

# So, you're thinking about a MIGHTY MITE?

By Rob Walsh



Author's M422a1 next to the Marine Corp Mechanized Museum's newly restored M50 Ontos at the 2014 Tower Park show. The Ontos is based at the Museum at Camp Pendleton, CA.

The M422/M422a1 Mighty Mite is one of the more unique, interesting, and misunderstood historic Military Vehicles to have been used by the U.S. military over the last 50 years. It also had very favorable performance characteristics relative to other ¼ ton jeep type vehicles. If you can get past the many myths and learn some basic maintenance specific to the vehicle you can have an excellent running, driving, and unique MV. For all practical purposes, the M422 and the M422a1 are basically the same -the a1 is simply 6 inches longer. For a quick ID, look for the extra "rib" on the side panel of the MM. That is the easiest way to ID a Mighty Mite to the untrained eye, other than looking at the dataplate.

## Why is the Mighty Mite so different?

Among other things, what sets the MM apart from the other Jeep type ¼ ton vehicles?

2 key things.... One is in its name. Yes it is listed as Truck Utility: ¼ TON, 4x4, but the last word in its description is "LIGHTWEIGHT"

The key thing in the name is "LIGHTWEIGHT". What it means is the overall vehicle is "light" not its capacity per-se. Since the mission of the vehicle was in part "air transportable" (by helicopter), the "light" is for the overall vehicle weight. To get the weight down, they designed a very "high-tech" vehicle for the time period.... much of the unique design of the engine and body are about minimizing weight.

Once you understand that designation, a lot of other things about this vehicle's unique design start to make sense.

The other thing you get with the lightweight, "ahead it's time" technology, is a great performing vehicle. This means great handling, acceleration, and braking. Additionally with 4 wheel independent suspension and

Posi-Traction units front and rear, you get excellent off road performance as well.

Aren't mighty mites RARE? Yes to some extent, but Mighty Mites themselves are not all that rare. In fact the survival rate for such low production number (~4K) vehicles is quite good.... **What IS RARE, is a Properly Running and Maintained Mighty Mite...** It is a unique vehicle and deserves proper care, relative to the machine it is. I was once given advice by an esteemed member of the MVPA (and MM owner) when I decided it was time for a mighty mite. He said "get one that runs!" Of course what fun would that be, and how would I learn anything? That said, I would not necessarily recommend one of these gems to a first time MV/Jeep buyer with little mechanical ability. In my case it would take working on a couple of different vehicles until I was able to say that I knew what it was like to drive a "properly running and tuned" Mighty Mite.

Given the fact that these vehicles are 60 years old, it's not a big surprise that many of those that "run", do not run well....vacuum leaks, worn cylinders, cracked heads, carbon fouled plugs and valves just to name a few possibilities.... but, when you do get one running and driving properly, you will know it....usually by the big smile on your face....WOW....

For years the AMC Mighty Mite has been an interesting vehicle to many in the hobby and, like many other ex-military vehicles that have come into civilian ownership,- it carries some "myths".

Often these myths get distorted and the vehicles can acquire a bad reputation....some of this has happened with the MM.

Top among these are: 1) The engines are no good 2) Don't they have plastic CV joints? 3) Weren't they disposable? 4) I heard the wheels can fall off? 5) Weren't they air droppable? 6) Don't those have a Porsche engine?



Don't be too eager just to try and start up your new find, take your time to evaluate engine condition



Barn Find Mighty Mite,(with barn) this MM was actually sitting outside when found

## Myths revealed:

- 1) Engines no good? - The engines are good, really good, if properly maintained. (remember, it is air cooled!)
- 2) No plastic CV's... They are high quality steel. The seal sleeves near the CV's have some plastic....may be where this myth started.
- 3) Disposable? Hardly....when produced the MM was as expensive as a new Corvette, and it was WAY ahead of its time.
- 4) Wheels fall off? Possible, not very likely... only if you don't do proper maintenance! Get the manuals and use proper procedures... The MM originally came with a "weak" front wheel hub bolt, these should have all been replaced Per Service bulletin MM-2 (as indicated by an X stamped into the end of the bolt) if no X, either get the proper bolt or new CV's with the updated bolt. Proper torque specs required!
- 5) Air Droppable? Don't confuse "Air Droppable" with "Air Transportable" - They were intended to be carried by early PISTON powered helicopters.... The advent of the TURBINE engined helicopter negated the need for such a costly platform.
- 6) Porsche engine? The first 7 prototypes had the Porsche engine....The rest were all AMC-V 108's (not a Wisconsin engine - another myth)

## A few things to look for: before pulling the trigger.

Like many MV's often you find a Mighty Mite and it has been disassembled and "scattered". Seems like there is no shortage of would be mechanics who get started on "open heart surgery" and once they realize this is a little bit different, they quit. This vehicle is not for everyone.

• Is it complete? Or scattered?... Beware of scattered. The MM has a lot of unique parts, not so easily found like a jeep. Even a bit of the hardware is unique. (so a complete machine will save you a lot of heartache and money).



In this photo a small chip can be seen where the plating is missing, that plating is the cylinder liner! Behind it is the aluminum wall...in this case it probably failed because of an ingested screw...(look at piston dings) If the mite has been stored outside in weather for years, you may be looking at peeling and corrosion.....always check the condition of an old MM engine before you just try to run it.

- Has the frame been cut between the shock tower and front bumper? This is a common “trick” to replace a bent front bumper - rarely completed properly. Does the body have excessively corroded rivets? Not the end of the world, but a bit of work to repair properly.

- Does the engine turn freely with the plugs out? If not, don't force it. (I repeat do not force it) Bore scope the engine for your first clue. Whatever you do....do not just attempt to start it....you are asking for trouble.....see below for more info...

- Cracked heads....hard to tell unless the engine is running. If running a compression and lead down test



An example of a chrome flake this piece was about 1x1". Sometimes there will be no large flakes and the cylinder with just be corroded with lots of small particles

are key.... (often caused by faulty cooling system/improper maintenance)

- Torn Motor mounts.... (Per the manual) Do not jack up the mite by the front differential...or under the transmission....if you do, you're likely to tear the motor mounts..... There is a good chance somebody has done this before....take a good look, the engine transmission mounts may be torn....if so...the engine is sitting there “loose” in the chassis!

#### A few Real issues:

**Engine:** The engine on the mighty mite is a unique air cooled engine unlike any other used in a U.S. jeep type military vehicle. (**no it is not a Wisconsin V4** - another MM myth) Yes the prototypes were Porsche/Volkswagen engines (only a handful of machines) The engine is an AMC V-4 108, unique all its own, and after its service life, it often had one particular problem - the chrome lined jugs.... (only a few thousands of an inch thick can deteriorate and peel) **THAT is a problem** and I suspect that quite a few MM's out there have peeling jugs.... Running or Not.... ( -BUT, THIS IS NOT THE END OF THE WORLD, OR THE VEHICLE ). I have torn down several mighty mite engines to find that the chrome peeled..... some of them were running quite well.... (maybe not for a lot longer though ☐). If there is an Achilles heel to the MM, this is it. How does the saying go....”Don't throw out the baby with the bath water.” This kind of thing happened with the Studebaker Weasel a few years ago and the track situation. People thought they were no good.... But look where the weasel is today.....the weasel has become very popular again.

**What does the chrome peeling mean?** In the MM, the chrome lining basically is the cylinder sleeve...this is



The coating your piston rides on is only about .006 thick (six thousandths of an inch) They really don't need much more than that.

how you save weight and still allow the use of aluminum cylinders. In many vehicles this is done with aluminum cylinders that have cast iron liners (sleeves) for the piston to run on (like the M274 MULE). Other vehicles however use an electroplated coating of Chrome (many airplane engines) and also many aluminum cylinders today use electroplated and honed Nickel Silicon Carbide. Porsche has used this as well.

In the case of the MM, it was very ahead of its time. Chrome plated cylinders were first pioneered in the early 50's. I have not heard of these coatings failing while the vehicles were in service. MM's came out in 1960, 1961, and 1962 -(well over 50 years ago). So like with all things, time can take a toll. In the case of the MM these coatings have been known to peel/chip etc.... type of storage may also be an issue.

Beyond the obvious issue of losing the cylinder coating, problems occur when chrome particles get in your oil..... and head for the bearing and journals. Chrome is very, very hard....so hard that the particles can wear through the bearing surfaces quickly....including the crank.... (which only came with standard bearings!) So, you will not be undercutting the crank, since there is NO Supply of oversized bearings! Never was, and you won't find them at NAPA.

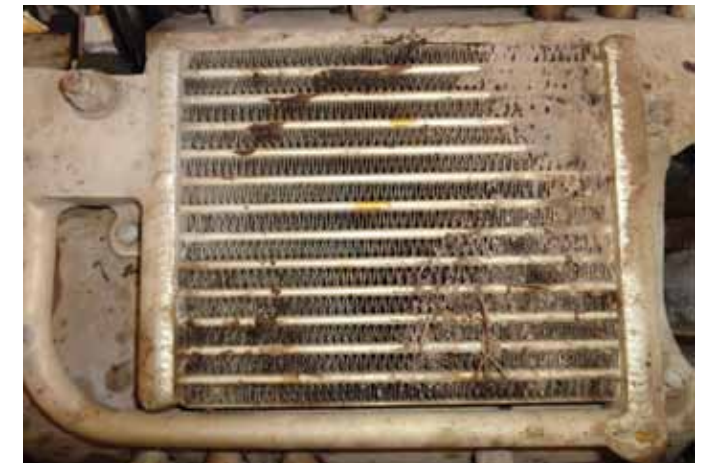
The bigger problems arise when running an engine that had chrome peeling....the cost of repairs will quickly add up.... You see, among other things, you will probably need a new crank (or a built up and turned one). The MM was such a low production run vehicle that although bearing sets are fairly plentiful... they are all standard sized.... So, you need to have “standard” sized component (crankshaft) to run the available sized bearing sets on.

In short, if you even suspect flaking, don't run that engine.... Check it with a bore scope....(thoroughly) or better, pull the heads to inspect. (for a weather exposed sitting engine this is really mandatory)

I'll repeat....**DO NOT CRANK a MM Engine that has been sitting/stored for a long time unless you inspect the cylinder bores!** If there is damage, it can quickly get more expensive. If it checks out visually (bore scope) and turns freely (plugs out) you may be in luck. You best bet is to pull the head for a real visual inspection.(while you're at, you can clean the oil cooler and the cylinder valley of debris, remember this is (AIR COOLED ☺)

**You can just get new cylinders, right?....**Yes, but.... have the NOS jugs been stored well?.... some “new in the box” cylinders have shown problems too....just make sure you check them out before installing.

So...how else is this problem addressed? Don't just throw out those old cylinders....they may be able to be **REPLATED.... YYes you can take an old cylinder**



Here is one possible source of overheating, as with any air cooled engine that has an oil cooler engine, check your oil cooler for debris and keep it clean, this is a “radiator” for your oil.



Clean oil cooler in the valley, ready to go back into service. Those cooling fins on the cylinders need to be clean and debris free as well.

**that has chipped and rough and replace the bore with a new Standard Size coating. (Stripped and Replated)**

There are specialty shops around the U.S. that do this type of thing on an ongoing basis. The coating of choice today is Nickel Silicon Carbide (often called Nikasil).... It will not be cheap, but it is typically less expensive than boring out a jeep block, and should be a lifetime solution. However, Mighty Mite engine overhaul would be enough for another article in itself.

**Can't I just sleeve it?** Theoretically yes, but my experience has been that this is not a good choice in this engine since the cylinder walls are so thin.... I know of this being done on two engines ...in both cases it failed.

#### Air Cooled engine

Yes, it is Air Cooled.... Actually an air cooled V4! With Individual cylinders like a VW.



Complete Power Pack ready to go back into the mite....) If possible, it is nice to test run it for leaks before it goes in.



Getting the power pack in a mite is a tight fit, one trick is the remove the brake drums on the front differential before installing....a little extra clearance goes a long way.



The Mite has a lot of hard oil lines to route oil, all the OEM vacuum lines on the Mite are plastic and a breeze to install.

If fact it is very much like a Volkswagen Air cooled boxer 4x4 that powered the beetle This is pretty much what powered the prototypes with the "Porsche" engine since early Porsche engine basically = VW engine.

The beautiful thing about this type of design is that there is no Boring Over, during overhaul.... You simply use new "standard" cylinders, pistons and rings, and your engine will be back to OEM specs.

Just like any other air cooled engine.....you **MUST** have good airflow....removal of the cooling tin or excessive dirt around the shrouding/oil cooler with help to overheat and quickly **KILL** a Mighty Mite, and possibly crack the (expensive to replace) heads. Before attempting to run a "new" found mighty mite, it is imperative to check the cooling shrouds and clean the cylinders and oil cooler of any excessive debris. (in addition to the previously mentioned chrome peeling check)

**Drivetrain:** If you don't want to have problems, do the maintenance! Make sure the front hub bolts are properly tight and have the locking tabs installed correctly! All covered in the manuals. Oh yeah, get the manuals, with "changes" and follow them.

**A few general notes on restoration:** This is a unique vehicle and it requires some unique skills to get it on the road again...if you don't have the skills, either acquire them, or seek out a professional.

- 1) Take your time
- 2) Seek out knowledge
- 3) Do it right, this vehicle is very unique....Not your average jeep type vehicle.

**Engine:** Air Cooled/Aluminum.... A different set of rules apply here! See Volkswagen engine for guidance.... Also remember when applying torque....Aluminum is softer than Steel or Iron. Lower torque specs and much less force is required.....or you will be breaking stuff! Also the "Change 1" manual is key, since they changed critical torque specs!

**Body: Avoid sandblasting!** -this is not steel. (often not a good idea to use sand on jeep bodies either depending on who's doing it). -These are made of thin aluminum....Built just like an aircraft....the media of choice would be soda or something softer and make sure it is done by someone who knows what they are doing.... (the hood...be careful here) maybe chemical stripper or just sand it by hand....

Dents...Remember this is aluminum....so go gingerly...chances are the amount of force required to move it is way less than needed for steel.....so take it easy. (this does make straightening panels a bit easier though).

**Body (Welding):** Tears and holes in the MM are best repaired with Tig Welding.... If you think you can repair this with a Mig welder with a spool gun for aluminum, think again.... most of the sheet metal on the MM is too thin for a spool gun.....So tig welding is the method of choice. For fixing holes/tears in the AL, this is not the time to learn how to tig weld.... While I'm all for encouraging everyone to learn this welding skill, this is not the vehicle to practice on....If you are stubborn and really need to do it yourself, get some training, but more importantly find some material to practice on and get proficient BEFORE welding on your prized MM. If you wreck it, it will be hard to impossible to cost effectively fix....think about it.

-In all reality, you want to seek out someone who knows how to TIG weld and TIG weld thin aluminum (.040-.070).

**Riveting:** -Same as welding....Use the correct method of repair.... The MM is not POP riveted together... the body is built just like an airplane.... As such, the correct tools and procedures are key.... (these can be acquired without breaking the bank...) See above section

on welding....Practice first before putting into practice on your mite..... (PS) an air hammer is not a rivet gun....destructive results will soon follow.

**Painting:** aluminum requires very different preparation than steel.... do it right and you will not be disappointed.

Mighty Mite body work and Painting could be the subject of another article in itself. Most importantly, take your time, and do it right.

**The Mighty Mite...** something special, but not for everyone... if you can get beyond the myths....and take a little care with these gems.... you will be rewarded and have a great vehicle....and possibly learn some new restoration skills. Are you up for the challenge?

A properly running MM is not common (rare) but not that hard to achieve with a little perseverance....just remember this little gem is a not your average jeep.... However with patience and the basic maintenance that the vehicle deserves, you will be rewarded with one of the better performing and unique military vehicles ever to grace the U.S. Military.

Happy Trails!



On the trail or on the street the mighty mite is quite a performer, that when properly tuned and maintained with surprise even a veteran HMV owner who is unfamiliar with them.