

J-22 Vanguard Exhaust *by Bob Olbers*

I thought I'd share some details about my approach to a custom Vanguard exhaust system for a Model 3. So far I've built two of these and they seem to work well. The basic parts and techniques can be adapted to other types of engines or King Midget models.

I've tried to give an idea of the measurements where it makes sense, but quite a bit of the fitment was done "on the fly" as I worked my way through the process. My friend Mike Haggerty was kind enough to loan me one of his spare Vanguard engines so I could easily mock things up on the bench, but the process could have been done in the car instead. The fitment is rather forgiving, as long as the manifold flanges mate accurately to the engine; I ensured this by bolting the bare flanges to the engine, then assembling the system step-by-step before welding the assembly to the already-installed flanges.

I decided upon the following key features:

- Tubular manifold with individual runners for each cylinder
- Two part system with bolt-together central flange for easy installation and service
- Flex section for strain relief
- Car-type muffler, vertically mounted with exhaust exit to left side
- Mandrel-bent tubing throughout

Description	Mfg	P/N	Qty
Vanguard exhaust flange	Briggs and Stratton	692074	2
Vanguard exhaust gasket	Briggs and Stratton	691613	2
Mandrel bend, 1" OD, 90 degree, 1.5" centerline radius, 16GA mild steel	Performance Tube Bending	100-150-313	4
Mandrel bend, 1.75" OD, 90 degree, 2" centerline radius, 16GA mild steel	Performance Tube Bending	175-200-313	2
Mandrel bend, 1.75" OD, 45 degree, 2" centerline radius, 16GA mild steel	Performance Tube Bending	175-200-413	1
Universal exhaust flange, 2-hole, steel, 1.75" dia	AP Exhaust Products	9153S	2
Universal exhaust flange gasket	AP Exhaust Products	8428	1
Flex coupling, 1.75" ID, 4" flex length, stainless	AP Exhaust Products	FT13404N	1
Muffler, 3.25" X 7.75" X 10.00" oval shell, 1.75" ID inlet/outlet	AP Exhaust Products	709004	1

Parts list

To keep the system compact, I chose the tightest-available radius mandrel bends and cut them down very close to the elbow when necessary to minimize length. I started with two 1" OD, 90-degree mandrel bends. I cut one leg off each of these just at the point where the bend began. Then I used a belt sander to remove about 1/4" of material from the outside of these elbows. This allowed me to form a "siamesed" joint which fit within the 1.75" diameter of the central flange and muffler pipes. I tack-welded the tubes together.

Next, I formed a 1" hole through a short section of 1.5" pipe, about 1.75" from one end. Instead of trying to accurately bore a single, centered hole through both sides of the pipe in one shot, I used some painter's tape and a center-finding rule to locate hole centers on opposite sides of the pipe and drilled from each side. Then I used a cutting disc, vise grips and hammers to flare the pipe into an open "tee" shape. I squeezed the pipe a bit in a vise to achieve a slightly oblong cross section to match the siamesed runners and inserted them into the tee. I trimmed and hammered the metal closed around the tubes and welded all the seams to form a leak-proof "collector." I cut off the excess tubing then welded on one of the flanges. I ground down some 5/16" bushings to fit the slotted bolt holes then welded them into place.

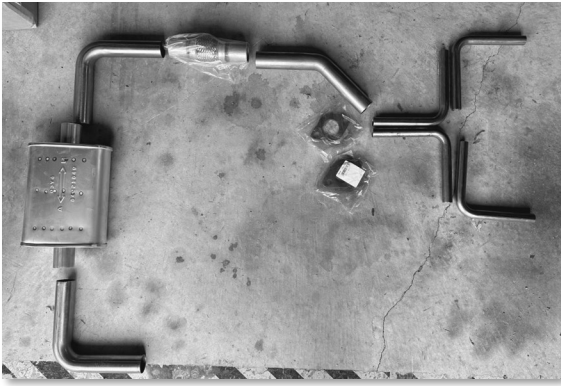
I cut down another pair of 1" OD mandrel bends to connect the collector assembly to the engine exhaust ports. I trimmed these such that the collector and runners cleared the engine timing cover. Note that the Vanguard exhaust flanges are offset from each other approximately 5/8" so this must be accounted for in the length of the runners. Using an electronic protractor, I set the collector flange 45 degrees up from horizontal to allow the exhaust to reach up and above the top of the muffler. Once all the pieces fit properly, I tack-welded them together into a single "header" unit.

The second half of the exhaust incorporated another flange, 45-degree elbow, flex pipe, muffler, and tailpipe. I trimmed the 45-degree bend and the flex coupling as short as possible and attached the flange. After temporarily bolting the flanges together through the previously-installed lower-side bushings with washers on the top side, I welded the washers in place. The bushings and washers positively located the flange bolts to keep the flange joint properly aligned during subsequent reassembly.

After cutting the tailpipe to the desired length and welding it to the muffler outlet, I clamped the muffler into place on the engine cradle. Then I adjusted the lengths of each leg of the muffler inlet to mate up with the flex coupling. I tack-welded everything in place, then finish-welded each subassembly.

(continued)

SHOP NOTES King Midget Maintenance and Restoration



Initial parts layout on floor

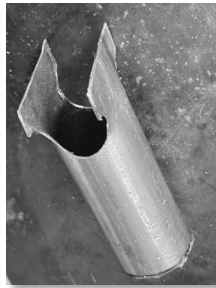


Forming the "siamesed" header joint



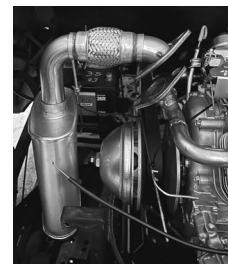
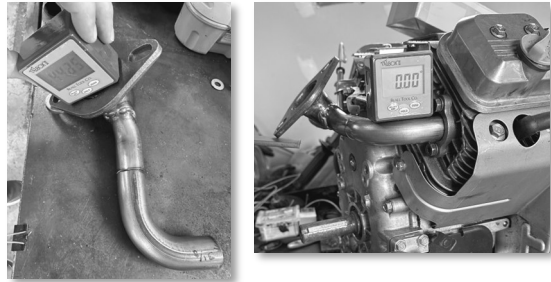
45-degree elbow for muffler assembly before trimming

Forming the collector "tee"



Completing the collector

Setting angles on header assembly



Trimming muffer inlet to mate to flex coupling

Completed muffler (top) and header (bottom) sections



System installed in car

