Where: RADIUS = Pitch circle radius of chain sprocket spur gear or belt pulley.

and F = Application Factor i.e.

Chain sprocket - 1.00 Vee/Wedge pulley - 1.50
Spur Gear - 1.25 Flat Belt pulley - 2.00

The maximum permissible shaft loads are given in the table below and are concentrated loads imposed at the centre of the keyway, midway along the shaft length. Any deviation from this position will increase or decrease the amount that can be safely applied.

Carter MK01 & 02 Type Variators: Maximum overhung load = 135 N (30lb)

SPEED CONTROLS

Speed control settings are adjustable with the variator running or stationary and frequent or infrequent speed changes can be made without detriment to the unit. The control can be used to positively accelerate or dynamically brake the driven load, providing the main driving motor remains energised.

They are usually set up and tested prior to despatch. However, to avoid damage during transit, combined handwheel and speed indicator controls are packed in a protective carton and supplied loose.

Electric remote and electronic controls should be set up in accordance with the appropriate technical data sheets supplied.
OIL LEVELS
When installing MK01 & 02 Type Variators fitted with flange mounted RS Series Reduction Gears it is important to remember that these have SEPARATE OIL SUMPS (see fig 1)

Fig.1 Horizontally mounted

1. OIL FILLER/ BREATHER PLUGS
2. OIL LEVEL PLUG
3. OIL DRAIN PLUGS
4. CARTER VARIATOR
5. RS SERIES REDUCTION UNIT
6. OIL RESERVOIR COVER

FILLING VARIATOR - horizontally mounted
Check oil drain plug is in position and tightened. Remove oil level plug and reservoir cover. Fill variator by pouring correct grade of oil into the filler aperture until it leaks from oil level hole.

Replace and tighten down cover and level plug. Subsequent 'topping up' may be done by removing filler/breather plug and fill through aperture.

APPRECIATE OIL QUANTITIES

<table>
<thead>
<tr>
<th>Unit Size</th>
<th>Oil Capacities (approx)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Litres</td>
</tr>
<tr>
<td>CARTER VARIATORS</td>
<td></td>
</tr>
<tr>
<td>MK01 &amp; 02</td>
<td>1.5</td>
</tr>
<tr>
<td>RS SERIES REDUCTION UNIT</td>
<td>0.4</td>
</tr>
<tr>
<td>GMOD</td>
<td>0.6</td>
</tr>
<tr>
<td>GM1T</td>
<td>0.6</td>
</tr>
</tbody>
</table>

RECOMMENDED GRADES OF OIL
Use a straight mineral oil of good quality, preferably with anti-oxidant, anti-foaming, anti-rust, film strength improvement and low pour point additives and with a flat viscosity curve to ensure ease of starting when cold. COMPOUND OILS MUST NOT BE USED. The standard grades of Shell oil suitable for normal ambient temperatures shown below.

Other standard grades may be used provided they conform to the specification relevant to site conditions. Details available on request.

In exceptional conditions such as extremes of temperature, high humidity, corrosive atmospheres etc., consult your oil supplier for recommendations. These should be based on the oils listed for normal conditions.

SHELL OIL COMPANY - Recommended Grades

<table>
<thead>
<tr>
<th>AMBIENT TEMP RANGE CENTIGRADE</th>
<th>OIL GRADE</th>
<th>MOUNTING ASSEMBLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 13</td>
<td>MOBIL DTE13M</td>
<td>MKF VARIATOR WITH DIRECT FLANGED MOTOR</td>
</tr>
<tr>
<td>13 - 30</td>
<td>MOBIL DTE15M</td>
<td>SHELL TELLUS T46</td>
</tr>
<tr>
<td>0 - 43</td>
<td>MOBIL DTE16M</td>
<td>SHELL TELLUS T100</td>
</tr>
<tr>
<td>0 - 43</td>
<td>MOBIL GEAR 632</td>
<td>RS SERIES REDUCER FLANGED TO VARIATOR</td>
</tr>
<tr>
<td>0 - 43</td>
<td>SHELL OMALA 320</td>
<td></td>
</tr>
</tbody>
</table>

INITIAL STARTING
Before any attempt is made to run the Carter Variator it must be filled with the appropriate quantities and grades of CLEAN oil as detailed above. Note that where flange mounted RS series or worm reduction units are fitted, these have separate oil sumps and require different grades of oil to the variator.

If the Variator requires filling, leave it to stand for 10 minutes, then set the control to zero. (Approx 9 turns of control spindle = Max. forward speed - 0 - Max. reverse speed).

Start motor and check rotation. It should be as that indicated on rotation indicator plate fixed to oil reservoir cover (usually clockwise looking on motor fan).

Slowly adjust speed control between half speed and zero (in both output directions if possible) approximately six times, applying a light load to the output shaft. Then run it continuously at half speed for approximately 10 minutes.

The Variator should now be ready for operation. If, however, it fails to reach maximum output speed, or produces excessive noise, the above procedure should be repeated to release air still trapped in the hydraulic system.

WEEKLY MAINTENANCE
Examine oil levels and ‘top-up’ as required. If regular ‘topping up’ is required, check shaft seals and all external fastenings for leaks.

OIL CHANGES
Under normal circumstances of temperature and environment, the oil should be changed every 2500 hours or 12 months, whichever is the sooner. Where other working conditions apply consult your oil supplier. Take care to ensure that dirt does not enter unit whilst changing oil. The oil will flow more freely if it is warm (after the drive has been running) and if the reservoir cover or breather/level plug is removed. Finally, it is advisable to remove, clean and replace oil filter element - located under the reservoir cover - before re-filling the Variator.

OIL LEAKAGE
Where oil leakage is evident, the relevant oil sealing component will need to be renewed as soon as possible. However, oil leakage will in general have no effect on the Variator’s performance unless the level in the Variator’s sump falls so low that the hydraulic circuit is starved, thus causing eventual drive failure. A weekly check on oil level should prevent this and give an early indication of leakage.

NOTE The instructions under ‘INITIAL STARTING’ should be carried out whenever the oil sealing components have been renewed.

MAJOR OVERHAUL
Eventually an extensive examination and overhaul will be required and this is best carried out at our works where all parts are stocked and, of prime importance, variators can be thoroughly tested before despatch. However, where this is impracticable, detailed instructions for the required procedure are set out in our Service Manual, which is available on request.

For overseas installations, our agents are, in general, equipped to carry out examinations and repairs.

Fig.2 Vertically mounted

1. OIL FILLER/ BREATHER PLUGS
2. OIL LEVEL PLUG
3. OIL DRAIN PLUGS
4. OIL VENT PLUG
5. CARTER VARIATOR
6. OUTPUT SHAFT