Do not use standard gasket sealant (like Permatex 300) or silicone! Use only aircraft type non-hardening stuff. Many critical transmission clearances are based on the use of this material.

MODEL 25/1

Have a machine shop redrill the bell housing so that the unit can be inverted. See the 25/2 instructions for reversing the ring gear, installing a new filler and new drain hole.

MODEL 25/2 (EX PANTERA)

DISASSEMBLY

Clean the exterior case before disassembly.

Drain the oil.

It may be helpful to make a rig to support the transaxle from the bell housing side for the following operations.

Invert the transmission so that the differential access cover is at the top. This is the way the transaxle will be installed in the car, so from now on any reference to top and bottom will refer to this position.

Remove the long cross-bolts going from side cover to side cover. **Save the shims** between the side plates and the top cover. Note their location and number for assembly later.

Remove the differential top access plate bolts.

Remove the nuts securing the side cover plates. Carefully and evenly pry the plates straight out from the main case. If there is resistance, check that all the bolts have been removed. Take your time! Don't damage the gasket surfaces. Save what is left of the gaskets. They will be useful when you set the ring gear backlash.

Remove the **differential side bearings** from the differential. This requires a special tool, or a lot of cursing. *The ring gear assembly will not come out of the case with the bearings on it.* Remove the differential/ring gear assembly, noting the side of the pinion gear it was mounted on. Don't install it on the same side unless you want 5 speeds reverse!

SHIFTER BOX

Remove the **shifter cover** and the rubber plugs at the top of the shifter box.

Using a small chisel or punch, release the **locking** portion of the **nut** on the end of the shifter cross-shaft. Jam something between the arm and the box to prevent rotation and remove the nut. Rotate the cross-shaft back to the neutral position.

Use a 5mm allen wrench (through the small holes in the top of the shifter box) to remove **the set screws** securing the socket arm to the longitudinal shifter shaft. Remove the shaft.

Pull the **ball/lever arm** out and disengage the socket arm.

Remove the arm from the cross-shaft, using a puller if necessary. Remove the half-moon key from the cross-shaft.

Remove the 3 hex cap screws and 1 socket screw securing the shift box to the case. *Note* that there is a ***thick shim*** between the box and the case at the front socket screw position. Don't lose it, and don't forget it on assembly.

Remove the **shift box** by gently tapping and rotating it.

GEARSET

Remove the **speedometer drive adapter** from the side of the case by removing the securing screw. Gently pry the adapter out.

Remove the end cover and intermediate gear plate by removing all the outside nuts and 4 allen screws at the top and bottom.

At this point you may want to inspect the gears and synchronizer rings for wear.

INPUT SHAFT

See the diagram on page 26 for input shaft dimensions.

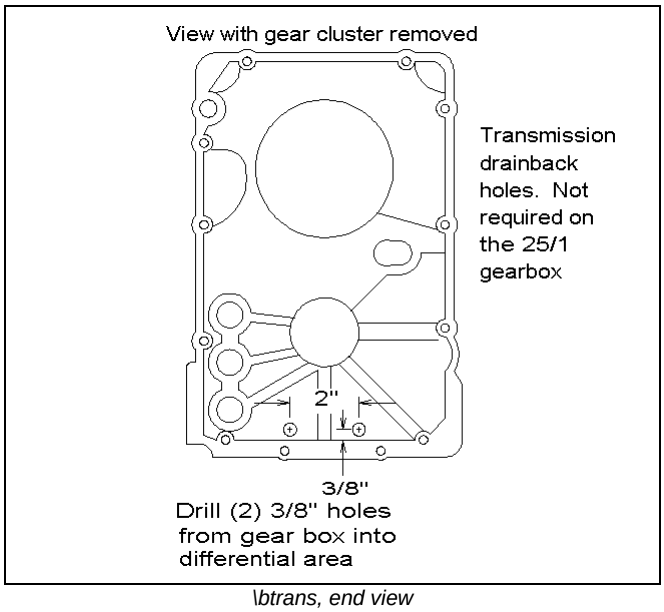
CASE MODIFICATIONS

Check the internal clearance for running the ring gear on the opposite side of the case. Later castings may have heavier walls adjacent to the ring gear. Look for machining on the inside face of the case for clearance for the ring gear bolts.

Measure from each side plate mounting surface to the opposite inside face. The measurements should be within .06" of each other. If not, the inside surface will have to be relieved. It can be carefully done with a simple hand grinder. Note that the case tapers from top to bottom, so only the bottom must be ground.

See the diagram on the following page for dimensions for the following modifications:

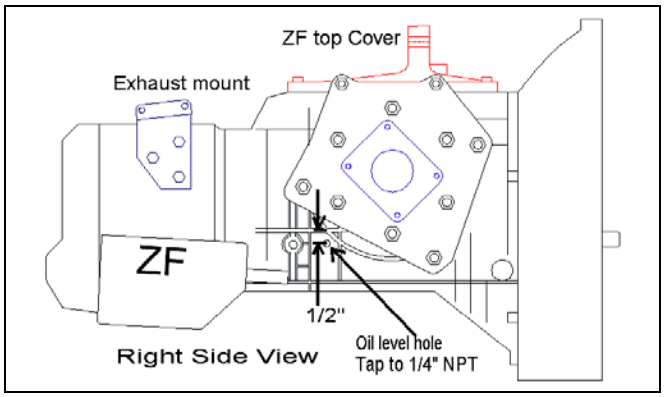
Drill 2 holes between the differential section and the gearbox as indicated. In my experience, this is only necessary on the 25/2 gearboxes. The 25/1 series already has the holes. Try to have the holes as close to the bottom of the case as possible. They allow oil to flow freely between the two sections.



\btrans, end view

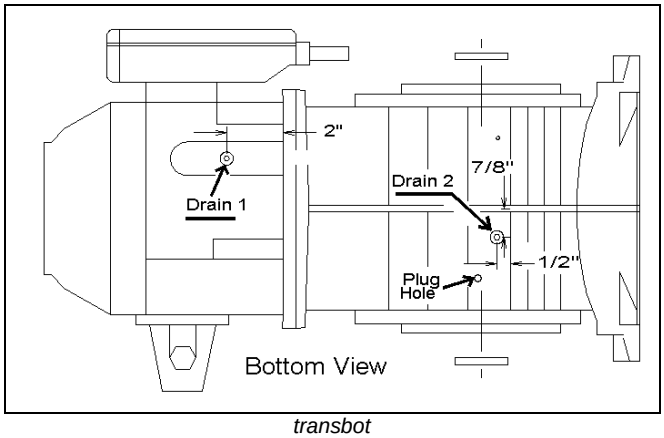
Remove the vent tubes from the inside and outside of the (now) bottom of the differential section of the case. They are a press fit into the case. You must drive the internal tube out through the outside hole with a punch. Tap the case ($^{5}/_{16}$-18) from the outside and use a cap screw to plug the hole. Use gasket sealer or silicone on the threads to prevent leakage.

Drill and tap an oil level hole in the right side of the case in the position shown. The hole should be drilled to $1^{5}/_{32}$" and tapped $^{1}/_{4}$" NPT, and a pipe plug installed. When filling the transmission from the top, the oil level should reach the bottom of the hole.



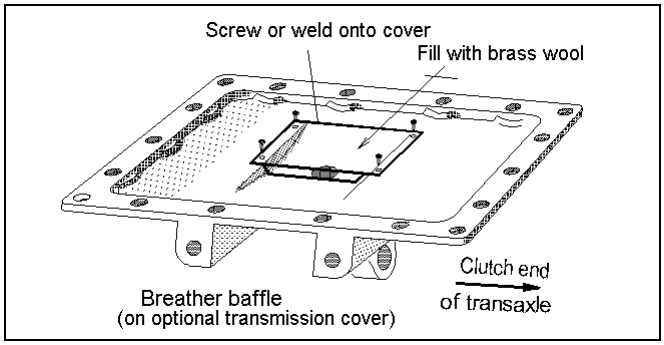
Zf_mods_side

Drill and tap two ¼ "NPT drain holes in the bottom of case as illustrated. If the transfer holes between the differential and the gearcase are low enough, the oil can be drained exclusively from the rear hole.



transbot

Install a baffle and vent fitting in the (now) top access plate. The baffle will prevent oil from being thrown out of the fitting by the rotating ring gear. E.R.A. makes a plate for this purpose that must be welded or screwed to the inside of the cover. *If you make your own*: The baffle plate must allow clearance for the ring gear on the left. Therefore the plate must be biased toward the right side of the gearbox access plate.



man\b\trnsbafl

Stuff brass wool from a scouring pad through the vent hole into the baffle area. Even so, a dump tank may be necessary to prevent excessive oil loss at race speed. ERA offers an optional breather conversion kit with dump tank that can be installed by the customer. Do not overfill the gearbox. The initial fill should be 2.7 qts. Refilling after draining will be 2.5 qts. You may want to check the accuracy of the fill level hole the first time you fill the gearbox.

ASSEMBLY

Clean the case of drilling chips.

Install 3 longer studs (10mm. diameter x 40mm.) into the left side plate for the slave cylinder bracket. See the diagram.

Insert the ring gear/differential spool assembly into transaxle case so that it is on the left side of the pinion (as the transaxle will be mounted in the car) without the side bearings installed. Remember the breather tube that was removed from the inside bottom of the case? That's the side that the ring gear goes on!

Install the ring gear bearings onto the spool. *Make sure that they are fully seated on the spool.*

Assemble gear cluster plate into case. Use non-hardening aircraft gasket sealer between the cases. Torque all bolts to 16 lb.ft.

Rotate the axles in the side plates, feeling for irregularities. If the bearings feel worn, now is the time to install new ones (FAG 6207 C2 is OEM, we replace with a slot-filled bearing Fafnir 207W) and also the seals.

Install new bearing cups in the side plates, noting the shims underneath the cups on each side. Don't mix them up. Install the side plates with the old gaskets onto the case, temporarily torqueing the 6 inner fasteners to about 25 lb.-ft.

Measure the backlash between the pinion and ring gear. It is easier to do this on the edge of the pinion gear. The ring gear bearings are preloaded and prevent the gear from rotating freely.

The **proper backlash** is etched on the outside edge of the ring gear, with some other numbers. Look for "0,20" or "0,25" or a similar number. This is the backlash in millimeters. Multiply by .0394 for the inch equivalent.

Adjust the ring gear backlash by changing the shims behind the cups of the differential bearings in each side plate. Removing the bearings requires a puller. See the transmission service manual for details. If the ring gear bearing preload was correct before disassembly, the total thickness of shims behind the *right plus the left* bearings should remain the same. It will only be necessary to redistribute the total thickness of the shims.

The **lash will change about 90%** of the amount of change of the shim thickness underneath the bearing cup. i.e. If you need to reduce the lash by .009", increase the thickness of the shim pack on the ring gear side by .010" and decrease the shim thickness on the opposite side by .010".

After the shims have been changed and the bearings re-installed, install the side plates. If the clearance change was small, you might want to "go for it" and use the new side gaskets now. Otherwise, check the clearance again with the old gaskets. Torque the side plate bolts/nuts to 45 lb.ft., in two steps, using a criss-cross pattern.

Install the **top access plate** with the baffle installed. Torque the bolts to 15 lb.ft.

Install the **transmission mounting bracket** on the top cover using the $^{3}/_{8}$" x 10" USS threaded rod supplied. Don't forget to replace the shims between the top cover and the side covers. The face bar with the $^{5}/_{8}$" holes faces forward toward the engine. Torque the cross-shaft nuts to 45 lb.ft.