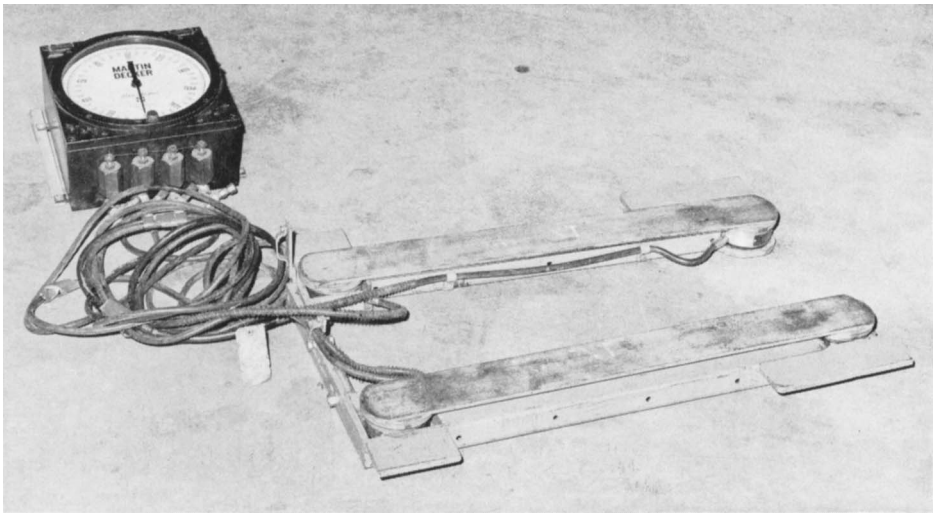
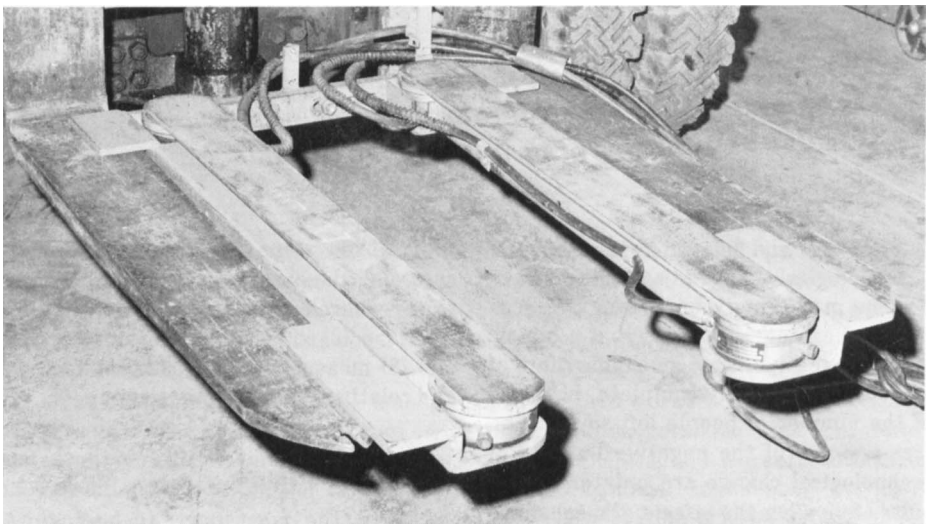


Fig. 1. Weight indicator dial with load cell mounting frame.

New weighing unit revolutionizes field research

James T. Yeager ■ James J. Mehlschau

Fig. 2. Load cell frame mounted on fork lift for carrying and weighing fruit bins.



Applied agricultural field research often stresses crop yield as a primary measure of treatments tested. With the advent of mechanical harvesting, yield data have been more difficult, or impossible, to obtain by direct methods because the commodity to be measured has been handled in bins or other large containers instead of small boxes. Indirect methods for determining yields are not always accurate and may slow a grower's harvest operation, making yield collection very costly and time consuming.

To adapt to mechanical harvesting operations and to gather yield data more precisely, various weighing systems were investigated at the University of California, Davis, that would meet the following criteria: be accurate; be usable when subjected to adverse conditions such as dust, moisture, and temperature extremes; be able to handle loads over ½ ton for varying field conditions; be flexible enough to be used on various pieces of harvesting equipment; and be portable.

A weighing system with a hydraulic load cell was selected and mounted on a frame designed for mechanical harvesting equipment used today by California fruit and nut industries.

The compression load cell system is hydraulically operated, requires no external power source, and is accurate to ± 0.2 of 1 percent of full scale capacity. The four-cell system transmits a no-lag, linear-load-indicating hydraulic signal to a totalizing gauge indicator. This is accomplished by a sensator diaphragm sensing element held in place by the load cell housing.

The mounting frame was designed to protect the load cell system, to adjust to various fruit catching frames and delivery systems used by the fruit industry, and to support a commercial fruit bin.

The selected load cell system has a capacity of 2,000 pounds which gives some weighing safety margin, assuming the maximum gross weight of a filled bin generally does not exceed 1,600 pounds. The weight indicator dial is hung on the bin or harvesting equipment, and can be tared for each bin, resulting in instantaneous readings of net weights. Returning the dial to 0 pound between individual measurements eliminates accumulation of weights and subtractions to determine single-tree or plot-yield weights.

The mounting system is quite versatile and can be utilized for any application where a forklift or its equivalent is used to handle containers.

By using a bottom dump bin or other appropriate containers, yield data can be obtained for grain, vegetable, and nut crops that are harvested into various transporting vehicles that don't have bin handling systems. It also works effectively in the field or warehouse as a platform scale.

After five seasons' use during harvest of experimental fruit and nut plots in California, the system has revolutionized the gathering of yield data. It has paid for itself in man hours saved and has made it possible to gather accurate yield data from sufficient numbers of trees for more statistically reliable results.

James T. Yeager is Extension Pomology Research Associate, and James J. Melschau is Associate Development Engineer, University of California, Davis.