

**SWITCHING SYSTEMS MANAGEMENT  
 CROSSBAR TANDEM  
 TRAFFIC MEASUREMENTS  
 REGISTER OPERATION**

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# SWITCHING SYSTEMS MANAGEMENT

## CROSSBAR TANDEM

### TRAFFIC MEASUREMENTS

#### REGISTER OPERATION

#### 1. GENERAL

**1.01** This section describes the various types of crossbar tandem (XBT) traffic registers. It also covers their method of operation and recommends the basis for their provision. Traffic registers are used to collect data required by the Traffic Engineer, Dial Administrator, Network Manager, Traffic Separations Supervisor, and others involved in network design and administration.

**1.02** References in this section to methods, planning, data requirements, service levels, and equipment quantities are based on American Telephone and Telegraph Company recommendations.

**1.03** Traffic registers are used to record measurements of various occurrences and conditions in crossbar tandem, collectively referred to as traffic data. The following are the kinds of data normally furnished by registers:

- (a) **Peg Count**—Scores each seizure of an idle piece of equipment and scores each call offered to an outgoing trunk group.
- (b) **Overflow**—Scores each call which finds all trunks in a group (or channels in the case of link frames) busy.
- (c) **Group Busy**—Scores once every 1.3 seconds that the associated group of common control equipment is in use.
- (d) **Delay**—Scores once each time a test call waits in excess of a predetermined time (3 or 7 seconds) to attach common control equipment.
- (e) **Usage**—Measures the time equipment and trunks are in use. The basic measurement device is the traffic usage recorder (TUR), which scans at 10- or 100-second intervals and scores the reading on traffic registers.

(1) **Common Control Equipment**—Crossbar tandem common control equipment usage is measured with two registers. One register reads total usage (traffic plus maintenance) while the other register reads maintenance only. Thus, traffic usage is derived by subtracting the maintenance usage from the total usage.

(2) **Sample Link Usage**—One register per switch per office link frame and per trunk link frame. Records usage on links 0 and 5 left and 2 and 7 right of each switch. These links are referred to as "sample links."

(3) **Trunk Usage**—Only total usage, which includes trunks plugged busy, is provided on 2-way and 1-way out trunks. Incoming trunks (CAMA, intertoll, tandem, etc) do not score plugged-busy usage because they are associated with open busy detectors.

#### 2. TRAFFIC MEASUREMENT FACILITIES

**2.01** A variety of traffic measurement facilities is available and should be provided to give load measurements on circuit groups in XBT. The following paragraphs give a brief description of these facilities which are required in conjunction with the operation of traffic registers.

##### A. Traffic Register Equipment

**2.02** The traffic register equipment provides for obtaining traffic data such as overflow, group-busy, peg count, load, and usage. When

the register portion of the equipment is located in an operating room, it is enclosed in a traffic register cabinet and the relays are on a traffic register relay rack in the switchroom. When the registers are located in the switchroom, they may be mounted in a traffic register cabinet or on a combination traffic register and relay rack with the relays in the upper portion of the frame. A traffic register distributing frame (TRDF) is furnished adjacent to the traffic register relay rack or traffic register and relay rack for terminating the many leads from the connecting circuits and for providing flexibility between the traffic registers and connecting circuits. Traffic usage recorder registers are cabled from the patching jack field directly to the traffic usage recorder frame where cross-connecting facilities are provided. The traffic register cabinet and the traffic register and relay rack can accommodate 300 14-type traffic registers. All of the traffic registers provided in the crossbar tandem are either the 14-type (4-digit) or KS-16493 magnetic counters (5-digit). In addition, the KS-15947 electronic counting device, commonly known as a totalizer, may be used in conjunction with these registers. The totalizer provides a total count of events occurring at up to 120 different points within the crossbar tandem. Since the totalizer scores once for each 10 counts received, the register reading must be multiplied by 10. In addition to the regular XBT registers, some XBT locations have requirements for multiples of frequently read administrator registers, ie, marker peg count, SADR, trunk group overflow, etc. The multiple registers to be provided are located outside the camera fields and may be resettable-types which facilitate current data gathering and can be reset to "0000" after each reading.

**2.03** The 405 data system is designed specifically for remoting traffic register leads. The system consists of two data sets connected by a voice grade private line circuit. The 405A data set is the transmitter and the 405B is the receiver. The basic system has the capacity of 8 input leads and also may be ordered in 20 and 32 input versions. The 405 system can interface other systems as a traffic register lead.

**2.04** The registers may be photographed automatically by means of traffic register camera KS-14776 (maximum 2 per bay, each covering 150 registers) and traffic register camera control equipment or

traffic usage recorder control equipment. The control equipment permits pictures to be taken at hourly or half-hourly intervals for predetermined periods. The forward projection of the camera beyond the face of 14-type registers is approximately 18 inches; therefore, special aisle space consideration is required when applying the camera to traffic register racks located in the switchroom. The traffic register control equipment consists of a small relay rack unit and a control panel suitable for mounting on a wall or column. This equipment is arranged for a maximum of 14 cameras.

## **B. Traffic Usage Recorder (TUR) Frame**

**2.05** The TUR is used to measure usage of various circuits by scanning on a 100-second cycle and recording busies on traffic registers. It is a 2-bay frame accommodating two to twelve 100-point 6-wire crossbar switches, 6 to 12 detectors, relays, and cross-connecting facilities. The switches are divided into scan and register switches which provide for scanning a maximum of 3600 circuits and provide access to a maximum of 1200 traffic usage registers. Circuits having holding times over 10 seconds are given one scan switch appearance, and the 100-second scanning rate (slow scan) provides sufficiently accurate hourly measurements in terms of hundred call seconds (CCS). An optional feature, alternate scan, can be provided to increase the scan interval to 200 seconds in order to reduce TUR equipment wear. For measurements of traffic usage on circuits having holding times of 10 seconds or less, the circuits are given ten equally spaced appearances on the switches in groups of 60 with a maximum of 180 per frame and thereby are scanned at a 10-second rate (fast scan) to obtain the desired degree of accuracy. As an alternative to use of the TUR fast scan feature, an auxiliary scanner unit can be provided which has a 20-second scan rate. Maintenance usage on these circuits is always taken at the 100-second scan rate, or at the 200-second scan rate using the alternate scan feature.

**2.06** Detector group usage (DGU) features provide means of totaling usage. With DGU, the total usage of a number of equipment units can be recorded on one register. DGU does not ordinarily replace the recording of individual equipment usage; it is supplementary to and occurs coincident with the individual readings.

**2.07** Control equipment for use with the TURs may be arranged for wall- or column-mounting in one or two metal cabinets or it may be mounted in a relay rack bay. With the wall or column arrangement, when not more than three frames are required, one cabinet will house the control equipment. When 4 to 12 frames are required, a supplementary cabinet is required to accommodate the register grouping switches. Register grouping is an optional feature that reduces the quantity of traffic registers required to record the usage of different equipment groups on a single set of traffic registers. The relay rack-mounted arrangement will serve a maximum of 12 frames. The TUR equipment also controls the cameras used to photograph traffic usage registers or regular traffic registers.

### C. Sender Attachment Delay Recorder (SADR)

**2.09** In crossbar tandem offices, one SADR is provided per office. Its purpose is (1) to sample the interval experienced by trunks in gaining access to a sender and (2) to record delays in excess of 3 seconds. The SADR will connect consecutively to a trunk location assigned to each sender link frame and will time for sender attachment exceeding a 3-second interval. When the last sender link frame has been tested, the SADR resets and starts a new cycle. To obtain a representative sample of the average sender delay condition, test terminations are spread evenly on lower, middle, and higher horizontals of the switches.

**2.10** Two registers are provided for each sender group, where required, and each type of sender as follows: (1) a peg count register to record sender bids and (2) a delay count register to record the number of 3-second delays encountered.

**2.11** A delay alarm lamp will indicate when a preset number of delays (3-second) are encountered on any one cycle of test bids. This lamp will remain lighted until a subsequent test cycle is completed with fewer than the preset number of delays encountered.

### D. Answer Time Recorder (ATR)

**2.12** The ATR records the speed of answer on the CAMA operator board. These registers score the number of calls observed (for speed of answer), the number of delays, and the number of calls timed for speed of answer. The calls are observed from the time the sender requests a CAMA position to the connection of a position.

## 3. TRAFFIC REGISTER PROVISION AND METHOD OF OPERATION

**3.01** The following paragraphs describe the recommended basis for providing traffic registers in XBT and explain what causes each of these registers to score. A chart description is included in Fig. 1 through 8. The chart description is divided into eight major headings as follows:

- (a) Fig. 1—Common Control Equipment Registers
- (b) Fig. 2—Link Frame Registers
- (c) Fig. 3—CAMA Equipment Registers
- (d) Fig. 4—Trunk Group Registers
- (e) Fig. 5—Division of Revenue Registers
- (f) Fig. 6—Directional Reservation Registers
- (g) Fig. 7—TUR Registers
- (h) Fig. 8—100A TSP Equipment Registers.

### A. Common Control Equipment Registers (Fig. 1)

#### Markers

**3.02** *Total Marker Peg Count*—One register per marker. Scores each time a marker seizes an idle trunk on an office link frame on both first and second trial calls. Scores even if a channel is not available.

**3.03** *Total Marker Usage*—One register per marker. Scores total usage for each marker including maintenance usage on fast scan (10-second)

basis. The sum of these registers is divided by ten to convert to CCS.

**3.04 *Marker Maintenance Usage***—One register per office. Scores test frame and plugged-busy maintenance usage on slow scan (100-second) basis. Results are read directly in CCS.

**3.05** Total traffic usage is total marker usage minus maintenance usage.

#### **Foreign Area Translators**

**3.06 *Foreign Area Translator Peg Count***—One register per pair of translator frames for each foreign area which requires 6-digit translation. Scores each time an area relay is operated, calling in the associated foreign area translator. Scores on both first and second trials.

#### **Senders**

**3.07 *MF Sender Peg Count***—One register per trunk link frame. Scores each time a connection is established through an idle channel between an incoming MF trunk and any outgoing trunk on both first and second trials. This item is also part of *Trunk Link Frame Peg Count*.

**3.08 *DP Sender Peg Count***—One register per trunk link frame. Scores each time a connection is established through an idle channel between an incoming DP trunk and any outgoing trunk on both first and second trials. This item is also part of *Trunk Link Frame Peg Count*.

**3.09 *RP Sender Peg Count***—One register per trunk link frame. Scores each time a connection is established through an idle channel between an incoming RP trunk and any outgoing trunk on both first and second trials. This item is also part of *Trunk Link Frame Peg Count*.

**3.10 *PCI Sender Peg Count***—One register per trunk link frame. Scores each time a connection is established through an idle channel between an incoming PCI trunk and any outgoing trunk on both first and second trials. This item is also part of *Trunk Link Frame Peg Count*.

**3.11 *Total MF Sender Usage***—One register per subgroup of 25 senders. Scores total usage including maintenance for each subgroup on fast scan basis. These registers are provided on a basis

of one per 25 senders in order to stay within the digit capacity of a 14-type register for fast scan items. Results must be divided by ten to convert to CCS.

**3.12 *MF Sender Maintenance Usage***—One register per office. Scores test frame and plugged-busy maintenance usage on slow scan basis. Results are read directly in CCS.

**3.13 *Total DP Sender Usage***—One register per group of DP senders. Scores total usage including maintenance for each group on a slow scan basis. These registers are provided on a basis of one per group of 80 senders because the volume of numerals required to be registered on slow scan items is less than on fast scan items, and thus more DP senders may be scored on one register. Results are read directly in CCS.

**3.14 *DP Sender Maintenance Usage***—One register per office. Scores test frame and plugged-busy maintenance usage on slow scan basis. Results are read directly in CCS.

**3.15 *Total RP Sender Usage***—One register per subgroup of 25 senders. Scores total usage including maintenance for each subgroup on fast scan basis. Results must be divided by ten to convert to CCS.

**3.16 *RP Sender Maintenance Usage***—One register per office. Scores test frame and plugged-busy maintenance usage on slow scan basis. Results are read directly in CCS.

**3.17 *Total PCI Sender Usage***—One register per subgroup of 25 senders. Scores total usage including maintenance for each subgroup on fast scan basis. Results must be divided by ten to convert to CCS.

**3.18 *PCI Sender Maintenance Usage***—One register per office. Scores test frame and plugged-busy maintenance usage on slow scan basis. Results are read directly in CCS.

**3.19 *MF Sender Partial Digits Peg Count***—One register per group of MF senders. Scored by the sender each time the operator's keyset start key is depressed before the sender receives the required number of digits. This is a "partial digits" condition for nonuniversal-type (non-DDD) senders such as SD-25978-01. Registers for MF universal-type

senders (used by both CAMA and non-CAMA type traffic) such as SD-27024-01 score each time the sender times out while awaiting complete registration of digits. Locations employing only universal-type senders for both MF and DP operation may provide only one MF and DP partial digits register. However, in locations where all CAMA traffic is DP, it may be helpful to maintain DP registrations on a separate basis.

**3.20 *Awaiting Registration Peg Count—MF Senders***—One register per group of MF senders. Scores the number of times an MF sender times out after the first digit is registered but fails to get complete registration.

**3.21 *DP Sender Partial Digits Peg Count***—One register per group of DP senders. Scored by the sender each time the sender times out while awaiting complete registration of digits. This is a partial digit condition for DP universal-type senders (used by both CAMA and non-CAMA traffic) such as SD-25999-01.

**3.22** Locations employing only universal-type senders for both MF and DP operation may provide only one register, if desired, for the total combined scoring of both MF and DP partial digits.

**3.23 *MF Sender Permanent Signal Peg Count***—One register per group of MF senders. Scores each time a sender is seized, but receives no digits and times out (20 to 36 seconds). Scored by the sender.

**3.24 *MF Sender Group-Busy Peg Count***—One register per group of MF senders. Scores initially when all senders in a group are busy and continues to make subsequent scorings at 1.3-second intervals for the duration of the group-busy condition.

**3.25 *DP Sender Group-Busy Peg Count***—One register per group of DP senders. Scores initially when all senders in a group are busy and continues to make subsequent scorings at 1.3-second intervals for the duration of the group-busy condition.

**3.26 *PCI Sender Group-Busy Peg Count***—Manufacture Discontinued.

**3.27 *RP Reorder Peg Count***—One per 75 RP senders. Scores when a marker is handling a call from a RP sender and finds all outgoing trunks busy.

**3.28 *Stuck Sender Peg Count***—One register for each sender combination (MF, DP, RP, PCI). Scores when sender times out waiting for distant office. Does not score when originating office senders are in reduced timing. With priming keys operated (on master test frame), alarm will identify the stuck sender. This feature is for plant maintenance purposes.

**3.29 *Intersender Timing Control Peg Count***—One register per office. Scores when the sender times out during the interval that reduced intersender timing is in effect.

**3.30 *DP, MF, and RP Sender Attachment Delay Recorder Total Peg Count***—One register for each type of sender. Scores each time an attempt is made to seize a sender regardless of whether or not the sender is attached.

**3.31 *DP, MF, and RP Sender Attachment Delay Recorder Total Delay Count***—One register for each type of sender. Scores each time a sender is not attached within 3 or 7 seconds after the attempt is made.

## B. Link Frame Registers (Fig. 2)

### Trunk Link Frames

**3.32 *Trunk Link Frame Peg Count***—One register for each trunk link frame for each type of sender. Scored on the trunk link frame by the marker when it establishes a connection through an idle channel between an incoming and an outgoing trunk. The marker peg count should always be greater than trunk link frame peg count.

**3.33 *Trunk Link Frame Overflow***—One register for each trunk link frame. Scores the number of times (per trunk link frame) the marker fails to find an idle channel between an incoming trunk and an idle outgoing trunk. For each TLF overflow scoring, there is a simultaneous OLF overflow scoring.

**3.34 *Second Failure-to-Match***—One register for the office. Scores the number of times the marker, on a second trial basis, fails to find an idle channel between the incoming and outgoing trunks.

**3.35 *Percent Matching Loss***—No registers provided since this is a derived figure.

$$\% \text{ Matching Loss} = \frac{2\text{nd Failure-to-Match} \times 100}{*\text{Mkr PC} - \text{Total Failures (OLF Ovfl)}}$$

\* Refer to 3.02 and 3.41.

**3.36 Sample Link Peg Count**—One register per marker. Scores each time the marker selects a channel between an incoming and an outgoing trunk over links 0 or 5 left and 2 or 7 right of each switch of a trunk link frame.

**3.37 Total Link Peg Count**—One per marker. Scores each time the marker establishes a connection between an incoming trunk and an outgoing trunk.

**3.38 Sample Link Usage**—One register per switch per trunk link frame. Records usage on links 0 and 5 left and 2 and 7 right of each switch. These links are referred to as "sample links." Through the use of the detector group usage (DGU) feature of the TUR, totalization of up to 300 leads may be used to score total sample link usage for the trunk link frames.

**3.39 Total Trunk Link Frame Usage**—No registers provided since this is a derived figure. Usage is obtained by the formula:

$$\frac{\text{Total Link Peg Count} \times \text{Total Sample Link Usage}}{\text{Sample Link Peg Count}}$$

#### Office Link Frames

**3.40 Office Link Frame Peg Count**—One register per pair of office link frames. Scores each time a marker seizes a pair of office link frames to look for an outgoing trunk including all trials and test calls. When trunk group-busy relays are provided, the marker will not seize the office link frames and score this register if all trunks assigned in a group-busy relay are in use.

**3.41 Office Link Frame Overflow**—One register per pair of office link frames. Scores each time the marker determines that there are no channels available between an incoming trunk and an idle outgoing trunk on a pair of office link frames. For each OLF overflow scoring, there is

a simultaneous TLF overflow scoring. Even though scoring on this register on first trial, a call may be completed on second trial. Thus, an office link frame overflow registration is not necessarily an indication that a call failed to complete. (Refer to *Second Failure-to-Match Register*.)

**3.42 Sample Link Usage**—One register per switch per office link frame. Measures usage in the same fashion as described for trunk link frames. Registers associated with trunk link frames may be converted by means of a register grouping key to reflect the usage on office link frame switches.

#### C. CAMA Equipment Registers (Fig. 3)

##### Transverters

**3.43 Transverter Peg Count**—Two registers per transverter. One register will record operator number identified (ONI) calls and the other will record automatic number identified (ANI) calls. The sum of these registers equals total transverter peg count.

**3.44 Total Transverter Usage**—One register per transverter. Records total transverter usage including maintenance at the 10-second (fast scan) rate.

**3.45 Transverter Maintenance Usage**—One register per transverter group. Records maintenance usage at the 100-second (slow scan) rate.

##### Recorders

**3.46 Recorder Peg Count**—One register per recorder. Scores each time a recorder is seized.

**3.47 Total Recorder Usage**—One register per recorder. Records total recorder usage at the 10-second (fast scan) rate. Results must be divided by ten to convert to CCS.

##### Incoming Registers (CAMA or Non-CAMA)

**3.48 Incoming Register Peg Count**—One register per group of incoming registers. Scores when an incoming register is seized. In areas having the digit "1" as a DDD access code, a scoring would also be made each time a "11" service

code (113, 114, etc) is dialed in a step-by-step office.

**3.49 Incoming Registers Group-Busy Peg Count**—One register per group of incoming registers. Scores each time all registers in the group are busy. Continues to make subsequent scorings at 1.3-second intervals for the duration of the group-busy condition.

**3.50 Digit "1" Received as Initial Digit Peg Count**—One register per group of incoming registers. Scores each time a register receives the digit "1" in the "A" digit position and register returns immediate reorder to the customer.

**3.51 Partial Digits—Incoming Registers**—One register per incoming register group. Scores each time a register times out when only one or two digits have been received.

**3.52 Permanent Signal—Incoming Registers**—One per group of incoming registers. Scores each time a register is seized, but times out before any digits are received.

**3.53 No Sender Attached—3-Digit Incoming Registers**—One register per incoming register group. Scores the number of times a sender is not attached to an incoming register by the time the third digit is registered in the incoming register.

**3.54 Total Incoming Register Usage**—One register per incoming register group. Records total usage including maintenance at the 10-second (fast scan) rate.

**3.55 Incoming Register—Maintenance Usage**—One register for total incoming register groups. Records maintenance usage at the 100-second (slow scan) rate.

#### **CAMA Position**

**3.56 CAMA Position Peg Count**—One register per CAMA position. Scores each time the position is seized by a sender.

**3.57 CAMA Position Disconnect**—One register for each operating unit. Scored by the CAMA position circuit each time the CAMA operator depresses the position disconnect key to free her position. The operation of this key signals the

sender to release the position link and position. The call is then routed to ROA.

**3.58 No Position Attached Peg Count**—One register per sender type. Scores the number of times a sender times out while waiting connection to a CAMA position.

**3.59 Wrong Calling Code Peg Count**—One register per transverter group. Scores each time the billing indexer recognizes that the calling number keyed by the CAMA operator is a vacant office code or a wrong calling office code (not in proper recorder group). The CAMA operator receives a reorder signal from the sender.

**3.60 Match Check Peg Count**—One register per transverter group. Scores the number of times the CAMA operator receives a reorder signal from the sender when the called office code, instead of the calling office code, is given by the customer. The match check is made by the billing indexer. Where match check equipment is not provided, these calls will be scored as described for wrong calling code peg count.

**3.61 CAMA Position—Answer Time Recorder (ATR)**—Three registers (D, N, S) per office. Scores the number of calls observed (for speed of answer), the number of delays (over 5.5 seconds), and the number of calls timed. The calls are observed from the time the sender requests a CAMA position to the connection of a position. The sender can be set to request a position when it has recorded the thousands, hundreds, or tens digit of the called number.

**3.62 CAMA Bulk Billed Free Call**—One register per transverter group. Scores each bulk billed call which is permitted to be completed but is not recorded on the CAMA equipment due to a recorder being out of order or due to some other type of trouble.

#### **D. Trunk Group Registers (Fig. 4)**

##### **Outgoing and 2-Way Trunk Groups**

**3.63 Outgoing and 2-Way Trunk Group Peg Count**—One register per outgoing and 2-way trunk group. Records the number of attempts to seize a trunk out of the crossbar tandem, regardless of whether or not a trunk is available. The

registration is made when the route relay is operated. (Peg count on incoming trunk groups is not available.)

**3.64 *Outgoing and 2-Way Trunk Group Overflow***—One register for each outgoing and 2-way group. Scored by the marker when testing for an idle trunk out of the crossbar tandem and finds all the trunks in the group are busy. (Overflow on incoming trunk groups is not available.)

#### **Incoming, Outgoing, and 2-Way Trunk Groups**

**3.65 *Trunk Group Usage***—One register per trunk group. Records total usage on intertoll, toll connecting, and toll completing trunk groups.

#### **Wide Area Telecommunications Service (WATS)**

**3.66 *WATS Usage***—One register per zone. Scores usage for each WATS zone.

#### **Tone and Announcement Trunk Groups**

**3.67 *Reorder Tone Peg Count***—One register per marker pair. Scores the number of calls routed to the reorder tone (120-IPM) trunk group when an all-trunks-busy condition is encountered on any toll completing or announcement trunk groups.

**3.68 *Reorder Tone Overflow***—One register per marker pair. Scored by the marker when all reorder tone trunks are busy. Overflow of these trunks returns no audible sound, which is called a "high and dry" condition.

**3.69 *Reorder Announcement (ROA) Peg Count***—One register per marker pair. Scores the number of times a call is routed to the ROA trunk group for the following reasons:

- (a) Sender time-out (except for reduced intersender timing)
- (b) Second failure-to-match
- (c) Marker or transverter second trial
- (d) Key pulsing irregularities.

**3.70 *Sender Overload (SOA) Peg Count***—One register for the office. Scores the number of times a call is routed to the SOA trunk group. Calls route to SOA only when senders are in short

timing, ie, waiting for senders at the distant office. Scored by the marker.

**3.71 *Vacant Code (VCA) Peg Count***—One register for the office. Scores the number of times a call is routed to the VCA trunk group on an attempt by a customer or operator to a nonworking NPA or NNX code.

**3.72 *No-Circuit Announcement Peg Count***—One register per marker pair. Scores the number of times a call is routed to the NC-NCA-RO trunk group when a no-circuit condition is encountered on a final intertoll circuit group. In ring marker offices using three separate route advancing groups [NC (TONE), NCA, and RO], the peg count register should be associated with the NC (TONE) group. (Refer to *NCA Overflow*.)

**3.73 *Misrouted Non-CAMA (MCA) Peg Count***—One register for the office. Scores the number of times a call is routed to the MCA trunk group when a customer dials a DDD access code on a local call. Scored by the marker. Call may advance to the billing indexer if class switching is not done in the marker.

**3.74 *Unauthorized Code (UCA) Peg Count***—One register for the office. Scores the number of times a call is routed to the UCA trunk group on an attempt by a customer or operator to an unauthorized code point.

**3.75 *ROA, SOA, VCA, MCA, and UCA Overflow***—One register for each group. Scored by the marker each time a call is offered to these announcement trunks and finds all trunks busy. Calls overflow to RO tone trunks.

**3.76 *NCA Overflow***—One register per marker pair in ring marker offices using three separate route advancing groups [NC (TONE) NCA, and RO]. This register should be associated with the NCA group. (Refer to *No-Circuit Announcement Peg Count*.) This information cannot be secured in route relay marker offices.

**3.77 *WATS Announcement***—One register for the office. Scores the number of times a call is routed to the WATS announcement when a WATS customer attempts to dial a code to which he does not have access.

**E. Division of Revenue (Fig. 5)**

**3.78 Traffic Separation**—One register per marker for each source-destination combination. Scores when the marker establishes a connection between an incoming trunk (having the proper source indication for the particular register) and an outgoing trunk (also having the destination indication for that register). Used for division of revenue purposes in measuring the amounts of the interstate and intrastate traffic served by the tandem. Second trial and test calls do not score.

**F. Directional Reservation Equipment (DRE) (Fig. 6)**

**3.79 Directional Reservation Trigger**—One register per DRE unit. Scores each time the DRE unit operates to restrict traffic.

**3.80 Directional Reservation Timing**—One register per DRE unit. Scores every 1.3 seconds during the interval in which the reservation equipment is triggered to restrict traffic.

**G. Sender Attachment Delay Recorder (SADR) (Fig. 1)**

**3.81 Peg count registers** are provided to record sender bids by sender group, where required, and the total by sender type. A maximum of 32 sender group registers and a total of 3 peg count registers per sender type may be associated via cross-connections with each recorder unit.

**3.82 Delay count registers** are provided to record the number of 3- or 7-second delays encountered. They can be provided to record delays by sender group or the total by sender type. A maximum of 32 sender group registers and a total of 3 delay registers per sender type may be associated via cross-connections with each recorder unit.

**H. TUR Cycle Register (Fig. 7)**

**3.83 Cycle Register**—One register per field of 150 registers. This register operates in synchronism with the master cycle TUR register and indicates the number of TUR cycles included in the period of study. Thirty-six cycles scored on this register indicate a full hour of operation. Where grouping registers are included in the register field, more than one cycle register may be required.

**4. 100A TRAFFIC SERVICE POSITION REGISTERS (FIG. 8)**

**4.01** 100A TSP registers are located in the terminal room register cabinet, an operating room register cabinet, or multiplied in both locations as specified. The operating room cabinet is furnished on the basis of one for each chief operator unit (maximum of 66 positions). A capacity of 90 registers is provided. The traffic registers described here are in addition to those normally provided in a XBT CAMA office.

**A. Traffic Service Position Register**

**4.02** One register for each position is furnished in the operating room cabinet. Each register counts all of the calls of all types handled at the position, except 10-cent toll, vacant code, and free calls which use the position momentarily but do not involve the operator.

**B. Registers per Chief Operator Unit**

**4.03** A chief operator unit is a unit of up to 66 positions called a link group. Each link group is served by a maximum of three controllers.

**(a) Link Group Registers**

- (1) Total CAMA calls
- (2) Total calls connected to the positions (except CAMA)
- (3) Noncoin 0+ calls
- (4) Coin 0+ and 1+ initial deposit calls
- (5) Coin 0+ and 1+ subsequent action calls
- (6) Noncoin 0 initial position seizure calls
- (7) Noncoin 0 position recalls
- (8) Coin 0 initial position seizure calls
- (9) Coin 0 position recalls
- (10) CAMA overlap calls

- (11) Delayed call trunk seizures
- (12) Controlled pulsing circuit peg count—inpulsing
- (13) Controlled pulsing circuit peg count—outpulsing
- (14) Position display circuit peg count
- (15) Outgoing trunk calls overflow
- (16) Transfer trunk calls overflow
- (17) Peg count of coin 0 calls received over combined 0, 0+, and 1+ coin trunk group.

**Note:** Registers in Steps (2) and (4) will score on the following calls where an operator is not brought in:

Coin—10-cent toll (initial)

Coin—10-cent zone (initial)

Coin—free calls

Coin—vacant code in the rater.

### C. Registers Common to the Crossbar Tandem Office

**4.04** The following traffic registers are located in the traffic register cabinet with key control and are provided for 10-digit DP registers, raters, computers, and the data transfer circuit.

#### (a) *Coin Rater Registers*

- (1) Number of rater seizures
- (2) Number of position seizures

**Note:** Ten-cent initial toll zone or free calls will score on the rater seizure register but not on the position seizure register.

- (3) Ten-cent toll initial rater seizure
- (4) Ten-cent zone initial rater seizure
- (5) Free calls and vacant code calls.

#### (b) *Coin Charge Computer Registers*

- (1) Notify (end of initial period)
- (2) Charge due (scores all computer operations in the overtime intervals)
- (3) Coin zone calls other than 10-cent initial rate.

#### (c) *Data Transfer Circuit—Data Group*

- (1) Peg count on each of the ten data groups.

(d) ***No Position Attached (NPA) Register:***  
This register is associated with the TSP senders and will score when a sender times out on a bid for a position.

#### (e) *Traffic Usage Recorder*

- (1) All TSP trunks are equipped to provide a circuit indication to a traffic usage recorder (TUR). The circuit indication distinguishes between a busy circuit condition while service is being rendered and a busy circuit condition due to the connection of a make-busy plug or to maintenance testing.
- (2) All TSP positions are equipped to measure position occupied and position busy CCS on a TUR.
- (3) All incoming trunks are arranged to measure call waiting CCS on a TUR.

### 5. PLANT REGISTERS

**5.01** In addition to these traffic registers, XBTs are equipped with plant registers which are used by the maintenance personnel as an aid in trouble analysis. The following plant registers are provided for this purpose:

(a) ***Awaiting Dialing (AD) Register—RP Senders and MF Senders***—Scores when the sender times out due to insufficient dialing.

(b) ***Awaiting Registration (AR) Register—RP and MF Senders***—Scores when the RP sender times out awaiting registration of office brush and office group or when the MF sender times out while awaiting registration of called number.

- (c) **Abandoned Call (AB) Register**—Scores when a call is abandoned before the double-connection check in the CAMA position link circuit.
- (d) **Controller Alarm (CA) Register**—Scores when the CAMA position link controller times out while attempting to set up a connection.
- (e) **False Start (LF) Register**—Scores when a false start signal is received in the sender link controller circuit.
- (f) **Partial Dial (PD) Register—DP Senders and PCI Senders**—Scores when the DP sender times out while awaiting dialing or when the PCI sender times out after having failed to record the numerical digits.
- (g) **Stuck Sender (SS) Register—RP, DP, MF and PCI Senders**—Scores (1) when the RP sender times out due to a trouble condition after having received all the selections, (2) when the DP sender times out after dialing has been completed, (3) when the MF sender times out after the called number has been registered, or (4) when the PCI sender has timed out after failing to handle the call.
- (h) **Marker Trouble Release (MTR) Register**—Scores when the marker times out because of a trouble condition.
- (i) **Master Timing Trouble Release (MTTRE/MTTRO) Register**—Scores when a trouble is encountered with a marker.
- (j) **Recorder Trouble Release (RTR) Register**—Scores when the recorder times out due to trouble conditions.
- (k) **Sender Link Controller Trouble Release (TR) Register**—Scores when the sender link controller blocks due to a trouble condition.
- (l) **Transverter Trouble Release (TTR) Register**—Scores when the transverter encounters trouble while processing a call.
- (m) **No Position Attached (NPA) Register—DP and MF Senders**—Scores when the sender times out awaiting connection to a CAMA operator position.
- (n) **No Marker Information (NMI) Register—DP and MF Senders**—Scores when the sender times out awaiting class-of-call information from the marker.
- (o) **Stuck Sender DP Outpulsing (SSDP) Register—DP and MF Senders**—Scores when the sender times out after registration is complete and DP class-of-call information has been received from the marker.
- (p) **Stuck Sender RP Outpulsing (SSRP) Register—DP and MF Senders**—Scores when the sender times out after registration is complete and RP class-of-call information has been received from the marker.
- (q) **Stuck Sender MF Outpulsing (SSMF) Register—DP and MF Senders**—Scores when the sender times out after registration is complete and MF class-of-call information has been received from the marker.
- (r) **Stuck Sender PCI Outpulsing (SSCI) Register—DP and MF Senders**—Scores when the sender times out after registration is complete and PCI class-of-call information has been received from the marker.
- (s) **Stuck Sender Straightforward (SSSF) Register—DP and MF Senders**—Scores when the sender times out after registration is complete and straightforward class-of-call information has been received from the marker.
- (t) **Permanent Signal (PS) Register—Incoming Registers**—Scores when the incoming register times out awaiting the start of inpulsing.
- (u) **No Sender Attached (NSA) Register—Incoming Registers**—Scores when the third digit is registered in the incoming register before the sender is attached.
- (v) **Stuck Sender (SR) Register—Incoming Registers**—Scores when the incoming register times out after registration is complete and a sender has been attached.
- (w) **Partial Dial (PD) Register—Incoming Registers**—Scores when the incoming register times out after inpulsing has started and before registration is complete.

- (x) ***CAMA Position Link Controller Trouble (PCTR) Register***—Scores when the CAMA position link controller times out while attempting to set up a connection.
- (y) ***Trouble Recorder Entries (TRE) Register***—Scores when the trouble recorder perforates a trouble record card.
- (z) ***Call Count Process Control (CCR1, CCR2) Register***—Scores when a call is completed through the transverter.
- (aa) ***Rater Trouble Register***—Scores when a rater times out because of a trouble condition.
- (ab) ***Coin Charge Computer Trouble Register***—Scores when a coin charge computer times out because of a trouble condition.
- (ac) ***Data Channel Trouble Register***—Scores when a data channel times out because of a trouble condition.
- (ad) ***100A Traffic Service Position Link Controller Trouble (GPTR) Register***—Scores each time the controller calls for the trouble recorder.
- (ae) ***Timer Link Controller Trouble (TRE, TRO) Register***—Scores when a timer link times out because of a trouble condition.

COMMON CONTROL EQUIPMENT REGISTERS					
PARA-GRAPH NUMBER	REGISTER DESIGNATION	PRIMARY TRAFFIC USER	INFORMATION RECORDED ON REGISTERS	METHOD OF REGISTER OPERATION	REGISTERS TO BE PROVIDED
<b>MARKERS</b>					
3.02	Total Marker Peg Count	Engineering Administration	The number of times a marker is seized. This includes all first and second trials.	<p>Scores when the marker seizes an idle outgoing, overflow, or vacant code trunk on an office link frame (OLF) whether or not an idle channel is available from the incoming tandem trunk. Scores on both first and second trials as indicated.</p> <p>For Example:</p> <p>A. Marker tests even-numbered OLF and</p> <ul style="list-style-type: none"> <li>(1) Fails to find an idle outgoing trunk (including all office re-order trunks) on first OLF tested or</li> <li>(2) Finds an idle outgoing trunk on the even-numbered OLF tested but fails to find an idle channel between the TLF and the first OLF tested.</li> </ul> <p>B. Marker tests odd-numbered OLF and</p> <ul style="list-style-type: none"> <li>(1) Fails to find an idle outgoing trunk (including all office re-order trunks) on odd-numbered OLF or</li> <li>(2) Finds an idle outgoing trunk on the odd-numbered OLF but fails to find an idle channel between the TLF and the mate OLF.</li> </ul> <p><i>Note:</i> Marker is released and sender bids for another marker which repeats process just described on a second trial basis and scores B(1) or B(2) again. If this also results in failure, as in B(1) and B(2), a third trial sets call to overflow and does not score the peg count register.</p>	<p>One per marker (5-digit).</p> <p>Does not score.</p> <p>Does not score.</p> <p>Scores.</p> <p>Scores.</p>
3.03	Total Marker Usage	Engineering Administration	The total marker usage, traffic plus maintenance.	Records the total marker usage at a 10-second scan rate.	One register per marker.

Fig. 1—Traffic Register Provision Chart—Common Control Equipment Registers (Sheet 1 of 4) (3.01 Through 3.31, 3.81, 3.82)

COMMON CONTROL EQUIPMENT REGISTERS					
PARA-GRAPH NUMBER	REGISTER DESIGNATION	PRIMARY TRAFFIC USER	INFORMATION RECORDED ON REGISTERS	METHOD OF REGISTER OPERATION	REGISTERS TO BE PROVIDED
<b>MARKERS (Cont)</b>					
3.04	Marker Maintenance Usage	Engineering Administration	The maintenance usage on markers which are plugged busy or which are being tested by an automatic test frame.	Records the maintenance usage for the marker group as a whole at a 100-second scan rate.	One register per marker group.
<b>FOREIGN AREA TRANSLATORS</b>					
3.06	Foreign Area Translator Peg Count	Administration	The number of times per foreign area that a translator is used.	Scored by the foreign area translator when it is seized by the marker.	One register per pair of translator frames for each foreign area which requires 6-digit translation.
<b>SENDERS</b>					
3.07 Through 3.10	Sender Peg Count	Engineering Administration	The number of times a call is received from each type of sender.	Scored on the trunk link frame by the marker when channel has been selected by marker.	One register for each trunk link frame for each type of sender. <i>Note:</i> These registers are also used to obtain trunk link frame peg count.
3.11, 3.13, 3.15, 3.17	Total Sender Usage	Engineering Administration	The total sender usage, traffic plus maintenance, for a subgroup of 25 senders on fast scan or per group of 80 senders on slow scan.	Records total sender usage at a 10-second scan rate for senders with a holding time of less than 10 seconds and at a 100-second scan rate for senders with a holding time over 10 seconds.	One register per sender type per subgroup of 25 senders on fast scan or per group of 80 senders on slow scan.
3.12, 3.14, 3.16, 3.18	Sender Maintenance Usage	Engineering Administration	The maintenance usage on senders which are plugged busy or which are being tested by an automatic test frame.	Records sender maintenance usage for the sender group as a whole at a 100-second scan rate.	One register per sender group by sender type.
3.19	MF Sender Partial Digits Peg Count	Administration	The number of times that the operator's start key is depressed before the sender receives the required number of digits.	Scored by the sender if a start pulse is received before a complete code is registered.	One register per group of MF senders.

Fig. 1—Traffic Register Provision Chart—Common Control Equipment Registers (Sheet 2 of 4) (3.01 Through 3.31, 3.81, 3.82)

COMMON CONTROL EQUIPMENT REGISTERS					
PARA-GRAPH NUMBER	REGISTER DESIGNATION	PRIMARY TRAFFIC USER	INFORMATION RECORDED ON REGISTERS	METHOD OF REGISTER OPERATION	REGISTERS TO BE PROVIDED
<b>SENDERS (Cont)</b>					
3.21	DP Sender Partial Digits Peg Count	Administration	The number of times that a DP sender times out while awaiting complete digit registration.	Scored by the sender if the sender times out before registration of the called number is complete.	One register per group of DP senders.
3.24, 3.25, 3.26	Sender Group-Busy	Administration	The number of times the sender link control circuit finds all senders in a group busy.	Scores the number of times the sender link frame control circuit finds all senders in a group busy. Continues to score at 1.3-second intervals for the duration of the group-busy condition.	One register per sender group per type of sender.
3.20	Awaiting Registration Peg Count — MF Senders	Administration	The number of times that an MF sender times out while awaiting complete digit registration.	Scored by the sender if a time-out occurs after the first digit is registered but prior to complete registration.	One register per group of MF senders.
3.23	Permanent Signal Peg Count — MF Senders	Administration	The number of times an MF sender times out when no digits are received.	Scored by the MF sender when the sender times out within 20 to 36 seconds.	One register per group of MF senders.
3.27	Revertive Pulse Reorder Peg Count	Engineering	The number of RP sender calls finding an all-trunks-busy condition.	Scores when a marker is handling a call from a RP sender and finds all outgoing trunks busy.	One register per 75 RP senders.
3.28	Stuck Sender Peg Count	Administration	The number of senders timing out and sticking.	Scores when sender times out waiting for distant office. Does not score when originating office senders are in reduced timing.	One register per sender.
3.29	Intersender Timing Control Peg Count	Administration	The number of times a sender times out during shortened sender holding time.	Scores when a sender times out during the interval that intersender time-out is in effect.	One register per office.
3.30, 3.81	SADR Peg Count	Engineering Administration	The individual number of test bids to secure a sender.	The sender attachment delay recorder automatically tests the sender attachment interval by making a bid for a sender and timing the interval.	One register per sender group per type or one register per sender link frame.
	SADR Total Peg Count	Engineering Administration	The total number of test bids.		One register per sender type.

Fig. 1—Traffic Register Provision Chart—Common Control Equipment Registers (Sheet 3 of 4) (3.01 Through 3.31, 3.81, 3.82)

COMMON CONTROL EQUIPMENT REGISTERS					
PARA- GRAPH NUMBER	REGISTER DESIGNATION	PRIMARY TRAFFIC USER	INFORMATION RECORDED ON REGISTERS	METHOD OF REGISTER OPERATION	REGISTERS TO BE PROVIDED
<b>SENDERS (Cont)</b>					
3.30, 3.82	SADR Delay Count	Engineering Administration	The individual number of sender attachment tests which exceed 3 sec- onds.	Scored by the sender attachment delay recorder when a test bid interval ex- ceeds the 3-second limit.	One register per sender type.
	SADR Total Delay Count	Engineering Administration	The total number of SADR delays.		One register per sender type.

**Fig. 1—Traffic Register Provision Chart—Common  
Control Equipment Registers (Sheet 4 of 4)  
(3.01 Through 3.31, 3.81, 3.82)**

LINK FRAME REGISTERS					
PARA-GRAPH NUMBER	REGISTER DESIGNATION	PRIMARY TRAFFIC USER	INFORMATION RECORDED ON REGISTERS	METHOD OF REGISTER OPERATION	REGISTERS TO BE PROVIDED
<b>TRUNK LINK FRAMES</b>					
3.33	Trunk Link Frame Overflow	Engineering Administration	The number of times per trunk link frame that the marker fails to find an idle link between an incoming and an outgoing trunk.	Scored by the marker when it fails to find an idle link between an incoming and an outgoing trunk on first trial only.	One register per each trunk link frame.
3.34	Second Failure-to-Match	Engineering Administration	The number of times that a marker fails to find an idle channel between an incoming and an outgoing trunk on a second trial attempt.	Scored by the marker when it fails to find an idle channel on a second trial.	One register per office.
3.32	Trunk Link Frame Peg Count	Engineering Administration	The number of times that a call is received on a trunk link frame from each type of sender.	Scored on the trunk link frame by the marker when it establishes a connection through an idle channel between an incoming and an outgoing trunk. (Same as Sender Peg Count.)	One register per trunk link frame per type of sender.
3.37	Trunk Link Frame Any Channel Selected Peg Count	Engineering Administration	The number of times a call has been closed through a channel.	Scored when marker has closed cross-points of a channel just prior to marker release.	One register per marker.
3.36	Trunk Link Frame Sample Link Peg Count	Engineering Administration	The number of times a marker selects channel left 0, left 5, right 2, or right 7.	Scored each time the marker establishes a connection between an incoming and an outgoing trunk (over the 0 or 5 left, or 2 or 7 right links of each switch on the trunk link frame).	One register per marker.
3.38	Trunk Link Frame Sample Link Usage	Engineering Administration	The usage on 4 links of each switch on a trunk link frame. This is a sample of the usage on the switch.	Each switch is measured separately. Measures usage on links 0 and 5 left and links 2 and 7 right at a 100-second scan rate.	One register per switch per trunk frame.
3.39	Trunk Link Frame Total Sample Link Usage	Engineering Administration	The total sample link usage of all trunk link frames.	These registers, in conjunction with the DGU feature of the TUR, measure the total sample link usage of all trunk link frames (links 0 and 5 left and 2 and 7 right) at a 100-second scan rate.	Two registers per office.

Fig. 2—Traffic Register Provision Chart—Link Frame Registers (Sheet 1 of 2) (3.01, 3.32 Through 3.42)

LINK FRAME REGISTERS					
PARA- GRAPH NUMBER	REGISTER DESIGNATION	PRIMARY TRAFFIC USER	INFORMATION RECORDED ON REGISTERS	METHOD OF REGISTER OPERATION	REGISTERS TO BE PROVIDED
<b>OFFICE LINK FRAMES</b>					
3.40	Office Link Frame Peg Count	Engineering Administration	The number of times the marker seizes a pair of OLFs.	Scores the number of times the office link and connector circuit is seized, in- cluding all trials and tests.	One register per pair of OLFs.
3.41	Office Link Frame Overflow	Engineering Administration	The number of times per pair of office link frames that the marker fails to find an idle link between an incoming and outgoing trunk.	Scored by the marker when it fails to find an idle link between an incoming and outgoing trunk on first trial only.	One register for each pair of office link frames.
3.42	Office Link Frame Sample Link Usage	Engineering Administration	The usage on 4 links of each switch on an office link frame. This is a sample of the usage on the switch.	Each switch is measured separately. Measures usage of links 0 and 5 left and 2 and 7 right at a 100-second scan rate.	One register per switch per office link frame.
3.42	Office Link Frame Total Sample Link Usage	Engineering Administration	The total sample link usage of all office link frames.	These registers, in conjunction with DGU feature of the TUR, measure the total sample link usage of all office link frames (links 0 and 5 left and 2 and 7 right). Scanning is at a 100-second scan rate.	Two registers per office.

**Fig. 2—Traffic Register Provision Chart—Link Frame  
Registers (Sheet 2 of 2) (3.01, 3.32 Through  
3.42)**

CAMA EQUIPMENT REGISTERS					
PARA- GRAPH NUMBER	REGISTER DESIGNATION	PRIMARY TRAFFIC USER	INFORMATION RECORDED ON REGISTERS	METHOD OF REGISTER OPERATION	REGISTERS TO BE PROVIDED
<b>TRANSVERTERS</b>					
3.43	Transverter Peg Count	Engineering Administration	One register scores operator number identified (ONI) calls and the other automatic number identified (ANI) calls. The sum of these registers equals total transverter peg count.	Scored when billing indexer is seized.	Two registers per transverter.
3.44	Total Transverter Usage	Engineering Administration	The total transverter usage, traffic plus maintenance.	Records the transverter usage at a 10-second scan rate.	One register per transverter.
3.45	Transverter Maintenance Usage	Engineering Administration	The maintenance usage on transverters which are plugged busy or are being tested by an automatic test frame.	Records the maintenance usage for the transverter group as a whole at a 100-second scan rate.	One register per transverter group.
<b>RECORDERS</b>					
3.46	Recorder Peg Count	Engineering Administration	The number of operations handled (initial entries, answer entries, disconnect entries, test entries, and time entries).	Scored when the recorder is seized.	One register per recorder.
3.47	Recorder Usage	Engineering Administration	The total recorder usage.	Records the recorder usage at a 10-second scan rate.	One register per recorder.
<b>INCOMING REGISTERS (CAMA OR NONCAMA)</b>					
3.48	Incoming Register Peg Count	Engineering Administration	The number of times an incoming register is seized.	Scored by the incoming register when it is seized by the incoming register link connector.	One per group of 10 or 20 incoming registers.
3.49	Incoming Register Group-Busy Peg Count	Administration	The number of 1.3-second intervals the incoming register link circuit finds all incoming registers busy.	Scores the number of times the incoming register link circuit finds all incoming registers in the group busy. Continues to make subsequent scorings at 1.3-second intervals for the duration of the group-busy condition.	One register per group of 10 or 20 incoming registers.

**Fig. 3—Traffic Register Provision Chart—CAMA Equipment Registers (Sheet 1 of 3) (3.01, 3.43 Through 3.62)**

CAMA EQUIPMENT REGISTERS					
PARA- GRAPH NUMBER	REGISTER DESIGNATION	PRIMARY TRAFFIC USER	INFORMATION RECORDED ON REGISTERS	METHOD OF REGISTER OPERATION	REGISTERS TO BE PROVIDED
<b>INCOMING REGISTERS (CAMA OR NONCAMA) (Cont)</b>					
3.50	Digit "1" Received as Initial Digit Peg Count	Engineering Administration	The number of times an incoming register receives the digit "1" in the "A" digit position and returns immediate reorder to the customer.	Scored by the incoming register when a "1" is inadvertently dialed in the "A" digit position.	One per group of 10 or 20 incoming registers.
3.51	Partial Digits — Incoming Register	Administration	The number of times an incoming register times out (in 17 to 25 seconds) when only one or two digits have been received.	Scored by the incoming register when an incoming register times out in 17 to 25 seconds and only one or two digits have been received.	One register per group of 10 incoming registers.
3.52	Permanent Signal — Incoming Register	Administration	The number of times a 17- to 25-second incoming register times out before receiving the first digit.	Scored by the incoming register 17 to 25 seconds.	One register per group of 10 incoming registers.
3.53	No Sender Attached — 3-Digit Incoming Register	Engineering Administration	The number of times a sender is not attached to an incoming register by the time the third digit is registered in the incoming register.	Scored by the incoming register.	One register per group of ten 3-digit incoming registers.
3.54	Incoming Register — Total Usage	Engineering Administration	The total incoming register usage, traffic plus maintenance.	Records the total incoming register usage at a 100-second scan rate.	One register per incoming register group.
3.55	Incoming Register — Maintenance Usage	Engineering Administration	The maintenance usage on incoming registers which are plugged busy.	Records incoming register maintenance usage at a 100-second scan rate.	One register per incoming register group.
<b>CAMA POSITION REGISTERS</b>					
3.56	CAMA Position Peg Count	Engineering Administration	Each time a CAMA position is connected to a CAMA sender.	Scored when the CAMA position is seized by the CAMA position link.	One register per CAMA position.
3.57	CAMA Position Disconnect	Administration	Each time a position is disconnected by operation of the position disconnect key.	Scored by the CAMA position circuit each time the CAMA operator depresses the position disconnect key to free her position. The operation of this key signals the sender to release the position link and position. The call is then routed to ROA.	One register per each CAMA unit.

**Fig. 3—Traffic Register Provision Chart—CAMA Equipment Registers (Sheet 2 of 3) (3.01, 3.43 Through 3.62)**

CAMA EQUIPMENT REGISTERS					
PARA- GRAPH NUMBER	REGISTER DESIGNATION	PRIMARY TRAFFIC USER	INFORMATION RECORDED ON REGISTERS	METHOD OF REGISTER OPERATION	REGISTERS TO BE PROVIDED
<b>CAMA POSITION REGISTERS (Cont)</b>					
3.58	CAMA No Position Attached	Administration	The number of times that a sender times out while awaiting connection to a CAMA position.	This register is scored by the sender if time-out occurs prior to an "operator attached" signal.	One register per type of CAMA sender.
3.59	CAMA Wrong Calling Code	Administration	The number of calls on which CAMA operator keyed an unusable calling office code. This includes vacant calling office codes, codes not in the recorder group, and called office codes given in error.	Scored by the transverter when a wrong calling code is detected by the billing indexer during the match check operation.	One register per transverter group.
3.60	CAMA Match Check	Administration	The number of times the called number instead of calling number is given by the customer.	Scores the number of times the CAMA operator receives a reorder signal from the sender when the called office code, instead of the calling office code, is given by the customer. The match check is made by the billing indexer. Where match check equipment is not provided, these calls will be scored as described for wrong calling code.	One register per transverter group.
3.61	Answer Time Recorder	Administration	Speed of answer on the CAMA operator's board.	Scores the number of calls observed (for speed of answer), the number of delays, and the number of calls timed for speed of answer. The calls are observed from the time the sender requests a CAMA position to the connection of a position.	Three registers per office.
3.62	CAMA Bulk Billed Free Call	Administration	The number of bulk billed free calls.	Scores each bulk billed call which is completed but not recorded on the CAMA equipment due to a recorder being out of order or some other type of trouble.	One register per transverter group.

**Fig. 3—Traffic Register Provision Chart—CAMA Equipment Registers (Sheet 3 of 3) (3.01, 3.43 Through 3.62)**

TRUNK GROUP REGISTERS					
PARA- GRAPH NUMBER	REGISTER DESIGNATION	PRIMARY TRAFFIC USER	INFORMATION RECORDED ON REGISTERS	METHOD OF REGISTER OPERATION	REGISTERS TO BE PROVIDED
<b>OUTGOING AND 2-WAY TRUNK GROUPS</b>					
3.63	Outgoing and 2-Way Trunk Group Peg Count	Administration Trunk Engineering	The number of times a call is submitted to an outgoing trunk group.	Scored by the marker when an attempt is offered to an outgoing trunk group. The registration is made when the first choice route relay is operated.	One register per outgoing trunk group.
3.64	Outgoing and 2-Way Trunk Group Overflow	Engineering Administration	The number of times that a marker tests an outgoing trunk group and finds all the trunks busy.	This register is scored by the marker when all the trunks in an outgoing group are busy.	One register per each outgoing trunk group.
3.65	Incoming, Outgoing, and 2-Way Trunk Group Usage	Engineering Administration	The usage on trunk groups.	Records the total usage on incoming and outgoing trunks, 1- and 2-way, at a 100-second scan rate.	One register per trunk group.
<b>WIDE AREA TELECOMMUNICATIONS SERVICE (WATS)</b>					
3.77	WATS Peg Count	Administration	The number of calls routed to the WATS announcement.	Scores when a WATS customer attempts to dial a code to which he does not have access.	One register per office.
3.66	WATS	Administration	The WATS usage per zone.	Records the total WATS usage per zone at a 100-second scan rate.	One register per WATS zone.
<b>STONE AND ANNOUNCEMENT TRUNK GROUPS</b>					
3.67	Reorder Tone (NC-RA) Peg Count	Administration	The number of times a call is routed to reorder tone.	Scores the number of calls routed to the reorder tone (120-IPM) trunk group when an all-trunks-busy condition is encountered on any announcement trunk.	One register per marker pair.
3.68	Reorder Tone "High and Dry"	Administration	The number of times a call is routed to the 120-IPM trunk group and finds all trunks busy.  Overflow of the 120-IPM trunks returns no audible signal and is called a "High and Dry" condition.	Scores the number of times an intertoll NC condition is encountered and all NCA and 120-IPM trunks are busy.	One register per marker pair.
	NC - IT			Scores the number of times a toll completing NC condition is encountered and all 120-IPM trunks are busy.	One register per marker pair.
	NC - TC			Scores the number of times a call is routed to MCA, VCA, UCA, ROA, or SOA and the announcement trunks and 120-IPM trunks are busy.	One register per marker pair.
	NC - RA				

Fig. 4—Traffic Register Provision Chart—Trunk Group Registers (Sheet 1 of 2) (3.01, 3.63 Through 3.77)

TRUNK GROUP REGISTERS					
PARA- GRAPH NUMBER	REGISTER DESIGNATION	PRIMARY TRAFFIC USER	INFORMATION RECORDED ON REGISTERS	METHOD OF REGISTER OPERATION	REGISTERS TO BE PROVIDED
<b>ZONE AND ANNOUNCEMENT TRUNK GROUPS (Cont)</b>					
3.69	Reorder Announcement (ROA) Peg Count	Administration	The number of times a call is routed to reorder announcement trunks.	Scores the number of times a call is routed to the ROA trunk group for one of the following reasons: (a) Sender time-out (except for reduced intersender timing) (b) Second failure-to-match (c) Marker and transverter second trials (d) Keypulsing irregularities.	One register per marker pair.
3.70	Sender Overload Announcement (SOA) Peg Count	Administration	The number of times a call is routed to sender overload announcement trunks.	Scored by the marker when an attempt is offered to the SOA trunks. Calls route to SOA only when senders are in short timing (waiting for sender at distant office).	One register per office.
3.71	Vacant Code (VCA) Peg Count	Administration	The number of times a call is routed to vacant code announcement trunks.	Scores the number of calls routed to the VCA trunk group on an attempt by a customer or operator to a nonworking NPA or NNX code.	One register per office.
3.72	No-Circuit Intertoll (NC-IT) Peg Count	Administration	The number of times a call is routed to the NC-NCA-RO trunk group.	Scores the number of times a call is routed to the NC-NCA-RO (120-IPM) trunk group when a no-circuit condition is encountered on a final intertoll circuit group. Total final intertoll trunk group overflow registrations should equal NC-IT peg count.	One register per marker pair.
3.73	Misrouted Non- CAMA (MCA) Peg Count	Administration	The number of times a call is routed to the MCA trunk group.	Scores when a customer dials a DDD access on a local call.	One register per office.
3.74	Unauthorized Code (UCA) Peg Count	Administration	The number of times a call is routed to the UCA trunk group.	Scores the number of calls routed to the UCA trunk group on an attempt by a customer or operator to an unauthorized code point.	One register per office.
3.75	MCA, ROA, SOA, UCA, VCA Overflow	Administration	The number of times a call is routed to these announcement trunks and finds all trunks busy.	Scored by the marker each time a call is offered to these announcement trunks and finds all trunks busy. Calls overflow to RO tone trunks.	One register per office per trunk group (5 registers total).
3.76	No-Circuit Toll Completing (NC-TC) Overflow	Administration	The number of times a call is routed to the RO trunk group.	Scores the number of times a call is routed to the RO (120-IPM) trunk group when a no-circuit condition is encountered on any toll completing trunk group.	One register per marker pair.

Fig. 4—Traffic Register Provision Chart—Trunk Group Registers (Sheet 2 of 2) (3.01, 3.63 Through 3.77)

DIVISION OF REVENUE REGISTERS					
PARA- GRAPH NUMBER	REGISTER DESIGNATION	PRIMARY TRAFFIC USER	INFORMATION RECORDED ON REGISTERS	METHOD OF REGISTER OPERATION	REGISTERS TO BE PROVIDED
3.78	Traffic Separation	Traffic Separation	The number of times a connection is made between an incoming trunk and an outgoing trunk. This information is used for division of revenue and is registered according to separate combinations of incoming and outgoing traffic.	Scored by the marker when it identifies the class of the incoming trunk and outgoing destination. Incoming trunks are classed according to place of origin, outgoing calls are classed by destination points. Register is scored after marker has closed through selected channel.	One register per marker for each source destination (See TFP Div. K, Sec. 1-d)

Fig. 5—Traffic Register Provision Chart—Division of Revenue (3.01, 3.78)

DIRECTIONAL RESERVATION EQUIPMENT					
PARA- GRAPH NUMBER	REGISTER DESIGNATION	PRIMARY TRAFFIC USER	INFORMATION RECORDED ON REGISTERS	METHOD OF REGISTER OPERATION	REGISTERS TO BE PROVIDED
3.79	Directional Reservation Trigger	Administration	The number of times the reservation circuit oper- ates to restrict access.	Scores each time the DRE unit operates to control traffic.	One register per DRE unit.
3.80	Directional Reservation Timing	Administration	The number of intervals the restricted access is in effect.	Scores every 1.3 seconds during the in- terval in which the reservation equip- ment is triggered to control traffic.	One register per DRE unit.

**Fig. 6—Traffic Register Provision Chart—Directional  
Reservation Equipment (3.01, 3.79, 3.80)**

TUR REGISTERS					
PARA-GRAPH NUMBER	REGISTER DESIGNATION	PRIMARY TRAFFIC USER	INFORMATION RECORDED ON REGISTERS	METHOD OF REGISTER OPERATION	REGISTERS TO BE PROVIDED
3.83	TUR Group Cycle Count	Administration	To check the number of scan cycles made in a given period of usage. When involved with register grouping, the register is also used to explain the equipment measured.	Records the number of scanning cycles included in each period of usage data taken on the registers in a particular camera field. When more than one register is provided in a camera field, it also indicates the RG key position operated. (Only the register associated with that key position will show scorings.)	One register per camera field of 150 registers where camera field is not involved with the register grouping feature or one register per key position per camera field per TUR frame when camera field is involved with the register grouping feature.
	Time Register (Clock)	Administration	Indicates elapsed time between readings.	Operates every 6 seconds by the central office clock circuit.	One register per traffic register cabinet.

Fig. 7—Traffic Register Provision Chart—TUR Registers (3.01, 3.83)

100A TSP EQUIPMENT REGISTERS					
PARA-GRAPH NUMBER	REGISTER DESIGNATION	PRIMARY TRAFFIC USER	INFORMATION RECORDED ON REGISTERS	METHOD OF REGISTER OPERATION	REGISTERS TO BE PROVIDED
4.01 Through 4.04	Traffic Service Position Peg Count	Engineering Administration	Total number of calls handled at a TSP position.	Scored when a TSP position handles a call.	One register per 100A TSP position.
	Total CAMA Peg Count	Engineering Administration	Total CAMA calls.	Scores the total number of CAMA calls handled on 100A TSP position.	One register per ten 100A TSP positions.
	Total Non-CAMA Peg Count	Engineering Administration	Total non-CAMA calls connected to 100A TSP positions.	Scored by the controller.	One register per controller.
	Noncoin 0+ Peg Count	Engineering Administration	Total noncoin 0+ calls.	Scored by the controller.	One register per controller.
	Coin 0+ and 1+ Initial Deposit Peg Count	Engineering Administration	Total coin 0+ and 1+ initial deposit calls.	Scored by the controller.	One register per controller.
	Coin 0+ and 1+ Subsequent Action Peg Count	Engineering Administration	Total coin 0+ and 1+ subsequent action calls.	Scored by the controller.	One register per controller.
	Noncoin 0 Initial Position Seizure Peg Count	Engineering Administration	Total noncoin 0 initial position seizure calls.	Scored by the controller.	One register per controller.
	Noncoin 0 Position Recall Peg Count	Engineering Administration	Total noncoin 0 position recalls.	Scored by the controller.	One register per controller.
	Position Display Peg Count	Engineering Administration	Total position display circuit calls.	Scored by the position.	One register per position display circuit.
	Data Transfer Peg Count	Engineering Administration	Total data transfer calls.	Scored each time the data transfer handles a call.	One register per data group.
	Coin 0 Position Seizure Peg Count	Engineering Administration	Total coin 0 position seizure calls.	Scored by the controller.	One register per controller.
	Coin 0 Position Recall Peg Count	Engineering Administration	Total coin 0 position recalls.	Scored by the controller.	One register per controller.
	CAMA Overlap Peg Count	Administration	Total CAMA overlap calls.	Scored when CAMA overlap calls are connected to 100A TSP positions.	Two registers per chief operator unit.

Fig. 8—Traffic Register Provision Chart—100A TSP Equipment Registers (Sheet 1 of 3) (3.01, 4.01 Through 4.04)

100A TSP EQUIPMENT REGISTERS					
PARA- GRAPH NUMBER	REGISTER DESIGNATION	PRIMARY TRAFFIC USER	INFORMATION RECORDED ON REGISTERS	METHOD OF REGISTER OPERATION	REGISTERS TO BE PROVIDED
4.01 Through 4.04	Delay Call Trunk Peg Count	Engineering Administration	Total delay call trunk seizures.	Scored by the controller when a delay call trunk is seized by the 100A TSP position.	One register per controller.
	Controlled Pulsing Circuit Peg Count (Inpulsing)	Engineering Administration	Total controlled pulsing circuit, inpulsing calls.	Scored by the controlled pulsing circuit when it is seized for inpulsing.	One register per controlled pulsing circuit.
	Controlled Pulsing Circuit Peg Count (Outpulsing)	Engineering Administration	Total controlled pulsing circuit, outpulsing calls.	Scored by the controlled pulsing circuit when it is seized for outpulsing.	One register per controlled pulsing circuit.
4.03 (a)	Outgoing Trunk Calls Overflow	Engineering Administration	The number of times a call is routed to an out- going trunk group and finds all trunks busy.	Scored by marker circuit.	One per group or subgroup.
	Transfer Trunk Calls Overflow	Engineering Administration	The number of times a call is routed to the trans- fer trunk group and finds all trunks busy.	Scored by marker circuit.	One per group or subgroup.
	Peg Count of Coin 0 Calls Received Over Combined 0, 0+, and 1+ Coin Trunk Groups	Engineering Administration	The number of times a call is routed to the com- bined coin trunk group.	Scored by marker circuit.	One register per combined coin trunk group.
4.04	Number of Rater Seizures	Engineering Administration	The number of times a rater is seized.	<i>Note:</i> Ten cents initial toll zone or free calls will score on the rater seizure but not on the position seizure register.	One per rater.
	Number of Position Seizures	Engineering Administration	The number of times a position is seized.		One per rater.
	Ten-Cent Toll Initial Rater Seizure	Engineering Administration	The number of requests for initial rate.	Scored by rater circuit.	One per rater.
	Ten-Cent Zone Initial Rater Seizure	Engineering Administration	The number of requests for 10-cent zone informa- tion.	Scored by rater circuit.	One per rater.

Fig. 8—Traffic Register Provision Chart—100A TSP  
Equipment Registers (Sheet 2 of 3) (3.01,  
4.01 Through 4.04)

100A TSP EQUIPMENT REGISTERS					
PARA- GRAPH NUMBER	REGISTER DESIGNATION	PRIMARY TRAFFIC USER	INFORMATION RECORDED ON REGISTERS	METHOD OF REGISTER OPERATION	REGISTERS TO BE PROVIDED
4.04 (Cont)	Free Calls and Vacant Code Calls	Engineering Administration	The number of requests for free calls and vacant code calls.	Scored by rater circuit.	One per rater.
	Notify (End of Initial Period)	Engineering Administration	The number of requests to notify at the end of the initial period.	Scored by computer circuit.	One per computer.
	Charge Due	Engineering Administration	The number of requests for charge information.	Scored by computer circuit.	One per computer.
	Coin Zone Calls Other Than 10- Cent Initial Rate	Engineering	The number of coin zone calls with other than 10- cent initial rate.	Scored by computer circuit.	One per computer.
	Peg Count on Each of the Ten Data Groups	Engineering Administration	The number of requests for a data transfer by each of the ten data sub- groups.	Scored when a data transfer is re- quested by a position, register, or a test circuit.	One per data group.
	No Position Attached (NPA) Register	Engineering Administration	The number of requests for a position with no position available.	Scored whenever a sender times out on a bid for a position.	One per tandem.

**Fig. 8—Traffic Register Provision Chart—100A TSP  
Equipment Registers (Sheet 3 of 3) (3.01,  
4.01 Through 4.04)**