

R24 Restoration Notes

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by Jean -Daniel Chambaz The battery in the R24 was dated March 1964, the time of its last service. The wheel had a nice "figure 8" shape, the front light was seriously nicked, and the general appearance of the bike showed neglect. The battery had exploded, leaving one side wide open. The bike probably saw a youngster playing with it in the fields generations ago. Aside from the dings, the bike had mostly surface rust, but was not really deeply rusted. I tested the old paint with a car-polishing wax, and found much of the original black color underneath. The engine, the gear box and the rear transmission were covered with an earthy, oily layer as thick as 0.5 cm, a mix of oil and dust and something else. After a strong high pressure water jet cleaning (yes I did it!), a part of the mess disappeared, What remained I had to scratch by hand. Surprisingly, the old tire tubes were OK, as they could hold air. I didn't use them again, of course, but it is quite interesting. I sprayed a whole can of WD-40 on the bike to help loosen all the screws soon after acquiring the bike. This application was useful, because I didn't encounter any unscrewing problems after a hiatus of eight years. Even the spoke nipples were relatively free, but I suspect they had been mounted with a drying oil, like boiled linseed oil, as is usually the practice here in Europe. Before starting the restoration, it became my goal to have a collector's bike, which requirements are pretty strong. I collect these kinds of bikes to ride and experience few problems. Documentation It is not practical to start a restoration without documentation such as copious notes and high definition photos which also allowed for a dramatic show of "before and after" (1: see footnote), technical manuals, newspaper articles, etc. The Internet helps a lot and complements what can be found in books. An iconographic research is very useful in determining finishing details. Spare parts It is not easy to find parts for the R24, adding to which, the number of interested people is growing dramatically, causing a demand for reproduced spare parts. One good source is Motorrad Stemler in Germany. One can see his catalogues about "Pre-war Spare Parts" and "Ardie to Z" online. Others who offer pre-war parts are Omega, Uli's, Rabenbauer and Tillmanns in Germany for instance, and Mark Huggett in Switzerland. Why pre-war parts? Because the R24 was initially built with pre-war parts, mostly from the R23, and some parts were also from the R35. Tires are somewhat difficult to find in Switzerland, and I wanted Metzeler Block C in 3.00 x 19. If one finds tires, they are simply too expensive here. I found them at Stemler's and at an agreeable price even with shipping and customs fees. Spokes and rims came from Omega, who also offers a lot of difficult to find parts such as the bronze bushings for the fork. They sell complete spoke kits for different wheels. R24 wheels have half-drum brakes and the front and rear are not the same, requiring three different spoke lengths to complete them. I mounted both wheels using linseed oil on the threads. It will dry and hold the parts tight, but still remain pliable for a later tightening while fending off rust. I installed new ball bearings in the front wheel. The rear wheel doesn't have any. (The rear axle floats between the rear drive bearing on the right and an externally mounted bearing on the left. The axle rotates with the wheel. ED). Caution with the front axle: once you have loosened the safety bolt, you have to unscrew the axle to the left, because it has a reverse or left handed thread, same as on all front axles of R35, and early R25. Many of these forks have been destroyed because of this feature. The threads are not visible, so ignorant mechanics bored out the stubborn axle and destroyed the left hand threads in the right fork leg. During disassembly, I distributed the parts into bins and labeled the bins and the parts. I made a task list, part after part in an Excel file, modifying the cell color noting the work in progress. It helps a lot and instantly shows what remains to be done and what to buy or make. Parts were cleaned, sand or glass bead blasted. I stated that the paint was easy to remove, except for the tool cover on the tank. I suspect the paint was of after-war quality, and pre-war for the cover. Interesting point is the paint had been sprayed directly on bare metal. There was no trace of primer. For the cover, I had to switch to corundum sand, a very hard medium. (Aggressive media blasting. ED) Then, except for the tank and the fenders, I applied two layers of an epoxy rust preservative (trade name Brunox). It is a clear coating which becomes black while drying. It is useful as one can see where the layer is too thin. I usually use it to coat small items like brake parts, side stands and so forth. It's time to spray it with black paint and to store it until it will be mounted on the bike. Consider that the cylinder and head are in a bad location behind the front fender, making them difficult to keep cool. By personal choice, some parts were directly sprayed with high temperature paint. The cylinder, of course, but also the under part of the engine, the oil pan, the rocker covers and the dynamo cover. This to help dissipate the heat. BMW had made trials in this way on the R25/3 series in order to lower engine temperatures. They had also painted the heads black, and even added an aluminum gasket between the head and rocker covers to help transmit heat. BMW stated a 25% temperature drop on the treated engines. BMW later stopped this practice because some buyers found the engine to look sad. A pity, because it was efficient. I also made gaskets out of aluminum. Annealing makes the alloy soft, enabling the metal to "crush" and form a seal. Copper could also work. I installed a finned nut to the exhaust with the same heat dissipation idea in mind. Efficiency and durability are my priorities. So much work on a bike and see the engine ruined by heat, no thank you. By parts Frame: This was sand blasted, part by part. The R24 frame is a bolted up affair, so it can be taken apart, and the smaller parts could go into my blast cabinet. After repaint, I used anti-seize grease (copper and aluminum grease) to coat all the threads before assembly. Engine: External cleaning with fuel oil and a brass brush and then glass bead blasting to make it like new. I did this before disassembly, but with all holes plugged! After this, came complete disassembly of the head, then glass bead blasting. At this point, the valves, seats and guides were renewed. I installed valve tail gaskets to prevent oil consumption. Valves were then checked to be leak proof. (2: see footnote) Disassembling the remainder of the engine was necessary with an engine this old and its overall condition. When the engine was fairly new, non-detergent mono-grade oil was in common use, which allowed for internal tar deposits. To run this engine with contemporary

detergent oils would have allowed loosened deposits and tars to accumulate in the purifier (slingers) resulting in oil starvation to the connecting rods. Gearbox: Externally cleaned, but not disassembled because there was no special noise and it showed no resistance to hand moving. I took great care to plug all holes and gave it a light glass bead blasting. I'll have both eyes and ears on it during the first trips and change oil shortly after, to prevent any damage. But for now, it sounds OK. Rear transmission: (3) Same as for the gear box, but I opened it for inspection. No problem, except for the leather and spring oil seals. Steering: I changed the ball bearings for Timken type bearings (tapered rollers). Screws and threads: As much as possible, I reused the original hardware I had found on the bike. I sandblasted and painted it, renewing the threads with a special file when needed. To replace certain parts, I used polished rustproof screws and bolts (A2-70). It is certainly NOT original, but it helps a lot, as these parts won't lose their primary aspect with time as do others. To polish these parts, I use a lathe to remove the letters and numbers on the heads, then polish with a buff and wax. It's fast and cheap provided one has the tooling. If it is too shiny, one can sandblast them a little. Tank, headlight and fenders: I first took note of all measurements regarding pin-striping, then cleaned and sandblasted all these parts. Then I had to use a hammer to correct all the dings. Putty, primer, surfacer, sanding, all took time to put back in shape. The headlight shell required "convincing" with a hammer and dolly straighten it out. Paint was of spray can type, as I cannot use a paint pistol in my shop, because of a fire alarm system. BMW docs say the coach lining (4) was a Cream white or Ivory white. Here in Switzerland, I often saw pure white stripes on restored bikes, which appeared to me to be too crude. So I mixed some Cadmium yellow with One-Shot Polar white paint to obtain this Cream White. American pin strippers use One-Shot colors, because it requires one only application to make good coverage. It also dries quickly. Here we are best advised not to use acrylic modeling paint like Tamiya, because it seems not to resist gasoline. Electrical. All the electrical cables had to be changed, because they were too old and clearly too "modified" and of course useless. I tore the entire wire harness away during disassembly. I couldn't conserve the original generator, as it was rusted and obviously out of order. Maybe I'll try to repair it, but in fact, it doesn't really matter: it gives only 45W, which is insufficient to use a 35W head light bulb. The search for an original 45 Watt generator was out, because they are scarce and very expensive when found. I then looked into a Power Dynamo 12V 100W system, but the firm couldn't deliver them at this time, so I switched to an R25 generator, a little more able to give me some good light. I tested it on my own R25. Halogen bulbs are welcome here. I installed a stop light and its switch. Easy to do and obligatory. The mechanical brake light switch and its return spring were attached to the brake rod. Electrical connections: all cable ends were tinned, even the ones I crimped into SAE connectors (those for the MZ main switch, for instance). I also used black plastic tubing and thermo-shrink tubing to achieve a good electrical system, resistant to mechanical wear and to water attacks. Not original, but useful. As I already said, I couldn't find a replacement main switch. I chose a neighbor model, from a former 250 MZ, which revealed to have the same three holding holes. (5) The electrical hi/lo switch for the head lamp is mechanical on the R24. It is controlled through a separate mechanical switch on the handlebar, with a cable which goes into the head lamp shell. I went to Germany to purchase Ni-Cad batteries, as it wasn't possible to ship them by postal services into Switzerland. Interesting that this technology was discovered in 1896 in Sweden. They use a caustic solution rather than acid. They cannot drive an electric starter, because they won't support a fast discharge. The restoration in itself Those high definition photos and copious notes are paying off, showing minute details, measurements of original stripes and their position on different parts. Assembly Once the parts were ready, I began the assembly. The frame parts and the wheels came first. Some friends teased me about this becoming my next bicycle. Their humor was wasted. I had to make a lighting fixture for the speedometer, as there was nothing left of the original part. I took two .44 Magnum (empty) cartridges and soldered them together and reamed them to accept a little bulb holder. It works fine. The engine, the gear box and the rear transmission are installed in the frame. I then finish the fenders and rear wheel, and install them. A persistent problem with the electrics took my attention and almost drove me crazy. I checked everything again and over again, but there was no spark at the plug, and no current in the system... As I wear glasses, I cannot quite make out the differences between the two numbers, 51 and 61 on the generator terminal, hence the problem. Once corrected, it did work. As the tank wasn't yet finished, I made a surgical perfusion as follows: using a plastic bottle with a PVC hose towards the carburetor, and hooked the bottle with some electrical cable to the handlebar. The tubing fed fuel to the carburetor. The feeling of excitement, ignition on and a few kicks, the engine awakens. YES! After 45 years of silence, it lives again. The typical single sound is here. It still requires tuning. The exhaust systems of today are made in the cheapest way, that is with two big washers at each end inside the silencer body with some small holes in them. That's all. A man in Germany (Markus Bittcher See Volume 2, Number 3 July 1, 2005 issue of the VMCA News ED) took the time to measure and compare the pressures in both original and contemporary reproduction exhaust systems, and recorded significant differences between their abilities to allow exhaust gasses to flow through them. The original silencers were more free. Hence he advised to drill the holes from 6mm (diameter in the new reproductions) to 8mm. Also a good idea to drill five or six more holes in the center of the washers. Not quite difficult to do. I made this change on both my R 25 and R 25/2 silencers, and was quite surprised to see and feel the difference in engine response. Well, even if one orders good parts, there is often a problem. I ordered special screws for my tank roundels. The screw heads were too small for the holes in the roundels. To correct, I took an M8 screw and drilled a 90° cone in it. Took the dead center in the tail stock spindle on my lathe and put some little washers in the hole and pressed the dead center against it. So it made the washers approximately conical. Adding the four washers, the small head screws now hold the roundels nicely. How to use the tailstock quill as a makeshift press. Speaking of tools: It is impossible to get along without them. One must have a BIG toolbox with GOOD tools in it. Special tools are also required, many of which are difficult to find and expensive. I made mine thirty years ago for work on my BMWs, and also bought some. If you cannot afford them, find a nice fellow who will agree to loan them to you. I also use a bike lift, a table, a lathe and a press, heavy tooling and not cheap. Two other tools I

appreciate are a front light and a digital camera. (6) Jean-Daniel made more than a hundred detailed photos of the bike when he first acquired it, documenting as much as possible for later study. These photos were later made available on a CD for standard reference. A CD will be available on request to VMCA members at cost plus postage. ED

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1). "The best memory is exceeded by the most faded manuscript" Chinese Proverb

2). It seems he is telling us he installed valve guide seals, which are commonly used in automobile engines to reduce oil being sucked down the guides. Very little oil actually reaches the valve stems in an R24.

3). Rear Transmission = Rear drive unit. It seems the Europeans use this terminology differently than we do in the States. Also: Gearbox = Transmission

4). Pin Stripes.

5). Hella, common to many models from this period. 6). Lamp which mounts in a head band, much like a miner's lamp.