

6. TANDEM DUMP TRUCK OPERATIONS

The purpose of this section is to introduce the FMT III candidates to the basic operations of the tandem axle dump truck. The initial safety and preventive maintenance procedures required for the tandem dump truck are the same as the single axle dump truck.

Transmissions

When engaging the clutch, always start in the proper gear. An empty truck can be started in a higher gear than a fully-loaded one. Starting in a gear too high for the load or grade can cause clutch slippage that will cause too much heat and unnecessary wear. A gear that will start the vehicle moving with the engine at idle speed is usually correct.

Load and grade conditions permitting, the common practice of starting in a higher gear and/or axle speed is okay for units equipped with organic composition clutch facings, which have a longer slip period. Ceramic clutch facings with shorter slip periods are less forgiving, and if misused can deform the flywheel, in addition to the facing and pressure plate.

When starting to move, it is important that the clutch be fully engaged with the engine at idle RPM, then accelerated. Do not slip the clutch by raising engine RPM and riding the clutch. Erratic engagement can cause engine stalling and potential serious damage to the units drive train components (i.e. transmission, drive shaft, rear axle).

Don't shift until the tractor has reached the proper speed. Upshifting before the unit has reached the right speed is almost as bad as starting in too high a gear. When the difference between the vehicle speed and the engine speed is too great, the clutch is forced to slip, resulting in extra heat and wear. All trucks are equipped with tachometers, which show engine RPM and all engines are equipped with governors to prevent engine speeds in excess of the desired maximum or below a predetermined idle rate.

A veteran operator may know by the sound of the engine when to shift to a higher gear. A novice operator should observe the tachometer and upshift at the ideal engine rpm. This is usually between 1200 and 1500 rpm.

Under load on a level road, maintain engine RPM at about 90% of governed engine speed for adequate power and best fuel consumption.

It may be necessary to downshift to a lower gear when the load pulls the engine RPM down, when climbing a hill. The shift point differs from unit to unit. A starting point is to downshift before the engine tachometer falls below 1300 rpm.

Downshift before the engine actually pulls down to shifting speed on a steep uphill grade, because the truck will lose speed while shifting gears. Failure to downshift at the right time will result in the engine failing to reach full power and make another downshift necessary.

The diesel engine is effective as a brake in a downhill operation, but care must be exercised not to over speed the engine going downhill. "Watch that tachometer!" The governor has no control over engine speed when it is being pushed by the load. Operating an engine beyond maximum governed speed can cause severe damage. Use a combination of brakes and gears to keep the vehicle under control at all times and keep the engine speed below rated governed RPM.

Do not attempt to gear down while going down hill. This can prove to be very difficult and dangerous because the truck will pick up speed as soon as you push the clutch in. The faster the truck's ground speed, the higher the engine and transmission rpm must be to get into a lower gear. The transmission must be in neutral with the clutch released while the engine rpm is increased to match the truck's ground speed. Once the ground speed surpasses the possible governed engine speed, it will be impossible to down shift. If you find yourself in this situation, return to a higher gear. A higher gear is better than no gear at all.

Never coast with the clutch disengaged! This can cause clutch failure by the very high rpm encountered when coasting and releasing the clutch in gear. This can result in over 10,000 rpm, which is beyond the bursting strength of facing material.

Never turn off the ignition while going downhill! With the engine still in gear, fuel pressure will build up against the shut-down valve and may prevent it from opening when the ignition is turned on.

In order to properly upshift or downshift you must use the following procedure, known as **"double clutching"**.

Upshifting

1. Depress the clutch pedal to disengage the clutch.
2. Shift the transmission into NEUTRAL.
3. Release the clutch pedal.
4. Depress the clutch pedal immediately and shift into the desired gear.
5. Release the clutch pedal to engage the clutch.

Downshifting

1. Depress the clutch pedal to disengage the clutch.
2. Shift the transmission into NEUTRAL.
3. Release the clutch pedal.
4. Accelerate the engine rpm to synchronize the ground speed with the lower gear.
5. Depress the clutch pedal and immediately shift into the desired lower gear.
6. Release the clutch pedal to engage the clutch.

Road Ranger Transmission

Models in this series provide nine forward speeds and two reverse, consisting of five-speed front section and a two-speed range or auxiliary section.

The LO ratio in the front section is used only as a starting gear. The other four ratios are used once in Low Range and once again in High Range.

After shifting out of LO, you use the easy Road ranger repeat "H" shift pattern. Low Range and High Range are selected with the Range Control Knob. It is used once during the upshift sequence and once during the downshift sequence.

Always pre-select the range shift as shown in the detailed instructions. After pre-selection, the transmission will automatically make the synchronized range shift as the shift lever passes through neutral.

Detailed Shifting Instructions

In the following instructions, it is assumed that the driver is familiar with operating heavy-duty trucks and tractors, and can coordinate the movement of the shift lever and clutch pedal to make smooth gear engagements while upshifting or downshifting.
Always double-clutch when making lever shifts.

Upshifting

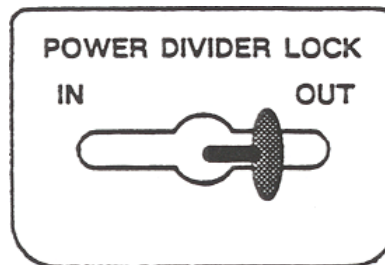
1. Move the gear shift lever into neutral.
2. Start engine and wait for the vehicle's air system to reach normal line pressure.
3. Make sure the Range Pre-selection Lever is DOWN in the LOW range position.
4. With the clutch disengaged, move the shift lever to the LO speed gear position.
5. Release the clutch pedal to start vehicle moving.
6. Upshift, double-clutching, from LO through 1st, 2nd, 3rd, and 4th while in Low Range.

7. PULL UP the Range Pre-selection Lever and move the shift lever, double-clutching, to the 5th speed gear position. As the shift lever passes through neutral, the transmission will automatically shift from Low Range to High Range.
8. Continue upshifting, double-clutching, from 5th through 6th, 7th, and 8th gear while in High Range.

Downshifting

1. Move the gear shift lever, double-clutching, from 8th through 7th, 6th, to 5th while in High Range.
2. PUSH DOWN the Range Pre-selection Lever and move the shift lever, double-clutching, to the 4th speed gear position. As the shift lever passes through neutral, the transmission will automatically shift from High Range to Low Range.
3. Continue downshifting, double-clutching, from 4th through 3rd, 2nd and 1st to LO while in Low Range.

Tandem axle Power Divider



The tandem axle power divider or inter-axle differentials in the forward rear axle are controlled by the dash mounted power divider lock switch.

Under normal highway conditions (good traction), the power divider lock switch should be in the OUT position. This will allow for the differential action between the forward, rear-axle and the rear, rear-axle, which will prevent the inter axle differential from wearing down.

The power divider lock (PDL) should be in the IN position to prevent the inter-axle differential action when operating on slippery surfaces (poor conditions). The idea behind the PDL is to allow better traction capability within the tandem axles and reduce the slipping of the tandem in less than normal conditions.

Remember to switch the PDL to the IN position **ONLY** when the tandem has come to a complete stop or when moving in low low gear. **NEVER** try to switch the PDL in the IN position while the wheels of the tandem are spinning.

Do not operate the PDL in the IN position on dry pavement (good condition). This will result in excessive tire wear and premature axle wear.

Never attempt to engage the PDL switch to the IN position while shifting from one range to the next. The PDL must be switched only when in low range and at low-low gear.

Remember that the PDL is used only when traction is poor, slippery and in rough terrain.