

DESIGN AND CONSTRUCTION OF A DUAL PURPOSE TWO WHEELED
TRACTOR GEAR BOX AND STEERING WHEEL ATTACHMENT.

By

WEERAKONDABADUGE KAPILA RUWAN PEIRIS

Thesis

Submitted in partial fulfillment of the requirements

for the degree of

MASTER OF PHILOSOPHY

in the

POSTGRADUATE INSTITUTE OF AGRICULTURE

of the

UNIVERSITY OF PERADENIYA

PERADENIYA

MARCH 2004

C 631.372

P23



557030

AGRICULTURE LIBRARY
UNIVERSITY OF PERADENIYA

557030

Abstract

Two-wheel tractor is a popular, widely used agricultural machine in Sri Lanka. The size and topography of most farmland, uplands as well as low-lands, match the capacity of the two-wheel tractor. The tractor is used as a) traction device for ploughs, rotavators, levelers etc., b). Power source for milling, threshing and winnowing, and water pumping, c). Carrier cum power source, and propelling device for combine harvesters and grass cutters. Also, it is used very widely in farmlands as well as in urban and suburban roads for transportation of goods as well as people. The independent-clutch steering mechanism in the two-wheeled tractor meant for agricultural purposes is not satisfactory for road transportation since it confuses the operator and leads to many other difficulties. There is no definite fixed relationship between steering input and output. To overcome these problems, differential type gearboxes have been introduced to the two-wheeler, with steering wheel attached to the trailer. In these steering wheel type two-wheelers, although the steering problems in transportation are eliminated, their potential as agricultural machines is lost. This is due to the elimination of the independent clutch system. Those two-wheelers with differential-type gear boxes can be used for land preparation by adding an independent brake system for the two traction wheels; but with the problem? such as the reduction of torque on the outside wheel when turning, need of a differential lock etc. will arise. Therefore, this is not a solution to the problems of the two-wheel tractor in transportation, while maintaining its agricultural features. Instead, this "Solution", however, has converted the two-wheel tractor to a road transport vehicle disregarding all its agricultural potential.

The objective of this study was to come up with a gearbox (final transmission) with a differential unit but without excluding the prevailing independent clutch system, which then with the steering wheel and the differential unit in action, could be used for transportation, and for land preparation with the normal independent clutch system. The mechanism introduced as a result of this study ensures the above said dual-purpose use of the tractor. By removing the trailer (with steering box and steering wheel), changing a gear, and connecting clutch cables to the handle this tractor could be converted for normal land preparation with independent clutch system. In this gear box the facility of differential lock is available in transportation. Also, this gearbox can be used to make four wheelers, three-wheeled combine harvesters with steered rear wheel, and three-wheeled trucks with front steered wheel etc.