This brochure is intended to show the extensiveness of the work performed on the TR engines that I rebuild. I treat each engine as if it were to be used in competition. Nothing is left unchecked or undone. Each engine is completely blueprinted. All this takes time, but the final product is better than an engine that was new. Because of this you can have full confidence in the reliability of the engine. Many modern upgrades are used both internally and externally to increase the reliability of the engine.

I have built engines from stock up to 205 HP for all out racing. Many of the performance engines that I have done over the years for both street and racing have been dyno tested for performance so when I quote a HP figure it is real, not some number thrown out to impress the customer. Most customers with street driven Morgan go for the mild street engine. With a 25 percent increase in HP and torque an 1800 pound Morgan is quite fun to drive. The added torque is very noticeable on the road. With the engine still making peak power below 5000 RPM and peak torque at 3500 RPM no excessive revving of the engine is needed which results in an engine with long life yet nice performance. Each engine is run in and tested before installing in the car or shipped out to the customer. I hope that the information in this brochure will help in your decision to use The Morgan Shop to build the engine for your Morgan. The information to follow covers stock to hot street engines. Each engine is completely stripped down and inspected for wear.

150 HP- 89mm forged pistons, carrillo rods, oversize valves, 10/1 compression, 45 DCOE’s, thin pulley conversion, alternator, alloy pan and valve cover..... this one’s gonna fly!

Ready to ship out.
Machine Work:

Block:
- Distributor drive bushing removed from oil galley
- Oil galley aluminum end plugs removed (1)
- Cam bearings removed
- Block boiled and magna fluxed for cracks (2)
- Main caps machined for hardened flat washers under bolts (3)
- Block checked for main bearing line bore (4)
- Main bearings installed and ID measured for exact crank size (5)
- Lifter bores checked
- Block resurfaced as needed
- Cam bearings installed

(1) The alloy end plugs and distributor bushing are removed so that the oil galley can be properly cleaned out. The holes are then tapped US pipe and pipe plugs installed.

(2) Blocks often crack around head stud holes and must be repaired.

(3) Factory lock washers gouge out and collapse the bolt holes in the main caps. New Duratorque bolts and ARP washers used.

(4) If block is out it is either line honed or line bored as needed.

(5) Bearing ID is checked so that the crank can be turned to leave an exact oil clearance of .002 thousands.

Crank:

**Stock and Street Performance Engine:**
- Plugs removed, cleaned, magna fluxed and checked for straightness
- Turned to nearest usable size for a clearance of .002 mains .0025 rods (1) (2)
- Rear seal scroll machined off for lip seal conversion
- Cleaned and new plugs installed
- Crank balanced

**Hot Performance Engine:**
- A used Std. size or .010 under size crank is prepared
- Plugs removed, cleaned, magna fluxed and checked for straightness
- Crank specially welded to prevent breakage
- Stress relieved and straightened
- Crank turned to .010 or .020 with bearing clearance of .002 mains .0025 on rods (2)
- Rear seal scroll machined off for lip seal conversion
- Crank surface nitrided
- Cleaned and new plugs installed
- Crank Balanced

(1) I will not use more than a .030 bearing. If a .040 bearing is needed I will use a replacement crank.

(2) This is done in accordance with the bearing ID sized checked in the block and rods.

Head:

**Stock Engine:**
- Bare head cleaned and magna fluxed
- Hardened valve seats installed for unleaded gas
- New bronze guides installed and reamed to fit new valves
- Valves and seats ground (3 angle)
- New stock springs installed
- Surface machined for flatness
**Mild Street Performance Engine 120-125 BHP:**
- Bare head cleaned and magna fluxed
- Hardened valve seats installed for unleaded gas
- New bronze guides installed and reamed to fit new valves
- Valves and seats ground (3 angle)
- Heavy duty springs installed with pressures set for performance cam used
- Ports polished
  - Cutting of head for cc of chambers to give a 9 to 1 compression ratio

**Hot Street Performance Engine 140-150 BHP depending on carburation:**
- Bare head cleaned and magna fluxed
- Hardened valve seats installed for unleaded gas
- Oversize valves installed
- New bronze guides installed and reamed to fit new valves
- Valves and seats ground (3 angle)
- Heavy duty springs installed with pressures set for performance cam used
- Porting of head and chambers
  - Cutting of head for cc of chambers to give a 9.5 to 1 compression ratio

**Rocker Assembly:**
- Rocker arms cleaned and new bushings installed and honed to fit new rocker shaft
- Rockers arms refaced

**Connecting Rods:**
- Cleaned and magna fluxed
- New bolts installed
- New piston pin bushings installed and honed to fit new piston pins
- Straightened as needed
- Big ends reconditioned as needed, bearings installed and ID measured for exact crank size (1)
  - Balanced
  - (1) Bearing ID is checked so that the crank can be turned to result in an exact clearance of .0025 thousands.

**Camshaft:**
- Camshaft reground to stock or performance grind as needed and ground with a 2° taper (1)
- New lifters checked for hardness and ground with 2° taper (1)
  - (1) 2° taper is so the lifters will turn in the bores to prevent the faces of them wearing and collapsing. Lifters are checked for hardness because many of the lifters being sold do not have proper hardness. I will use good used original lifters whenever possible and recondition them.

**Piston and Liners:**
- Stock and Mild Street Engine: (1)
- Liners installed in block and torqued down with a deck plate to check liner protrusion. Liners machined to .003-.005 protrusion as needed and piston tops cut equal amount to restore deck clearance.
- Sealed Power 3 piece oil rings used to replace oil rings supplied in liner kits.
  - Pistons balanced.

**Hot Performance Engine:**
  - Liners installed in block and torqued down with deck plate and honed to fit new 89mm forged pistons.
  - Pistons balanced
  - (1) 87mm piston and liner sets used
Flywheel:
Stock Engine:
  Cleaned, resurfaced and balanced
Performance Engine:
  Cleaned, resurfaced, lightened 10 lbs and balanced
Pressure Plate:
  Balanced

Assembly Work

All internal engine parts are set out and organized for engine assembly

Lower End:
  Block:
    Painted with high quality engine paint
Crankshaft:
  Crank installed and end float set
  Crank removed and new rear lip seal kit checked for fit and installed
  Crank installed with new bearings
Camshaft:
  Camshaft installed and setup for cam timing. Moly lube put on lobes
  Timing cover installed and front pulley degreed for distributor timing (1)
Pistons and Liners:
  Ring end gaps checked
  Pistons and rods assembled with 3 piece oil rings
  Piston and liners installed in block with new bearings
Oil Pump:
  Rebuilt with new gears.
  Pickup screen replaced if needed
Oil Pan:
  Painted with high quality engine paint or powder coated
  (1) Pulley marked for TDC (top dead center)
    30, 35, and 40 degrees.

Upper End:

Head:
  Painted with high quality engine paint
  Assembled as needed
Rocker Assembly:
  Reconditioned assembly assembled

Engine externals:
  All aluminum items are stripped, cleaned and painted with an aircraft alloy paint to protect the aluminum
Oil Filter Head:
Disassembled, cleaned, and detailed as needed
Reassembled with new pressure spring and installed with spin on filter kit

Fuel Pump:
Disassembled, cleaned, rebuilt or replaced as needed

Water Pump:
Housing cleaned and painted
Pump checked, replaced if needed
Pulley checked, cleaned and painted

Distributor:
Disassembled, cleaned rebuilt and detailed (1)

(1) Distributor is set up for advance curve so advance starts at 1000 RPM and total advance is 23-25 degrees at 3000RPM Electronic ignition installed if desired.

Generator and Starter:
Both disassembled, checked, cleaned and detailed as needed

Carburetors:
Disassembled, cleaned, rebuilt and detailed as needed

Intake Manifold:
Cleaned and detailed (1)

(1) On performance engines the TR3 intake is worked inside for enhanced flow.

Preparation for running:
Engine is primed and initial oil pressure set on filter housing
Engine set up on stand for running in
Engine started and run up to operating temperature
Head re torqued
Valve clearance set for the cam used
Engine restarted and the following performed:
Oil pressure set for 75 pounds at 3000 RPM
Ign. timing set for 3000 RPM
Carbs set and adjusted as needed
Complete engine spec sheet prepared for customer

New items always used:
gaskets and seals
rear lip seal conversion
pistons, pins, rings and liners
main, rod, thrust bearings
main bearing cap bolts with hardened washers
ARP Head stud kit
high head nuts and hardened washers
adjustable cam gear on all performance engines
cam gear retaining bolts and lock tab
timing chain
timing chain tensioner
reconditioned camshaft and lifters
rockershaft
rocker arm bushings
oil pump gears
connecting rod bushings
connecting rod bolts
in stock head: seats, springs, valves and guides
in performance head: seats, valves, springs, retainers, keepers, guides
freeze plugs
pilot bushing
pressure plate
clutch disc
ARP flywheel bolts and washers
oil pressure relief spring
20-50w oil and spin on filter conversion with Fram filter
carburetor shafts, throttle discs, rebuild kits
spark plugs
spark plug wires
points, condenser, rotor, distributor cap or electronic Ignition unit
all hardware with stainless steel
all original zinc plated items plated with new zinc gold chromate
generator mounting hardware with grade 8 bolts and nylock nuts
fan belt
thermostat
block drain
bypass hose
fuel lines, pump to carbs and carb to carb
vacuum line and fittings when used
6 blade plastic fan to replace steel 4 blade fan

Items usually replaced but not necessarily:
waterpump
waterpump pulley
vacuum advance unit
coil
fuel pump

Items replaced as needed:
crankshaft and camshaft timing gears
starter with Gear Reduction Starter
generator with Alternator Kit
thermostat housing and cover
oil pump housing
oil pump pickup screen
Items upgradable from stock motor:

- alloy valve cover
- 45 DCOE Webers
- ribbed alloy oil pan
- jet coated headers
- thin pulley conversion kit
- electronic ignition in Lucas distributor
- Mallory dual point distributor
- alternator conversion
- gear reduction starter