NETWORK MANAGEMENT

STATUS INDICATORS AND CONTROL FACILITIES

CONTENTS PAGE

CONTENTS PAGE

Figures

CONTENTS PAGE

1. GENERAL

1.01 The network manager is responsible for controlling and maintaining service in the network during periods of overload and abnormal situations. The need for minimizing the degradation of service due to shortages of trunks, switching equipment, or periods of high customer demand for service, has resulted in the development of network management control equipment and traffic control procedures. These procedures and controls serve to balance circuits and equipment to meet customer service demand. The network manager has been provided with specialized control equipment to effectively manage the switching network. The complexity and sophistication of the control equipment will differ with the types of switching machines used in the system. This section provides an overview of the interaction of network management control equipment and controls, and the integration of network management controls through the intertoll hierarchy to establish a unified approach for meeting the network service objectives.

1.02 Whenever this section is reissued, the reason for reissue will be listed in this paragraph.

1.03 The title for each figure includes a number in parentheses which identifies the paragraph in which the figure is referenced.

1.04 The network management control decisions made in response to observed traffic patterns at any point in the network hierarchy will affect the levels of traffic to higher, subtending, or lateral offices in the hierarchy in addition to out-of-chain routed traffic. These decisions must be made in concert with other affected network managers or in accordance with a prearranged schedule. Pursuant to this objective, a knowledge and understanding of the capabilities and degree of sophistication of the network management control equipment in the affected offices is equally essential.

1.05 The capabilities of network management control equipment will vary with the sophistication of the switching system. Network management controls in electronic switching systems, such as, the No. 4 Electronic Switching System (ESS) or the No. 4 crossbar machines equipped with ETS/PBC (Electronic Translator System/Peripheral Bus Computer), are software controlled. Changes to network management controls in a No. 4 ESS machine are input via the network management cathode-ray tube (CRT) display system. Changes to network management controls in a switching machine are input No. 4 ETS/PBC switching machine are input via the network management console or the network management (channel 2) teletypewriter. On the other hand, network management controls in non-ETS electromechanical switching systems are mechanical key controls which represent physically wired connections. Activation of these network management controls requires manual activation of selected control keys.

2. NETWORK MANAGEMENT OBJECTIVES

2.01 The objectives of the network management system are basically the same for both the toll connecting and intertoll networks, although the manner in which the network management controls are applied will differ according to the type of switching system affected. These controls serve to reach the following objectives:

A. Keep All Trunks Filled With Messages

2.02 The switching network is trunk limited; therefore, switching system congestion should never occur, providing the message-nonmessage relationship is maintained. When events occur that cause an undue increase in nonmessage attempts, action must be taken to block these attempts as close to their source as possible. Blocking the nonmessage attempts will allow the network to handle more messages to the satisfaction of customers and will provide a financial return to the telephone company.

B. Utilize All Available Trunks

2.03 There are periods such as major holidays or abnormal events when, due to changing traffic patterns, the demand for service cannot be handled by the engineered pattern of trunking. When this situation occurs, it can cause excessive short holding-time attempts and resultant machine congestion due to specific trunk shortages. At the same time, many other trunks may be idle. Special equipment, such as traffic overload reroute control, route transfer keys, network control consoles,

etc, have been provided or are available to allow the network manager to adapt the trunking and routing pattern, which pattern is designed for the average business day (ABD), to the pattern of traffic applied during the special period involved.

C. Give Priority to Single Link Connections When All Available Trunks are Exhausted

2.04 The basic nationwide telephone switching network utilizes automatic alternate routing and is designed in a hierarchical structure. While very efficient when operating at or below designed levels, alternate routing loses that efficiency when the load increases above the designed level. This is caused by the increased attempts requiring two, three, or even more links per call. Using additional links during an overload increases the possibility of one call blocking several.

2.05 Due to the increase in multiple link connections through the application of alternate routing, the message capacity of the network will decrease while short holding time attempts increase because of increased no circuit (NC) conditions. This increase in nonmessage attempts causes machine congestion at the switching machine. Thus, during an overload when outgoing trunks from the switching machine have been exhausted, the number of trunk groups to which an attempt has access should be restricted.

D. Inhibit Switching Congestion

2.06 As stated previously, the telephone switching network is trunk limited. It becomes the function of the switching machine to handle attempts generated over these trunk groups. During the average business day operation, an average message-nonmessage relationship exists per circuit which permits efficient use of circuits and machines. An undesirable increase in nonmessage attempts can and does result in congestion at the switching machine. If this congestion is left unchecked, it can spread and cause a further degradation of the switching network. Since this congestion is the primary reason why the switching machine cannot serve attempts and since other switching machines can be affected, such congestion should be inhibited. Another cause of switching congestion can be inadequate engineering of equipment or equipment out of service. These factors can be a significant problem area for the network manager.

3. NETWORK MANAGEMENT CONTROLS

3.01 Intertoll switching machines often experience extreme fluctuations in traffic levels and are frequently offered traffic loads in excess of their operational capacities. The optimum utilization of intertoll switching machines can be maintained only if adequate network management controls are available. During periods of traffic overload, the objective of the network manager is to control the flow of traffic so that circuits are occupied with effective attempts and switching congestion is minimized. To accomplish this objective, corrective action (more specifically, control action) is required. The controls available to the network manager are classified as either ***protective*** or ***expansive.*** The protective controls usually involve blocking or restriction of certain categories of traffic to prevent the spread of congestion. The second category of controls available to the network manager, expansive controls, includes the manipulation of routing to divert traffic from its normal route to other facilities that have spare capacity.

3.02 One important consideration that must be given to any type of control (expansive or protective, automatic or manual) is that the network or machines should be neither overcontrolled nor controlled longer than necessary. Surveillance must be continued for control to be changed or removed, as appropriate, at the proper time.

4. CONTROL EQUIPMENT AND CONTROL MEASURES

4.01 This part describes the principal control equipment and measures available to the network managers for controlling and maintaining service in the network during periods of overload.

A. Dynamic Overload Control

4.02 Dynamic overload control (DOC) equipment is a switching oriented control which monitors the load presented to the switching machine. The dynamic overload control sensing circuits react to impending overload conditions by monitoring the length of sender or marker/decoder queues in No. 4 crossbar and crossbar tandem switching machines. The circuits automatically activate the following controls to restrict traffic so that service is maintained at an acceptable level when the predetermined threshold is exceeded.

4.03 The types of internal controls activated by DOC are as follows:

(a) ***Automatic Cancellation of Short Sender Timing***—This feature conserves common control usage during periods of switching congestion by reducing the number of calls routed to sender overload announcement following sender time-out.

Note: Short sender timing (SST) is an internal overload control but is not part of the DOC system. SST is activated by an all-sender busy condition and, upon activation, the sender time-out interval is reduced from about 30 seconds to about 5 seconds. The result of SST is more effective sender usage and reduction in the regenerative sender delay.

(b) ***Automatic Cancellation of Second Trial***—During overload periods, the probability that a call which failed on the first attempt will complete on the second trial is relatively small. Cancellation of the second trial reduces unproductive common control equipment usage.

4.04 The DOC system also provides features to automatically restrict traffic routed to a crossbar tandem or a No. 4 crossbar. These features are ***external*** controls as opposed to the internal controls described already. The switching system receiving controls can be other crossbar tandems or No. 4 crossbars, or it can be a No. 5 crossbar, a No. 1 crossbar, panel, or ESS. The control signal is of the simple on/off type which contains no coded information; the response of the receiving office is strictly a function of how that office has been wired or programmed to respond. Each DOC signal will stimulate a unique response. The signaling mechanism can be a wire pair, a telegraph channel, E&M leads, or a ground return.

4.05 Congestion in the DOC sending switching system is sensed by a sender queue indicator circuit which monitors the level of waiting attempts on sender link frames and, at a preset threshold, causes the DOC signal to be transmitted to subtending offices. During the interval that the signal is ON, the DOC equipment at the subtending offices restricts access to the office sending the control signal. The restriction can be arranged to cancel the access of certain alternate routed traffic and/or deny access to a part of the direct routed traffic. The fact that this type of control is dynamic permits routings to be restored to normal whenever the load level drops below the threshold.

4.06 This dynamic regulation of offered loads tends to contain the congestion without reducing the tandem common control occupany below maximum capacity. DOC also improves the throughput of the subtending system since its senders/transmitters are not held up (or timed out) while waiting for service from the congested system. The programmed responses sent to the subtending system depend on routing and the network design, but they generally include the following:

(a) ***Automatic Cancellation of Alternate or Direct Routing***—In response to a DOC signal, a percentage of alternate routed traffic is generally denied access to the congested system and routed directly to an announcement. Alternate routed traffic is controlled before direct routed traffic because it has outlets other than the congested system. If denial of alternate routed traffic provides insufficient ***control leverage,*** a percentage of direct routed traffic may be controlled. For DOC to be effective, enough traffic ***must*** be controllable to rapidly reduce congestion in the controlling system.

(b) ***Automatic Trunk Make Busy***—This feature provides for a predetermined portion of the trunks to a congested switcher to appear busy at a lower ranking office, thus reducing its access to the congested system. The trunk group involved may be either one-way or 2-way.

(c) ***Skip Route***—In response to a DOC signal, a subtending office may deny a percentage of alternated routed traffic access to a high-usage group to the congested office and ***skip*** it to the next route in the chain. During periods of congestion in the higher ranking office, ***skip route*** reduces attempts on the congested office and allows the traffic to attempt completion via the trunk layout of the next office in the routing chain.

B. Directional Reservation Equipment

4.07 Directional reservation equipment (DRE) is a trunk-oriented control used at lower ranking offices to preferentially directionalize the flow of traffic on 2-way final trunk groups to higher ranking offices. This network management control is placed

into effect automatically when a predetermined or preset level of trunks between the two offices on each subgroup of 40 2-way final trunks are busy (80 2-way final trunks in crossbar tandem offices). From one to five trunks per trunk subgroup of 40 may be reserved for calls from the higher ranking office. When more than the preset number of trunks (1 to 5) are idle, both offices have free access to the trunk subgroup. When the preset number of trunks or less are idle, only the higher ranking office has access to them. The network manager must exercise his judgment as to the adequacy of a particular setting and change the reservation settings to provide network congestion relief for both the higher and lower ranking offices.

4.08 Each time the DRE is triggered or becomes operative, a peg count register is scored and an indicating lamp lights. A group busy timing register is scored every 1.3 seconds during the directional reservation equipment operative period.

4.09 DRE can be installed in No. 4 and No. 5 crossbar, crossbar tandem, step-by-step, and No. 1 ESS offices.

C. Protective Reservation Equipment

4.10 Protective reservation equipment (PRE) is a trunk-oriented control which was developed for No. 1 ESS to automatically prevent alternate routing to a final trunk group when a predetermined number of trunks in the final group are busy, thus giving preference to first route traffic.

4.11 PRE may be installed at both ends of a final trunk group. It is arranged to monitor the individual circuit busy leads; at a predetermined level, usually two remaining idle trunks, the equipment is activated. This action prevents route advance to the final group and routes the call to a no circuit announcement. In effect, this reserves two trunks for first routed traffic whenever the remaining trunks in the group are busy. When more than two trunks are idle for a period of 10 seconds, the protective reservation equipment restores alternate routing to the group.

4.12 This control equipment serves two purposes. It provides preferential service to first route traffic, and it reduces alternate routing during periods of heavy traffic usage on the final trunk group.

4.13 The protective reservation feature is used in the No. 1 ESS. In the No. 4 ESS this control is referred to as selective trunk reservation (STR). (STR can cancel both first routed and alternate routed traffic, whereas PRE cancels only alternate routed traffic.)

D. Directionalization of Circuits

4.14 Where control devices such as DOC or DRE are not available, the technique of manually directionalizing circuits is used.

4.15 On a 2-way trunk group, the switching machines at each end have an equal chance of obtaining an idle circuit. In periods of overload, it may be desirable to give one office preference over the other in obtaining a circuit. This can be accomplished by ***locking out*** a designated portion of the 2-way trunk group at one office only. This will give the other office the exclusive use of these locked-out circuits, in effect making them one-way out trunks. In some cases, when a 2-way trunk group is directionalized, it is also ***finalized.*** Finalization is accomplished by canceling alternate routing of the directionalized trunk group during periods of congestion. The directionalized, locked-out condition should be checked periodically by the Maintenance group due to the possibility that the locked-out circuit was previously seized and will not release upon completion of the message traffic.

4.16 Directionalization is used where directional reservation equipment is not available or applicable. This action does not provide the flexibility of directional reservation equipment. Directionalization is not switching-oriented, but trunking-oriented. It can be applied on any 2-way trunk groups from a test board.

E. Short Sender Timing

4.17 Common control systems, such as crossbar tandem and the No. 4 crossbar, are equipped with an automatic reduced sender timing feature. Short sender timing (SST) is an automatic feature. Normally senders wait 20 to 40 seconds for a sender in a distant office or an outgoing sender in the same office. When all senders of one type in a sender group become busy, the intersender timing circuit causes the sender time-out interval on that sender group to be reduced from 20 to 40 seconds to 5 seconds at class 2 offices, or lower, and 8 seconds at class 1 offices. Also, the short sender

timing may be adjusted from 3 to 8 seconds. If the distant sender does not connect within the specified reduced time interval, the circuit is released and the call is routed to a sender overload announcement (SOA).

4.18 Once activated, the short sender timing interval will remain in effect until at least one sender in the group is available for a period of 30 seconds.

4.19 In No. 4 crossbar and crossbar tandem offices, the short sender timing feature can be overridden by the DOC equipment keeping the senders on the normal 20- to 40-second waiting interval (cancel short sender timing [CSST]).

F. Traffic Overload Reroute Control

4.20 Traffic overload reroute control (TORC) equipment is provided at regional centers for rerouting interregional traffic during overload periods.

4.21 Through the use of this control equipment, calls overflowing as inter-regional final trunk group are routed to a regional office (via office) having idle or lightly loaded trunk groups into the called regional area. At the ***via*** office the high usage groups (as well as the final) are utilized to complete traffic into the third region.

4.22 This rerouting can be done on a percentage basis (25, 50, 75, or 100 percent) of all overflow traffic from one regional center final trunk group via another regional center final trunk group through the ETS network control console. Only one regional center or via office can be used at a time for rerouting traffic from a particular regional center to a regional center final group. Traffic in the opposite direction on the same regional center to regional center group can be redirected or rerouted through a different regional (via) office.

4.23 In the actual operation of traffic overload reroute control, the New York Network Operating Center coordinates offices at each end of the final group and the via office to determine the direction and pressure of traffic and the available capacity of switching systems and circuits.

G. Line Load Control

4.24 Line load control (LLC) equipment reserves the availability of serving office equipment for essential subscribers. Line load control is not necessarily designed to control toll network congestion, but to relieve an overload condition in class 5 offices. This reservation results in a complete denial of originating service to those subscribers in the group on which it is operated. Even though operated for relatively short periods of time, it results in denial of service both on an intermachine and an intramachine basis. This action preserves service to essential subscribers, but does not affect incoming calls or calls already in progress.

4.25 The customer lines in each office are divided into three groups. For example:

Class A—10% (Approximate)—Priority and Emergency Lines Plus Coin

Class B—45%—Nonpriority Users

Class C—45%—Nonpriority Users

Line load control provides individual keys for disabling, by line groups, portions of Classes B and C, so they cannot obtain dial tone. Two master keys are provided so that all lines in Class B or all of Class C may be disabled at once.

4.26 There is a requirement for line load control, but its application should be reserved only for the most severe circumstances and not as a control for machine congestion. Line load control equipment can be installed in class 5 electromechanical. In No. 1 ESS machines, line load control is provided in the stored programs. In No. 2 ESS machines, line load control is referred to as dynamic service protection.

H. Code Blocking

4.27 The cancellation of traffic to hard-to-reach codes, referred to as code blocking (CB), provides the capability for restricting or blocking calls for the following code choices:

NPA, 3-digit area code

NXX, 3-digit central office code

NPA-NXX, 6-digit area/central office code

NXX-XXXX, 7-digit directory number

NPA-NXX-XXXX, 10-digit directory number

4.28 Code blocking may be applied to all traffic or to a specified percentage of the traffic destined for a particular office. Code blocking is an effective control for a focused overload where a large volume of calls are directed toward one destination. Code blocking at or near the originating point prevents the overloading of the terminating switching system and allows calls destined for other locations to go through.

4.29 The 3-, 6-, 7- and 10-digit code blocking can be manually activated to block a percentage of the attempts to each code through the Network Control Console (3- and 6-digit code blocking) and the Network Management Teletypewriter Channel (7- and 10-digit code blocking) in No. 4 ETS/PBC/CCIS offices, and through the CRT display system in the No. 4 ESS offices. The 3- and 6-digit code blocking is activated through the network control Console is No. 4A ETS, non-CCIS, offices. The 3- and 6-digit code blocking is activated through card changes in No. 4 card translator (CT) offices and through wiring changes in crossbar tandem offices.

I. Trunk Controls

4.30 Trunk-oriented controls are the basic method of network control in use today. Trunk controls are sometimes ***protective*** in nature. They serve to block or restrict certain categories of traffic to prevent the spread of congestion. DRE, PRE, and directionalization of circuits, which were discussed previously, are trunk-oriented controls. The following categories of trunk controls are sometimes referred to as ***key*** controls. The name ***key*** control was derived from the application process which involved the manual activation of a locking key to apply a specific control. These categories of trunk controls include the following functional categories:

(a) ***Cancel From (CANF) controls,*** similar to ***S*** cancellation keys in crossbar tandem, No. 4 CT, and No. 5 crossbar offices are used in the No. 4 ETS to cancel a percentage of alternate routed traffic only or a percentage of both direct and alternate routed traffic from advancing to a particular trunk group. The canceled traffic is then routed to an announcement. This control finalizes the trunk group.

(b) ***Cancel To (CANT) controls,*** similar to ***R*** cancellation keys in crossbar tandem, No. 4 CT, and No. 5 crossbar offices used in the No. 4 ETS to cancel a percentage of alternate routed traffic only or a percentage of both alternate and direct routed traffic of the traffic offered to a trunk group. The canceled traffic is then routed to an announcement.

(c) ***Skip Route controls*** are used to allow a percentage of the overflow traffic from a particular high usage trunk group to bypass its normal alternate route and advance to its next in-chain trunk group alternate route.

(d) ***Key Reroutes*** are predetermined changes to established routing patterns that may be needed frequently. They are designed to utilize idle capacity in trunk groups outside the normal routing pattern. These reroutes are implemented through the use of control keys during periods of network congestion (ie, crossbar tandem traffic supervisory cabinet). These controls are activated through the use of the following types of keys:

(1) ***R*** and ***CR*** keys used in crossbar tandem, No. 4 CT, and No. 5 crossbar offices to cancel alternate routed traffic on an ***all or nothing*** basis.

(2) ***S*** or ***RT*** keys used in crossbar tandem, No. 4 CT, and No. 5 crossbar offices to provide selective cancellation of a preset percentage of alternate routed traffic.

J. Recorded Announcement Equipment

4.31 Recorded announcement equipment provides messages which give the calling party or the originating operator an indication of why a call was not completed and what subsequent action should be taken. Recorded announcement equipment is utilized all switching systems in use today. Equipment configuration, capability, and control arrangements will vary in switching machines. This equipment will provide all announcements which include such basic announcements as no circuit, vacant code, and a series of special emergency messages.

K. Operator Attempts Limiting

4.32 Operators may be instructed to limit the number of attempts on each call for an area experiencing congestion.

5. SURVEILLANCE INDICATORS AND CONTROL CONSOLES

5.01 This part describes the surveillance indicators and control consoles available to the network managers for implementing controls.

A. Surveillance Indicators

5.02 This section provides a brief description of some early surveillance (status) indicators which are used to provide a measure of switching network performance in electromechanical switching systems.

Traffic Registers

5.03 Traffic registers provide a mechanical means of obtaining data on various components of the network (ie, peg count, overflow, and usage). Register data are used for load balance, equipment engineering, service reports and special studies, and in analysis of ineffective machine attempts. Types of traffic registers in use are:

(a) No. 14 Type—a four-digit counter capable of scoring 10,000 pegs.

(b) Veeder-Root—a five-digit counter capable of scoring 100,000 pegs, or a six-digit counter capable of scoring 1,000,000 pegs.

(c) Sodeco—a five-digit counter capable of scoring 100,000 pegs.

(d) Totalizer—an electronic counting device which provides on one traffic register the total count accumulated by many individual traffic registers. This register pegs once for each ten inputs.

(e) Resettable—a four-digit counter capable of scoring 10,000 pegs. The manual operation of a reset arm immediately resets the register to 0000.

Traffic Usage Recorder

5.04 The traffic usage recorder (TUR) measures usage of circuit groups, common control and other equipment. Test scans are made every 100 seconds, or 36 times each hour. Busy conditions are scored on registers. Results are in terms of CCS, or hundred-call-seconds of usage.

5.05 Camera equipment controlled by the TUR automatically photographs the registers at hourly or half-hourly intervals, as desired.

Load Meter Equipment

5.06 In many early No. 4 crossbar and crossbar tandem machines, various meters have been provided to give a quick check of loads being carried through various parts of the switching system. Some meters are arranged on a patching cord basis, so that selected components of the switching system can be measured.

5.07 TUR registers give more accurate engineering and load balance data than load meter equipment. Most load meter equipment was provided on early installations and is now rated "Manufacture Discontinued." The load meters that may be encountered are:

(a) Recording Ammeter—uses a pen tracing on a circular chart to record the load fluctuations on trunk link frames or sender groups.

(b) Train Load Meter—one per switching train, permanently associated with the incoming trunk link frames of each train. This meter is a graphic recording device which indicates the total train load on a continuously moving tape in terms of percent of engineered trunk link frame capacity.

(c) Instantaneous Ammeter—one per office, to secure instantaneous readings of the loads on the trunk link frames or sender groups.

Twenty-Pen Recorders

5.08 Most electromechanical offices are equipped with Esterline-Angus Twenty-Pen Recorders. The twenty-pen recorder is used by the network manager to record current machine and network performance data.

5.09 One effective arrangement is to have the recorder set up to show peg count and overflow on a final group to a given location. On adjacent pens, the overflow from the high usage groups that alternate route to the final can be shown. In this manner, those groups that are contributing heavy traffic to the final are readily apparent, and can be selectively controlled as the situation dictates.

5.10 The twenty-pen recorder can also be used to study the ineffective switching in a machine such as to indicate the volume of ROA, NCA, SOA and other items during a period of overload.

Sender Attachment Delay Recorder

5.11 The sender attachment delay equipment provides a means for placing test calls through the sender link frames to record, on a sender group basis, the number of test calls placed and the number which encounter delays in sender attachment greater the 3- or 7-second standard interval. All sender attachment delays in excess of the prescribed 3- or 7-second interval are registered as a count on a peg count register. The sender attachment delay equipment will connect consecutively to each assigned sender link frame and will time for sender attachment delays. When the last sender link frame has been tested, the sender attachment delay equipment will reset and start a new timing cycle. Sender attachment delays can be plotted on a twenty-pen recorder chart.

B. Status Boards

5.12 Status boards (see Fig. 1) are located at the national and regional centers, at many sectional centers, at key primary centers, and in metropolitan areas. These boards utilize lamp displays to indicate impending or actual machine overload and no circuit conditions on major trunk groups. They are used by network management for the identification and administration of overloads. Some of the lamps provided are as follows:

- All Markers Busy
- All Decoders Busy
- All Senders Busy, by Sender Group
- Short Sender Timing, by Sender Group
- Sender Attachment Delay Recorder (SADR) Alarm
- No Circuit (NC)

C. Traffic Supervisory Cabinet

5.13 A Traffic Supervisory Cabinet" (Fig. 2) establishes a unified control point for traffic regulating functions for crossbar tandem offices to improve control of overloads in the local and toll network. The supervisory cabinet is equipped with lamp indicators, control keys, and control switches for use in connection with the following features:

(a) Directional reservation of 2-way intertoll final trunks assists in the control of overloads. One key, two lamps, and one rotary selector switch associated with the trunk group perform this function. Each trunk group, or subgroup, having directional reservation control requires one or more directional reservation equipment units, with a maximum of 80 trunks per unit in crossbar tandem offices (normally 40 trunks per unit in No. 4A crossbar offices). When directional reservation is in effect on a final intertoll group to a higher ranking office, the equipment reserves all of the 2-way trunks in the group for the higher ranking office.

(b) Alternate route traffic control permits a network manager to deny (to selected traffic) access to an alternate route when the distant office (or an office beyond) is temporarily not capable of handling the alternate routed traffic. This is accomplished by means of 50 locking keys associated with route transfer relays in the marker. Operation of a key changes the routing pattern as prewired: selective cancellation, skip route, or regular cancellation.

(c) Flexible control connects announcement trunk groups to any of the recorded announcement channels.

(d) Traffic is transferred from a final route to either no circuit announcement (NCA) or emergency (EMG) announcement instead of no circuit (NC) tone. Three position keys associated with the routing functions of the marker permit final route advance on some trunks.

(e) No circuit lamps are used to identify busy circuit groups. A lamp is provided for each

final trunk group and for selected high-usage groups.

(f) All-busy lamps are used as indications for senders, markers, incoming registers, and transverters. In addition, all-busy lamps are used as lamp indications for sender load registers and short time-out.

(g) Sender attachment delay recorder (SADR) control keys provide control of the operation of the sender attachment delay circuit, including the ability to set the time delay interval desired.

(h) An auxiliary cabinet provides a multiple of the traffic supervisory cabinet lamps.

5.14 For a detailed description of the Traffic Supervisory Cabinet operation refer to DFMP, Division H, Section 12d(4), Traffic Supervisory Cabinet.

D. Traffic Control Console

5.15 The "Traffic Control Console" (TCC), also referred to as the "DOC console," is a network management tool which enables the crossbar tandem network manager to alleviate machine congestion and to control traffic entering the machine from its subtending offices or from other crossbar tandems in a metropolitan network. The control panel contains keys and lamps which indicate (Fig. 3) the status of the control equipment and subtending office traffic. A pen strip chart recorder may also be provided to give a continuous record of the office sender load. The traffic control console provides for both dynamic (automatic) and manual controls.

5.16 The traffic control console accommodates control facilities for a maximum of 60 subtending offices or can originate 60 cancellation signals. The console is usually installed in the network administration quarters near the traffic supervisory cabinet. The timer controls are located on a frame in the Maintenance quarters.

5.17 The traffic control console performs the following dynamic (automatic) functions:

(a) Senses the immediate load on senders and initiates a signal to activate network controls in subtending offices when the load exceeds preselected thresholds. These signals are called sender queue low (SQL) and sender queue high (SQH). SQL is the lower of the two levels of sender load that is determined to be greater than the tandem can serve effectively. The SQL signal is generally sent via external circuits to the subtending offices to initiate cancellation of alternate routing to the tandem or to limit access to the tandem trunk group for hard-to-reach (HTR) codes. SQH is the higher level of sender load determined to be greater than the tandem can serve effectively, recognizing that SQL has already limited access to the tandem for certain traffic. The SQH signal is generally sent to the same subtending offices, as well as to other offices, to activate additional controls to reduce the load. The SQH controls are generally more encompassing than the SQL controls. They usually cancel direct-routed traffic to the tandem, make trunks busy, or limit access to the tandem for easy-to-reach codes.

(b) Senses the immediate load on the tandem markers and initiates network controls within the tandem to reduce the load on the markers. The control, cancel short sender timing (CSST) operates whenever all crossbar tandem markers are busy for a preselected interval. CSST cancels the reduced intersender timing interval and causes the tandem senders to wait the normal interval for a ***sender attached*** signal from the distant office before timing out and routing the call to reorder announcement (ROA). This reduces the ineffective load on the markers caused by short time-out calls routing to announcements and allows the marker to serve calls that may be completed. In addition, the traffic control console is arranged so these controls can be operated manually, regardless of the condition of the automatic sensing circuits.

5.18 For a detailed description of the operation of the Traffic Control Console, refer to DFMP, Division H, Section 12d(6), Traffic Control Console.

E. Network Control Console

5.19 The "Network Console Console" gives the No. 4 ETS network manager the ability to alter routing data in the stored program control (SPC). The console provides both manual and preprogrammed controls to help alleviate network congestion.

5.20 The network control console (Fig. 4) is located in the traffic management center of the No. 4 ETS office. The console contains control keys and lamps for the following manual and preprogrammed functions:

Manual Controls

5.21 ***Code Blocking:*** The console provides means for blocking a percentage of all traffic to any 3-, or 6-digit codes. (A new CCIS feature which allows 7- and 10-digit code blocking is implemented through the Network Management Teletypewriter, Channel 2.) Manual implementation of the code block can be placed on any 3-, or 6-, digit code. The code block will cancel the designated traffic routed to the trunk groups and will route it to an announcement.

5.22 ***Cancel To (CANT) or Cancel From (CANF):*** The console provides the ability to cancel a percentage of all alternate-routed ***or*** direct- and alternate-routed traffic advancing to (CANT) or from (CANF) a particular trunk group.

(a) These two controls are frequently misunderstood. Most of the confusion is due to the fact that they are frequently compared to ***R*** and ***S*** cancellation keys; although similar in purpose, they are more complex and versatile. The key items to remember about these controls are as follows:

(1) CANT and CANF controls can be applied in percentages selected by the network manager.

(2) CANT and CANF controls can be applied to block alternate-routed traffic only ***or*** alternate and direct-routed traffic.

(b) Manual CANF is used to cancel traffic overflowing a high usage trunk group and to prevent it from advancing to its next alternate route. In effect, this finalizes the trunk group. Canceled traffic is routed to an announcement.

(c) Manual CANT is used to cancel traffic offered to a trunk group. The canceled traffic is then routed to an announcement.

5.23 ***Skip Routing:*** Skip routing causes a percentage of the overflow traffic from a particular high usage trunk group to bypass its normal alternate route and advance to its next in-chain-group alternate route. When a skip route is applied to a multipart trunk group (more than one GB relay), the control should be applied to the first subgroup.

5.24 ***Restore:*** The ***RS*** key provides the ability to deactivate a particular control from active status.

5.25 ***Clear:*** To remove all manual controls at one time, operate the CLR key.

5.25 ***Traffic Overload Reroute Control (TORC):*** This reroutes a percentage of all overflow traffic from one regional center final trunk group via another regional center trunk group where high usage and final trunk groups are utilized to complete the traffic.

5.27 ***Active Control Printout:*** This is used to obtain a printout of a particular active control.

Preprogrammed Controls

5.28 Preprogrammed controls are made available in the stored program control via a recent change message. A choice of 100 preprogrammed changes can be initiated by switch operation at the network control console. Records of the implemented controls can be obtained via teletypewriter. The types of controls include code blocking, skip, CANT, CANF, and reroutes. Some preprogrammed controls may be operated manually, while others will respond to a remote signal, such as those associated with dynamic overload control. Preprogrammed controls are a ***shorthand*** method for activating preplanned controls. The reroute feature allows certain direct- or alternate-routed traffic to flow to other trunk groups outside the normal routing pattern to utilize idle capacity.

Additional Capabilities

5.29 In No. 4 ETS offices equipped with a Peripheral Bus Computer (PBC) the network manager has available, in addition to the Network Control Console, a DATASPEED 40® cathode ray tube (CRT) display system. The PBC display system provides structured reports (Automatic, Exception, Scheduled, and Demand) which notify the network manager that a situation exists which may require control action. The PBC display system

utilizes the exception alerting approach which provides an exception report printout whenever preset traffic or machine threshold values have been exceeded. Using these reports the network manager can quickly identify the cause of a specific condition and apply appropriate controls to alleviate or minimize the problem.

5.30 For a detailed description of the Network Control Console and network management capabilities, refer to DFMP, Division H, Section 13d(4), Network Control Console, and 13e(3), Traffic Measurements—Network Management Capabilities.

F. No. 1 ESS Network Management Center

5.31 With the introduction of the No. 1 ESS as a tandem intertoll switcher, expanded network management capabilities have been provided for No. 1 ESS machines serving in this capacity. The "Network Management Center" (NMC) performs this function to coordinate service continuity. It includes the function of network performance monitoring and implementing and removing controls to maintain acceptable levels of service under all conditions.

5.32 The network management center contains a locally designed status display, which provides machine status indicators, trunk group via circuit indicators, and receiver attachment delay report (RADR) indicators, and one or more teletypewriters for activating and removing manual controls.

5.33 The following preprogrammed, automatic controls are available to the network manager:

(a) ***The Dynamic Overload Control*** (DOC) system is designed to both transmit and receive control signals that indicate machine congestion levels. The machine congestion levels are based upon a shortage of real time; a shortage of multifrequency, dial pulse, or revertive pulse receivers; or a lack of capability to switch calls. These machine congestion level thresholds are comparable to sender queue low (SQL) and sender queue high (SQH) thresholds in the DOC system associated with No. 4A machines. When activated, DOC will either cancel or skip route a percentage of the traffic as specified (ie, direct- or alternate-routed by the network manager).

(b) Two ***Trunk Reservation*** control options are available:

(1) ***Protective Reservation Equipment (PRE)*** is used for reserving facilities for first-routed traffic. If the PRE threshold is crossed, all traffic alternate-routed to this trunk group is inhibited from searching for an idle trunk in this trunk group and is routed in no circuit announcement (NCA).

(2) ***Directional Reservation Equipment (DRE)*** is used for reserving facilities for incoming traffic. Thus, DRE has meaning only on 2-way trunk groups. If the DRE threshold is crossed, all outgoing traffic to this trunk group is inhibited from searching for an idle trunk in the trunk group and is routed to NCA.

5.34 The following manual controls can be activated by the network manager via teletypewriter:

(a) ***Code Block:*** Application of this control inhibits a call from hunting for an idle trunk subgroup (TSG). The call is routed to no circuit (NC) treatment, EA 1, or EA 2 announcements. The No. 1 ESS provides the capability for 10-digit code blocking. These can be 3-digit NPAs, 3-digit office codes (NXX), 6-digit NPA office codes, 7-digit office line numbers, or the total 10-digit NPA office line number.

(b) ***Cancel To:*** A call encountering this control on a TSG will not search for an idle trunk in the TSG; based on the type of traffic, it is classified as alternate- or direct-routed. The network manager has the capability to be selective in the type of traffic that is controlled. If alternate-routed traffic is specified, the direct-routed traffic offered to this TSG will not be affected. If 100 percent direct- and alternate-routed traffic has been specified, the TSG has been directionalized and any call to this TSG will be routed to no circuit available (NC) treatment.

(c) ***Cancel From:*** The application of this control will prevent a call from advancing further after hunt on the TSG that has the control applied. An unsuccessful hunt will advance the call to final treatment as specified by the network manager. The type of traffic alternate-routed or direct- and alternate-routed, must be specified by the network manager.

(d) ***Skip:*** Application of this control will result in traffic offered to this TSG being routed to the next in-chain TSG. The percentage of traffic affected and the type of traffic must be specified. The type of traffic must be designated alternate-routed or direct- and alternate-routed.

5.35 When these controls are activated, the following options associated with each control must be specified:

(a) ***Percentage of Control:*** First-routed (direct) and/or alternate-routed traffic can be controlled in percentages selected by the network manager for the CANCEL-TO, CANCEL-FROM, and SKIP controls.

(b) ***Handling Treatment:*** An attempt affected by a CANCEL-TO or CANCEL-FROM control is routed via a fixed route index to the NCA.

5.36 For a detailed of the No. 1 ESS network management system, refer to DFMP, Division H, Section 6d(2), Network Management Operational Features.

G. No. 4 ESS Network Management Center

5.37 The "Network Management Center" (NMC) function is important to maintain service continuity. It includes monitoring of network performance and implementing and removing controls to maintain the best possible service under all conditions.

5.38 The network management center contains a network management exception panel (either desk or wall-mounted) (Fig. 5), a cathode-ray tube (CRT) terminal with keyboard, and one or more high-speed teletypewriters.

5.39 The network management system utilizes the exception alerting approach. The alerting function is accomplished using an exception panel which notifies the network manager that a situation exists which may require network management intervention. To further investigate and identify the problem, a cathode-ray tube (CRT) display system is included in the network management system. The CRT display system is also used to activate manual controls in response to exception information.

5.40 The following automatic controls are administered through the No. 4 ESS network management center:

(a) ***Selective Dynamic Overload Control (SDOC)*** is an automatic trunk subgroup (TSG) control designed to alleviate machine congestion. The system is designed to transmit and receive control signals that indicate machine congestion levels. The machine congestion level thresholds are comparable to sender queue low (SQL) and sender queue high (SQH) DOC systems associated with No. 4A machines. SDOC can be assigned on up to 512 TSGs. When activated, SDOC will either cancel or skip route a percentage (0, 25, 50, 75, 87-1/2, or 100 percent) of the traffic specified (ie, originating, alternate-routed, or hard-to-reach codes) by the network manager.

(b) ***Selective Trunk Reservation (STR)*** is an automatically activated TSG control designed to dynamically sense outgoing TSG congestion on a call-by-call basis. The STR can be assigned to up to 512 TSGs. When the number of idle trunks in a TSG reaches a predetermined number, the STR system controls certain amounts of traffic to relieve congestion. STR thresholds can be established to enable STR to function comparably to PME and DRE. When activated, STR will either cancel or skip route a percentage (0, 25, 50, 75, 87-1/2, or 100 percent) of the traffic specified by the network manager.

(c) ***Automatic Out-Of-Chain Routing (AOCR)*** is an automatic routing control that provides extended routing to calls when they have overflowed their in-chain final TSG. Extended routing will only be permitted when there is idle capacity in the out-of-chain route (OCR) and in the via switching machine. To discipline this type of traffic, a traveling class mark (in a CCIS network) will accompany each call which is routed out-of-chain. The choice of outgoing TSGs for OCR calls will not be limited to CCIS TSGs.

(d) ***Hard-To-Reach (HTR)*** code identification is provided to enhance traffic flow through the network. By using per code completion data, the system can identify those codes which have a poor probability of completion. Although HTR code identification is not a control within itself, it is a determining factor in what traffic is to

be controlled when the previously mentioned controls are activated.

Note: Although, technically, OCR calls are not limited to CCIS TSGs, practically, except in certain cases, AOCR will not be used in the automatic mode until CCIS is available.

Prior to CCIS, AOCR will only be used with; (a) specific agreement from the network operations center (NOC) or regional managers as appropriate and only with manual surveillance, and (b) in the non-automatic mode similar to the manner in which TORC is now used.

5.41 The following manual controls can be activated by the network manager via the display system:

(a) ***Code Block:*** Application of this control inhibits a call from hunting for an idle TSG. The call is routed to no circuit (NC) type treatment, EA 1, EA2 arrangements. The No. 4 ESS provides the capability for 10-digit code blocking. Code blocking can be placed on up to 128 codes. These can be 3-digit NPAs, 3-digit office codes (NXX), 6-digit NPA office codes, 7-digit office line numbers, or the total 10-digit NPA office line number. When the code block is activated, the control percentage and termination treatment must be specified.

(b) ***Cancel To:*** This control can be activated on up to 512 trunk subgroups (TSGs). A call encountering this control on a TSG will not search for an idle trunk in the TSG; based on the type of traffic, it is classified as alternate- or direct-routed, hard-to-read (HTR), or HTR and unspecified. The network manager has the capability to be selective as to the type of traffic that is controlled. If alternate-routed traffic is specified, the direct-routed traffic offered to this TSG will not be affected. If 100 percent direct- and alternate-routed traffic has been specified, the TSG has been directionalized and any call to this TSG will be routed to no circuit available treatment.

When this control is applied percent control, routing, HTR, and terminating treatment must be specified. When the network manager specifies the type of traffic (alternate or direct and alternate) to be controlled, either HTR or HTR and unspecified must be selected.

(c) ***Cancel From:*** The application of this control will prevent a call from advancing any further after hunt on the TSG that has the control applied. An unsuccessful hunt will advance the call to final treatment as specified by the network manager. The type of traffic, alternate-routed or direct- and alternate-routed must be specified by the network manager. The percent to be affected, HTR or HTR and unspecified, must also be specified.

(d) ***Skip:*** Application of this control will result in traffic offered to this TSG being routed to the next in-chain TSG. The percentage of traffic affected and the type of traffic must be specified. The type of traffic must be designated alternate- routed or direct- and alternate-routed, and HTR or HTR and unspecified.

(e) ***Reroutes:***

(1) When this control is implemented, the traffic overflowing this TSG will route to a manually specified TSG that is not normally in-chain. If the traffic overflows this manually specified TSG, it will then return to the next TSG in the in-chain routing data block (RDB).

(2) Reroutes can be placed on up to 512 TSGs. The network manager must specify the selected option for percentage and HTR. A manually rerouted call is identified by a traveling class mark (provided the via office is a CCIS office) so that the via office routes the call via the normal first choice TSG, as specified by its routing chain or by the network manager.

(3) An override capability is provided whereby specified 3-digit codes in the direct distance dialing (DDD) domain are excluded from manual rerouting. This is accomplished by recent change message input.

5.42 When these controls are activated, selected options associated with the control must be specified such as the following:

(a) ***Percentage of Control:*** The network manager must specify the amount of traffic to be controlled. The network manager must designate one of the following values: 25, 50, 75, 87-1/2, or 100 percent.

(b) ***Routing:*** The type of traffic to be controlled must be specified as alternate-routed or the combination of alternate-routed and first-choice.

(c) ***HTR:*** This option determines that only codes designated HTR or all codes, both HTR and unspecified, are controlled.

(d) ***Terminating Disposition:*** This option determines the final treatment given to a call. The call can be sent to no circuit announcement (NCA), emergency announcement (EA) 1, or EA 2, as specified by the network manager. If no option is specified, the call will be processed to NCA.

5.42 For a detailed description of the operation of the No. 4 ESS network management system, refer to the following DFMPs, Division H.

SECTION	TITLE
9i(1)	Network Management—Controls
9i(2)	Network Management—Exception Panel
9i(3)	Network Management—Display System
9i(4)	Network Management—System Printer
9i(5)	Network Management—Operational Considerations

H. Engineering and Administration Data Acquisition System/Network Management

5.44 The Engineering and Administration Data Acquisition System network management (EADAS/NM) is a new computerized system. It allows centralized, real-time surveillance and control of all levels of the switching hierarchy from regional centers to selected end offices within predefined segments of the network by analyzing traffic information as it is being gathered from all types of switching machines via EADAS.

5.45 EADAS/NM will monitor the status of critical switching machines and trunk group functions and report immediately when potential congestion is imminent. This capability will provide more effective and more responsive network management action, when required, to maintain network switching efficiency.

5.46 EADAS/NM will employ a minicomputer and peripherals to provide the following features:

(a) Real-time surveillance of switching machine and trunk group interaction. This function will be accomplished by (1) performing calculations at 5-minute intervals on the most recently acquired register data, (2) analyzing the status of selected discretes and alarms, and (3) then reporting any specific exceptions to the network manager for possible action.

(b) A network status display system (Fig. 6) which will be driven by the calculated exceptions found in the 5-minute data and by the status of selected discretes and alarms. This display system will be in the form of a high speed line printer, cathode-ray tube (CRT) terminal devices, and a modular wall display board which will be organized along the lines of the network hierarchy under surveillance by the respective EADAS/NM center.

(c) Centralized, remote network management control capability using the interactive mode of the CRTs which will enable the responsible network manager to institute control measures quickly when required to maintain and protect the network call carrying capacity.

5.47 The EADAS/NM collects two categories of data: measures and discretes. Measures are 5-minute summaries of peg count and usage traffic data transferred to EADAS/NM directly from peripheral bus computers (PBCs) and data collection computers (such as basic EADAS computers obtaining unprocessed data from EADAS traffic data conveters (ETDCs), pollable data terminals, No. 1 ESS terminals, etc. EADAS/NM performs arithmetic operations on these data to convert the data to quantities more meaningful to network managers such as marker peg count, ACH, CCH, and percentage of overflow.

5.48 The other category of data collected is discretes, which consist of office status information such as sender delay, DOC received, and sender queue low/high. Discretes are received either directly into EADAS/NM via E2A links to

No. 4A/4M crossbar or large crossbar tandem machines or via data collection computers such as EADAS. Discretes are collected at 20-second intervals.

5.49 The EADAS/NM has three software subsystems which use the measures and discretes to drive various types of displays: exception, monitor, and demand.

(a) The "exception subsystem" provides continuous network surveillance and alerts the network management force of abnormal network conditions. Every 5 minutes it performs calculations on the collected measures and compares the results to predefined user assigned thresholds. Calculation results which exceed their thresholds activate user assigned indicators on the wall display board. Additionally, calculation results and other related information can be printed optionally on one of the exception printers.

(b) The "monitor subsystem" provides a flexible and versatile method of automatically monitoring a limited quantity of data of special interest to a network manager. For example, a trunk group affected by a traffic control may be monitored for excessive occupancy or conversely too few attempts. The monitor subsystem provides the user with an expanded calculation set (as compared to the exception subsystem) and a more flexible thresholding arrangement. Monitor calculation results outside specific threshold limits may activate wall display board indicators and print messages on the monitor printer. Additionally, a printed history of the status of discretes of special interest to the network manager can be obtained using the monitor subsystem.

(c) The "demand subsystem" is used to analyze and control abnormal network conditions. DATASPEED® 40 KDP display terminals are used interactively to retrieve, analyze, and display measures, calculation results, and discretes for the network manager. This is done using a set of approximately 40 generic display formats, each of which is designed to present a unique aspect of the data. This subsystem provides the network manager with essentially unlimited flexibility in analyzing the data collected by the system. In addition, the CRTs are used to provide a centralized control taking capability and a means of updating the system's nongeneric reference data base.

5.50 The EADAS/NM system when fully implemented will allow network managers to implement appropriate coordinated traffic controls network-wide to alleviate network congestion.

5.51 A detailed description of the operational features of EADAS/NM shall be issued in the Dial Facilities Management Practices at a later

I. CCIS Network Display Panel

5.52 In No. 4 ETS/PBC/CCIS switching offices (SO), and signal transfer points (STP) a new network management control panel is being developed for the CCIS/SO and STP to eventually replace the current ETS Network Control Console in CCIS/SO and STP. The new CCIS control panel will display information for both CCIS and conventional traffic. Figure 7 is provided to show, in a tabular format, a comparison of the new No. 4A ETS/PBC CCIS network management control capability with current ETS (non-CCIS) controls.

5.53 A detailed description of the CCIS Control Panel shall be issued in a Dial Facilities Management Practice when the design is finalized.

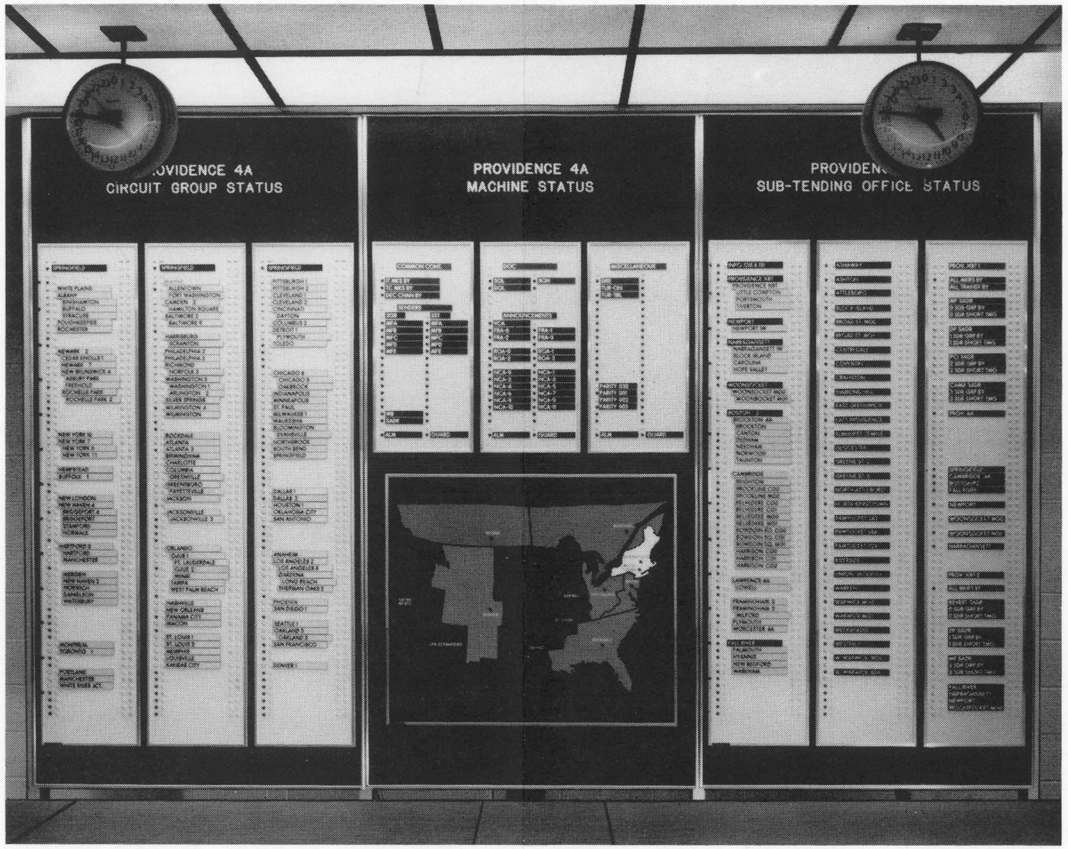

Fig. 1—Example of a Network Status Board

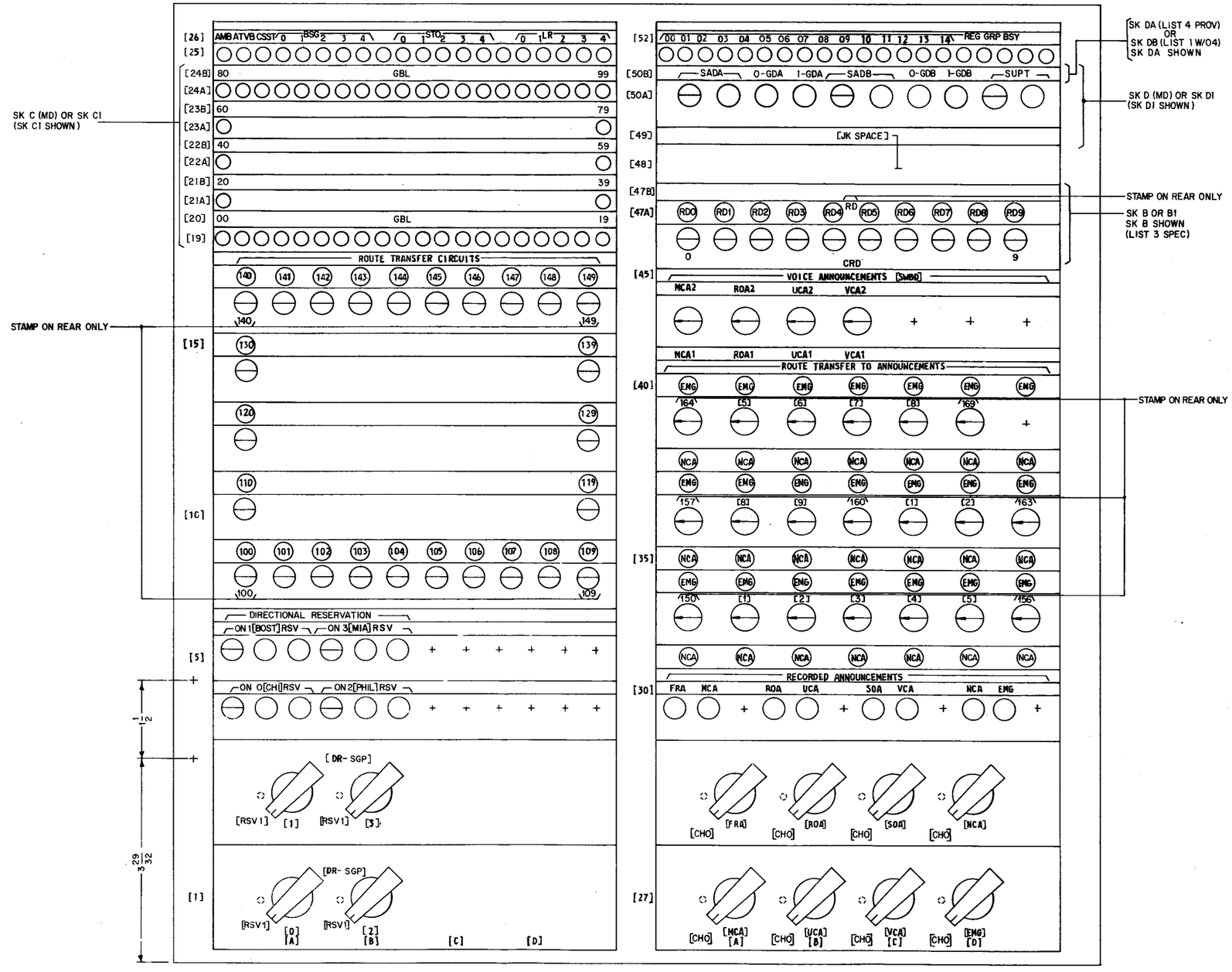

Fig. 2—Traffic Supervisory Cabinet (XBT)

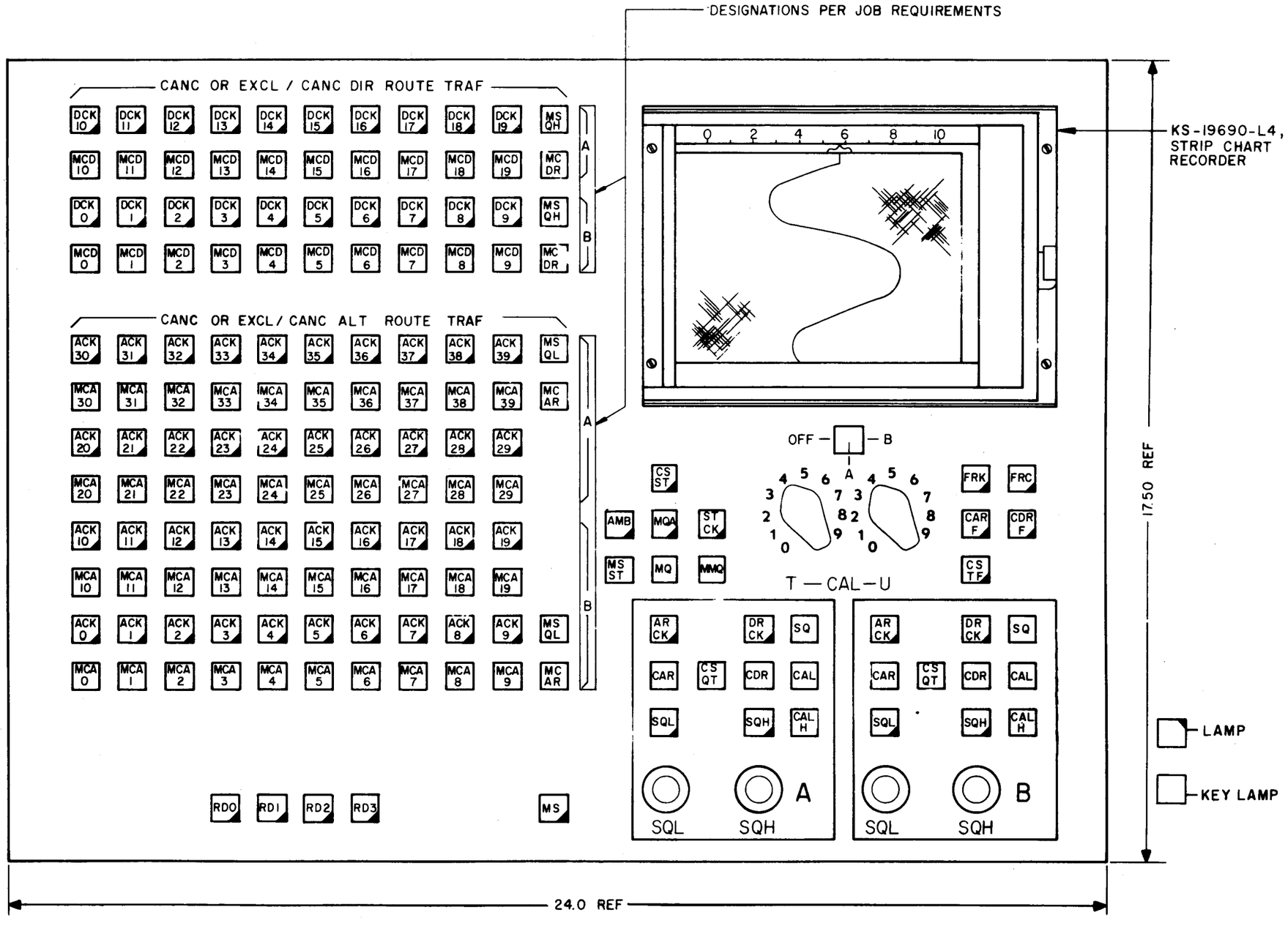

Fig. 3—Traffic Control Console (XBT)

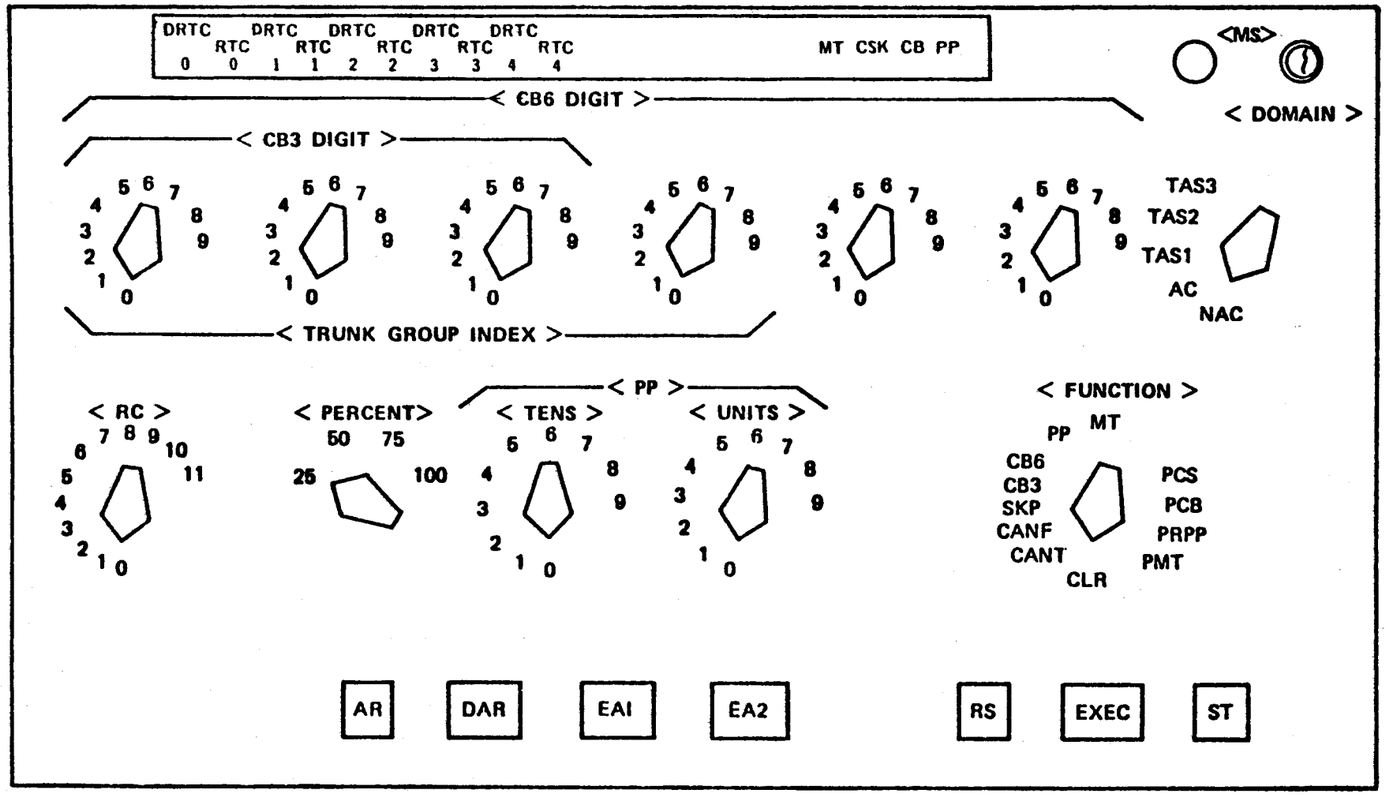

Fig. 4—Network Control Console (No. 4A-ETS)

NETWORK MANAGEMENT DISPLAY

NETWORK PERFORMANCE

TRAFFIC PATTERNS

INCOMING NNN OUTGOING NNN

- FOR REG
- HOME REG
- SUBTEND
- HOME TCA

COMPLETION DATA

IMA

- NC
- TIMEOUTS
- INT Q
- CAMA
- OUT FAIL
- INC FAIL
- PSTO/FSA
- VAC/IWK
- CONTROL

INEFFECTIVES

- NPA IMA
- NPA INA
- HOME IMA
- HOME INA
- FNPA NXX
- SPECIAL

TRUNK SUBGROUP PERFORMANCE

NC	OFL	ACH	CCH	NSD	OOS
NN					
NN					
NN					
NN					
NN					

NETWORK CONTROLS

MANUAL CONTROLS

- CODE BLOCK
- ROUTE CONTROL
- REROUTE CONTROL
- MANUAL CHANGE

HARD TO REACH LISTS

TRANSMIT	CONTROL	CHANGES
AUTO	AUTO	INTERNAL ADD
MANUAL	MANUAL	INTERNAL DELETE
	REMOTE	REMOTE ADD
OVERRIDE	OVERRIDE	REMOTE DELETE

- LIST OVERFLOW

TRUNK SUBGROUP CONTROLS

STR	AUTO OCR	DOC RECEIVED
ACTIVE	ACTIVE	MC 3
OVERRIDE	RDB NA	MC 2
	TURNOFF SENT	MC 1
	TURNOFF RCVD	OVERRIDE
	OVERRIDE	

MACHINE STATUS

EQPT STATUS

- CRITICAL
- MAJOR ALARM
- INTERRUPTS
- CARRIER ALARM
- CAMA
- TELEMETRY

CAPACITY

OFL	OOS
MF TRMTR	
MF INC	
CAMA OPR	
DP/CCIS	
DISK	
CR	

TEST CALLS

SEIZE TIME

- MF
- DP
- CCIS
- ADDRESS TIME
- RESPONSE TIME
- INCOMPLETES

OPERATIONS

PHASE

- P4
- P3
- P2
- P1

OVERLOAD

- REAL TIME
- MF INCOMING
- DP INCOMING
- CCIS INCOMING
- INTERNAL

INTERNAL CONT

- DENY ACCESS
- LIMIT ACCESS
- LIMIT TASKS
- DEFER MTCE
- ALARM OFF

DOC SENT

MC 1	MC 2	MC 3	
			MF
			DP
			CCIS

MAN DOC ACK

OVRD

Fig. 5—Exception Panel (No. 4 ESS)

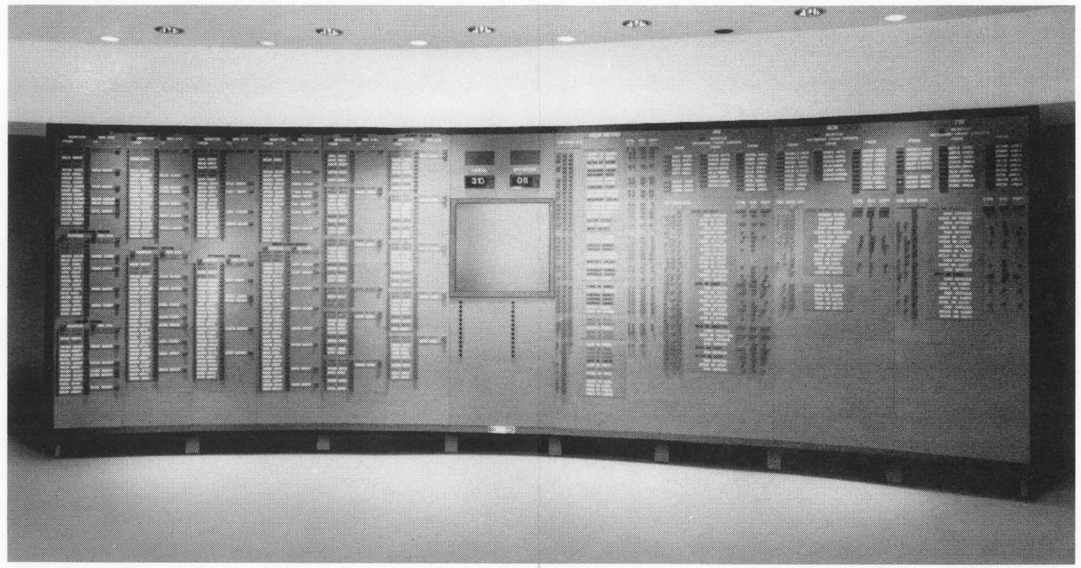

Fig. 6—Example of an EADAS/NM Status Board

NO. 4A ETS PBC CCIS NETWORK MANAGEMENT CONTROLS

Cancel To (CANT) — Cancel From (CANF) & Finalized Cancel To (FCANT)

NEW Maximum — 1022 CCIS & 128 Conv (shared with Skip)
Percentages — 25, 50, 75, 87½, 100
Capability — Manual & Preprogram

Cancel To (CANT) & Cancel From (CANF)

OLD Maximum — 210 (20 Manual) (shared with Skip)
Percentages — 25, 50, 75, 100
Capability — Manual & Preprogram

Skip (SKP)

NEW Maximum — 1022 CCIS / 128 Conv (shared with Cancels)
Percentages — 25, 50, 75, 87½, 100
Capability — Manual & Preprogram

Skip (SKP)

NEW Maximum — 210 (20 Manual) (shared with Cancels)
Percentages — 25, 50, 75, 100
Capability — Manual & Preprogram

Reroute (RR) & Immediate Reroute (IRR)

NEW Maximum — 64
Percentages — 25, 50, 75, 87½, 100
Capability — Manual & Preprogram

Reroute (RR)

OLD Maximum — 20
Percentages — 25, 50, 75, 100
Capability — Preprogram

Code Block (CB—)

NEW Codes — 3D, 6D, 7D & 10D
Maximum — 128 (shared with HTR)
Percentages — 25, 50, 75, 87½, 100
Capability — Manual & Preprogram

Code Block (CB—)

OLD Codes — 3D & 6D
Maximum — 18 Local & 2 Remote
Percentages — 25, 50, 75, 100
Capability — Manual & Preprogram

Hard To Reach (HTR)

NEW Codes — 3D, 6D, 7D & 10D
Maximum — 128 (shared with CB—1)
Capability — Manual & Preprogram
Application — All Controls

Hard To Rech (HTR)

OLD Codes — 3D (AC & NAC)
Maximum — No limit
Capability — Remote Preprogram
Application — Remote CANT only

Trunk Make Busy (TMB)

NEW Non—CCIS: Hardware application
CCIS: Software application
Manual Input (TTY 2)
75%-80%-85%-90%-95%-100%

Trunk Make Busy (TMB)

OLD Hardware application

Trunk Reservation

NEW Non—CCIS: Hardware (DRE)
CCIS: Software application
Manual Input (TTY 2)
2 Thresholds (SRL1 & SRL2)
Range: 1 — 15
Category Response

Trunk Reservation

OLD Hardware (DRE)
Range: 1 — 5

SELECTIVE TRUNK RESERVATION (STR)

Cancel Type Traffic	SRL 1 Response Categories A	B	C	D
AR — HTR	100	100	100	100
DR — HTR	0	0	0	0
AR	0	0	0	0
DR	0	0	0	0

Cancel Type Traffic	SRL 2 Response Categories A	B	C	D
AR — HTR	100	100	100	100
DR — HTR	75	0	100	100
AR	0	100	100	100
DR	0	0	0	100

NO. 4A ETS PBC CCIS NETWORK MANAGEMENT CONTROLS (Cont)

Dynamic Overload Control (DOC)

NEW Maximum — 1022—CCIS & 5 Remote Preprogram (50)—Conv
Percentages — 25, 50, 75, 87½, 100
Capability — Manual & Preprogram
4 Thresholds
Category Response

Dynamic Overload Control (DOC)

OLD Maximum — 5 Remote Preprogram (50)
Percentages — 25, 50, 75, 100
Capability — Remote Preprogram

MC 0 = No machine congestion
MC 1 = Sender Queue Low
MC 2 = Sender Queue High
MC 3 = Machine incapable of processing calls

SELECTIVE DYNAMIC OVERLOAD CONTROL (SDOC)

Cancel Type Traffic	MC 1 (SQL) Response Categories A	B	C	D	E	F
AR — HTR	0	0	100	100	100	100
DR — HTR	0	0	0	100	100	100
AR	0	0	0	0	0	100
DR	0	0	0	0	0	0
OOC	100	100	100	100	100	100

Cancel Type Traffic	MC 2 (SQH) Response Categories A	B	C	D	E	F
AR — HTR	100	100	100	100	100	100
DR — HTR	0	100	100	100	100	100
AR	0	0	0	100	100	100
DR	0	0	0	0	75	75
OOC	100	100	100	100	100	100

NOTE: For STR & SDOC a CANT control will be applied when condition is encountered, unless a SKP control is specifically set via a TTY input.

NEW — Out of Chain Routing (OOC)

(1) Initial link out-of-chain TCM
(2) Subsequent link out-of-chain TCM
TCM = Traveling Class Mark
(3) Via office capability for AOOC
AOOC = Automatic Out of Chain
(4) Manual override of OOC

Fig. 7—No. 4A ETS PBC CCIS Network Management Controls