

CHAPTER 7  
TRAFFIC COUNTERS



## 7.1 INTRODUCTION

The Traffic Counters were used by the Pavement Study Group to determine traffic flow rates on specific road sections under study.

The three types of automatic traffic counters shown in Figure 7.1 were used. They were the Leopold and Stevens recording traffic counter with a perforated paper tape readout, the Streeter Amet Junior traffic counter (with a pneumatic tube), and the Fischer and Porter 3000 loop detector traffic counter. In addition to the automatic type of counter, two manual counters were used. They were multiple-tally boards, containing six manual mechanical counters mounted on a clip board, and the Keuffel and Esser 89-1100 hand-held manual mechanical counter.

A number of manufacturers of automatic traffic counters were considered. The selection was made based on recommendations of the owners of the particular traffic counters purchased. The units were selected to cover a variety of applications. The manual counters were purchased to provide high mobility for short-term counts at specific locations.

In general, battery maintenance proved to be the most difficult problem with all of the automatic counters. Batteries in Brazil are quite expensive and generally of low quality. It proved impractical to import batteries for the traffic counters, because of the short shelf-life of dry cell storage batteries and the uncertainty regarding when and how many batteries would be needed.

When possible, traffic counters were located at police posts on road sections. If this could not be done, the counter itself was buried at the site in order to hide it. Prior to this practice, two counters were stolen. The Leopold and Stevens counters have rechargeable batteries and were supplied additional power by fitting main powered battery chargers on them. These counters were kept at police posts but occasionally their batteries would run down. In some cases the outbuilding, housing the counter, had only a single electrical outlet and the assumption was that other devices superseded the traffic counter in importance.

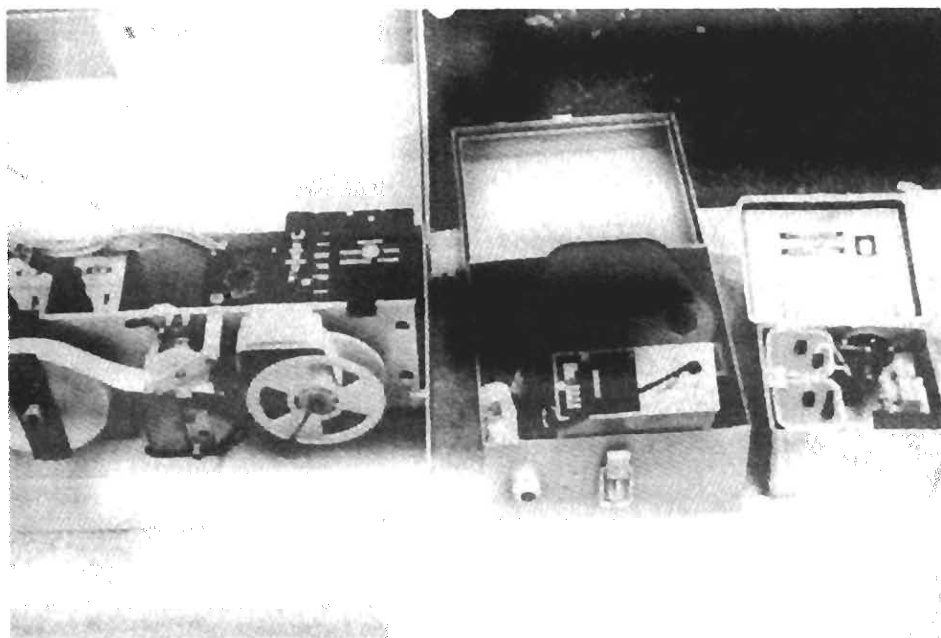


FIGURE 7.1 - THREE TYPES OF TRAFFIC COUNTERS USED IN THE STUDY

## 7.2 LEOPOLD AND STEVENS COUNTER

The Leopold and Stevens counter delivers its output on teletype compatible punched paper tape which is also directly readable. This feature eliminated the need for the operating staff to monitor the counters at frequent intervals. The traffic count is summed and punched on the tape at selectable time periods, from 5 to 60 minutes. The counter can be used as a sensor on either loop detectors or pneumatic road tubes. It can simultaneously record traffic in both directions or in two lanes of the same direction. The supply of tape lasts months without the need for changing, depending on the output interval used.

### 7.2.1 *Installation and Operation*

The traffic counter installation required cutting the pavement surface for the installation of the loop detector wires. Also, a main power source was required.

Operation required that the installer turn on the power, install a fresh reel of paper tape and press the RESET switch to start the timer at zero. Also, the configuration switches were set to cause the output format to reflect the number of loops and direction of traffic per loop.

### 7.2.2 *Maintenance*

The Leopold and Stevens counter is a well-designed and constructed instrument. However, it was difficult to keep these units out of the workshop and in the field. The CMOS circuitry used in this sophisticated device is susceptible to destruction from high static charges that may be introduced onto the circuit boards by handling them. The unusually high circuit failure rate experienced with these units indicated that the circuit boards were mishandled by the installer in an attempt to "get a counter going" from some real or imagined malfunction. Regardless of the cause, it is recommended that these counters not be used in exacting environments.

Two counters were hit by lightning. Both were repaired, however.

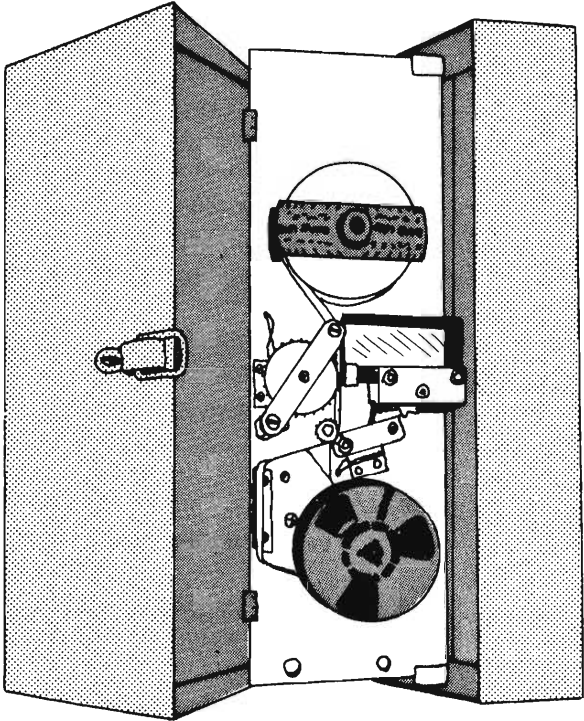


FIGURE 7.2 - LEOPOLD & STEVENS TRAFFIC COUNTER

### 7.2.3 *Recommended Repair Facilities*

One electronics engineer  
One top electronics technician  
Volt-ohm meter  
Oscilloscope  
Hand tools

## 7.3 *FISCHER AND PORTER COUNTER*

The Fischer and Porter 3000 Counter is of the loop detector type, supplied with an electromechanical counter to record traffic flow. It records only one lane or direction at a time. These counters were generally used at remote locations and buried at the site for concealment. They are powered by a large 7.5 volt dry cell battery housed in the same steel box as the counter unit. No sensitivity adjustments or controls are required of the operator, which makes the unit simple to use. The counters must be read at frequent intervals to establish the periodic traffic flow rate desired. This kept the installer quite busy visiting each installation to recover data counts. Figure 7.3 shows the counter.

### 7.3.1 *Maintenance*

As previously mentioned, the battery situation created the major maintenance difficulty with these counters. The type of battery required was unavailable in Brazil. The problem was solved by constructing batteries from large "Bell battery" single cells configured to supply the 7.5 volts needed.

These counters proved to be very reliable. The only required repairs were from damage inflicted by a leaking battery and from water damage when the counter was submerged during a heavy storm.

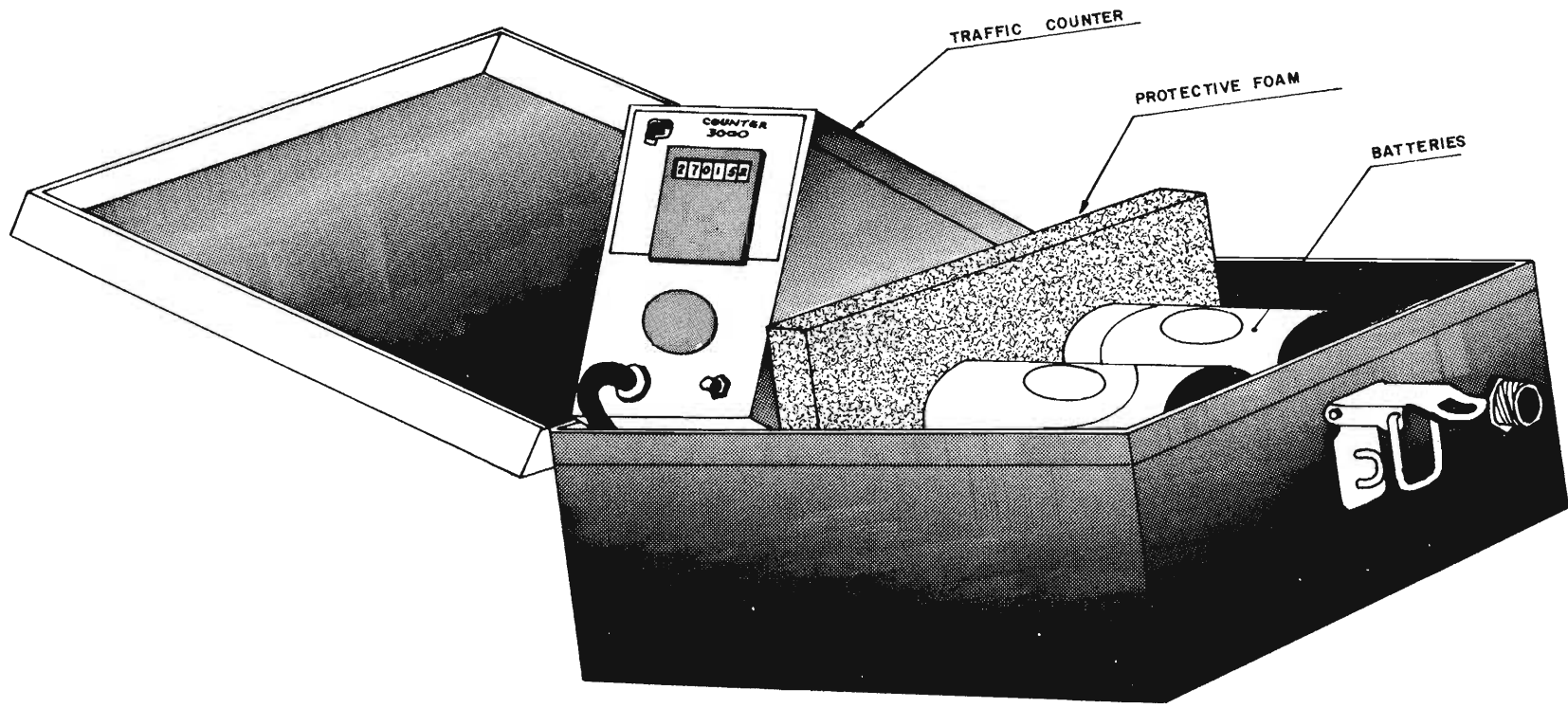


FIGURE 7.3 - FISCHER & PORTER COUNTER 3000



### 7.3.2 *Recommended Repair Facilities*

One electronics technician  
Volt-ohm meter  
Oscilloscope  
Hand tools

## 7.4 *STREETER AMET COUNTER*

The Streeter Amet junior traffic counter is a small battery-powered pneumatic tube counter. Its readout is an electromechanical register viewable through a small window in the traffic counter cover. It only accommodates one tube so it cannot distinguish between traffic lane or direction. The counter is illustrated in Figure 7.4.

Such counters were used at remote sites and chained to an immovable object for security purposes. Nevertheless, two of them were stolen from their roadside position. In general, the road tube was not a suitable type of sensor because the very coarse texture of many of the roads prematurely shortened the life of the thick rubber tubes.

The junior traffic counter has two adjustments, one for sensitivity and the other for wave suppression within the tube itself. These adjustments interact, which makes them too complicated for project field personnel. If the controls are poorly tuned, the result can be either a multiple register from a single axle or no register at all from lightweight axles. It is possible to tune out lightweight vehicles all together. Because the loop detector traffic counters proved easier to maintain, even on unpaved roads, the junior traffic counter was used infrequently during the study. Nonetheless, because of its simplicity, low cost, and freedom from maintenance difficulties, this counter is recommended for use in situations favorable to road tubes in environments where qualified maintenance personnel are available.

### 7.4.1 *Maintenance*

As previously mentioned, road tube replacement was the major maintenance problem. The battery used in this counter is a very common

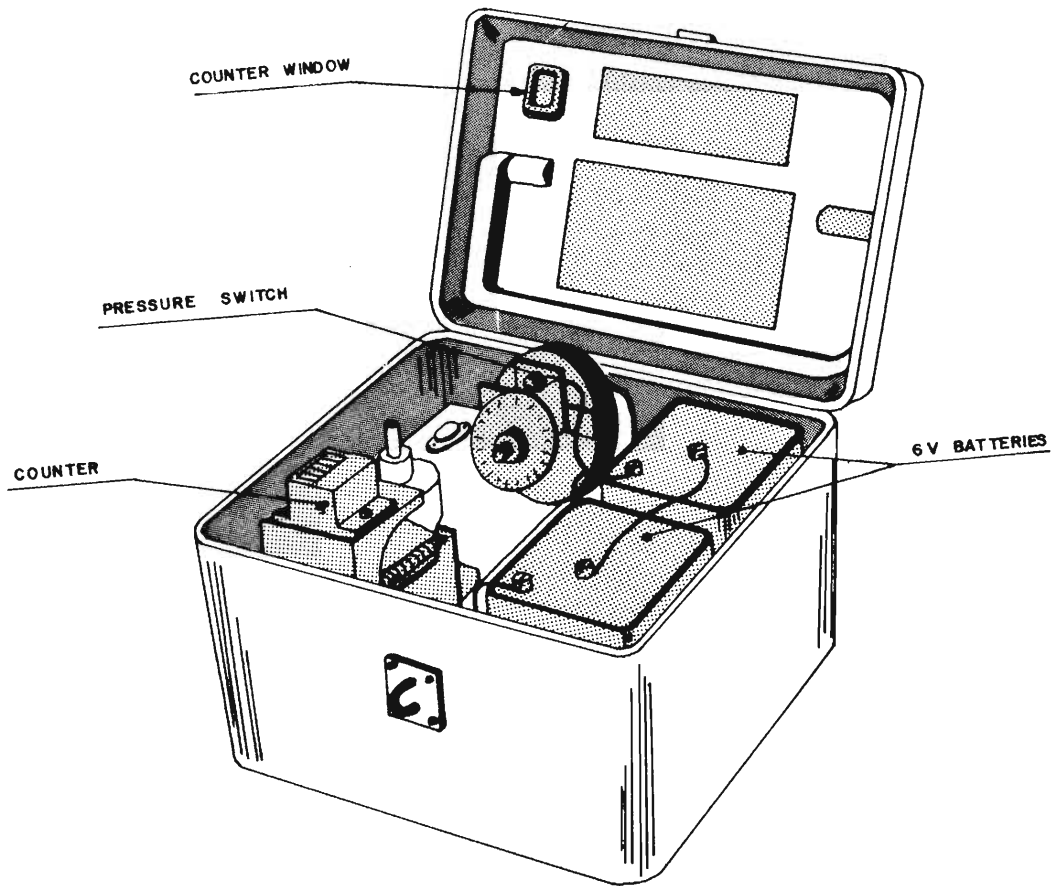


FIGURE 7.4 - STREETER AMET TRAFFIC COUNTER

6 volt lantern type, readily available in Brazil. In this respect, the junior traffic counter was the easiest of the three to maintain. Aside from road tubes and batteries, there were no maintenance problems. This counter is very simple in design.

#### 7.4.2 *Recommended Repair Facilities*

One technician  
Volt-ohm meter  
Hand tools

#### 7.5 *MANUAL COUNTERS*

Two types of Manual Counters were available and are shown in Figures 7.5 and 7.6. They were used infrequently and presented no maintenance problems or requirements.

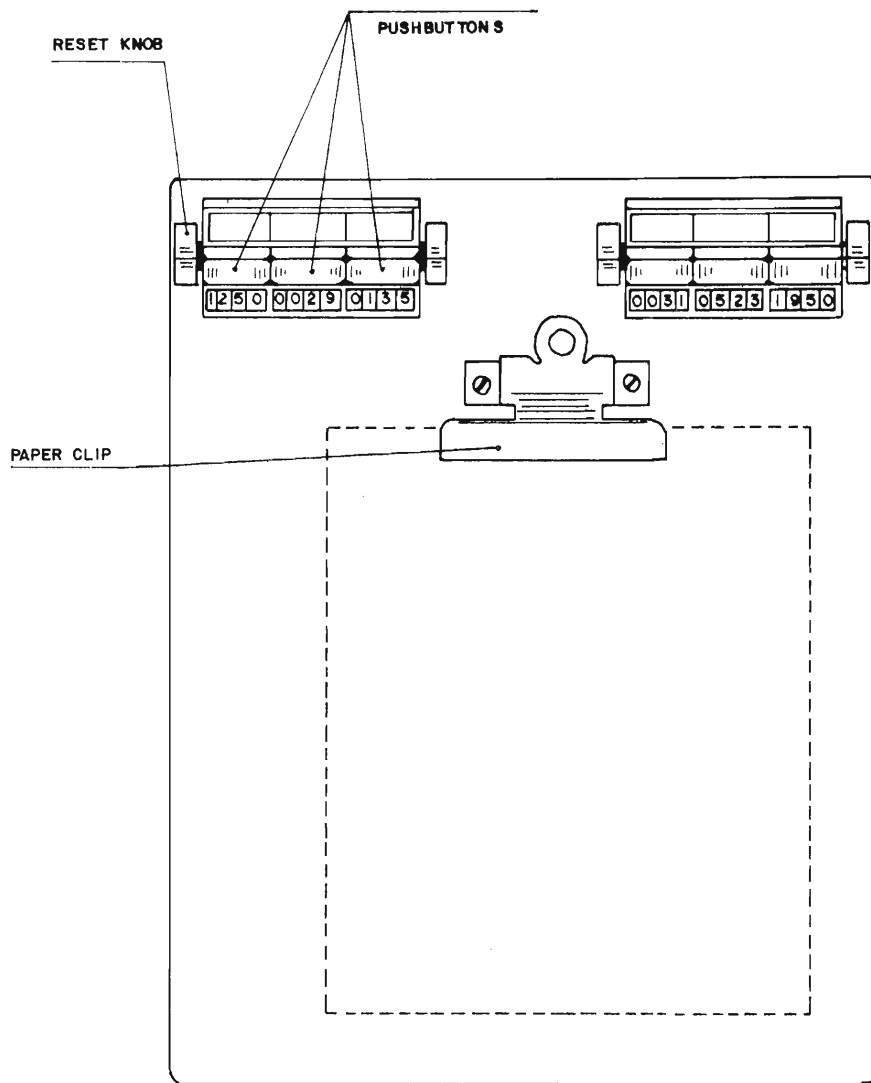


FIGURE 7.5 - MULTIPLE TALLY

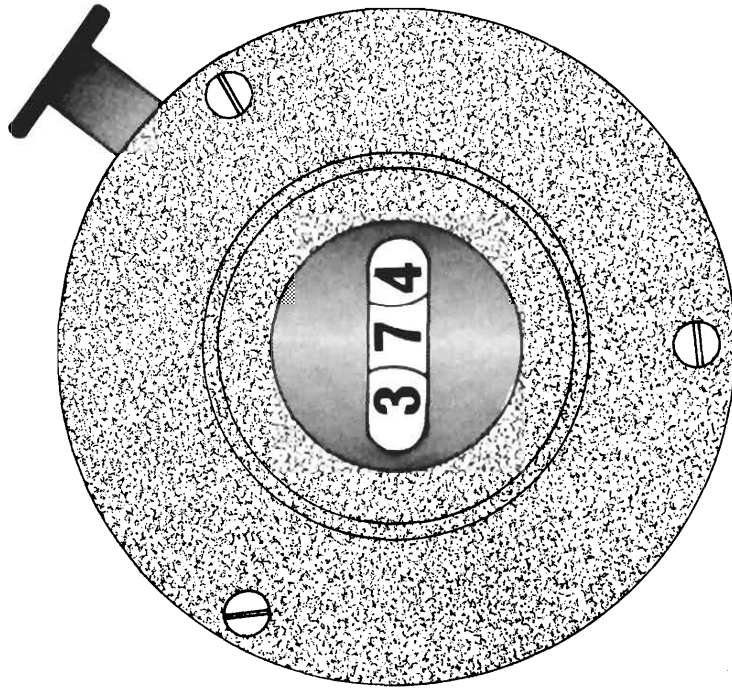


FIGURE 7.6 - TALLY REGISTER