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Operating Hints  
Flail Mower  
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#### A. Excessive Vibration.

Vibration is a MONSTER and if allowed to continue unchecked, can cause the complete break up of a machine in as little as 1/2 hours time. When cracks are caused by vibration, the two edges of the crack will be in line - in the same relative position as before the crack and will match up perfectly. If the crack (or break) is caused by just plain exceeding the ultimate strength of a part, the edges of the crack or break will be distorted - bent or twisted - and will no longer match up perfectly.

Very little vibration will be noticed on a Flail mower which is operating properly. If vibration does occur, the mower should be stopped and the trouble corrected, as warranty does not cover failures resulting from continued operation after something happens to cause the mower to vibrate excessively.

Vibration comes, on the Flail mowers, from some rotating part which is out of balance. This would be the cutter shaft or, from the drive shaft. To check where the vibration is originating, first be sure the ends of the universal drive shaft are parallel. Then if vibration is present, remove the drive belt and run the mower. If vibration is still present, it most likely is coming from and caused by a bent drive shaft. If so, the shaft should be replaced or straightened. If the vibration is gone - the drive portion of the mower is running smooth - then the vibration is probably coming from the cutter shaft (it could be a pulley out of balance or a faulty belt with a varying cross section, but this is not likely.)

The cutter shaft will run out of balance if:

1. Wire, rope, string, rags, etc. are wound around the cutter shaft, holding the knives in a folded back position. Remove such foreign objects and be sure all knives are free to swing to the extended position.
2. Knives are missing or broken. Replace missing or broken knives.
3. Knife hanger lugs are broken off shaft. This condition usually results from continued operation in contact with large hard objects where the knife hanger lugs themselves are hitting the hard objects. Lugs should be replaced.

4. Cutter shaft ball bearings are worn enough to have radial "play" in them. Replace ball bearing and other worn parts to eliminate "play".
5. Shaft is bent. The shafts are straight within a couple of thousandths of an inch when they are made. It is possible that they may become bent in use, such as if the shaft is hooked on a stump while the tractor is moving forward at good speed. Straightness can be roughly checked by anchoring a stick against something solid with the end of the stick just clearing the shaft. The shaft is then rotated by hand and the gap between the stick and the shaft noted. If the gap varies, the shaft is bent. The shaft should be straightened.

Shafts which have knife hanger lugs re-welded on them or which are straightened, should be checked when reinstalled in the mower to be sure they are operating smoothly. Shafts which aren't should be rebalanced.

#### B. Wrapping - Causes and Effects:

Wrapping is a condition where the grass or other growth being mown will wrap around the cutter shaft instead of being cut and mulched. This condition is caused by too low a cutter shaft speed.

Different grasses, vines, etc. cut differently and require different minimum speeds of the cutter shaft to keep it clear and free from wrapping. Tough fibrous growths are the hardest to cut without encountering wrapping and in some instances may require more than the nominal cutter shaft speed of 2000 RPM. Usually, however, 2000 RPM cutter shaft speed is enough to cut cleanly without wrapping.

The cutter shaft speed may be too low if not enough power is available to do the job to be done. If the mower is taken into a cut too tough for the power available, the cutter shaft speed will drop. If the speed gets too low, the cutter will start to wrap. The wound up grass will form a big wad at the end of the cutter shaft pressing against the cutter housing end plate. This wad will act like a big friction brake. It can become so tight that it will be impossible to turn the cutter shaft without first cutting the wad away. Such a wad naturally causes the mower to pull hard. We have here a situation where a lack of power actually causes a need for more power.

So much heat can be generated by a wad wrapped around the end of a cutter shaft that the bearing will actually turn blue. Naturally, such heat will destroy the heat treat in the bearing material and result in bearing failure. Even if the bearing does not get that hot it may get hot enough to melt the grease in the bearing. Once the grease is gone (it can happen in as quick as 15 minutes) there is nothing to keep the bearing from burning up due to lack of lubrication (even though the bearing was just greased). The type grease recommended for mower bearings has a high temperature melting point and will stay with the bearing under adverse conditions longer than ordinary greases. Bearings which fail because of above mentioned conditions are not defective in material or workmanship, and are not covered by warranty.

If a lack of power is the cause of slow cutter shaft speeds and subsequent wrapping, and more power can not be had, then - if the job is to be done successfully - the power requirements must be reduced to below that which is available. Several actions which can be taken to reduce the power requirements are:

1. Be sure the knives are sharp. Dull knives require more power to do what sharp knives will do. Other than this, it makes little difference whether the knives are sharp or dull. Where plenty of excess power is available, the dullness of the knives

would never be noticed. The only exception to this would be on fine lawns where, for the cleanest job, the knives should be sharp and in good shape.

2. Raise the cutting height. A great portion of the power needed is taken up in cutting the tangled matter undergrowth within several inches of the ground. It helps tremendously to take two passes to cut down growths which have not been mown for several years.
3. Take a partial swath.
4. Increase the cutter shaft speed. Normally, this would not help, as running the cutter shaft faster requires more power. However, where wrapping occurs (which could be prevented with more cutter shaft speed), the total power requirements could be less with the higher cutter shaft speed.

In summation: To prevent wrapping (which causes hard pulling and bearing burn outs), the cutter shaft speed must be kept up. This means 2000 RPM or, for some tough fibrous growths, maybe even more. To accomplish this, the tractor must be big enough for the job and in good condition. It must be operated at proper recommended speeds - not throttled way down. There must be enough power available to "cut the travel."



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