TRAINING ON ANTAM STANDARD CODE
For TESTING OF KNAPSACK MISTERS CUM DUSTERS

Theory 15: Turning Ability (Test Code Section IV(6) and D- 4 of Annex D)

2nd Training of Trainers on ANTAM Codes
16 - 28 October 2016, Nanjing China

ANTAM
Asian and Pacific Network for
Testing Agricultural Machinery

Turning performance

- ☐ Power till is basically a two wheeled tractor that is controlled by operator walking behind it.
- ☐ The Mechanism of turning of a power tiller is different from other vehicles like tractor.
- ☐ The power tiller uses a pair of steering clutch to turn the wheels.
- ☐ The wheels have no independent brake and hence the turning is not completely controlled
- ☐ When power is cut off to a drive wheel by the steering clutch, the wheel continues to turn due to the directional inertia of the chassis and the rotary inertia of the wheel.
- ☐ The wheel behaves as a free rolling wheel and its resistance is from the soil.
- ☐ At low forward speed the turning is controlled as the free wheel will come to a halt and the driving wheel takes the power tiller in to a turn.
- ☐ At high speeds, the rate of turn is proportional to the angular speed of the driving wheel and the power tiller may take a rapid turn.

Turning performance

- When used under field condition, the power tiller has to make a sharp turn to enable it to turn with minimum head land.

- The turning time is also reduced with turning radius.

- The steering clutch is usually a dog clutch and the engagement if very rapid.

Turning mechanism
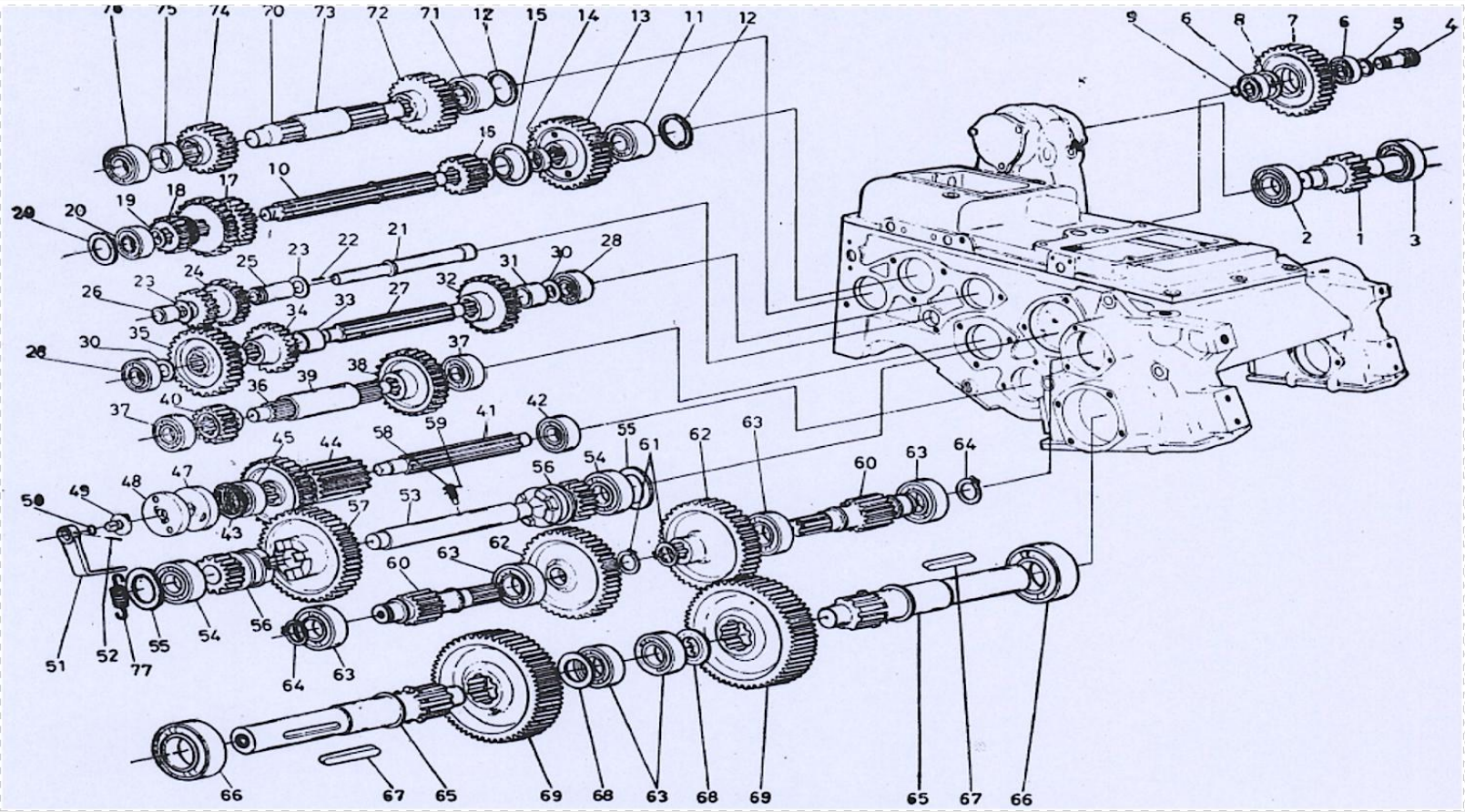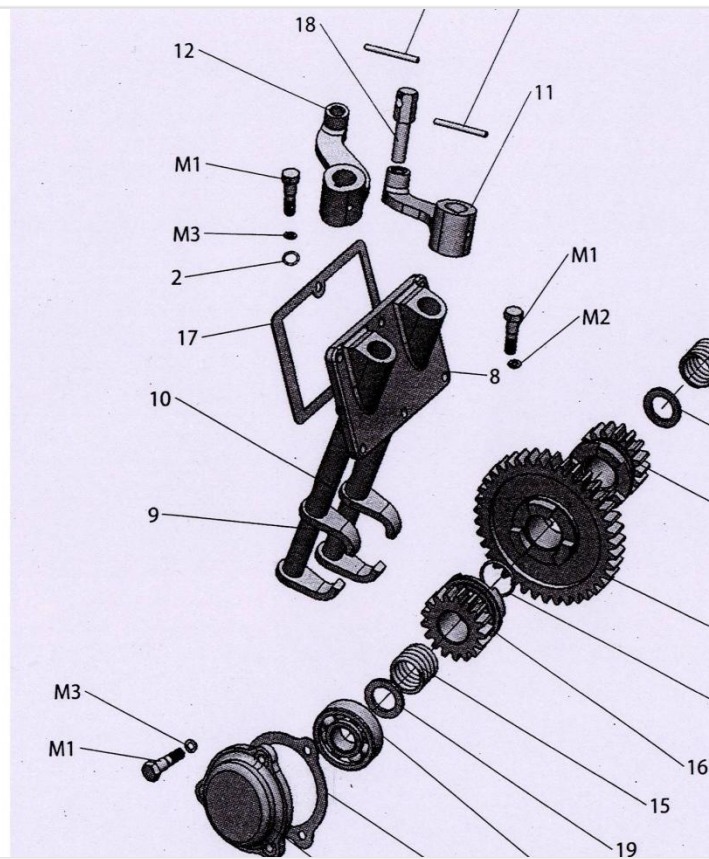
TURNING ABILITY

ANTAM 001-2016

- [ ] The test area shall be a horizontal compacted or paved surface having good tyre adhesion and capable of displaying legible marking.

- [ ] The power tiller shall be tested with all liquid reservoirs filled to the specified level but without ballast, mounted implements and any other specified components (lS 9935 :2002)

- At the beginning of the test, the height of the tyre tread bars shall not be less than 65 percent of their height when new. The inflation pressure in the tyres shall be maintained as recommended for the road work by the manufacturer.

- The test shall be conducted with the power tiller without tailed wheel at the minimum attainable speed. The measurement of the turning circle and turning space are referred in figure

Requirement of surface

- ☐ The test area shall be a compacted or paved dry surface affording good tire adhesion, capable of displaying legible markings, and resistant to defacement by turning machines.

- ☐ The test surface shall be visually flat, with no more than 3 % grade in any direction. (ISO TC 23 N790 Date: 2012-02-28, IS11859-2004)

Definition IS 11859 -2004

Turning Diameter — Diameter of the circular path described by the centre of tyre contact with the surface of the test site of the wheel describing the largest circle when the tractor is executing its sharpest possible turn under the test conditions described.

Clearance Diameter — Diameter of the smallest

circle which will enclose the outermost points of

projection of the tractor and its equipment while

executing its sharpest possible turn.

Definition of
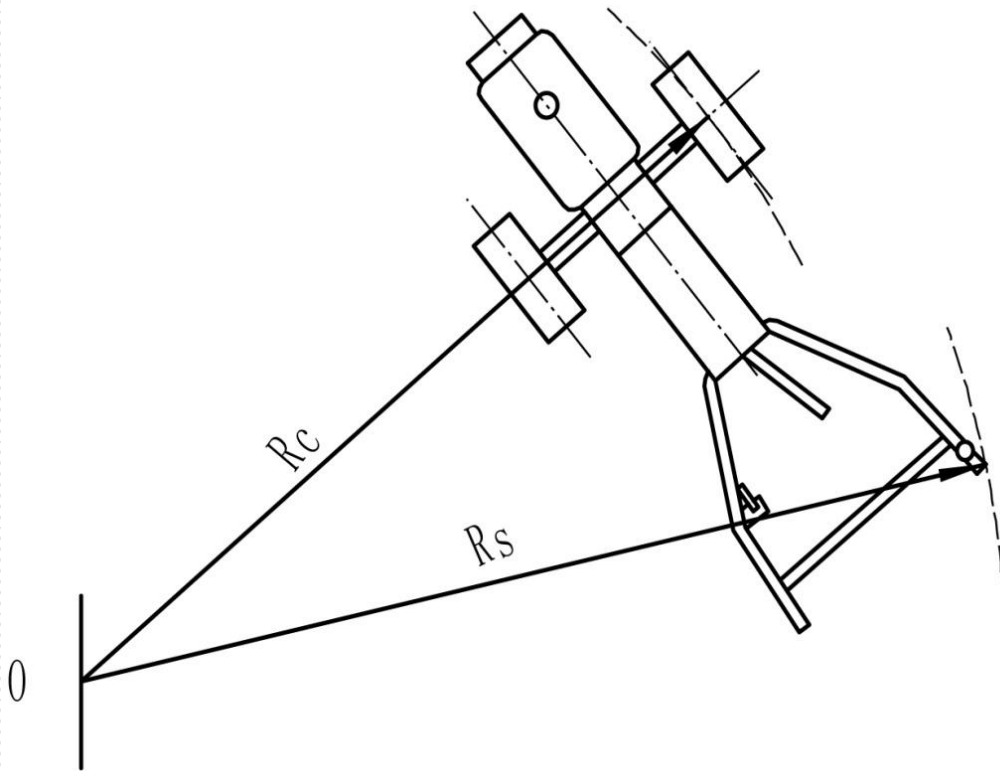
Rs=turning space radius
Rc=turning circle radius

- The test shall be carried out on the power tiller by turning it to the right and the left side by the use of steering clutch till a 360^0 turn is completed. During the test the following shall be recorded:

- a) Diameter of the minimum turning circle, and

- b) Diameter of the minimum turning space required.

Points to be noted:

- All tests shall be conducted with un ballasted tractor and moving at 1.5 to 2.0 km/h (IS 11859-1986)

- The wheel track setting should be that recommended by manufacturer (IS 11859-1986)

Procedure (IS 11859 -2004)

Continue to drive the tractor slowly forward on the same lock for a further complete turn, at a speed not exceeding 2 km/h. At short regular intervals around the turn, mark on the ground those points coinciding with the centre of the tyre-to-ground

contact area of the outermost wheel. Make the marks immediately behind this contact area and determine the position of each mark by visually projecting
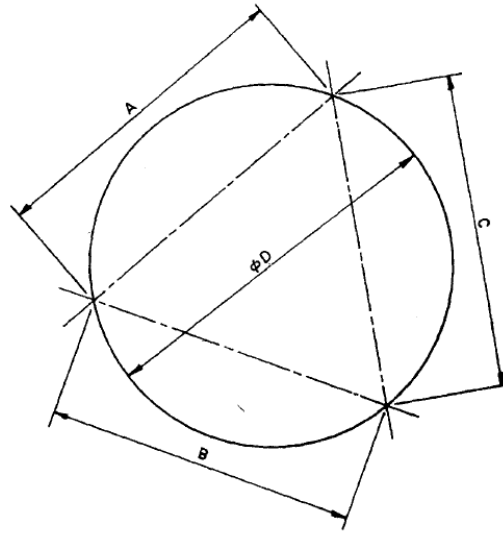
vertically downwards from the centre of the tyre tread width at points on the tyre circumference situated as close as possible to the ground. The marking may be done with or without stopping the tractor. The broken circle formed by the marks on the ground is the turning circle.

During -the turn , stop the tractor and drop a plumb-line to the ground from the outermost point of the tractor (that is, form the point of the tractor describing the largest circle). Clearly

mark the point on the ground beneath the plumb-line: this point lies on the tractor clearance circle.

Calculation of turning circle

$$D = \frac{2ABC}{\sqrt{2\left(A^2B^2 + B^2C^2 + C^2A^2\right) - \left(A^4 + B^4 + C^4\right)}}$$