A NEW PORTABLE SPEED RECORDER AND A COMBINATION TRAFFIC COUNTER AND SPEED RECORDER

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SYNOPSIS

In response to the recognized need for a practical speed recorder, the State College of Washington, in cooperation with the Washington State Highway Department has undertaken to develop such an instrument. It is believed the successful conclusion of this development will be of special interest to traffic engineers and to enforcement personnel having to do with the handling of vehicular traffic

Prior to undertaking work on the speed recorder, specifications were formulated to cover what was believed to be the most desirable practical type of instrument for use by the traffic engineer. These consist of three principal items:

1 It must in no way affect the normal flow of traffic
2 It must be self contained and easily portable.
3. It must be capable of being set up and operated by one man.

The completed instrument as turned over to the Highway Department has met these specifications with a record of over a year's satisfactory performance In the meantime, successful application of the same electrical circuit has also been made to a stationary traffic counter. The paper contains a description of both the portable and the stationary types

When the new traffic counter was checked against an eight hour manual count, it showed a total error of one in 400. During that interval, the counter made several errors due to trailers, and to passing cars, but these appeared to be compensating rather than cumulative

A two-way portable speed recorder recently developed * to meet the needs of the highway traffic engineer consists of two separate units, each mounted on its sturdy tripod, and operated by a storage battery. The light source unit projects two parallel light beams across the highway and into two photo-electric cells in the receiver unit. These control an electrical circuit capable of measuring the time interval between the interruption of the two light beams by a passing car.

The horizontal spacing of the parallel light beams is 24 in., although 18-in. spacing has been used successfully. Wider spacing, of course, would also be permissible. Infra-red filters make the light beams invisible to the motorist at night.

An experienced man can set up and adjust the entire equipment ready for operation in a minimum of 12 min., although it customarily takes about twice that long for the usual setup. Two men, of course, can accomplish the alignment of the light beams much more easily, since one can adjust the transmitter unit while the other observes the results in the receiver unit. After being set up and in operation, it requires only one man to observe the indicating meter and record results, or to supervise the recording meter and make notes. One man can demount and load the equipment on a car or truck in from six to ten minutes.

When demounted for transporting, the transmitter unit consists of three separate items: the battery in its case, the tripod, and the light source assembly including lamps, filters, and lenses. The receiver unit consists of its battery and case, a tripod, and the receiver assembly including lenses, photo-electric tubes, the speed

* Credit is due Mr. Howard F. Clarke, graduate student, and Hugo Libby, Chief Engineer of KWSC for their assistance in developing this device.

measuring circuit and the high voltage power pack. The speed indicating meter, or the speed recording instrument, as the case may be, is attached to the receiver by means of a polarized two-wire extension cord of any practical desired length.

The electrical circuit of the speed recorder is designed for two-way operation;

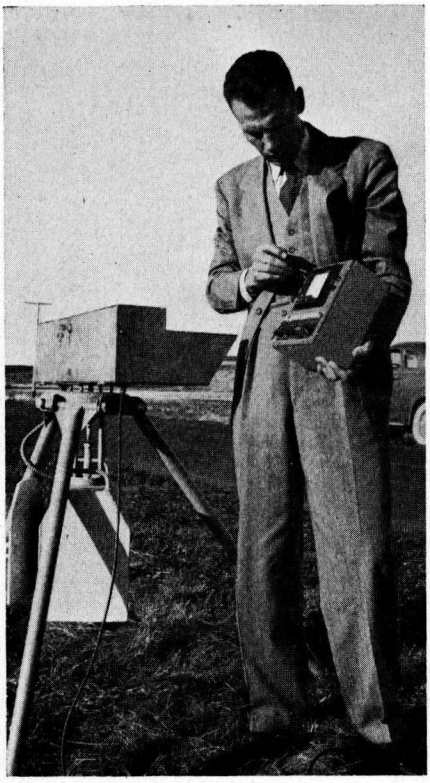

Figure 1

This shows a close-up view of the receiver and of the attached 50-foot extension cord which permits the observer to take the indicating meter to a position out of view of the motorist.

hence many of its components are symmetrically arranged. It has two photoelectric cells controlling two thyratron tubes, which in turn, from a common battery, draw current through two impulse circuits. The sequence in which the light beams are interrupted determines which of the two impulse circuits will charge the timing circuit to which both are connected in common. Included in the timing circuit is an indicating meter, or optionally, a recording meter with its hand set at center zero. Right hand traffic causes a right hand deflection, and left bound traffic causes a left hand deflection of the meter.

Since the electrical circuit actually measures the time interval between the interruption of the two parallel beams by the passing vehicle, the deflection of the indicating meter is proportional to this time interval and inversely proportional to the speed of the car. The exact ratio depends upon the component parts of the electrical

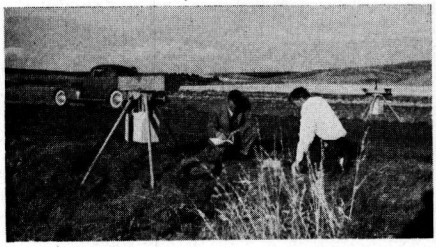

Figure 2

In this case, one man reads the meter while the other records the reading together with data such as type of car, state license, etc. Normally, these men would be concealed from the view of the motorist.

circuit, but it appears to be logarithmic in character. Original calibration was made by means of a car with a calibrated speedometer driven across the light beams, and at various speeds from minimum to maximum.

The accuracy of the speed recorder is not dependent upon the constancy of the optical system, hence a reasonable variation in light brilliancy does not change the calibration. In repeated test runs, the speed recorder indicates car speeds consistently within one mile per hour of those reported by the test driver.

Several months of field use have proved this instrument capable of providing data

on speed of traffic more easily, more rapidly, and more accurately than by any other practical method now available.

Upon the successful conclusion of the development of the speed recorder, work was undertaken to adapt the electrical circuit to a two-way traffic counter. Several years ago Washington State College had developed a two-way traffic counter for the State Highway Department, using a dozen relays and about three dozen pairs of contacts. The new circuit, replacing the original equipment in this counter, employs but two relays and only three pairs

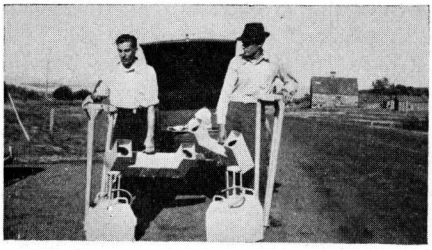

Figure 3

When demounted, each unit is easily portable and can be stowed in a small space for transporting. The batteries remain in their cases for more easy handling.

of contacts. It operates to count the traffic in each direction and tabulates it separately. Each hour the two totals are stamped on a clock driven tape.

In addition to functioning as a two-way traffic counter, the same instrument also will now function simultaneously as a two-way speed recorder. When the speed recording meter is plugged into the circuit, a speed record is made of all passing traffic. If the traffic engineer, or a patrol officer, wishes to observe traffic speeds, he may use an indicating meter connected to the traffic counter by means of an extension cord. The dial of the meter is calibrated directly in terms of speed in miles per hour, and since the pointer rests at center zero, the deflection to right or to left denotes the direction of travel of the passing car.

The perfection, therefore, of this new and simplified electrical circuit has made available to the traffic engineer a portable two-way speed recorder, and also a combination two-way traffic counter and speed recorder. Obviously, of course, the latter

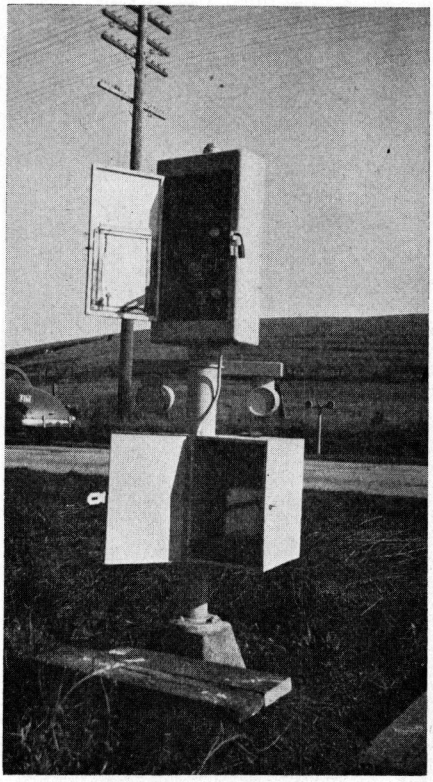

Figure 4

When adapted for permanent installation the equipment would be mounted on concrete foundations as shown, and suitably protected from weather. The portable recording meter is plugged into the circuit and placed in the cabinet as shown, or it may be moved to a distance and operated through the extension cord. Operation of the speed recorder in no way affects the operation or accuracy of the counter function.

may be either of portable type or designed for permanent installation. In the latter event, it would be operated from a 120 volt A.C. source.

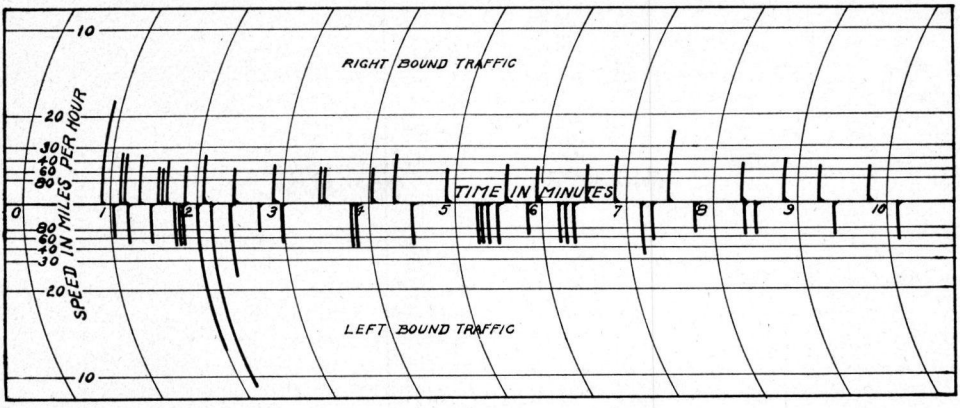

Figure 5

A typical strip chart record was constructed from data secured on the traffic counter shown in Fig. 4, and is intended to show the actual full scale calibration of this instrument. The observer would make notations on the chart as to date, time of day, location, etc. On a busy highway, high chart speed would be used, while on light traffic, a much slower chart speed would give a satisfactory record.

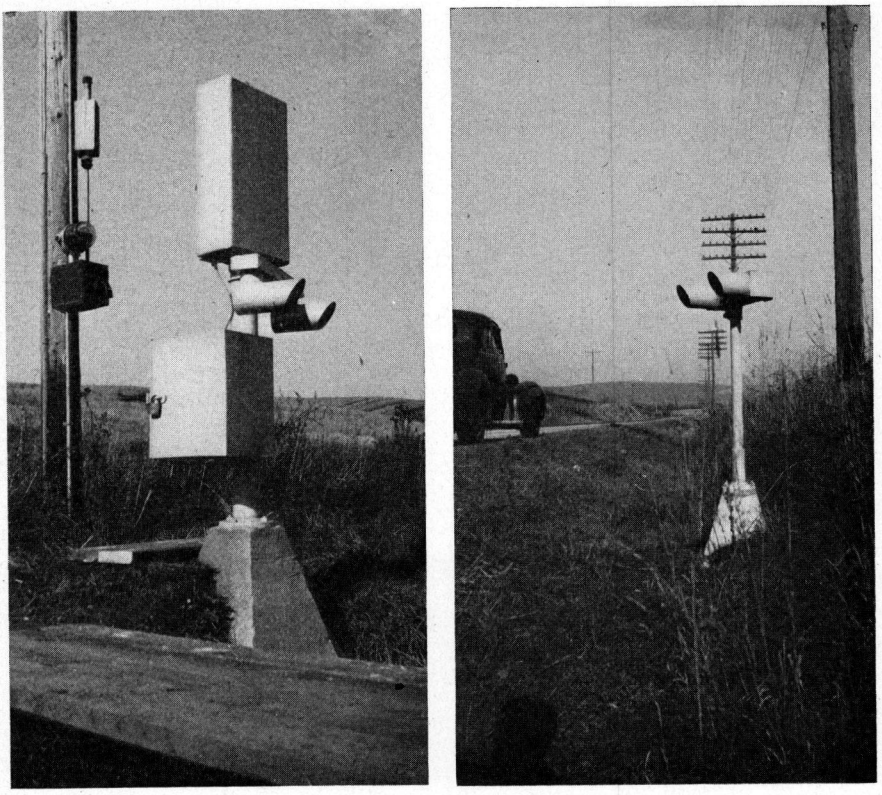

Figure 6

The parallel beams on this counter are only 18 in. apart. However, it is recommended that spacing be not less than 24 in. and preferably 36 in. Rigid foundations are essential to maintain alignment of the beams.