Directions for competition modification of the Saab V4

(Group 2 Special Standard)

The following tuning instructions are for competition purposes. Carried out in a proper way the tuning will, depending on the carburetion system chosen, deliver

1500 cc Engines 105—130 HP DIN
1700 cc Engines 125—145 HP DIN

Experience has proven the engine to be very reliable in operation, provided the tuning modifications are made carefully and reliable parts are used. The parts furnished from the Saab Sport & Rally Department in Sweden have been tested in laboratories and during numerous competition events and give the best possible insurance against failures.

The parts you will find in the following tuning instructions can be ordered from a franchised Saab dealer.

ENGINE BLOCK

Clean the engine block with an oil-dissolving detergent, flush it with water and blow it clean with compressed air.

Use a steel brush to clean casting surfaces in the crankcase and the camshaft housing. Grind or mill off any rough edges.

Clean carefully the gasket surfaces.

After these operations the block has to be cleaned again and dried carefully.

Inspections

1. Check the bolt hole threads making sure that they are clean and in perfect order. The holes for the bearing cap bolts and the cylinder head bolts are especially important. Take the bolts separately and screw them in until they bottom. Check that they are approximately 2 mm deeper than in the position when they are finally installed. Cut the bolts if necessary.

2. Bearings for camshaft and balance shaft. Check that the oil channels in the block and bearings match. Check also that the bearings are in good condition and not scratched or worn.

3. Tappet holes. Check for scratches in the tappet holes. Minor scratches can be honed.

4. Surfaces. All surfaces must be checked for finish and alignment and straightness, especially the surfaces for the oil filter, head gaskets, and bearings. They must be absolutely even and undamaged.

5. Bearing positions. Install the main bearings and torque to70 ft. lbs (l0 kpm). Check:

a. that the cap and block mating surfaces are straight and even
b. that the bearing surfaces are even.
c. that the out-of-round is no more than .0002 inches (0.005 mm).

When the block has been checked and approved, the next step depends on what type of piston and head gasket is to be used:

ENGINE BLOCK MODIFICATIONS

1. Cylinder

A. The part number for the cast piston is 884834 for the 1500 cc engine and number 1001 for the 1700cc engine. Hone the cylinder to 3.545” (90.06 mm) which gives a piston clearance of 0.0024-0.0032” (0.06-0.08 mm) depending upon piston class.

B. The part number for the 1 mm oversize cast piston is 884836 for the 1500 cc engine and 1002 for the 1700 cc engine. As before, the piston clearance should be 0.0024-0.0032” (0.06-0.08 mm). If there are any doubts, the piston diameter should be checked with a micrometer. Check the diameter at a right angle to the wrist pin approximately 0.6” (15 mm) from the pistons lower end.

C. The part number for the 3.58” (91 mm) forged pistons are 1003 for the 1500 cc engine and 1004 for the 1700 cc engine.

The cylinders should be bored to 3.584” (91.03 mm) and then honed to 3.585 (91.06). During the boring and

honing procedure the bearing caps should be installed and tightened to 70 ft. lbs. Cylinder out-of-round and taper may not exceed 0.004" (0.01 mm).

The recommended piston clearance for forged pistons is 0.0056" (0.014 mm). The clearance must not be less than 0.0056" (0.014 mm) due to cylinder taper or out-of-round. Clean after honing and blow dry with compressed air. The cylinder walls should then be wiped off with a clean rag soaked in motor oil. Wipe the cylinder walls until the rags no longer get dirty. That way you get rid of all metal dust from the honing procedure which otherwise might cause rapid wear of the piston rings.

2. Head Gasket with Separate Copper Rings

A. If the head gasket with separate copper rings (part no. 1016) is used, grooves have to be made in connection with the cylinder boring. See Enclosure.

3. Compression Ratio Increase by Milling (when cast standard pistons are used)

A. The block may not be milled on the blue and black engines. If a higher compression ratio is wanted, and standard pistons are used, the heads can be milled up to 0.07" (1.75 mm) without jeopardizing the strength. This will increase the compression ratio to 10.5-11.0 if the combustion chamber is left unmodified. See Enclosure 8 and 13.

B. 1700 cc (1500 cc engine modified with a stroker kit or the standard 1700 cc engine modified with new pistons and connecting rods). With pistons 1001 or 1002, diameter 3.545" or 3.58" (90 or 91 mm), there are two different ways to increase the compression ratio.

a. Mill the engine block 0.04" (1.0 mm) so that the piston tops at top dead center are level with the engine top surface. Also, mill the cylinder heads to make sure they are straight. Also, mill 0.047" (1.2 mm) from the engine block surface against the intake manifold to obtain better alignment.

b. Mill the cylinder heads (maximum 0.07" (1.75 mm)).

If the alternative is chosen, the combustion chamber can be modified as per Enclosure 4 and a compression ratio of 10.5-11 can still be obtained. By milling the cylinder heads only, a compression ratio of 10.5-11 can be obtained if the combustion chambers are not modified which is shown in the sketches number 3 and 6.

Alternative number 1 is better from a performance point of view, but also more expensive.

CRANKSHAFT SECTION

Crankshaft 1500 cc Engine

Dot not modify the connecting rod. However, check and adjust the clearances for the main bearings and connecting rod bearings.

The clearances are supposed to be:
Main bearings - 0.035 - 0.045 mm
Connecting rod bearings - 0.035 - 0.050 mm

Crankshaft main journal diameter:
Standard red 56.990 - 57.00 mm
Standard blue 56.980 - 56.99 mm

Corresponding bearing diameter, installed:
Standard red 57.014 - 57.030mm
Standard blue 57.004 - 57.020 mm

Crankshaft connecting rod journal diameter:
Standard red 53.990 - 54.00 mm
Standard blue 53.980 - 53.99 mm

Corresponding bearing diameter, installed:
Standard red 54.014 - 54.044 mm
Standard blue 54.004 - 54.034 mm

Use green Plastigauge to check the bearing clearances.

If the clearance is 0.00118-0.00138" (0.030-0.035 mm) and the bearings are the blue marked type, replace the bearing half in the cap with a red marked type and check the clearance again. If the initial clearance is more than 0.00197" (0.050 mm), both bearings should be replaced with the blue marked type and the clearances checked again.

If necessary, check the clearances using several different bearings until the right clearances are obtained. During every check it is necessary to torque the bolts properly

which means 70 ft lbs (10 kpm) for the main bearings and 28-30 ft lbs (4.0-4.5 kpm) for the connecting rod bearings.

The following bearings can be used:

Connecting rod bearings, blue 881122
Connecting rod bearings, red 881121
Outer main bearings, blue 881239
Outer main bearings, red 881238
Center main bearings, blue 881241
Center main bearings, red 881240

Crankshaft 1700 cc engine

The same instruction as for the 1500 cc engine above. For tuning, special checked crankshafts, number 1062, have to be used.

CYLINDER HEADS

Modification instructions for cylinder heads on the blue and black engines used from year model 1968 and on:

1 . The intake ports should be ground or filed according to the instructions in Enclosure number 3. The measurements should be 25-26 mm wide and 45-47 mm high, measured on the gasket surface. The gasket surface surrounding the port should not be less than 3.5 mm wide or satisfactory tightening cannot be accomplished.

Before modification, it is advisable to paint the gasket surface with machinists' dye and then mark out the future measurements.

If valves with chrome plated stems and separate valve guides are to be used, (44/37 mm and 44/38 mm), remove the valve guide portion of the valve guide which extends into the port.

If these valves are not used, the valve guide sides should be tapered toward the port. The height should not be reduced.

If larger valves are to be used (42/37 mm, etc.), the valve seat machining should be done before the valve guide extruding portion is removed, as it afterwards is extremely difficult to center the mill.

2. Combustion Chamber - When valves larger than standard are installed, the combustion chamber should be modified in order to improve the breathing. The modifications are shown in Enclosure 4a.

In order to get the same volume in all combustion chambers it is advisable to make a template of cardboard, steel sheet, or similar, according to Enclosure 4a.

The combustion chamber volume after modification should be 44 cm^3. Note: This volume is obtained for the combustion chamber in a cylinder head that has not been milled. It gives a compression ratio of 11.0 with 1700 dome type piston. If a different type of piston is used, the heads have to be milled to obtain this compression ratio.

3. Valve Seats - The valve seat angle should to be 45°. With the seat outer diameter the same as the valve diameter, the inner diameter should be 2 mm smaller. This applies to both the intake and exhaust valves.

Machine the valves in a valve grinder as follows:
1 . Grind the inner part of the valve to 30°.
2. Grind the 45° part of the valve to the same measurements as the corresponding seat; that means the outer diameter the same as the seat and the inner diameter 2 mm smaller.

The sharp edges on both sides of the 45° angle on the valve and on the seat should be slightly rounded. Before the valves are installed, the tightness of each one should be checked. Here is an easy way to do that: make approximately 15 thin lines across the valve seat using chalk. Install the valve and turn it in the seat a few times in both directions using a slight pressure. Remove the valve and check that the chalk lines have been erased and similarly.

4. Recommended Compression Ratio - When the valves are fitted, the compression ratio and the level of the cylinder head can be set. (See /2 above). Now install the spark plugs which will be used in the final installation.

The compression ratio is limited to 10.5 if standard head gaskets are to be used. With the special arrangement with copper rings the compression ratio can be raised to 11.5

using one two-barrel carburetor and to 11.0 using two two-barrel carburetors.

5. Exhaust Ports - Bench tests show that the V4 engine torque increases continuously with increased port areas. This is valid for intake ports as well as exhaust ports.

The limitation is the wall thickness (limit 4 mm) in the head and the gasket areas between the heads and the manifolds.

The exhaust port should increase in area all the way from the valve to the exhaust manifold. The valve guide should be filed or ground so it no longer intrudes into the port. The outlet diameter should be increased to 44 mm. See Enclosure 2.

Use exhaust gasket number 1145. If the gasket is too small after the modification has been made, and tightening problems are encountered, a special gasket can be made of aluminum and covered with Permatex gasket compound on both sides prior to installation.

6. Valves and Guides - As mentioned earlier, special valves with diameters of 42 and 37 mm are available. The stem diameter is the same as standard which makes guide modification unnecessary unless the old ones are damaged or worn, in which case separate valve guides are to be installed. Part number 1172, Enclosure 7. When the valve guides are filed level with the port, the sharp edge at the guide end should be rounded to prevent valve stem damage or ground off.

The valves will recess into the valve seats as time is accumulated on the engine. This is first noted through decreasing valve clearance. When the valve recesses, the seat width also increases. When the seat width increase approaches 1 mm, it is time to reduce the inner diameter by using a 70° mill or grind on the head. If the recession is as much as 0.06-0.08" (1.5-2 mm), the valves should also be replaced. The cylinder head is in that case restored by installation of 44 mm intake valve number 1168 and 38 mm exhaust valve number 1167. As the stem diameter on these valves is 0.04" (1.0 mm) smaller than on the previous valves, separate valve guides have to be installed. Valves 42/37 and 44/38 give similar HP ratings.

7. Valve Springs, Retainers, and Locks - Install stiffer valve springs, part number 1011 . If standard valves are used, install the standard valve retainer and lock. If larger valves are installed, the distance between the upper and lower spring seats should be measured. The distance should be 1.51"- l.55" (38.3-39.5 mm); never less than 38.3 mm if a camshaft with a lifting height of more than 7.2 mm is used.

There are two different valve retainers available. Black retainer 1087 should be used when new, large valves are installed, white retainer 1012 after the first recession.

After modification of a valve with new valves, a spring length of approx. 1.52" (38.5 mm) is achieved with the black retainer and and 1.45" (37.0 mm) with the white retainer.

CARBURETORS

There are three different alternatives for the 1500 cc and the 1700 cc engines.
1. Carburetor Kit - 1 Weber 40 DFI , Part No. 1160
2. Carburetor Kit - 2 Solex 40 - 42 CCI, Part No.1161
3. Carburetor Kit - 2 Weber DCOE 16S, Part No.1162

These carburetor kits include: intake manifold, carburetor with linkage, air filter, hardware and installation instructions. Alternative 3 (side draft carburetor kit) also includes a special distributor.

You will find the torque and HP information in Enclosures 14 and 15.

FLYWHEEL

The flywheel should be as light as possible without endangering the strength. Two different alternatives for lightening can be found in Enclosure 5.

a. Reduce the outer diameter behind the starter gear to 19.45" (240 mm) by turning.
b. After the turning, mill the flywheel so only a small amount of material is left around the retaining bolts for the clutch. Polish the surface and balance the flywheel. Always use new bolts for the installation of the flywheel and tighten to 50 ft. lbs (7.0 kpm).

Weights:
Standard flywheel - 16.1 lbs (73 kp)
Modified according to alternative 'a.' - 12.8 lbs (5.8 kp)
Modified according to alternative 'b.' - 11.5 lbs (5.2 kp)
Modified flywheel according to alternative 'b.' has the part number 1169.

CLUTCH AND DISC

Clutch part number 1052 has stiffer springs (marked red). The disc, part number 1053 or number 1131, also has stiffer springs than the standard disc.

Pressures:
Standard pressure plate - 750-940 lbs (340-425 kp)
Competition type - 930-970 lbs (420-440 kp)

The competition-type pressure plate and disc should be used if the engine is tuned to more than 90 HP.

PISTONS

Cast standard piston 90 mm (1498 cc), Part No.884834
Cast standard piston, oversize 91 mm, (1531 cc). Part 884836
Forged piston, size 91 mm, (1531 cc), Part No. 1003
Cast standard piston, 90 mm (1698 cc), Part No.1001
Cast standard piston, size 91 mm (1740 cc), Part No.1002
Forged piston, 91 mm (1740 cc), Part No. 1004

If the engine is intended mainly for competition, the forged pistons should be used. They can withstand higher pressures, temperatures and rpm's than the standard pistons. They are also domed which makes it possible to modify the heads more extensively.

The forged pistons are delivered with piston rings and bolts' pins. When assembling the piston and connecting rod, part number 1005, the top end of the connecting rod has to be heated to 535-610° F (280-320° C) when the bolt pin is being installed. The necessary press force is approximately 1900 lbs (800 kp). During the installation the piston has to be supported by a tool with a shape fitting the piston to prevent distortion of the piston.

Before installation of the pistons, the ring gap has to be measured as follows: Install the ring in the cylinder and press it down approximately 1" (20-30 mm) using the piston as a guide. The gap of the compression rings should be 0.012-0.020" (0.30-0.50 mm).

CONNECTING ROD

A. Standard Connecting Rod - In order to reduce the chances for breakage, the connecting rod should be polished with the grinding along the length of the rod. The rod bolts and nuts should be replaced every time they are removed. When installed they should be torqued to 28-30 ft lbs (40-4.5 kpm) and locked with Loctite, Lockn' Seal, (or similar which will withstand a temperature of at least 300^0 F (150^0 C)).

After installation. check that the connecting rods side play on the crankshaft are 0.004-0.008" (0.10-0.20 mm). The pistons and connecting rods can be balanced, but it is not necessary.

B. Connecting Rod No. 1005 — In order to reduce the changes of a connecting rod failure, especially on 1700 cc engines, a special connecting rod is available. part no. 1005. NOTE: This connecting rod should not be polished!

CAMSHAFT

Three different camshafts are available:
7.2 — Part No. 1007
7.6 — Part No. 1008
8.3 — Part No.

Type 7.6 is recommended for rallies. It can also be used for track races where a high torque at a tentatively low rpm is required (ice racing). For higher speed tracks, where the rpm can be held around 5000-7500 rpm, the type 8.3 camshaft is preferred, as it gives better performance above 6000 rpm.

The type 7.2 camshaft gives the maximum torque approximately 500 rpm earlier than type 7.6 but approximately 5 % lower top performance. This is a good street cam.

When a high-performance camshaft has been installed, the valve lift then should be checked intermittently in order to detect any wear of the camshaft. This can be done as follows:

Adjust the valve play correctly (for 7.6 intake 0.0197" (0.50 mm), exhaust 0.024" (0.60 mm)) on all valves except the one to be measured. Here you set the valve play first to '0' and then you tighten the adjustment screw another 1/10 of a turn to be sure all play is eliminated. Then use a dial indicator to measure the lifting height on the valve, parallel to the valve stem. Rotate the engine and repeat at least once on each valve to check the initial measurement. Readjust this valve to proper play and go on with the next one the same way.

The camshaft type 7.6 gives a valve lift of 10.9 - 11.50 mm, depending upon manufacturing differences in the rocker arms, etc. When the lift caused by wear has decreased 0.008" (0.2 mm), the power loss is significant and the camshaft and the valve lifters should be replaced.

Valve play	7.2	7.6	8.3
Inlet	0.50 mm 0.0197"	0.50 mm 0.0197"	0.50 mm 0.0197"
Outlet	0.50 mm 0.0197"	0.60 mm 0.024"	0.60 mm 0.024"

CAMSHAFT DRIVE TRAIN

Install the steel gear (part no. 881027) on the balance shaft (part no. 881133). The gear backlash should be 0.00197 - 0.0055" (0.05 - 0.14 mm). Check that the camshaft gear backlash is 0.00197 - 0.0055" (0.05 - 0.15 mm). Replace the gears if necessary.

BALANCE SHAFT

Use the balance shaft for the 1500 cc engine (part no. 881133) on the 1700 cc engine as well as the 1500 cc engine.

VALVE LIFTERS

Two different types of valve lifters are available the standard lifter and the competition type, part no. 1013. The later type is of highest quality and lighter (79 grams compared to 100 grams for the standard lifter). It is not recommended to try to make the standard lifter lighter, as experience has shown that they will easily fail.

New lifters should always be installed together with a new camshaft. If the lifters however, are in perfect condition they could be used over again, but if they have scratches or rings on the bottom surface they should be replaced.

Push rods

Replacement not needed but check straightness and the ball surfaces carefully.

Rocker Arms

Modify the rocker arm by grinding the arm at the valve end to a 8 mm diameter half circle positioned directly over the valve stem. Do not reduce the height of the rocker arm.

Rocker arm shaft support

A competition-type rocker arm shaft support is available (part no. 1171). It is retained by the two standard bolts plus three head bolts have to be replaced by three special head bolts threaded for an M8 x 1 mm in the head (part no. 883107).

At installation, the support is first retained by the two standard bolts. Adjust then the height of the spacers so they fit exactly, and tighten the side bolts.

The competition type rocker arm shaft support bracket has the following advantages:

1. Valve recession will be decreased and, thereby, also the need for valve adjustment.
2. The rpm limit will be increased 500 rpm.

CYLINDER HEAD GASKET

There are three alternatives:

1. Standard gasket.
2. A gasket, part no.1017, which has a reinforced steel lining for blue and black engines only.
3. Gasket 1015 with copper rings (part no. 1016, separately).

The standard gasket should be used only with minor modifications (single carburetor or maybe two-barrel carburetor Weber 40 DFI) and never for a compression ratio higher than 10.5

If difficulties are encountered with the standard gasket and arrangements are not made for the copper ring-type gasket, the gasket with a reinforced steel lining (which is market red) can be used. In any case, the head bolts and nuts should be retorqued after approximately 300 and 600 miles (500- 100 km). Torque to 85 ft lbs (12 kpm). If the bolt "creeps" (the torque does not increase continuously up to 85 ft lbs (12 kpm)) the bolt should be replaced immediately.

For competition use, only the copper ring-type gasket is recommended. This gasket consists of separate copper rings around the cylinders (part no.1016 if sold separately) and a standard gasket, 1015, scaling for water and oil.

For the copper ring-type gasket a special recess has to be made in the block. See Enclosure 6. It is very important that the recess has exactly the measurements indicated on the sketch. Note the following concerning the copper rings:

a. Replace the copper rings every time the head is removed. If this for any reason cannot be done, reinstall the old copper rings but make sure they are installed in the same cylinder and the same position as before. It is, therefore, necessary to mark them before they are removed from the recesses.
b. The copper ring must not be less than 0.0846" (2.15 mm) high. If there are differences in the copper ring thickness, install copper rings with the same thickness under the same head. Torque the head bolts to 85 ft lbs (12.0 kpm). No retorqueing is necessary.

NOTE : When ordering head gasket, also specify the engine model year.

OIL PUMP

Replace the oil pump spring with the stiffer spring, part no. 1014. The oil pump plunger should be modified as follows:

a. Polish the plunger inside in order to reduce the spring wear.
b. The outer sharp edge on the plunger top should be honed round.

Despite the polishing of the plunger inside, experience has shown that the spring is worn and, therefore, it should be replaced every time the engine is rebuilt or after 8000- 12000 miles (15000-20000 km) of competition driving.

The oil pressure, with a warm engine, should be approximately 85-90 lbs/sq in (6-6.5 kp/cm^2). If the maximum pressure is lower than approximately 55-60 lbs/sq in (4 kp/cm^2) the reason for it has to be determined.

FUEL PUMP

The standard fuel pump is sufficient up to a horsepower output of approximately 115 DIN HP. Fuel pump, part no.1024, has capacity for 160 HP. It is installed in place of the standard pump.

In summertime there is a chance for vapor locks in the fuel pump. Normally, this happens after a hot engine has been shut off a few minutes or has been idling and a demand for maximum fuel is made. Suddenly the engine loses power for a while and then recovers when colder fuel has reached the pump.

In order to insulate the fuel pump from the engine heat, a fiber gasket, no.1174, can be installed under the fuel pump. The fuel pump push rod then has to be extended the same distance. Put the extended portion towards the pump. Extended push rods' for the fuel pump, part no. 1175.

If the ambient temperatures are very high, it is sometimes not enough to insulate the fuel pump. The fuel reaches the pump too hot and is heated up too much there. An electric fuel pump can eliminate the problem. It should never be installed close to the exhaust system.

OIL COOLER

The oil cooler, part no. 1023, is necessary for a competition engine. The oil temperatures can still reach as much as 285-300° F (140-145° C). This does not

indicate engine trouble, but the additives in the engine oil are used up very fast, and the engine oil has to be changed often.

The oil cooler should be installed in a place where the best possible air is obtained; for instance, on the left engine housing level with the engine valve train.

COOLING SYSTEM

The original cooling system is in most cases sufficient for a mildly tuned engine (about 110 HP). For more tuned engines and especially for competition use a larger radiator (part no.1166) with a special overflow container (part no.1164) should be fitted. When fitting the larger radiator it is necessary to exchange the rectangular headlamps with round ones, see group 10 catalogue for the US Market.

For summertime competition, note:
a. Do not cut the fan.
b. The thermostat housing should be modified so that all unnecessary material is removed and the thermostat is left resting only on a small shelf with an inner diameter of 39 mm. The thermostat can also be removed completely.

As temperatures below -5° F (-15° C), a standard thermostat can usually be used. If it is not sufficient, the thermostat can be modified as follows:

Make a screwdriver groove with a hack on the center screw on the thermostat. Then melt the solder around the screw and screw it down approximately four (4) turns. Drill three 3 mm boles in the seat circumference.

If the cooling capacity is not sufficient,. install a bigger radiator, part no. 1166.

IGNITION SYSTEM

Install ignition coil, 850663, together with resistor 850059. Remove the resistors in the ignition wires and install connectors no.1178. Change to rotor, no.1177.

Remove the vacuum unit and lock the breaker plate to the fixed bottom plate in the distributor. The basic (static) ignition timing should be 9° BTDC with vertical carburetor system and 6° BTDC with side draft carburetor Weber 45 DCOE-16S.

Recommended spark plugs:
Motorcraft (Autolite) AG 901- Part No. 1099
Bosch W 280 T2
Champion N 60

(Grey engine)
Motorcraft (Autolite) AE 901 — Part No. 1176
BoschW280 T l 3S
Champion L64Y

EXHAUST SYSTEM

From both an efficiency and a strength point of view, the exhaust system has to be replaced with part no. 1091. Make a hole in the engine compartment floor according to Enclosure 1. Use hardware kit, part no. 1092. For street modifications, exhaust system kit, part no.1147 can be used.

CRANKCASE VENTILATION

The engine should have a closed crankcase ventilation system. Connect the right side valve cover with a hose to the flame guard in the air filter. Connect the left side valve cover to the connection on the intake manifold. Under this connection a 1 mm hole enters into the intake manifold.

For the side draft carburetor, Weber 45 DCOE-16S, the left side valve cover should also be connected with the air filter for the left side carburetor. Oil filler cap, part no. 881156, should also be installed.

MODIFICATION OF CARBURETOR

Included in the carburetor kits are modification specifications. For dual carburetor installations, it is important that the carburetors are synchronized and the linkage straight and in order. No play in the linkage is allowed.

LUBRICATION

Competition-type oils should be used. In the summer, use viscosity SAE 40; and in the winter, use SAE 30. Vegetable base racing oils may not be used.

The oil should be changed at least every 1200 miles. During winter, the low temperatures cause the oil to become diluted and should be changed even more frequently.. If you change to a different oil brand, the engine should be flushed with a standard engine oil.

The oil level should be from "medium" (between the oil level marks) to "high" (upper oil level mark).

For the transmission, Hypoid oils should be used - quantity 1.5 liter.

TRANSMISSION

It is possible to modify the transmission by installing alternate gear sets with different ratios. It is also possible to change the ring and pinion gear.

Three different gear sets are available: Standard, Special 1, part no. 1085, and Special 2, part no. 1086.

The standard gear set has the widest ratios. Special 1 has standard third (3rd) gear, while first (1st) and second (2nd) are higher and fourth (4th) lower than standard.

Special 2 has the same fourth (4th) gear as Special 1, but the other gears are higher.

Ring and pinion gear

The standard ring and pinion gear has the ratio 8:39 and is not very well suited for modified cars. The 7:36 gears, part no. 783629, are recommended for engines without extensive modifications. The ring and pinion gears 7:38, part no. 1049, and 6:35, part no. 1048, are both made of very good material and are well suited for modified engines.

Most widely used is 6:35 while 7:38 is mostly preferred for private driving.

Below are shown the speeds in miles per-hour per 1000 rpm's in each gear based on a tire radius of 300 mm (155 x 15 tires).

Ring and Pinion Gear	Gear Set	1	2	3	4
8:39 (4.87 to 1)	Standard	4.1	6.9	11.1	17.2
7:36 (5.15 to 1)	Special 1	4.3	7.3	11.6	14.8
7:38 (5.43 to 1)	Special 1	4.1	6.9	10.0	14.2
6:35 (5.83 to 1)	Special 1	3.8	6.4	9.1	13.2
7:38 (5.43 to 1)	Special 2	4.9	8.1	10.9	14.2
6:35 (5.83 to 1)	Special 2	4.5	7.6	10.2	13.2

Below are shown the speeds in km-per-hour per 1000 rpm's in each gear based on a tire radius of 300mm (l55x 15 tires).

Ring and Pinion Gear	Gear Set	1	2	3	4
8:39 (4.87 to 1)	Standard	6.7	11.1	17.9	27.7
7:36 (5.15 to 1)	Special 1	7.0	11.8	17.0	23.9
7:38 (5.43 to 1)	Special 1	6.6	11.2	16.1	22.7
6:35 (5.83 to 1)	Special 1	6.2	10.4	14.9	21.1
7:38 (5.43 to 1)	Special 2	7.9	13.1	17.5	22.7
6:35 (5.83 to 1)	Special 2	7.3	12.2	16.3	21.1

Use a cast iron transmission housing, part no. 1051, when you install close ratio gear sets or non-standard ring and pinion sets, and always when the power output is more than 130 HP. It is also advisable to install a modified motor mount, 880170, between the transmission and floor pan to give the transmission additional support. Also, install the engine support brackets, part no. 1018. between engine and transmission.

BODY

For off-road racing and rallies, it is important to install a belly protection plate which is long enough and well supported. Part no. 1100 (for Group 1) and part no. 1065 (Group II) meet these requirements.

CHASSIS

For competition cars, special rally front springs, part no. 1057, and shock absorbers, part no. 1059 and 1060 are recommended. Rally Special front springs, part no. 1057.

Should be installed only with spring supports, part no. 1088.

If a larger fuel tank is used, the rear springs should be changed to a more progressive type (part no. 1058). They can, of course, be used for other purposes.

Rear Axle

A modified rear axle has part no. 1061 and is used by Saab on all rally cars.

Brake

Brake pads Ferodo DS 11, part no. 1056, or Ferodo 2430, part no 786828, should be used. It is important to "fade" the new pads after installation. This is accomplished by braking several times, getting the brake pads so hot that the braking power disappears. This causes the brake pads to cure so that the initial "break in" fade does not occur in the early part of a race.

It is also important to change brake fluid to a type with a very high boiling point. For example, BP Disc Brake Fluid, ATE Blaue S, Castrol Green, LMA, or similar.

The dust shield plates on the inside of the front brake discs should be bent so a better air stream towards the discs is accomplished. The rear brakes should not be modified.

Wheels

Two types of wheel rims are recommended: The Saab Sonett wheel rim, 741207, of steel or the aluminum wheel rim, part no. 1120. For the aluminum wheel special bolts, part no. 1121 , and special washers, part no. 1122, should be used.

Recommended tire sizes are 155 x 15 or 165 x 15