Volvo 245 AW71 to M46 Transmission Swap

Here are the tranny swap details. The one thing you need to keep in mind is I was swapping the transmission in a turbo car ('85 245) so I ran into a few extra surprises because of that. I started with a worn out AW71 and wanted to end up with a good M46. I spent a few hours at a local PYP yard pulling the replacement out of an '84 242DL that was in really good shape other than the major collision damage to the front passenger corner. It had under 200,000 km on it and appeared to have been well looked after so the decision to take that particular transmission was made. I pulled the following items initially.

Transmission
Bellhousing
Shift Lever assembly
Front Portion of the drive shaft
Wiring harness including the relay by the glove box
Complete pedal assembly including the clutch cable
All associated bolts, nuts, pins, washers and bushings
The turbo block I rebuilt had a clutch and flywheel so I didn't take those.

Actual removal is pretty straightforward. The bellhousing-to-block bolts (don't forget the starter bolts) came out first. Then the rear half of the driveshaft came out. I did this because one of the bolts on the front flange was in rough shape and I didn't want to waste time trying to break it loose. Next comes the support bearing. I left the front section of the driveshaft attached to the tranny. The gearshift assembly needs to be removed. Pull the knob off first. Hope that the P/O didn't use epoxy to keep his knob on. Once the knob is off, the leather boot comes off. There may be bolts or plastic pins under the carpeting holding the rubber shifter boot on. Once the boot is off the reverse lockout bar comes off. Then the roll pin that holds the chrome shifter barrel comes out and the barrel slides up the shifter rod. Be careful with the wiring. It should slide out a hole in the back of the shifter barrel. There is a small allen head pinch-bolt under the shifter mechanism that holds it together. It's easier to get at if you drop the crossmember first. Loosen the allen bolt, push the pin out (taking car not to lose the nylon bushings) at the base of the shifter rod and the whole assembly should pull out the top. Edit…there is a big circlip at the base of the shifter, just inside the extension housing that needs to be removed before the shifter will lift out… Remove the speedo cable at the tranny. Now the tranny should be ready to pull out. I also pulled the wiring harness from inside the vehicle and stuck it through the shifter hole just so I wouldn't break off any connectors. Some pushing, pulling, lifting and vigorous wiggling and the transmission should come out. Make sure you have a buddy to help

you with this stage. I tried it once by myself and wound up laying under my car with a transmission on my chest and no place for me or the tranny to go. If the car is high enough off the ground this won't be quite as much of a problem...

The pedal cluster is easier removed if you're a contortionist. It's not that difficult once you figure out where all the bolts are. I found it was easier (on the donor car as well as my own) to remove the instrument cluster and the vent ducting directly behind it. This will allow you to see most of the bolts and, if you have a really long extension, remove them from the front instead of under the steering wheel. If your steering wheel comes off easily, I'd remove that too. I didn't but I think it may have made things a bit easier. There are three bolts that bolt vertically into the dash support that need to be removed from underneath. There are 7 or 8 bolts in total; 4 of which actually loosen the brake booster. The booster actually needs to be pulled away from the firewall in order to get the pedal cluster out. Disconnect the wires to the brakelight switch and the cluster is ready to come out. It just takes some careful massaging of the wiring harnesses and out it comes.

Getting the AW71 out of my car was a similar process to pulling the M46 but because we were pulling the block, we opted to leave the tranny attached until it was out of the car. There were quite a few things that needed to be detached first. The shifter linkage needs to be disconnected. The tranny cooler lines get disconnected (don't forget to drain it first) and the dipstick needs to come out. It was late when I removed the gear shift selector and plastic housing so details are a bit sketchy. Bottom line is it all comes apart and the metal bucket that houses it pushes up through the floor from underneath. Pull the wiring harness out taking care not to damage the connectors in the driver's foot well. You need to use those again. One of the connections is for the reverse lights. The other is the park/neutral lockout. The plug for the reverse lights gets used again. The park/neutral lockout gets jumpered. The donor, manual tranny car will have this jumper setup if you want to grab it. Just pull the carpet away from the console in the driver's foot well and it should be pretty obvious. If you want to get really creative, I'm sure you could rig a switch on your clutch pedal to do the same job.

Removing the pedal cluster in my car was the same process as the donor car with one exception. It mattered if anything else got damaged! With the instrument cluster removed, it was easier to wire the new harness. One wire goes down to the fuse panel. One wire to plug #4 (I believe) on the big round plug that goes on the back of the instrument cluster. That's the one that lights up the "5" light in the middle of the idiot light panel. The AW71 light on the cluster is the arrow and it lights when O/D is not engaged so that wasn't an option. One of the connectors goes to the reverse lights and the other goes to the relay that gets parked next to the glove box and your new tranny is wired.

Installing the new pedal cluster is as much of an effort in frustration as removing either of the old ones. It takes patience but it will go in. There will be a plastic plug in the dash support where a bolt will go in. The auto pedal cluster doesn't use that hole but if you kept all the bolts, you will have one for that spot. Then it's just a matter of wiggling and twisting it to get it into place. Once again, the brake booster will have been pulled away from the firewall so once the pedal cluster is in place, pushing the booster back into place will help with proper location. Tighten up the bolts, hook up the brake light switch wires and you're almost done. The clutch cable will still need to go in and the pin and cotter pin on the clutch pedal. Be careful not to drop either of those items because they will probably fall behind the foam insulation, under the carpeting. Ask me how I know this and how much time it can take to find them again!

Installing the M46 was done with the motor out of the car so there weren't any problems associated with lining up the clutch etc. Once it's attached to the block, it's a simple bolt up the driveshafts, the center support bearing and the crossmember, hook up the clutch cable and you're ready to roll. I suppose you should re-assemble the shifter assembly in there somewhere and hook up the wiring (before you bolt up the crossmember).

Unexpected problems I ran into:

The turbo driveshaft is a different size than the B21A driveshaft. Therefore the flanges wouldn't mate. A B23E is the same as the turbo. The front shaft is a different length from the AW71 to the M46. The flange on the output shaft of the M46 was smaller from a B21A. Once again, the B23E worked. I realize that B23E's are hard to find in the States and I can't tell you what else will work other than another turbo. The speedo cable ends up to be about 2 inches too short so be sure to pull the one from the donor car or buy a new one. If you want cruise control on your manual tranny you'll need a clutch kick-off switch as well as a proper bracket for the vacuum switch that's mounted on the brake pedal. The bracket from the auto assembly doesn't match although with some skillful bending, I'm sure it would.

Total time spent doing this project is hard to tell because of all the other work I did at the same time. It's certainly something you could do in a weekend. One day to remove the transmissions and pedal assemblies and one day to put it back in. No special tools other than a really long extension to get at the top starter bolt and some of the bolts on the pedal cluster. A set of "wobbly" sockets came in handy too.

The M46 is in my car and is working to perfection. I'm sure I missed a couple of

things here but this is pretty much how I remember it. Feel free to ask me anything in case I've missed something.

Whew...

Dale