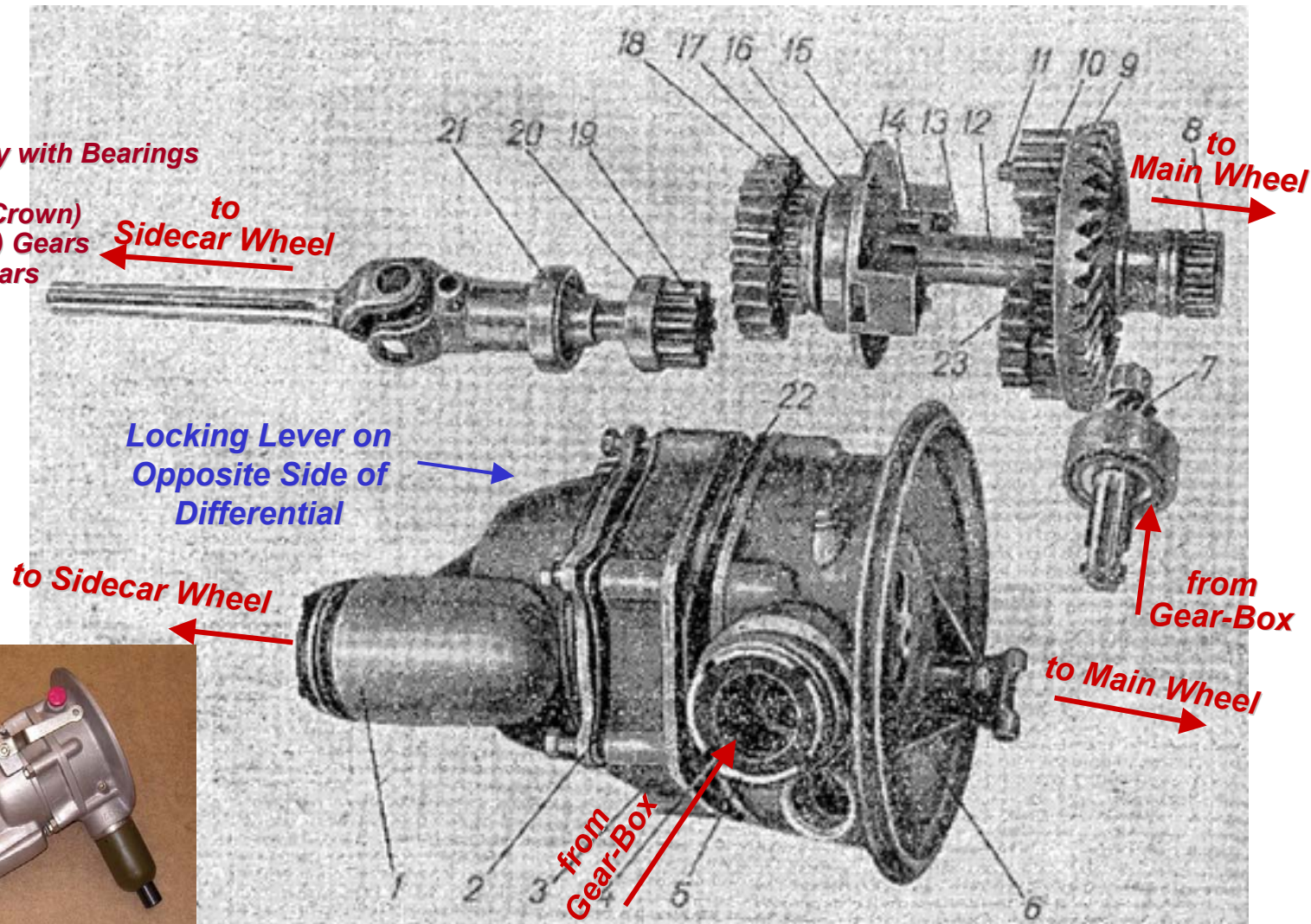


The **locking mechanism** from Oldtimer garage is a differential lock that is easy to install on the Dnepr MT-16 full-time 2WD (with differential), to lock the differential, just like an off-road motorcycle. The only work required is drilling/milling two holes in the right cover on the FD.

MB-750 Rear Drive with **Lockable Differential**

Repair Guide for Army Motorcycle K-750 and MB-750 , Published 1967
(РУКОВОДСТВО ПО ВОЙСКОВОМУ РЕМОНТУ МОТОЦИКЛОВ К-750 И МВ-750)
and МОТОЦИКЛ МВ-750, Published 1967

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



The maintenance manual for the MB-750 clearly show a **locking differential**, which may have been later deleted after 1967 (date of the MB-750 Manual).

MB-750 Differential Covers (2WD)



Lever for Locking Differential

Drive Outer Cover Gasket

Rear Drive Case

8П48310 Grease Filling Cover

8П48017-A

8П48006

220078

8П48007

8П48008

8П48201

75005137

011407

Oil Dip-Stick and O-Ring

MB 75048210

Dipstick
BП75048210

- 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
- BП48006 Gasket
- BП48007 Cap
- BП48008 Gasket Crankcase Differential
- BП48011 Setscrew
- BП48017-A O-Ring
- BП48201 Carter Differential Housing
- BП48310 Lock Lever Assembly (2WD)
- BП48320 Fork Lock Assembly
- BП48401 Bushing
- BП48402 M8 stud-M8h1h50
- BП48411 Carter's Final Drive
- BП48801 Differential Cover
- MB75048210 Probe Assembly (Dipstick)

8П48801

8П48411

8П48401

7205126

7205113-6

7205116

Drive Hub Needle Bearing
Inner Race

7201134-A Two Casing Gaskets

011407

250511

7205107

8П48402

264072

7201134-A

75006514

011407

Six Studs
Holding Casing Together

Gasket for
Differential Cover

Oil Plug + Washer



Rear Drive Housing



Seal Collar with Seal



MB-750 with Locking Differential

(www.konsulavto.ru and www.araon.by)

Fork for
Locking Differential

Lock-Up Clutch



Right-Hand Hub
BP48005

Satellite Gear, 8 teeth

Differential Cup

Stray Gear

Bushing or Sleeve

Satellite Gear

Idle Gear



Output Gear
BP48001-A

Locking Parts Shown in Blue

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)
BP48001 Pinion Output
BP48002 Lock-up Clutch
BP48004 Circlip
BP48005 Right Hub
BP48012 Bolt M8h1h32
BP48014 Satellite Gear
BP48015 Idle (Stray) Gear
BP48101 Bevel Driven Pinion (Crown)
BP48111 Spacer
BP48121 Differential Cup
BP48122 Bushing or Sleeve
BP48131 Hub left
BP48322 Rusk
BP48323 Fork Lock
BP48403 Roller 6.5 x 6, 5
BP48806 Axis of satellites
BP48808 Adjusting Washer
BP48812 Adjusting Washer
BP48814 Adjusting Washer

72052-2
75005223-A
7205334
7205318
7205319
7205320
7205321
7205322
7205325
7205330



Left-Hand Hub
BP48131

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

MB-750M with Locking / Non-Locking Differential?

- **MB-750M with Non-Locking Interpretation**
 - 1975 MB-750M Non-Locking
 - sovietsteeds.com, www.genuinemotorcycleparts.com and autos.groups.yahoo.com
 - MB-750M Locking Removed Since These models, Transmission MT-804 Improves Agility
 - motoizhtuning.ucoz.ru
- **MB-750M with Locking Interpretation**
 - MB-750 / MB-750M with Locking Differential
 - www.konsulavto.ru and www.araon.by
 - MB-750M Locking Diff Mechanism
 - motoizhtuning.ucoz.ru
 - MB750M: Full-Time 2WD + Locking Differential 2WD
 - autos.groups.yahoo.com/group/Dneprheads, May 2005 Scott Pell
 - MB-750M 2WD with Added Bonus of Locking Differential (note lever)
 - sites.google.com/site/foilheadz/dnepr, Gary Pell
 - MB-750M from Early to Mid-1970's Fitted with Lockable Diff and Reverse Gearbox
 - bcozz.multiply.com, Steve W
 - MB-750M with Locking Diff
 - www.eurooldtimers.com
 - MW-750M Military Version of the Dnepr-12. MT8204 Gearbox for Reverse Gear and Differential Lock Replaced with Reduction Gear
 - www.gaz69.org
 - Video Advertisement (with Soviet National Anthem & Volga Boatman) for 1969 KMZ MB-750M 2WD with Locking/Limited Slip Differential. Only Built for a Few Years and Dropped Due to Very High Production Costs (Note: If It's a 1969, Then It's a Actually a MB-750. If It's Truly a MB-750M, It Must Be 1973-1977)
 - fun4universe.com
 - MB-750, MB-750M and MB-650 with Locking Differential. MB-750M and MB-650 Locking Mechanism Removed as a Result of Transmission MT-804 (Dnepr Gearbox with Reverse)
 - white.metal-forever.com

Most of the evidence points toward a *locking differential* for the MB-750M, but there is a little more to the story.

MB-750M Locking Differential Mechanism

1. Differential Cover
2. Gasket
3. Differential Casing
4. Seal (Gland)
5. Nut
6. Final Drive Casing
7. Drive Gear Assembly with Bearings
8. Left Hub (Nave)
9. Driven Bevel Gear
10. Satellite Gears
11. Axis of Satellite Gear
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. Idler Gears
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 Nut
40. Castle-Nut
41. Ball Left Hub (Nave)
42. Lock Ring
43. Adjusting Shims
44. Grease Filling Cover



Transverse Driveshaft to Driven Sidecar Wheel

17. Lock-Up Clutch
18. Output Gear
42. Lock Ring

9. Driven Bevel Gear
15. Differential Cup

to Main Drive Wheel

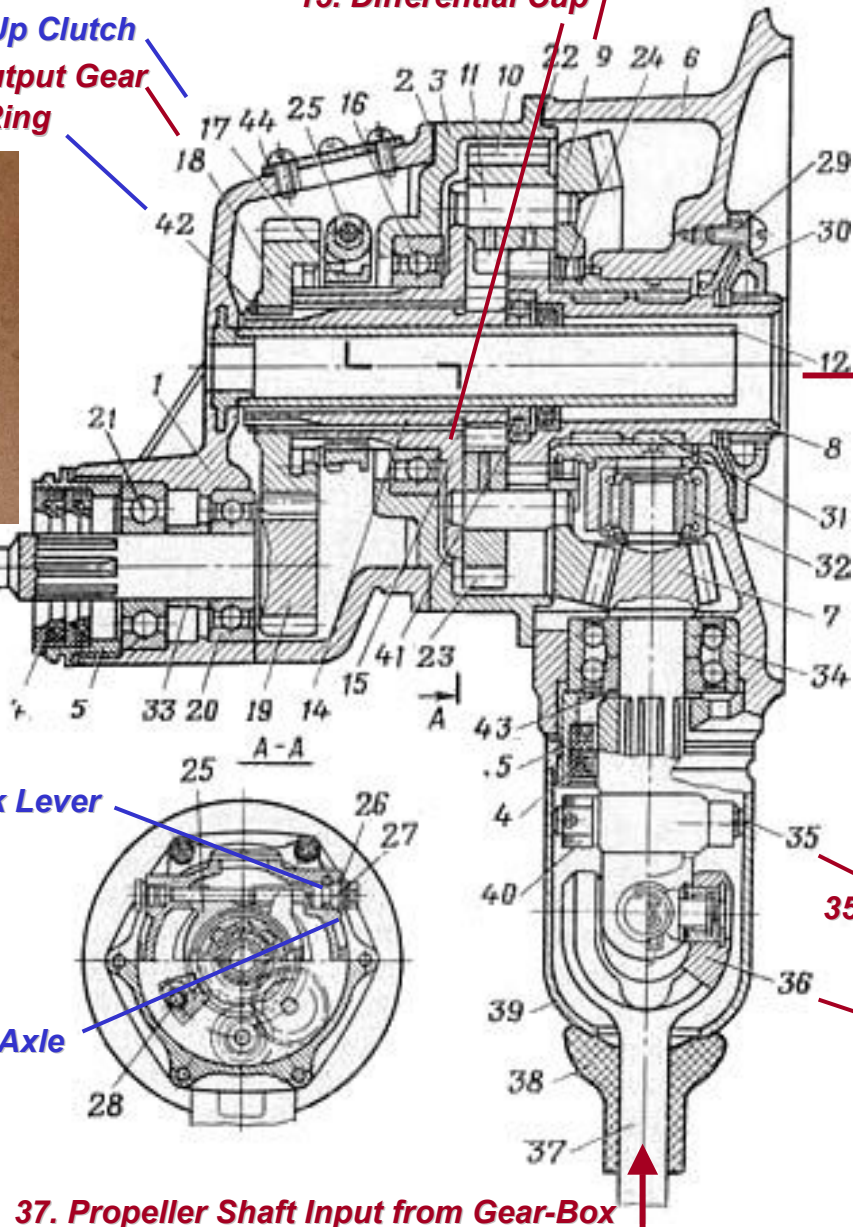
26. Lock Lever

27. Lock Lever Axle

35. Wedge-Bolt

36. Fork

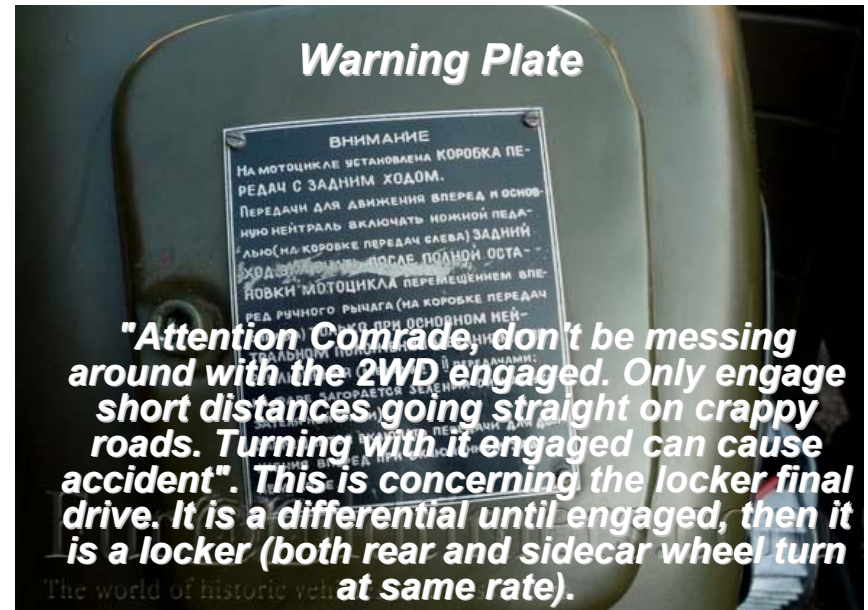
37. Propeller Shaft Input from Gear-Box



MB-750M Locking Diff Mechanism (cont.)

- **Rear Drive with Differential Mechanism Distributes Torque between Drive Wheel and Sidecar Wheel**
 - Gear Ratio of 19:11
- **Differential Consists of 3 Parts: Rear Drive Casing (6), Differential Casing (3) and Differential Cover (1)**
 - Held Together by Six Studs and Sandwiched between Two Paper Gaskets
 - Rear Drive Consists of a Pair of Bevel Gears (7 and 9) with Spiral Teeth and Gear Ratio of 4.625:1
 - 8 Small Pinion Teeth and 37 Teeth in Larger Crown Gear (4.625 ratio)
 - Cylindrical Differential Consists of Left and Right (8 and 14) Hubs, Two Satellites (10) Gears, Two Idler (23) Gears and Differential Cup (15)
 - Left Hub (8) Mounted in Casing (6) on Two Needle Bearings
 - Right Hub (14) Rotated in a Bronze Bushing Differential Cup
 - Satellite and Idle Gears Mounted on Axles (11) with One Side Included in Differential Cup Holes, and Other Side in the Slot in Body of the Driven Bevel Crown Gear (9)
 - Differential Cup (15) and Driven gear (9) Centered by Two Control Pins and Two Bolts, and Latched with Special Key-Washer
 - Assembled Differential Mechanism Mounted on Ball-Bearings (16), Set in Differential Casing (3)
 - Rotation of Differential to the Cross propeller shaft is transmitted thru Output and Small Pinion Gears (18 and 19)
 - Output Gear (18) Mounted on Right-Hand Hub Slots (14), on Side of Crown with Internal Teeth
 - Small Pinion (19) Gear Has a Long Shaft with Slots on the End, Held in Differential Cover with Two Ball Bearings (20 and 21)
 - Output Gear (18) Attached to Hub Slots Lock-Washer (14) Is Fixed against Axial Movement
- **Drive Wheels Are Locked by Means of Lock-Up Clutch (17)**
 - Manually Engage Lever (26) for Locked Differential
 - Engaging On-the-Move Could Damage Differential
 - 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
 - Rotation of Both the Drive Wheel and Transverse Shaft to Sidecar Wheel Together Directly from the Driven Bevel Gear (9), Connected by Bolts to Differential Cup (15), Bypassing the Cylindrical Differential Gear Mechanism

MB-750M with **Locking Diff** (www.eurooldtimers.com)



1975 MB-750M with Full-Time 2WD (*non-Locking Differential*)

(sovietsteeds.com)



MB-750M Non-Locking Diff
(www.genuinemotorcycleparts.com)

All 2WD Dneprs are full-time with true differentials, and some Dneprs have locking diff's on top of that. All 2WD Urals, except for the Sportsman, cannot be used on hard surfaces when 2WD is manually engaged, because there is no real differential.

MB-650 with *Locking / Non-Locking Differential?*

- **MB-650 with Non-Locking Interpretation**
 - **Illustrated Parts Catalog MB-650, MT-16, MT-11**
 - **Full-Time 2WD model (note the lack of a lever)**
 - sites.google.com/site/foilheadz/dnepr Gary Pell
 - **MB-650 Full-Time 2WD with non-Locking Differential**
 - www.ebay.com
 - **1978 MB-650**
 - clip.suabnag.com
 - **MB-650 Non-Locking Diff**
 - www.vostokmotors.com
 - **MB650 Non-Locking Diff**
 - Ken Ulrich U-2 Cycles
 - **MB-650 Non-Locking Diff**
 - www.oldtimergarage.szn.pl
 - **MB-650 Non-Locking Diff**
 - www.genuinemotorcycleparts.com
 - **Non-Locking Differential Drive: MT-16, MB-750, MB-650)**
 - www.ebay.com
 - **MB-650 Non-Locking**
 - www.databikes.com
 - **1969 MB-650 Non-Locking Diff**
 - www.rajveteranu.cz
 - **MB-750M-650: Locking Device Removed, Since Use of These Models, Transmission MT-804 with Reverse Improves Agility**
 - motoizhtuning.ucoz.ru
- **MB-650 with Locking Interpretation**
 - **No References**
 - **MB-750, MB-750M and MB-650 with Locking Differential. MB-750M and MB-650 Locking Mechanism Removed as a Result of Transmission MT-804 (Dnepr Gearbox with Reverse)**
 - white.metal-forever.com

It appears that the MB-650 started with a *locking mechanism*, but was produced with a non-locking differential.

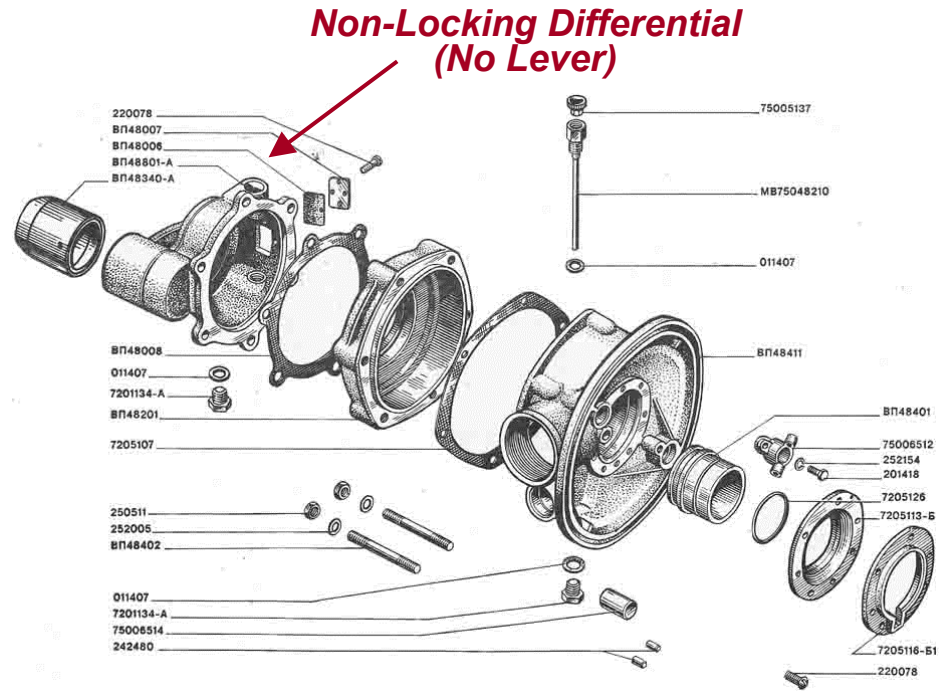
MB-650 (*Non-Locking Differential*)

- **MB-650: A Full-Time 2WD Model** (note the lack of a lever
–sites.google.com/site/foilheadz/dnepr Gary Pell



MB-650 with **Non-Locking Differential**

- **Full-Time 2WD**
 - Lack of a Lever
- **Same Parts Catalog as MT-16**



MB-650M with *Locking / Non-Locking Differential?*

- **MB-650M with Non-Locking Interpretation**
 - **Motorcycle MV650M Instructions**
 - **МОТОЦИКЛ МВ-650М ИНСТРУКЦИЯ ПО ЭКСПЛУАТАЦИИ**
- **MB-650M with Locking Interpretation**
 - **No References**

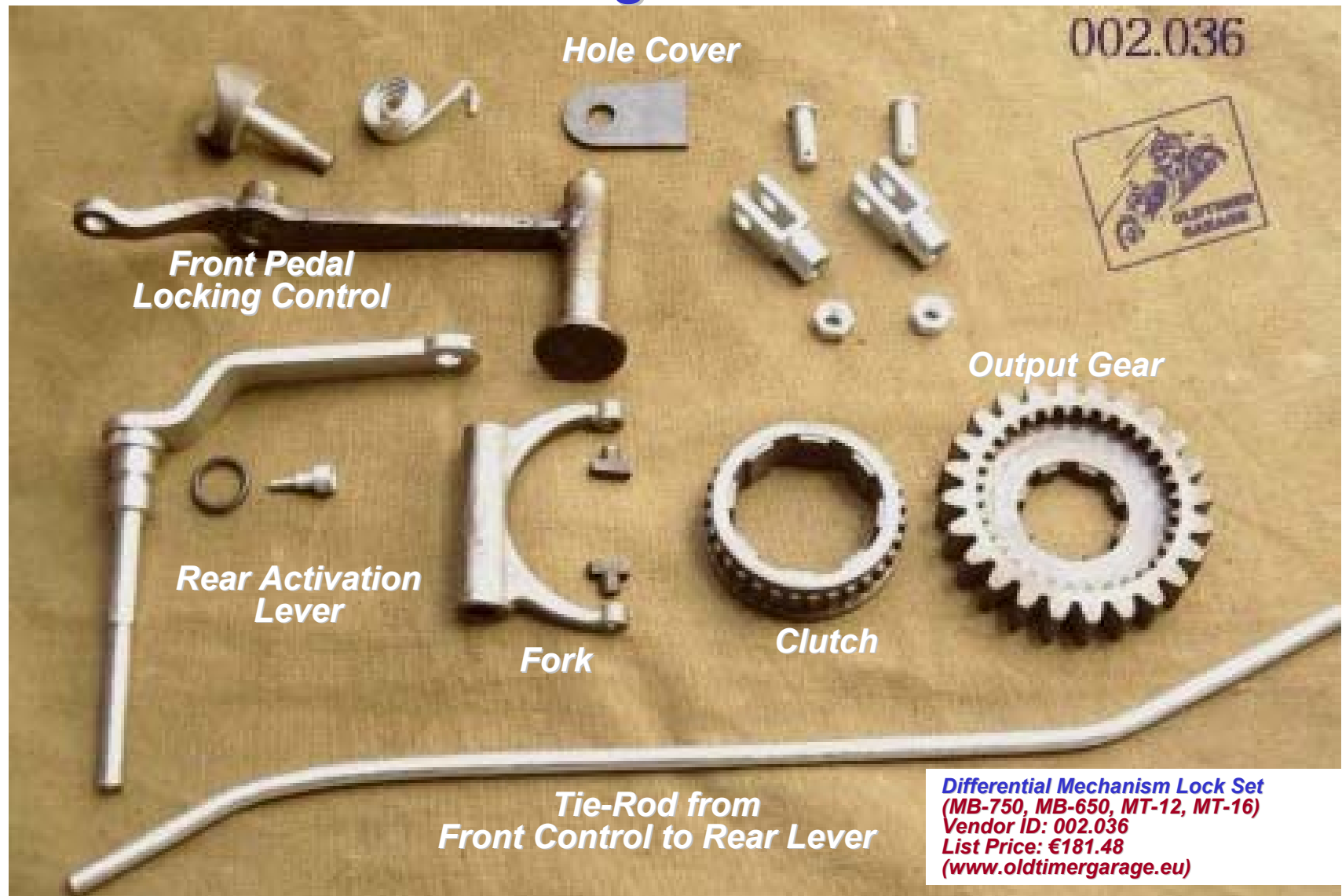
*It appears that the MB-650M was produced with a **non-locking differential**.*

MB-650M1 with Locking / Non-Locking Differential?

- ***MB-650M1 with Non-Locking Differential***
 - ***Non-Locking Diff***
 - ***MB650M1 Service Manual 1990***
- ***MB-650M1 with Locking Differential***
 - ***Military Version of MT-16, which Has 2-wheel Drive, but with Differential Lock***
 - ***www.russianmotorcycles.co.uk***

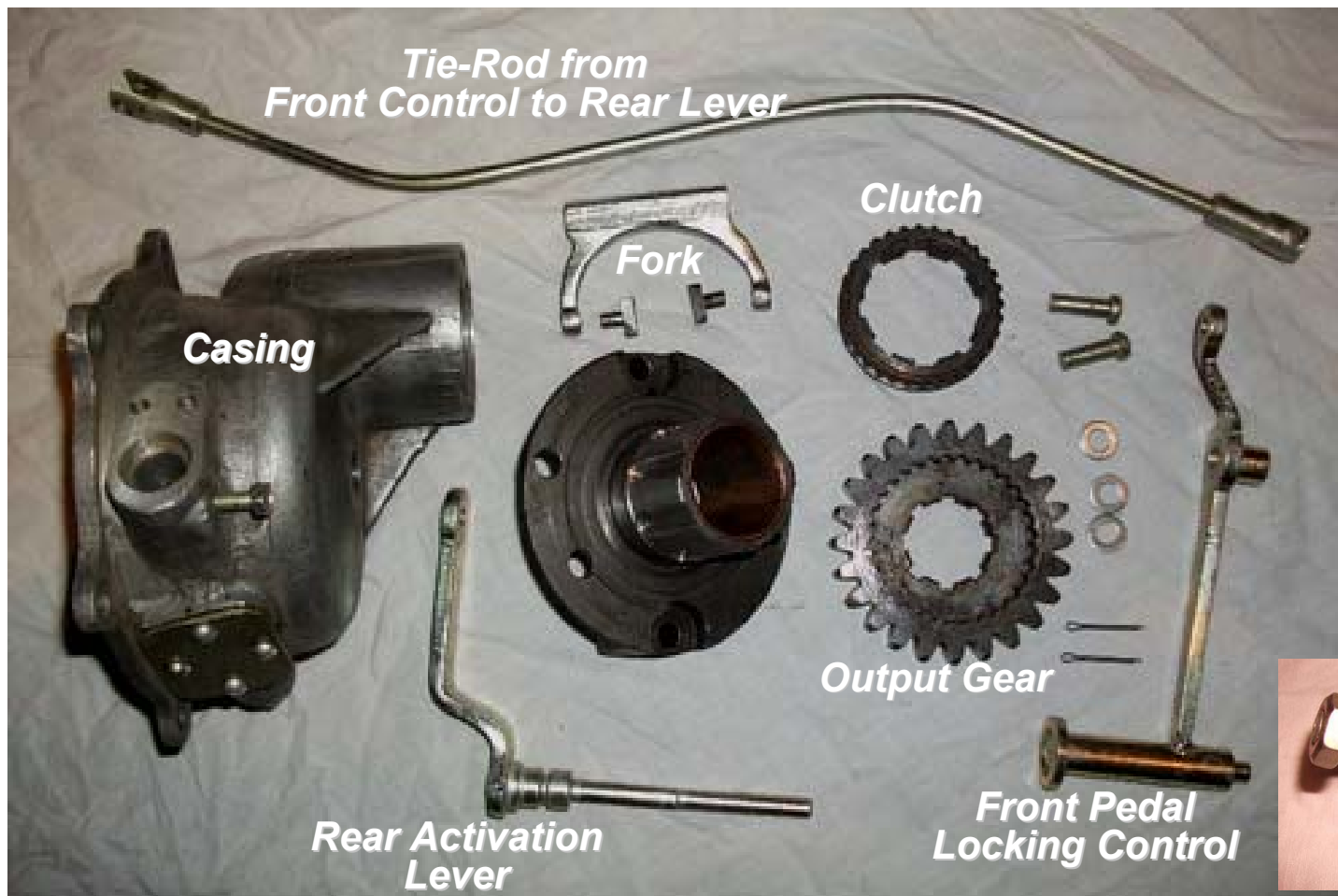
Documentation on the MB-650M1 is mixed, probably indicating that several versions, locking and non-locking, were produced.

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.

Another Set to Upgrade Full-Time Dnepr Differential to **Locking Differential**



Differential Mechanism Lock Set
(MB-750, MB-650, MT-12, MT-16)
Vendor ID: 190586412762
List Price: €289.00
(www.ebay.in)

Ebay also offers a kit for retro-fitting a **locking differential** to the MB-650, MB-750, MT-12 and MT-16. You can buy each piece separately from the kit.

Differential Conversion Kit (non-Locking) for K-750



***Conversion Kit for K-750
Consists of Rear Swing-Arm, Sidecar Drive, Final Drive with Differential (non-Locking) and Rear Axle.***

Note: Sidecar Has No Brake

List Price:

No Sidecar Brake: €950.00

With Sidecar Brake: €1,150.00

Vendor ID: 1538

(www.ural-hamburg.de)

***As expected, conversion kits are available to convert
from 1WD to 2WD with differential.***

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 Is 15-to-20 mm Longer than Previous Model (6204) Used in K-650 and 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 Be Mounted on K-750, K-750M, K-650 and Latest Ural Models***