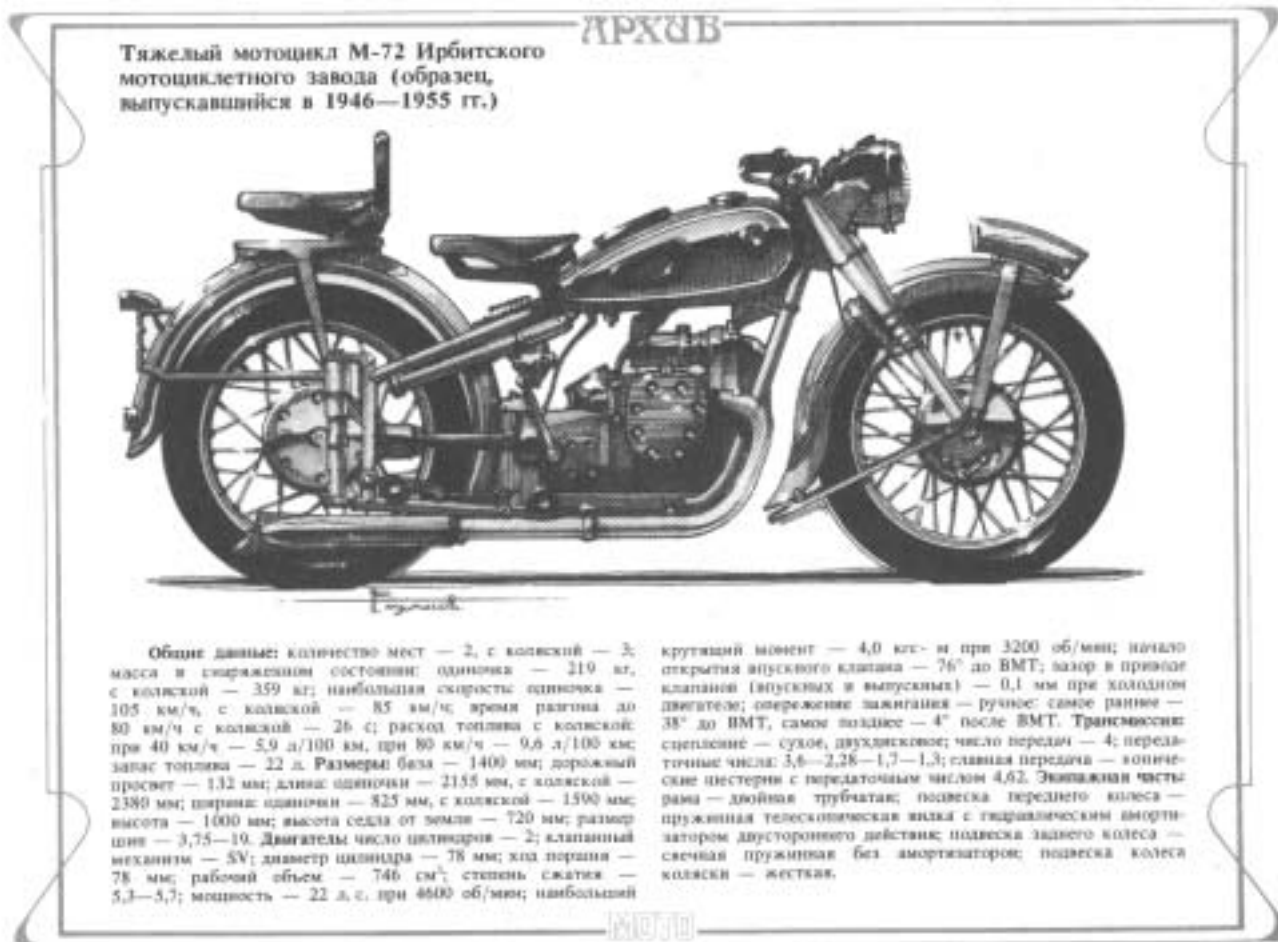


## Origins of the Just Pre-WWII Soviet Motorcycles

**Which Soviet Motorcycles?** This article is concerned with the motorcycles that started production in the USSR just before the Second World War (WWII). Thus mainly the M72 as produced in six Soviet factories from 1941 derived from the BMW R71, but also – Minsk 125cc and Ishevsk 350cc machines – from DKW RT125 and RT and NZ 350. The article does not cover those motorcycles that were developed after WWII with German motorcycle designs.



### M72 model from 1946 (MOTO)

**The German motorcycle origins.** The BMW R71 was produced in Germany from 1938 to 1941, but only 2000 examples were built. The 750cc R71 was the last in a long series of BMW motorcycles with sidevalve engines. It replaced the 1935 R12, also 750cc, of which 36,000 were produced right into WWII. The R71 incorporated more modern styling features than the R12 including a tubular steel frame (oval and circular sections as still used today on Urals and Dniepers) as opposed to the cheaper pressed steel frame of the R12, and 22bhp as opposed to 18bhp for the R12. The R71 was aimed mainly at the top end of the European civilian market since the German military still preferred the R12 with the pressed steel frame. The BMW 600cc civilian R66 over head valve (OHV) machines were in production also from 1938 to 1941. These produced more power, 30 bhp at 5300 rpm as opposed to 22 bhp for the BMW R71, these were surely more attractive to solo riders. In 1941 the military only specification twin wheel driven combination R75 with OHV arrangement was produced, even at 26 bhp it was a capable machine with a high and low range four speed and reverse gearbox, 16,500 of these were built.

**Were the copies licensed or stolen?** This is the real question, were these motorcycles copied without permission from the German factories or built under licence with help from the German factories and government? This article concentrates on the BMW based machine as opposed to the DKW based ones since the author at this point in time has concentrated research on the BMW origins.

**Other evidence for licensed copying.** Many generally well researched books from reputable authors written in the 1980s and 1990s claim, like old motorcycle magazines from the 1940s, that the M72 was a licensed copy. However no source of this claim or supporting evidence is ever supplied. 'Follow ups' with the authors so far have lead little further. Verbal assertions from an elderly Russian gentleman now living in England who says they were licensed copies does not in my opinion provide proof, though is worth recording.

**What does the IMZ Ural factory claim.** The IMZ Ural factory's position is that just around 1940 they obtained via Scandinavia, through an intermediary, a few examples of the BMW R71 for assessment. These were then accepted as suitable machines to meet the needs of the Soviet Union. The Soviet Red Army had demanded a modern motorcycle for military use, the civilian BMW R71 machine was apparently chosen as being suitable as opposed to the military specification BMW R12. The M72 that they copied from these examples was put into production in six Soviet factories the M72 by 1941 – no mean task. There is concern that this claim does not quite ring true for various reasons. It is difficult to check documentary evidence since it will either be:

1. in old Soviet archives in Moscow.
2. in the 1940 factories, since the IMZ (Irbit Motor Works – now Ural Moto was not involved in 1941)
3. with German Third Reich archives, little chance that they still exist.
4. with BMW, but their factories were heavily bombed in the wars and much was destroyed.

If they were copied with licence, then why would IMZ now claim the opposite?

**Question** - Was it more acceptable to the Soviet Union populace that the new and successful M72 motorcycle was stolen from their neighbour and eventual enemy Germany, with Germany being able to do nothing about it, **OR** to win praise from the 'fact' that the Soviet authorities had got Germany to help them build a motorcycle that the Soviets then used against Germany?

**How easy is it to copy machines to then mass produce?** To produce a few copies hand made from a sample is laborious but with care a machine that would work well can be produced. However to produce reliable copies in great volume requires a great deal of effort with any drawings or specifications.

For example:

- a. Material properties are needed for the parts such as pistons that will expand at running temperatures. Even if the BMW piston to bore clearance was measured from the samples, this would not be the same on the M72 if the piston aluminium alloy was different, and it would be. German aluminium alloy technology was good, look at their aircraft engineering. Soviet metallurgy was probably limited, look at the serious problems the factories have had since with metallurgy problems (valve springs, gearbox parts)
- b. Press tools need to be designed to allow for the spring back in the parts straight off the press tool, applies to fork shrouds, fuel tanks, mudguards etc. Possible with experienced pressed tool designers then good pressed tool die profiles can be developed, but so much easier with drawings of the tools, or even the old tools!
- c. Casting and forging tools need to be designed to allow for the shrinkage after cooling with different materials. Again possible without tool drawings, but with the tools or drawings so much easier.
- d. Clearances between all the rotating parts to allow for operating at high temperatures without seizing or rattling.

In my view it is a massive task to reproduce fully toleranced drawings of all the parts and all the tools to make all the parts. Then to get the tool makers to make the tools, then to use the tools to produce the parts in different factories in large numbers that will fit together and create a high quality machine! A vast army of designers, draughtsmen, tooling engineers, metallurgists would have been needed to do this. If these professionals were already available to do this work then why had they not developed their own high quality mass produced machines?

It is a big task to build a complete set of tools from drawings. The M72 has some very complex part designs, these need quite special tools and manufacturing techniques.

### **Why copy in detail certain complex parts without taking the opportunity to simplify?**

The first M72s are very close copies of the BMW R71; not similar but the same design. The complex parts only become simpler, cheaper and sadly less attractive as the next 20 years roll on. Little or no effort seems to have been made at the start to simplify the design without loss of quality or performance at the copying stage when it would have been most sensible. Even the higher 3.89:1 final drive was copied originally from the BMW R71 for an outfit to go into military service! A few years later they had to get the 4.625: 1 ratio from the 1938 BMW R6, R51 and R61 that only used 4.625:1 final drive ratios.

Examples of complex design features copied:

- a. The top fork shrouds were originally tapered oval sections, on later models these went to simply tapered circular sections. Now tapered oval section shrouds with fixings hidden underneath is what would be expected on a 1930s German high tech executive Art Deco style machine, the rich German customers would pay for that, but hardly the same market in the USSR!
- b. The top fork yoke was originally a light weight hollow casting, this went to a ribbed design years later. Why not do this first to save tooling costs and manufacturing time?
- c. The R71 and original M72 left and right rider's foot rests were different lengths. The right being longer and hence further back to get the right booted foot away from the more rearward right cylinder. Later M72s had equal lengths, this halves the number of spare foot rests and cuts tooling costs in half, why not do this simple change at the start? See diagram at end of this article.

### **Why was the Civilian R71 used as opposed to the Military/Utility BMW R12 used as basis for the military Soviet motorcycle?**

The civilian R71 was of course being used all around Europe by private owners, whereas the military/utility R12 had been used for many years by private owners as well as the German army and possibly police forces and had proved itself. Surely the R12 as a military model was more suited as a donor for a Soviet military motorcycle? Consider the tooling required for the complex manufacturing process of the R12 pressed steel frame structure suited for high volumes where a tubular chassis does lend itself to ease of manufacturing. If the Soviets just wanted a design of military machine then the earlier R12 was better suited as had been proved by the German military, but if they wanted a machine and its manufacturing tooling the R71 would have to do, since the machine was not selling well in Germany and BMW could afford to supply machine and tooling.

### **Why not copy the more advanced BMW R66 OHV models instead of the obsolete SV models?**

The Soviets would surely have known that there were advanced OHV 600cc BMW R66 machines around, but they were not copied, this is also strange if the Soviets set about choosing a modern machine to steal the design from. The OHV machines were of course stolen after the War when the Soviets took over the Eastern Germany BMW factories.

### **What if BMW were forced to give the Soviets a motorcycle design?**

It is well established that the Germans and the Soviets set up a few treaties between 1939 and 1941. There were mainly set up by the Soviet Foreign Minister Molotov (previously Prime Minister) working for Stalin and the German Foreign Minister von Ribbentrop (ex German Ambassador to Britain) working for Hitler. These were a series of three treaties that covered land, gold and technology. In simple terms: the Soviet Government gave the Germans gold and raw materials and the assurance that they would not oppose the invasion of Southern Poland by Germany in exchange for the Germans giving the Soviets modern technology. This technology is known to have included marine engines, railway locomotives, power generating stations and though still to be proven, motorcycle designs (see lists at bottom of this article). The Germans of course used the raw materials to build their war machine and it is believed then used the gold to purchase weapons from the modern arms factories in 'neutral' Switzerland, but gold is gold is gold, before the days of tracing the origins. (Interestingly Switzerland, during the post WWII accusations, denied that it had lengthened the war by continuing to supply Germany with arms in exchange for gold and coal since it showed Germany no favour and the Allies could have also bought Swiss manufactured arms if they had wanted to! – mmmmm!)

Historical work is now underway with a professional historical researcher in England to determine the content of these technology transfers and other related agreements. Archives in Russia are being searched for evidence one way or another. This is being funded by the Cossack Owners Club.

If BMW were forced to give a design to the Russians what would they choose? They would surely choose a civilian version since they would not want to give a military specification machine to a country Germany would

inevitably be at war with sooner or later. They would also choose a machine that used old technology such as sidevalves instead of the advanced and powerful over head valve machines. They would also choose a machine that they would stop production of in 1941 since it was to be superseded. So what fitted these criteria? The R71 fitted all. I accept that it was a well proven design, but the BMW range had such good commonality of parts, designs, methods, materials across their range of similar models that the reliability and durability of all their machines were probably similar and high anyway. Photograph on left shows Molotov signing one of the agreements, with von Ribbentrop behind him with Joseph Stalin on his left, under a portrait of a smiling Lenin!



There are suggestions that Hitler also encouraged the production of the R71 in USSR so that he could buy back huge numbers cheaply for use as military motorcycles. The twin wheel drive BMW R75 was coming on stream in 1939 and the R12 was still in use by the German army so spare parts and some new R12s were still required by the army, thus extra factory space made available if the R71 line was shipped to USSR would have made room for the new R75. The reason suggested by some that transfer of the R71 to USSR to make military motorcycles for Germany was done to avoid the restrictions placed on Germany by the 1919 Versailles Treaty is a bit weak. The Versailles Treaty required Germany not to produce military equipment, but since BMW were currently building the R12 for the army and were putting the R75 into production at the same time, both of which seemed to contravene the Versailles Treaty anyway!

**Who was involved?** In a book by the late motorcycle historical researcher Erwin Tragatsch there is apparently the following information. I have yet to see the reference, so can not vouch for it. “A Russian aero-engineer named Serjukow worked for BMW in Munich from 1935 to 1940.” It is known that BMW were helping the Russians build modern aero engines in Russia as part of the Molotov von Ribbentrop pacts. “The R71 has been selected for manufacture in the USSR.”. It is unclear who selected it, either the Russians, BMW or the German government. “Serdjukow was given access to the R71 drawings and parts, since the model was not top of the line”. The R71 had certainly been a sales flop and since it was being produced alongside the earlier designed R12 it could have been possible to remove the whole R71 production line without stopping the R12. It would also have given more room to produce the R75 from 1941 of which 16,500 were produced up to 1946, yes post WWII, see later. “Serjukow shipped several R71 back to Russia for analysis”. The Russians certainly confirm that they did obtain 5 examples of the R71 for examination.

I have no other references to involvement of Soviet engineers with BMW pre-WWII. Much of the work continued after the war, but of course the Soviets took control of many German factories during their march into Germany and also received official War Reparations after the war where they received industrial equipment, knowledge and product from the remains of Germany.

#### **Why Copy if it could have been done legally.**

Why would the Russians bother copying the BMW R71 illicitly when Russia was at the same time buying millions of pounds worth of machine tools from Germany, buying designs of cars and trucks (the official texts say ‘vehicles’ so that could include motorcycles!) for production in the USSR? This surely does not make sense. The Russians even had an engineer in the BMW plant from 1935 to 1940 working on the official aero-engine transfer to the USSR. Remember the BMW logo is based on an aeroplane propeller rotating against a blue sky, the motorcycle and car part of their business was a small part compared with aero-engines. The civilian BMW R71 machine had flopped and would have been little use to Hitler’s war plans. There was no sense in stealing the R71 when similar technology transfers were going on around it and it could have been part of those transfers.

**What do BMW say?** The head of the archives in 2002 confirmed that they have no evidence either way as to whether production of the R71 in Russia was licensed or not, but many archives were lost in the WWII. Interestingly there are still records relating to patent infringements of BMWs by various manufacturers around the

world pre WWII, and that none of these refer to infringements by Russia. So the possibility if a legitimate copy is not ruled out by BMW themselves.

**Post WWII Technological transfers.** It has been discovered that after the end of WWII when the allies took over the BMW factories that BMW had to play their part in War Reparations to the allies. Although the Russians took over the Berlin BMW factories (as well as nuclear and V2 rocket research centres and engineers) the stripping of the Munich BMW works was done more formally. A few more examples of the R75 were produced between January and June 1946 and around eight were shipped to Russia (frame numbers from 770,000.) The sidecar wheel drive was then used in the M73 prototypes. The manufacturing plant was removed and shipped to the USA, what happened then is unknown. The BMW machine tools taken from Berlin by the Russians were then used in the USSR along with the designs of the 500cc and 600cc OHV BMWs that formed the basis of the OHV Urals that we know and love. Some of the BMW machine tools from this transfer and possible early transfer were then passed on to the Chinese when production of the M72 moved there in the 1950s and indeed there were still BMW machine tools in the Chinese works in the 1990s according to the importer of the Chang Jiang into the USA!

**Article from the Russian motorcycle magazine MOTO follows (translation is believed to be accurate):**  
**The Successors of BMW R-71**

*Shortly after the war there was an exhibition of motorcycles in Moscow – the Harley, the black BMW, red Moto-Guzzi, green “Indian”. The M72 was inconspicuous – through its dark colouring, absence of chrome and silent running.*

*The engine ran at low rpm – only with the side-car could you hear it. Low compression (5.5:1), side valves and “soft cam profiles” explain this.*

*Only from 1954 was this machine available to the public. It was designed to have many virtues. M72 output began in 1941. BMW R71 had given the German army an advantage.*

*General (believed) I. Dyumulin of the Red Army strongly advocated a wide use of motorcycles but was criticised for his references to the Germans. In 1941 he died in battle.*

*The Moscow Velocipede Factory was the main manufacturer, others produced components. German specifications of their BMW R71 were to be followed to the letter. The many technical refinements and innovations represented no mean task for the Russian factories. Ultimately the Soviet BMW R72 (M72 in later terminology) was completed and was an equivalent achievement to the contribution of the Fiat 124 in 1970 (built under licence in a factory built by the Italians PJB).*

*The duplex frame, gear change by foot, the telescopic front forks, the feeding of each cylinder from a separate carburettor, are some examples of the novel features. The placing of the cylinders ensured a good balance and low centre of gravity though the cylinders did sometimes catch the ground. The width of the cylinder heads (603 mm) was an inconvenience when riding without the sidecar. The auxiliary assemblies e.g. air pump & generator were covered with rust proof lacquer. The connecting rods were not on a common pin but each on separate ones. The left cylinder was forward 39.2 mm in relation to the right one. To reduce the length of the crank case a crank shaft was made with two main bearings and with a thin centre web (18 mm). Under pressure the latter broke even though made from high quality steel.*

*Problems did arise. It was difficult to synchronise two carburettors. The air filter was inefficient and caused cylinder wear. The attachment of the spokes to the rim was also unreliable.*

*The handlebar levers pointing inwards not outwards were an advance. The Moscow factory was moved to Irbit as the Germans advanced. The Red Army took over running the factory. However, the quality and specification was unchanged.*

*In 1942 cast iron had replaced the aluminium parts owing to shortages. In 1946 a twin disc clutch replaced the single disc item. The final drive was modified from 3.89:1 to 4.625:1 - a slight loss of speed and fuel economy but gain in tractive power.*

*Other factories went over to production of the M72 and gradual improvements to technical details were made. A few lighter models were produced for sporting clubs – showing some differences such as front forks, no headlamp, with a magneto replacing generator and battery in the M72K.*

*The M72H in Kiev was fitted with a leading link front suspension, some foreign firms copied it.*

*The K750 brought in the biggest technical changes: new cylinder heads, increased compression, an air cleaner lid with a breather (?), two oil-rings on the piston. The suspension of the rear wheel was modified and used hydraulic shock absorbers, a new side car with springs also appeared.*

*With the K750-M a rear forked swinging arm was introduced with telescopic hydraulic shock absorbers (double action). The side valve motor was finally abandoned in the early 1980's. This was the end of a generation that started in 1941. In China the M72 is still produced from Soviet specifications. It is called Chang-Jiang and even exported."*

Note that the new motorcycle had to built to 'the letter of the specifications', this really implies to me that the Soviets had the design and manufacturing specifications of the BMW, not just second hand examples. Even the manuals were copied, possible of course however the design was copied.

**So what is the truth?** We hope that further research will throw up the truth, but it may not be conclusive. In my view, even with the recent declarations from IMZ, I am pretty convinced as an engineer that the M72 was a licensed copy of the BMW R71 not a machine built from stripping down and measuring a few samples. There was no attempt to develop or cheapen the R71 for the Soviet terrain and purposes and more advanced BMWs were not copied in favour of the obsolete R71. We will keep looking.

#### **Mentions of the Russian motorcycles developed from BMW by other authors:**

1. Bahnstormer, The Story of BMW Motorcycles by L.J.K.Setright in 1977.

Page 103. States that engine of Ural (does not say which one) is substantially R66 with frame substantially that of the later R67/R52 series. He fails to notice the pre WWII R71 origins, instead assuming it was all from post WWII takeover of the BMW Dixi factory at Eisenach.

2. BMW Twins and Singles by Roy Bacon in 1982.

An interesting picture on page 169 of what is describes as a M53, it seems to be a K750 machine with a OHV engine. He sadly dates the Ural 'copies' as the 1970s, but based on the BMW R66 engine and frame with the R50 swinging arm assembly. He describes owners using BMW parts in the Russian engines, but of course the reverse happened!

3. Military motorcycles of WWII by Roy Bacon. Page 152 states that the M-72 flat twin was even nearer to its German counterpart [than the DKW] for it was based on the BMW model R71. In 1939 it was made under licence at the Iskra Zavod in Moscow, but in 1941 the whole plant was moved to Irbit in the Urals".

4. Unknown book on military motorcycles - "*prior to the outbreak of the Second World War, the M-72 sidecar combinations appeared, a machine just like the BMW of the times, and was manufactured in various guises. 1938/1939 and the Russians purchase the plans and the licence to produce the BMW R71, directly from BMW themselves. The first of these machines thus produced was designated the M-71. The "M" for Moscow and the "71" direct from the BMW model code. The M-72 was a 750cc sidevalve flat twin .....*"

5. Illustrated BMW Motorcycle Buyer's Guide by Stefan Knittel and Roland Slabon. Page 39 "*there was a copy called the M-72 which was built under licence starting in 1939 in Moscow*" going on to correctly state the true origins in the BMW R71.

6. The Motor Cycle February 10<sup>th</sup> 1949. Page 115 "*Finally the sidecar outfit is the GMZ (probably means Gorky Motorcycle Works) and is the BMW 750cc sidevalve model R71 which was , in fact, made under licence in the Soviet Union in 1939; it was then called the M71.*"

7. Military Motorcycles by David Ansell in 1985. "*During the early years of the Second World War the Moska National Works began production on the M-72 for military service within the Soviet armed forces. This machine*

was a close copy of the BMW model R-71, which had been assembled as the M-71 under licence in the Soviet Union since 1939.”

#### 8. Military Motorcycles by David Ansell in 1996

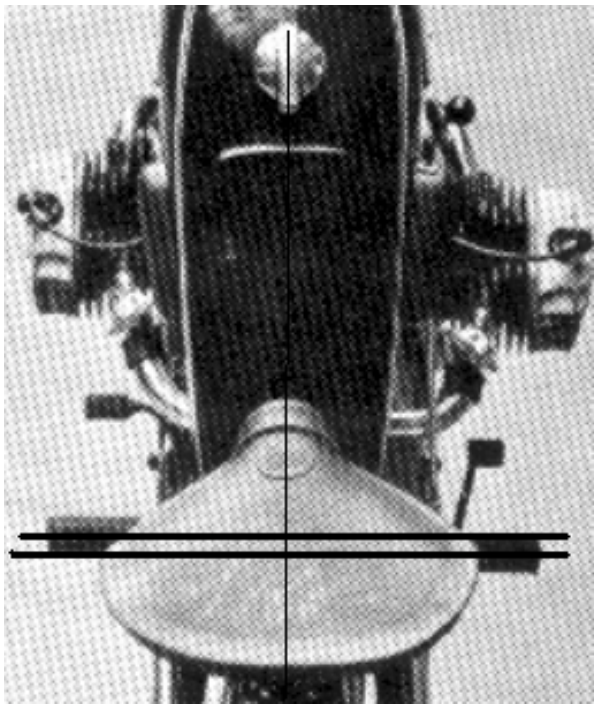
“In 1938, the 750cc/78 x 78mm engine of the BMW R12 was adopted by the R71, the final BMW to adopt a side-valve layout. The next year under licence, the R71 was also produced by the Russians and the entire factory was moved to the Urals in 1941 where the R71 became the M72.....”

9. *Berühmte Motorräder (Famous Motorcycles)* by the late Erwin Tragatsch. Believed to refer to the Russian aero-engineer who worked for BMW 1935 to 1940 who obtained the R71 drawings, parts and examples.

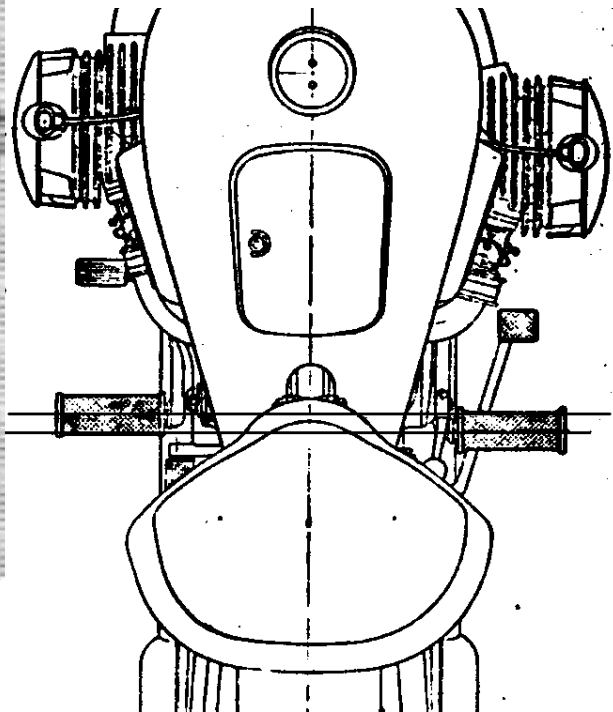
Thus there are professional writers on motorcycle history willing to put into print that the M72 was a licensed copy of the BMW R71, and not stolen. It is of course quite possible that they all read the 10<sup>th</sup> February 1949 copy of “The Motor Cycle” and reproduced an unsubstantiated ‘fact’, but they do have reputations to uphold.

**End Piece:** Consider the Footrest Positions – of the BMW R71 left and the M72 right. For those of you who look at the details in these machines, you will have noticed that the right foot rest is further back than the left foot rest to give more room for the right foot behind the more rearward right hand cylinder. The BMW photo is not quite a true view from above and so the seat and tank filler fore/aft locations do not apparently match with the true drawn view from above of the M72. It is however interesting to note that the M72 tank is a lot bigger than the slim version on the BMW.

It can be seen quite clearly that the right foot rest has a longer rearward pointing section than the left foot rest, even though it meant extra tooling, extra line side stocks and extra spare parts. Later Soviet models based on the M72 soon went to identical left and right foot rests, but not from the start – it was ALL copied to the specification!



**BMW R71**



**M72**

## Trade content of the Molotov von Ribbentrop Pacts.

### Examples of technology sold to Russia by Germany before WWII between 1939 and 1941.

#### 1939:

Industrial Processes.

Industrial Installations.

War matériel.

Also USSR to place orders directly on German firm to 200,000,000 Reichsmarks for:

Equipment for factories.

Installations.

Fittings of various kinds.

Machinery and machine tools of all kinds.

Construction of apparatus.

Equipment for the naptha industry.

Equipment for the chemical industry.

Products of the electro-technical industry.

Ships, vehicles, means of transport.

Measuring instruments.

Laboratory equipment.

Spares, raw materials, chemical products, consumer goods, articles of daily use,

#### 1940:

Naval construction: Cruiser *ex-Lützow*. After launching, the hull and all the equipment, armament, spare parts etc to be delivered for completion in the USSR. Complete plans, specifications, working drawings, and sea trial results, plus information on the performance of *Seydlitz* and *Prince Eugen* or *Admiral Hipper*. Plans for battleship *Bismark* and a large destroyer with 15cm guns and complete machinery for a large destroyer. Also ship building material; welding electrodes 365 tons, armour plate 31,000 tons, various types of boiler tuning 2628 tons, 175 power shafts of various lengths, 1 submarine periscope, several thousand items of electrical equipment, various tanks, motors, ventilating systems etc.

Naval Artillery: One 381mm double turret, fully equipped, to be delivered by March 1 1941; preliminary sketches for a 406mm triple turret and working drawings for a 280mm triple turret, 2 noncorrosive submarine guns, fire control apparatus etc.

Mine and torpedo gear.

Marine acoustical devices, precision clocks and watches.

Hydrographic instruments, optical instruments.

Aircraft; 10 Heinkel "He-100", 5 Messerschmitt 109, 5 Messerschmitt 110, 2 Junkers "Ju-88", 2 Dornier "Do0215", 3 Buecker "Bü-131", 3 Bü-133", 3 Fokke-Wulf "Fu-58-V-13", 2 Fokke-Wulf "Fa-266" Helicopters, 1 Messerschmitt 209 plau various instruments, spare parts, armaments and bombs etc.

Field artillery and ballistics equipment.

Communications including radio, telephone and telegraph equipment.

Chemical warfare equipment, synthetic rubber.

Engineering equipment, including road building gear, explosives, pumps etc.

Munitions, samples of explosive, munition filling equipment and plant to produce explosives.

Armoured vehicles and accessories including tanks, trailer and half tracks.

Machine tools, 308 machines.

Mining equipment; excavators, drills, electric locomotives and rolling stock, pumps, compressors.

Locomobiles (?) and turbines including generators.

Equipment for petroleum industry including pumps, drills, compressors, drill tubes, electric motors.

Equipment for electric power plants, turbines, generators, transformers, oil switches, meters and protection.

Equipment for the chemical industry, turbo compressors, gas bellows, plastic machines, laboratory equipment, high pressure tubes etc.

Equipment for steel wire works.

Forges and presses.

Coal and steel tubing.

Ships including a tanker, 3 merchant ships, 1 repair vessel and 1 hoist ship.

Metals, 50,000 tons of steel tubing.

Naval construction; 5 floating cranes.

Naval artillery including double and triple turrets, periscopes, fire control equipment etc



Hydrographic gear; 1950 stop watches, 2000 stop watches, 80 chronometers, 3 gyro compasses, 150 deck clocks.  
Aircraft equipment for testing and maintenance.  
Plans and equipment to produce plastics and synthetic rubber.

**Examples of raw materials sold by USSR to Germany before WWII between 1939 and 1941.**

**August 19<sup>th</sup> 1939 agreement:**

1,000,000 tons of grain and vegetables for 120,000,000 Reichsmarks.

900,000 tons of mineral oil for 115,000,000, Reichsmarks.

100,000 tons of cotton for 90,000,000 Reichsmarks.

500,000 tons of phosphates (Ed for explosives).

100,000 tons of chromium ores (Ed for high grade steel)

500,000 tons of iron ore (Ed for steel)

300,000 tons of scrap iron and pig iron

2,400 kg of platinum (Ed for electrical contacts?)

Other Soviet exports.

Sub Total during first treaty year 650,000,000 Reichsmarks.

Also the Soviets reduced the trans-Siberian freight rates for certain goods for Germany, considered to be worth 100,000,000 Reichsmarks.

Total during first treaty year 800,000,000 Reichsmarks.

Also 1939 to mid 1940

11,000 tons of copper (Ed wiring)

950 tons of tin (Ed electrical connections)

500 tons of Molybdenum (Ed Steel alloys and lubricants)

500 tons of wolfram (Tungston ore for tools and steel).

40 tons of cobalt.

It should also be noted that Stalin promised to obtain some of these supplies from third countries since Russia could not supply it all!

**1940:**

1<sup>st</sup> 6 months:

Similar raw materials to 1939.

Total 230,000,000 Reichsmarks, but expected to be higher than 1939 by the end of the year.

Also:

Asbestos (Ed for heat insulation)

Sulphur, Rags, Powered Arsenite, Iridium, Tobacco, Guts, Herbs, Iodine, Turpentine, Oils of Ether, Opium, Spuce-needle oil, Endocrine products, Brownstone, Mica ore, Glycerine, Licorice, Horn materials, Albumin, Seeds, Vegetable tar, Lime.

These exports from the USSR were far higher than were needed by the USSR to meet its domestic needs, it seems to have been taking advantage of the Germans desperate need for raw materials for its war effort to catch up with technology.

Also: Oil and petroleum supplies in exchange for coal and steel tubing.

Thus it can be seen that there was an enormous trade between Germany and USSR. for Germany to build its war machine and for USSR to catch up with technology. Included in the transactions are vehicles and means of transport, but motorcycles?

**Currency Conversions** - In 1939, the Reichsmark (RM) was relatively stable, after the massive revaluation in the 1920s where billions of old German Marks were made to equal one new Reichsmark. In 1939 2.5 RM = \$1.00 = £0.23, and in 1940 £0.26. Thus approximately 10RM = £1.00. Looking at the worth of £1.00 in 1939, the British Government calculates that the buying power of £1.00 in 1938 equals the buying power of £35 in 1998. Thus approximately, 1RM in 1939 = £3.50 now. Thus the financial worth for each 100,000,000RM = £35,000,000 in today's money!

Peter J. Ballard. 12<sup>th</sup> Dec 2002