

## 3B SMALL TRAFFIC USAGE RECORDER GENERAL DESCRIPTIVE INFORMATION

CONTENTS	PAGE
1. GENERAL . . . . .	1
2. OPERATING PRINCIPLES . . . . .	1
3. EQUIPMENT ELEMENTS . . . . .	2
4. METHOD OF OPERATION . . . . .	3
5. TESTING FEATURES . . . . .	5

### 1. GENERAL

**1.01** This section describes the 3B small traffic usage recorder (3B STUR) and its function as a measuring facility in obtaining traffic load information on trunks and other traffic-handling components of switching systems.

**1.02** The 3B STUR may be used to record the usage of a variety of traffic-handling circuits limited only by the requirement that they provide a ground condition as a busy indication. The 3B STUR also provides the following optional features:

- (a) Use of high-impedance detectors.
- (b) Control of traffic register camera.
- (c) Horizontal scanning.

The principal use for the 3B STUR is in offices too small to warrant the installation of the traffic usage recorder (TUR) described in Section 951-510-100 and to provide up to 600-line capacity over the 200-line capacity of the 3A STUR described in Section 951-500-100.

**1.03 Capacities:** 3B STUR will accommodate 200, 400, or 600 circuits divided into 20, 40, or 60 groups, respectively. Each group normally contains ten circuits of the same type by associating ten terminals on an arc with one register. Two groups of ten terminals on the same arc can be combined to provide for a group of as

many as 20 circuits with the usage of the 20 circuits recorded on a single register. The total usage of each group of ten circuits is recorded on one traffic register in terms of erlangs (100 call seconds or CCS).

**1.04 Lead Connections:** Busy-test leads from the trunks or circuits on which traffic is to be measured are connected to scan terminals on the usage recorder unit.

**1.05 Scanning Cycle:** The busy-test leads on each circuit group are scanned in sequence once every 100 seconds. The scan cycle is repeated 36 times for each hour of operation.

**1.06 Operation Control:** The 3B STUR may be controlled by either an optional 24-hour program timer or one of two other devices which contain a program timer; (a) the traffic register camera control circuit, or (b) the traffic usage recorder (TUR) circuit. The optional program timer is required whenever the traffic camera control or TUR is not available in the office, or whenever a separate clock is desired. The recorder can function automatically under control of the program timer and can be started and stopped at predetermined intervals within one day. These operation periods may be automatically repeated for predetermined days within a week, skipping any day or days of the week as desired.

**1.07 Recording:** 14-type traffic registers are used to record the data. The register readings for one hour of testing will normally indicate hourly usage in CCS directly. One 14-type peg count register records total cycles of scanning. This records 36 counts for every hour of usage recording. These registers are located in the central office traffic register rack or cabinet.

### 2. OPERATING PRINCIPLES

**2.01** The 3B STUR records usage in CCS per hour by employing the switchcount method. This method, simply expressed, involves the repeated scanning of busy-test terminals for the

trunks under study and the cumulative recording of the number found busy per group on each scan. At the end of any period of time, the average traffic load carried by a study group can be determined by taking a count of the number of scans made and the total number of busy conditions encountered.

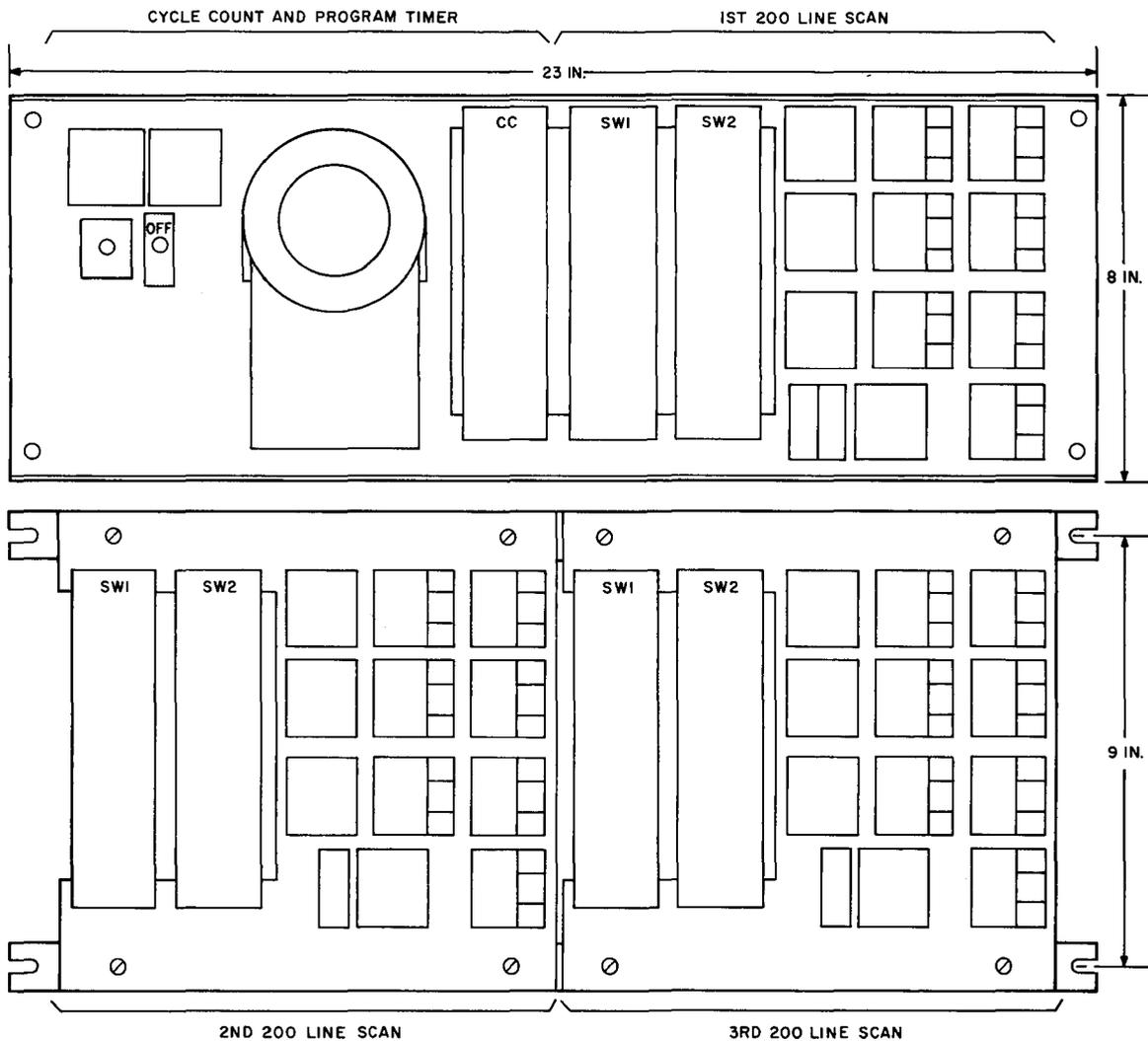
**3. EQUIPMENT ELEMENTS**

**3.01** The major components of the 3B STUR (Fig. 1) are a 100-second interval timer, 22-point rotary selector switches, several relays, a key, and an optional program timer. A 120- to 24-volt step-down transformer is provided to furnish the ac supply for the timers.

**3.02** The 3B STUR unit contains one rotary selector switch for cycle counting and up to three pairs of rotary selector switches for scanning. One pair of switches (unit A) provides for 200-terminal scanning, a second pair (unit B) provides for 400-terminal scanning, and a third pair (unit C) provides for 600-terminal scanning.

**3.03** The program clock timer will usually be used to control the 3B STUR, although either the camera control circuit or the TUR may be used on an optional basis.

**3.04** A key is provided for manually turning this circuit on and off. The recorder may be stopped at the end of the current recording hour by operating this key to the OFF position.



**Fig. 1 — 3B STUR**

**3.05** Three optional features may be provided in the 3B STUR unit, either separately or in combination:

(a) Five transistorized detector circuits, having a 300,000-ohm input impedance, will be furnished when the STUR is used to scan busy-test leads whose functions may be susceptible to interference from a low-impedance connection. One detector will be associated with each scan switch arc. The detector unit requires 2 inches of mounting space.

(b) The camera control feature automatically controls the traffic register cameras so that a photograph is taken of the traffic registers at the beginning of the scan period at 1/4-, 1/2-, or 1-hour intervals during scanning and at the end of the last scan. The camera control unit also requires 2 inches of mounting space.

(c) The horizontal scan circuit permits combining of those groups which are simultaneously vertically scanned. During each vertical scan, five inputs are observed simultaneously. Horizontal scanning permits registering all or some of these inputs on a common register.

#### **4. METHOD OF OPERATION**

**4.01** A 24-hour program clock timer may be provided to control operation of the 3B STUR. This timer can be programmed for starting and stopping at predetermined times and days throughout the week.

**4.02** The dial on the 24-hour program timer is equipped with 96 tabs, each representing a 15-minute interval. For automatic operation, a tab is set at the desired starting time. A tab may be set at any quarter hour. For one hour of operation, only one tab set at the desired start time is sufficient. For two or more consecutive hours of operation, additional tabs must be set to assure continuous operation from one hour to the next. For example, if the scanning period is to start at 1:00 P.M. and stop at 4:00 P.M., then the tabs for 1:00 P.M., 1:45 P.M., 2:00 P.M., 2:45 P.M., and 3:00 P.M. are set. Tabs are set at 1:45 P.M. and 2:45 P.M. to prevent any interruptions between hours of operation.

**4.03** Days of operation of this circuit may be preselected. A 7-day calendar wheel which has a spoke for each day of the week is provided on the program timer. This calendar wheel rotates once each week. Operation may be suspended for one or more 24-hour periods beginning at midnight by setting removable pins into the tapped holes of the spokes for those days of operation to be omitted.

**4.04** Operation of the 3B STUR can be controlled from the traffic register camera control circuit by operating the proper camera key and by following the operating instructions for that circuit.

**4.05** By means of the OFF key provided in this circuit, the 3B STUR may be manually turned off while the central office TUR or camera control circuit continues to operate. If the OFF key is operated while this circuit is in operation, operation will continue until a total of 36 scans has been completed. For accurate camera readings, the OFF key must be placed in the ON position at least 98 seconds before the programmed starting time to allow the recorder to resynchronize.

#### **Scanning and Registering**

**4.06** The function of a scan switch is to connect test leads from the circuits being measured to registers or detectors for the recognition of busy conditions present on these leads. Twenty terminals on each of five arcs of a scan switch are used for this purpose. As the five wiper brushes rotate, they contact a row of five terminals at each step, thus scanning five circuits simultaneously. The ten leads of a circuit group, such as a concentrator trunk group, are assigned to ten consecutive terminals of a single arc. Thus the trunks of a group are scanned in sequence. A register associated with a circuit group is operated each time a busy indication is received from a circuit in that group.

**4.07** A scan cycle is initiated every 100 seconds by an interval timer, located on the recorder unit, which starts the scan switch out of its normal position. Brushes on the scan switch are then stepped around the arcs and returned to normal by the action of its own self-interrupted drive magnet. The second, third, fourth, fifth, and sixth

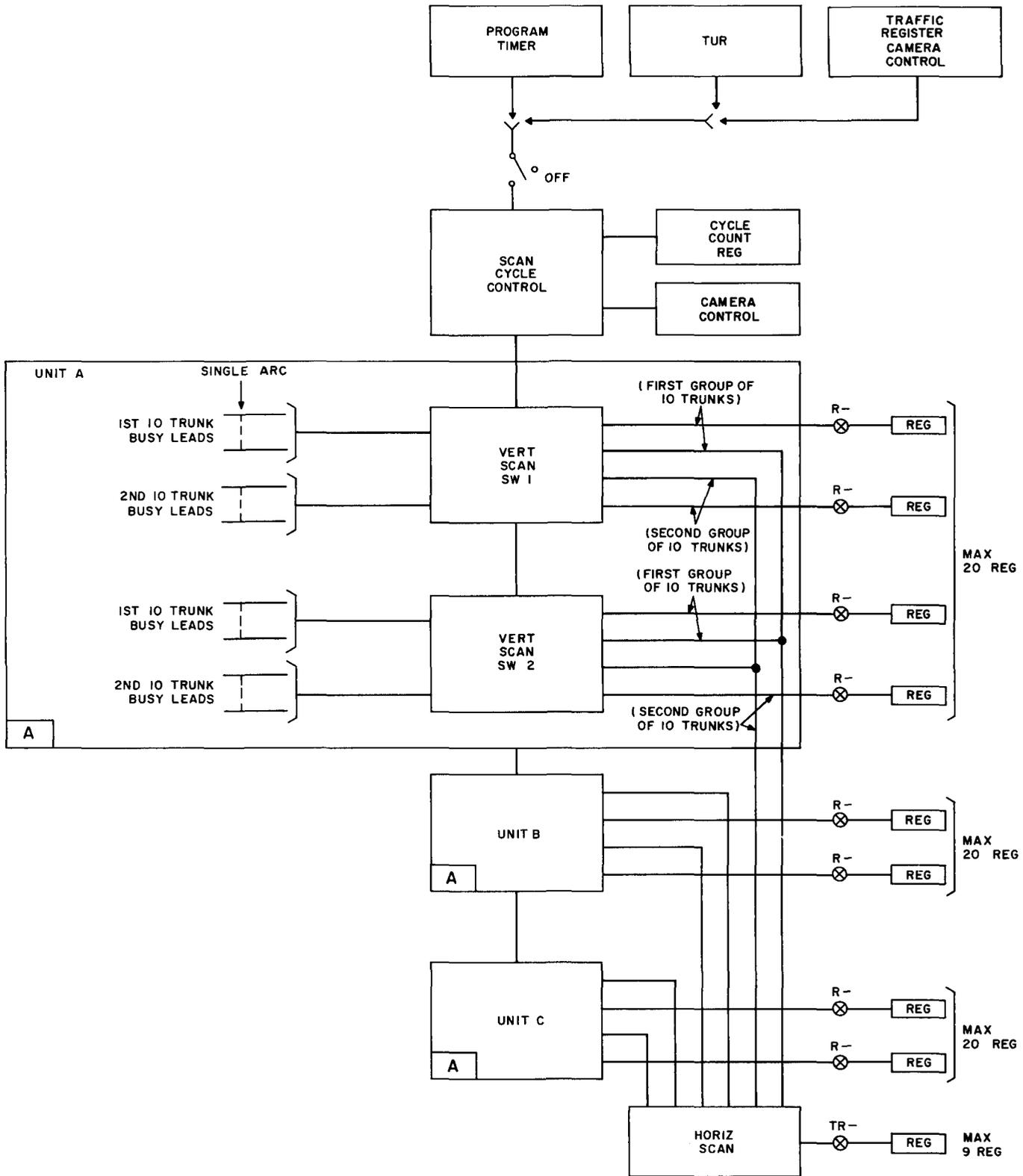


Fig. 2 — 3B STUR — Block Diagram

switches are started in sequence when the preceding one returns to normal. Each scan cycle is counted by advancing the cycle count switch one step. When 36 cycles have been completed, an hour of operation is recognized and scanning will be stopped unless the program timer has been set to start another hour.

**4.08** When detectors are used with the 3B STUR, they are interposed between the scan switch brushes and the usage registers to isolate the latter from the test leads of the connecting circuits. The input transistor of each detector is permitted to operate only during an enabling pulse, which lasts but a few milliseconds after the brushes come to rest on a row of terminals. If the terminal tests busy, the input transistor triggers a 2-transistor flip-flop circuit, causing it to operate and hold a relay, which in turn operates the usage register. When the scan switch steps to the next terminal, the circuit is restored to its original state and again is ready to score a register.

**4.09** If the 3B STUR is required to operate a traffic register camera, a suitably timed impulse is delivered on the camera control lead immediately before starting the first scan cycle of each hour; again at 1/4-, 1/2-, and 1-hour intervals for the 3B STUR; and again at the conclusion of the last consecutive hour of operation.

**4.10** The horizontal scanning option of the 3B STUR permits a greater number of like events to be recorded on one traffic register. With each step of the vertical scan, the five horizontal terminals are scanned. Each of these horizontal terminals can be connected to an individual register or can be grouped with any number of other terminals on one register.

### Setting the Program Timer

**4.11** The program timer furnishes a pulse to start each hourly measurement period when the recorder is under automatic operation. When thus started, scanning continues for a minimum of 36 cycles (1 hour). Scanning may be started on the hour or on any quarter- or half-hour as many times during the day as required and will continue for as long a period as required.

**4.12** When setting the timer, the 7-spoke wheel must first be set to the correct day. This is done by turning the dial counterclockwise until the fixed tab turns the 7-spoke wheel. Next, turn the 7-spoke wheel by hand until the spoke that indicates the present day of the week is pointing downward. During operation of the timer, the present day is always in this position.

**4.13** When connected initially or whenever reset, the timer is set to the correct time of day by turning it counterclockwise until the correct time of morning or evening is opposite the time arrow on the nameplate.

## 5. TESTING FEATURES

**5.01** No special equipment provision has been made for testing the 3B STUR. However, manual tests as described in Section 201-402-501 may be made for the following:

- (a) Detection of crosses and false grounds among trunk-busy leads.
- (b) Detection of crosses and false grounds among traffic register leads.
- (c) Combination continuity test, cycle timing test, and cycle count verification.

**5.02** These tests can be performed by one man during periods of very light traffic.