

# Fan Clutch test

First, let's discuss what the fan clutch does and why it is there. The fan clutch is just what the name says, it is a mechanism that will clutch the fan on and off depending on the need for more or less cooling air to flow thru the radiator. It is a thermostatically controlled device that when operating normally will vary the fan speed independently of the engine speed. When cruising down the road at freeway speeds, with outside temperature less than desert conditions, the fan should be merely idling along, turning just fast enough to add a little air flow when needed, in this way the fan noise and drag on the engine is greatly reduced. When reducing speed, the fan clutch will sense higher temperatures thru the radiator and "clutch up" thereby increasing the fan speed to help maintain constant engine temperature. It may in fact, cycle as the temperature of the air thru the radiator changes depending on airflow. If the fan clutch operation is normal, when first starting the car, the fan clutch should "clutch up" and an increase in noise and airflow should be obvious. After about 60-90 seconds, the fan will un-clutch and the noise and airflow will drop. The fan will continue to turn but at a much reduced speed. As the engine warms and the thermostat opens to regulate the temperature, the air thru the radiator gets hotter and the clutch will sense this, thereby increasing the speed of the fan to maintain a normal operating temperature.

First signs of trouble:

A normal temperature indication at freeway speeds and an increasing temperature as the vehicle slows is one of the first indications of trouble. Many other things may give this indication but if the temperature seems to be stable at speeds but climbs in traffic or while stopped, this is a good indication that the fan clutch isn't working correctly. As the temperature continues to climb, the auxiliary electric fan should start but may not provide enough air to keep the engine from overheating.

Another sign of trouble is if the fan noise is high and never decreases after starting, and is there anytime the engine RPM is higher than idle, this means that the fan clutch is "frozen" and is not releasing. Although this will not result in immediately serious trouble, it will load the engine continually and gas MPG will be reduced. Load on the fan belt(s) will be higher and shorten the life of that component also.

Fan modifications:

It has been suggested that other models of BMW fans can be substituted to reduce the noise and load of the fan. This is **NOT** recommended! If the fan clutch is working properly, there should be no need to replace with a lesser fan. The noise and load of the fan should only be there when it is "clutched up" and the fan speed needed to keep that big V-12 cool. BMW designed it this way and it is never a good idea to alter the cooling system and in particular where alloy engines would be effected.

## Testing the fan clutch:

If you have reason to suspect that the fan clutch is defective, here is the recommended procedure to verify the condition of the fan clutch.

1. Start the car (cold) with the hood open and note if the fan is turning, increase the engine RPM and note if the fan turns faster and the noise increases, if it does, first good indication, if it **does not increase** speed/noise, clutch is bad and needs to be replaced. (Remember, this must be tested after the car has been off for an extended period, over night etc.)
2. Leave engine running and note if the fan starts to slow down after 2-5 minutes, speed/noise should diminish and even raising the RPM, the fan should not make as much noise as when first starting, if it does slow, this is the second good indication. If speed/noise **does not decrease**, clutch may be “frozen” and should be replaced.
3. Leave the engine idle and watch the temperature indicator. When normal operating temperature has been reached, some increase in fan speed/noise should be noted, in particular when the RPM is increased. If temperature is fairly stable and the fan noise/speed increases or cycles, third good indication. If temperature indication continues to increase, with **no increase** in fan noise/speed, clutch is defective and should be replaced.
4. After the engine is at normal operating temperature or above, is the only time that the “rolled up newspaper” test that many people talk about should be performed! Take some newspaper and roll it up into a long narrow tube. **Be careful, keep hands and fingers away from the fan while performing this test!** With the engine at full operating temperature and idling, take the rolled up paper and insert it on the back side of the fan and try to reach the hub of the fan avoiding the blades until close to the hub. Push the rolled paper at the fan increasing the friction to the hub area of the fan. If the fan can not be stopped easily this is the fourth good indication, if it **can be stopped** the clutch is defective and should be replaced. Again, this test can only be performed when the engine is at or above full operating temperature.

Testing can be performed in any order but just make sure the conditions during testing are those that are specified for that specific test.

Do not continue to operate the engine if the temperature continues to rise and certainly stop if the temperature approaches “redline”.