tellabs
technical manual
76-81345-1
rev A

system-description practice section 81345-1

345 Status/Control Concentrator System Description

contents

1. general description

1.01 The Tellabs 345 Status/Control Concentrator (SCC) System (figure 1) is a microprocessor-based telemetry, emergency monitoring, and control system designed to provide local or remote status-reporting and output-control functions via a standard RS-232-C ASCII serial communication port. The 345 SCC can be used in conjunction with other Tellabs modules and systems to augment their features and functions, as described later in this practice.

1.02 In the event that this practice section is reissued, the reason for reissue will be stated in this paragraph.

system configuration

1.03 The 345 SCC System is modular in design and is housed in the prewired, connectorized 345A Mounting Assembly. This assembly houses up to 12 modules and is completely self-contained. Larger systems are made up of multiple mounting assemblies with appropriate interconnections. A minimum-size 345 System consists of one 345A Mounting Assembly equipped with an SCC master control module, a logic power supply module, and one to ten additional modules, which can be all of one type or any combination of input and output modules. This equipment is described in detail in section 2 of this practice.

system applications

1.04 The 345 SCC System can be used as a telemetry system, as an output control system, or as a combination of both. When used as a telemetry system, the 345 SCC scans multiple input lines (up to 2000 maximum) and provides formatted status output information compatible with commercially available devices such as CRT terminals, printers, modems, and computer (CPU) communication ports. When used for control applications, the 345 SCC supplies solid-state switching (closure of output loops) or grounded outputs of multiple control circuits (up to 960 maximum) in response to the input of formatted command and data information. Also, a combination of both telemetry and output control functions can be configured within a single 345 SCC System.

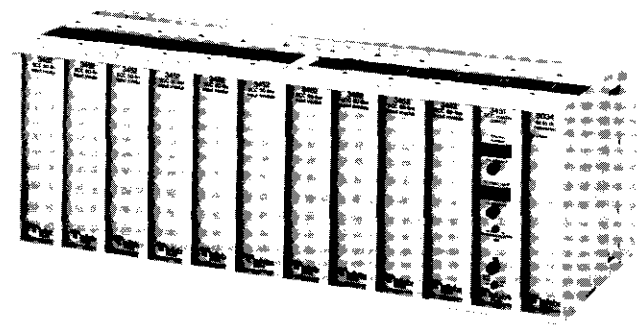

figure 1. 345 Status/Control Concentrator (SCC) System

1.05 Examples of conventional telemetry applications include relay-contact-closure detection, alarm-switch and fuse-panel monitoring, valve and pressure transducer status, and other similar applications. The 345 SCC can also be used in telemetry applications where concentration of status information from Tellabs modules and systems is required. Modules that can be scanned include the 3228 Data Set Transmit/Receive Module and the 6231 Octal Loop-to-Level Converter, while systems supported by the 345 SCC include the 293 One-Way Alerting System and the 294 Community Alerting System. The 345 System provides emergency monitoring at a central control location for 29X Systems. The SCC System can also be used to activate the scanned module or system if the installation is equipped for two-way signal transmission.

system features

1.06 The specific features of the 345 SCC System are determined by the feature package used with the system. Refer to the appropriate Tellabs 345 feature-package practice for specific details on the feature package being used. Certain characteristics of the 345 SCC, however, are common to all feature packages. These features are as follows:

- All options are easily set via the associated CRT terminal; most options can also be set via the front panel of the 345's master control module.
- System self-diagnostics (built into the master control module) can be activated either from the module's front panel or from the CRT terminal.
- The system is easily expandable by adding additional shelves, connectorized cables, and bus extender modules. (Only one master control module is required.)
- The 345, while very compact, provides a large number of input and output lines.
- The fully connectorized backplane eliminates the need for hand wiring.

- The System's self-monitoring function immediately notifies the operator of errors or major malfunctions.
- All programmed information is retained indefinitely; no battery backup is required to safeguard information.

installation and power

1.07 The standard 345A SCC System Mounting Assembly is a specially prewired Tellabs Type 10 Mounting Shelf with a connectorized printed-circuit backplane. Input/output (I/O) connections to the 345A are made via standard 50-pin Amphenol-type female connectors on the backplane of the System Mounting Assembly (see figure 2). Ten 50-pin I/O connectors, as well as one 25-pin RS-232-C connector, are provided on each assembly. When multiple mounting assemblies are used, a connector cable provides the required interconnection between the shelves. The system's logic power supply module provides the logic power to the entire 345 System. This module itself is powered from a −21 to −56Vdc power source.

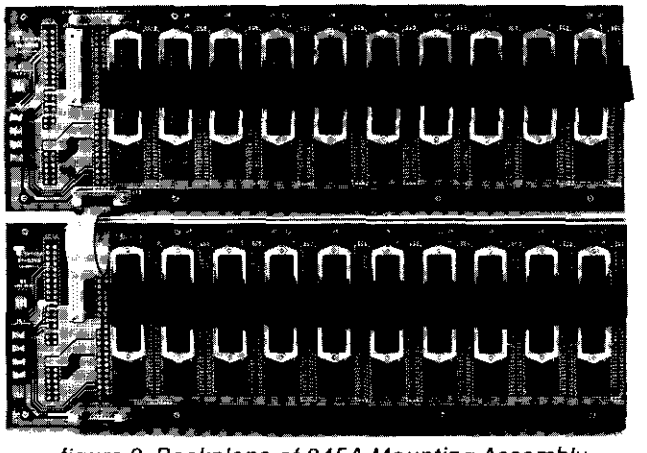

figure 2. Backplane of 345A Mounting Assembly

2. system components

2.01 The 345 SCC System is modular is design, and its modules mount in the prewired, connectorized 345A Mounting Assembly. This assembly houses up to 12 modules and is completely self-contained. Larger systems consist of multiple mounting assemblies interconnected via ribbon cables and backplane connectors. Also, one bus extender module, which replaces the master control module in each added shelf, must be included with each additional shelf. Figure 3 shows a front view of a typical two-shelf 345 System.

2.02 The 345 SCC System can be used in a variety of applications by selection of the appropriate software feature packages. However, the following hardware (modules and mounting assembly) is common to all feature-package applications. Please note, however, that not all modules are used in all applications.

345A Mounting Assembly

2.03 The 345A Mounting Assembly includes all the necessary hardware to mount and interconnect the modules of the 345 SCC System. The mounting assembly uses standard Tellabs 1012 Shelf hardware. The printed-circuit-board backplane contains ten 50-pin I/O Amphenol-type female connectors, ten 80-pin card-edge module connectors for module positions 1 through 10, and a four-position power terminal block. Module positions 11 and 12 use 56-pin card-edge connectors and are dedicated to house the 3451 Master Control Module and the 8034 DC-to-DC Converter Module, respectively. A 25-pin RS-232-C serial communication connector is located on the backplane at module position 11 (for connection to the 3451 Master Control Module). An option switch also located on the assembly backplane provides the shelf-addressing function for multishelf applications, i.e., allocating the module address space required for more than one shelf and arranging it in the proper order. Interconnections between multiple mounting assemblies are made via 16-conductor ribbon cables and backplane connectors.

3451 SCC Master Control Module

2.04 The 3451 SCC Master Control Module is a microprocessor-based control circuit that directs the scanning and communication functions of the System. Software programs contained in the Basic SCC System Feature Packages contain task-oriented commands used to control other System modules and also to direct the communication port's activity. LED displays and pushbuttons on the front panel of the 3451 can be used to program a majority of the System's options and operational parameters, review the module's programmed options, and control normal telemetry and control application functions. All front-panel control and program functions can also be performed via the System's RS-232-C communication port. In most applications, a CRT terminal (interfaced via this port) provides the main control point for the System.

2.05 All System options and operational parameters are retained in the 3451's memory elements indefinitely, even if a power failure occurs. Thus, a battery backup system is not required to protect programmed information. In addition, the 3451's software contains self-test and diagnostic programs which allow the user to diagnose System failures through use of the module's front-panel pushbuttons and displays or via the RS-232-C communication port. The operational modes of the 3451 are covered in detail in the **operation** section of this practice. The 3451 mounts in position 11 of the 345A Mounting Assembly.

3452 SCC 50-Line Input Module

2.06 The 3452 SCC 50-Line Input Module interfaces up to 50 single-ended active-ground input lines and reports their status to the 345 SCC System. The input lines are connected to the 345 System via an associated 50-pin backplane connector. The 3452 accepts ground-closure input levels (grounded input is the active state, open input is the inactive state) and converts them to TTL levels.

These levels can then be read by the microprocessor-based 3451 module. A common ground reference must be provided between the 345 System and the external detection nodes (input line states) being monitored by the 3452 module.

Note: *The* **ground** *state is defined as a level greater than or equal to −6Vdc to a limit of +200Vdc. The* **open** *state is defined as a level less than or equal to −11Vdc to a limit of −200Vdc. The* **indeterminate range** *is defined as a level between −6Vdc and −11Vdc. (Either an open or a ground state may be interpreted here.)*

3453 SCC 24-Pair Output Module

2.07 The 3453 SCC 24-Pair Output Module provides solid-state switching control of 24 output loops (pairs) that interface the 345 System through a 50-pin backplane connector. Each output pair can be individually set and reset by the microprocessor-based 3451 module. (A ground must be applied to an input lead to obtain a ground output.) Each solid-state driver is capable of switching up to 75mA of externally supplied current and is optically isolated from the control circuitry.

3458 Bus Extender Module

2.08 The 3458 Bus Extender Module is used in the 345 System when two or more assemblies containing input/output modules are required. The 3458 module buffers the control line from the 3451 module and essentially "parallels" the control function of the 3451 to the extra shelf. One 3458 module is required for each additional shelf. In addition, a bus extender cable (included with the 3458 module) must be connected to each additional shelf.

8034 DC-to-DC Converter Module

2.09 The 8034 DC-to-DC Converter Module supplies logic power to all module positions in the entire 345A Mounting Assembly. This module is a switching-type power converter that derives the internal voltages required for System operation from −21Vdc to −56Vdc input battery supply. The 8034 mounts in position 12 of the 345A Mounting Assembly.

3. application

3.01 The Tellabs 345 SCC System can be used in a wide variety of telemetry and control applications. The System's family of modules and flexible operating software allow it to be custom-tailored to meet specific requirements that depend upon the type of application, the system size, and the operational speed required. Figures 4, 5, and 6 show an information I/O application, a data communication application, and a basic telemetry and control application of the 345 System, respectively. This last application includes switch and fuse-panel monitoring, relay-contact-closure detection, pressure transducer status, and acquisition of data from the Tellabs 3228 Data Set Transmit/Receive Module and the Tellabs 6231 Octal Loop-to-Level Converter Module. Typical output control functions include energizing relay coils and valves, driving indicator circuits such as LED's, lamps, and audio alarms, and supplying output data to the Tellabs 3228 Data Set and 6232 Octal Level-to-Loop Converter Modules. The RS-232-C serial communication port on the SCC permits the System to interface such equipment as CRT terminals, printers, modems, CPU's, and other 345 SCC Systems.

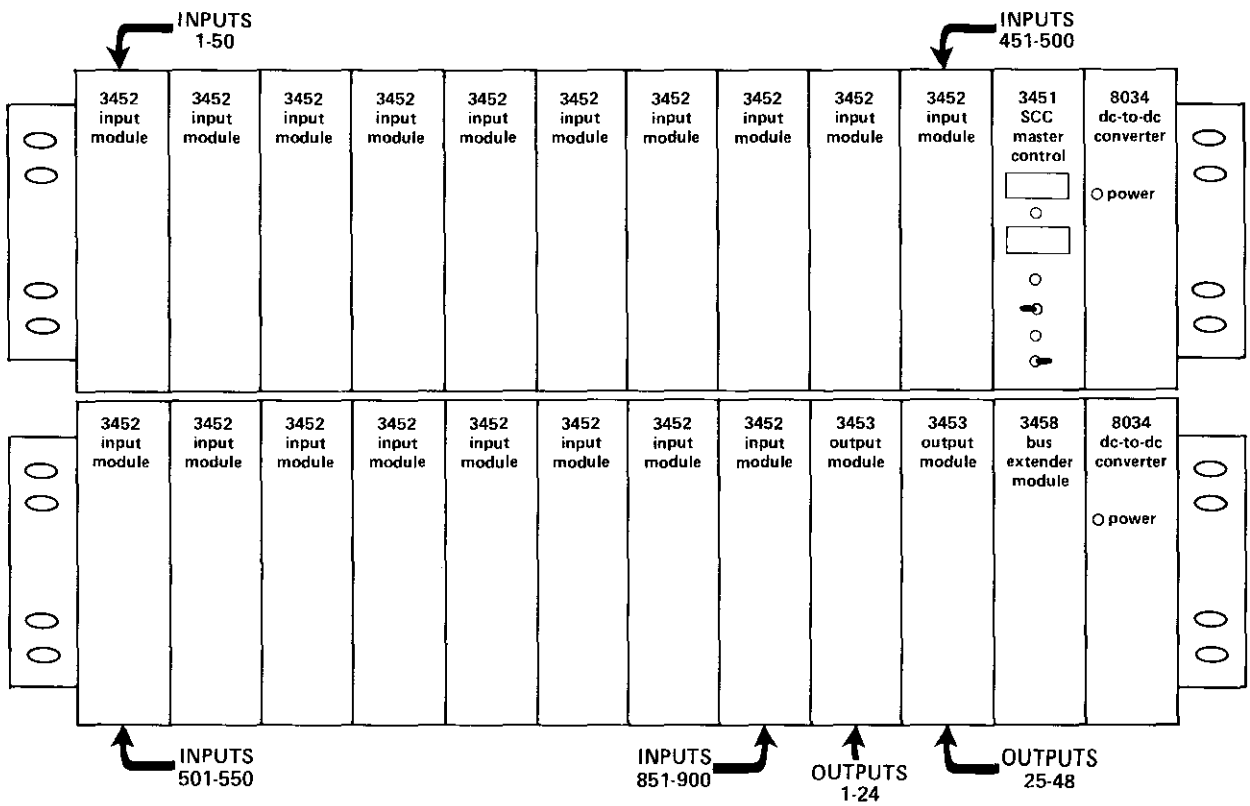

figure 3. Typical 345 SCC System (900 input lines, 48 output lines)

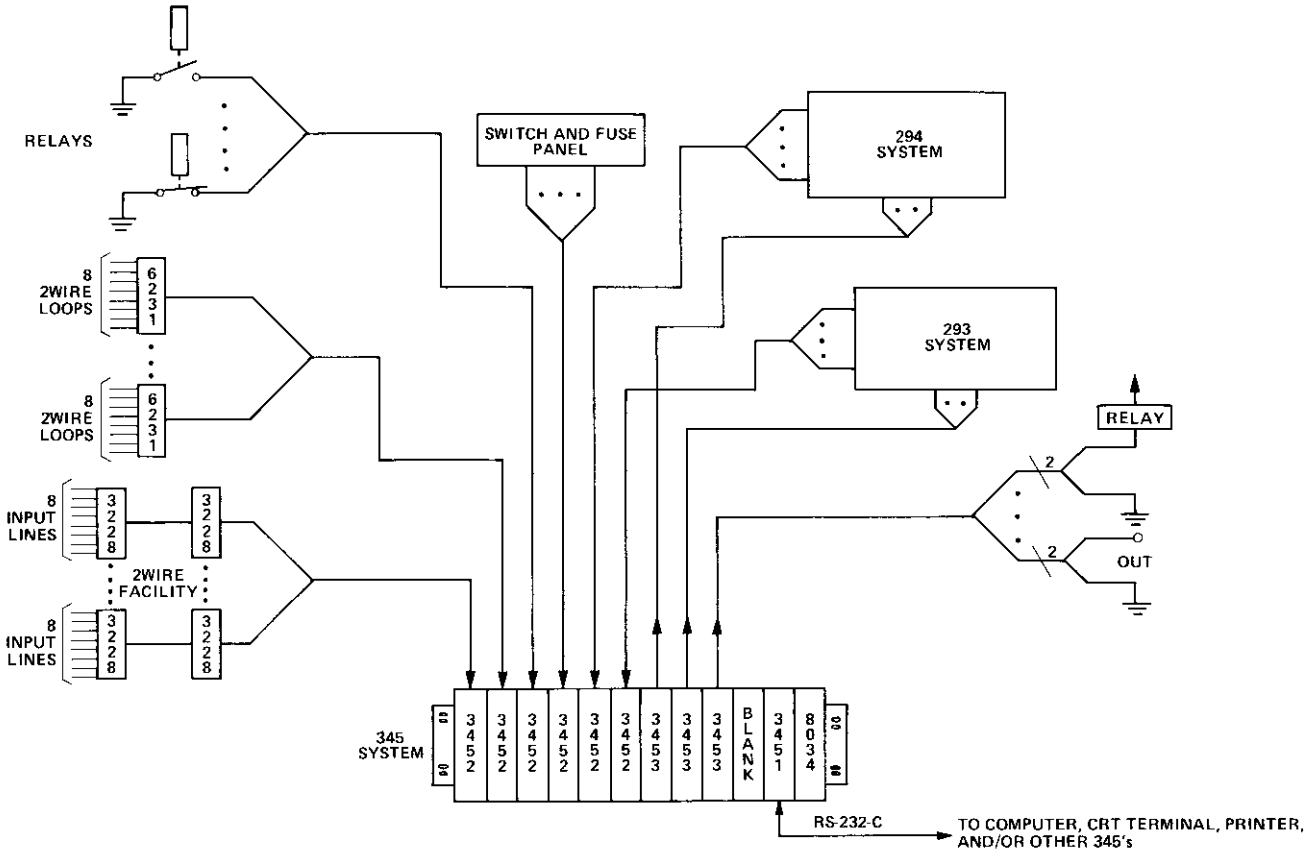

figure 4. 345 System in information input/output application

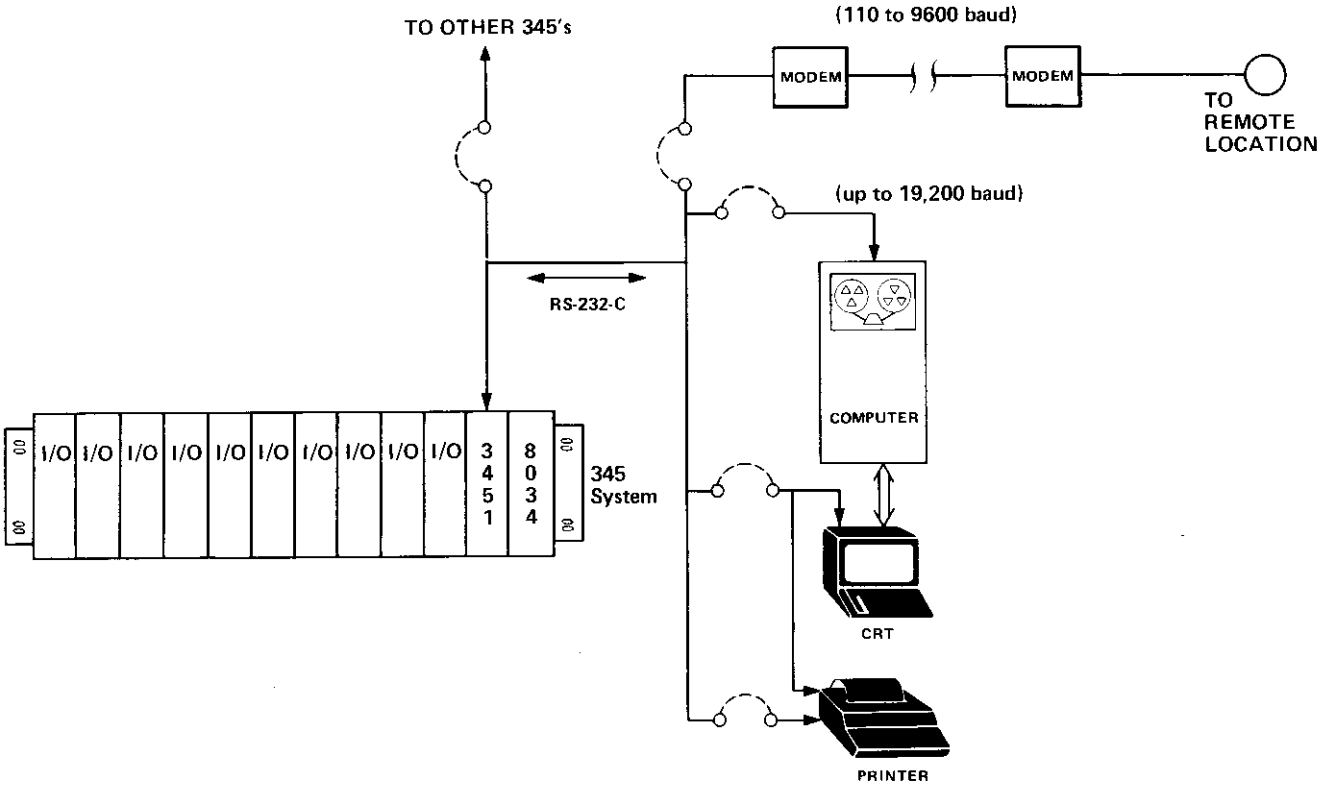

figure 5. 345 System in data communication application

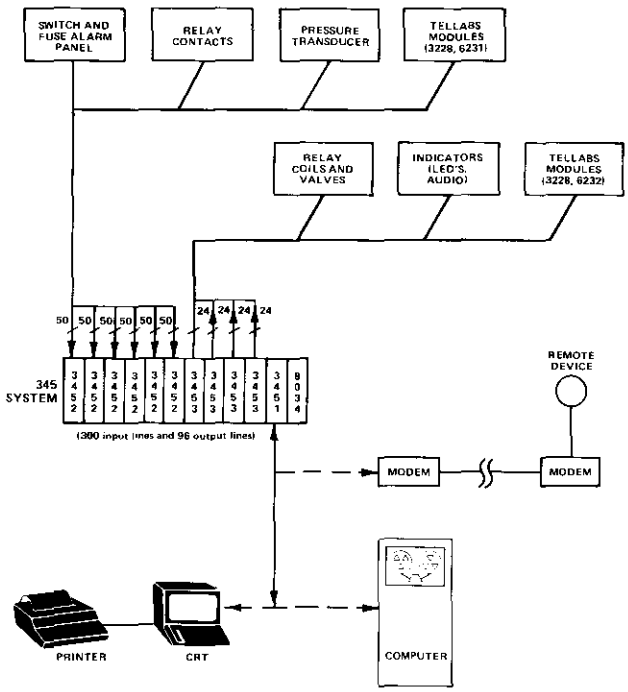

figure 6. 345 System in basic telemetry and control application

3.02 The 345 System is modular in design; therefore, various combinations of SCC telemetry, output control, and auxiliary communication modules can be mounted in positions 1 through 10 of the 345A Mounting Assembly. Positions 11 and 12 of the Mounting Assembly are dedicated locations for the 3451 SCC Master Control Module and the 8034 DC-to-DC Converter Module, respectively. If a particular application requires more input or output modules than can be housed in a single 345A Mounting Assembly, additional assemblies can be added to the System (up to a total of four) to house the extra modules.

3.03 In addition to serving conventional telemetry and control applications (some using Tellabs modules), the 345 can support existing Tellabs systems. The 345 Feature Package 1 supports the Tellabs 293 One-Way Alerting System and the Tellabs 294 Community Alerting System. The operation of these systems in conjunction with 345 Systems is described below.

293 One-Way Alerting System

3.04 The 345 SCC System (when equipped with FP1) can be used in conjunction with the Tellabs 293 One-Way Alerting System to provide remote status information during emergencies that result in activation of the 293 System. This information, which can be displayed on a CRT terminal, listed by a printer, or analyzed by data-processing equipment, typically identifies those zones (of several served by the 293) which have been activated and those telephones within activated zones which have not been answered or are busy. Figure 7 shows a 1600-line 293 System that uses the 345 SCC System for remote status reporting. The 293 System is activated in response to zone or all-call input signals (grounded zone or all-call leads) from smoke detectors, a central activation panel, or key-type DTMF telephone sets. These activation inputs to the 293 System are continuously scanned by the 345 System, as are answer-lead outputs (latched ground leads) from the telephones being rung by the 293 System within *activated* zones only. Scanning the various leads in this manner provides the trigger information for the display, printout, or analysis of the 293 System's activated/nonactivated zone and answered/unanswered/busy station-telephone status within activated zones.

3.05 The 3451 SCC Master Control Module is programmed by the user to define the required zones (which consist of groups of 293 answer leads). Normally, the 345 System is programmed for direct assignment of input lines to reported output lines (i.e., input line 314 is displayed as output line 314). The 3451 module can also be programmed to reassign any input to correspond to any specific output. This enables a direct connection to the 293 System without the need for a cross-connect field between the two systems.

294 Community Alerting System

3.06 The 345 SCC System (when equipped with FP1) can be used in conjunction with the 294 Community Alerting System to provide emergency remote status indications in the same manner described for the 293 System. Figure 8 shows a 600-line 294 System that uses the 345 System for remote status-reporting and output-control functions. Communication between the SCC System (located at the telephone company) and the remote data-processing equipment (CPU) is established via the primary data link (modem-driven private-line facility). Alarm information and the appropriate command message protocol are transmitted to the 3451 module. The 294 System is activated as directed by the 3451 module in response to the zone information supplied by the SCC output modules. The selected 294 answer leads are scanned by the 3451 module, and this information is returned to the remote CPU via the primary data link. The SCC continues to provide remote status indications for the selected 294 answer leads until the remote CPU returns the 294 and 345 Systems to their idle states.

3.07 An optional RS-232-C backup data link is available to provide a redundant communication path if the primary data link malfunctions. Several options are available for the remote end of the backup data link to activate the 294 System and to display the status information returned by the 294 System. Figure 8 also shows this aspect of a 294-System-to-345-System application.

4. operation

4.01 This **operation** section presents basic operational guidelines for the user. While the specific functions of the 3451 module are directly correlated with the Feature Package being used, some functions are general enough to be applicable to all applications. Please note, however, that some of the following examples are unique to Feature Package 1 applications only.

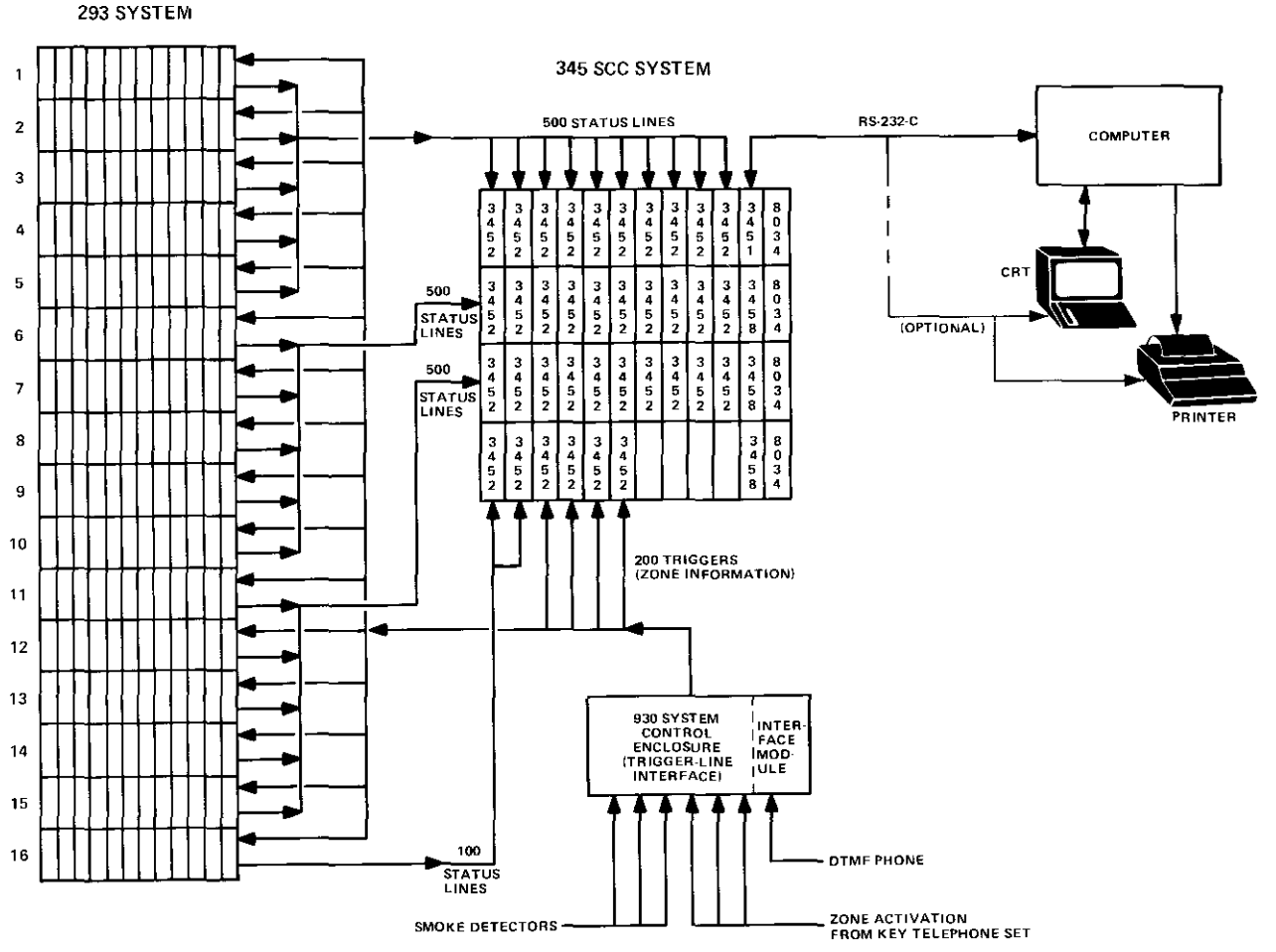

figure 7. 345 System providing remote status reporting for 1600-line 293 System

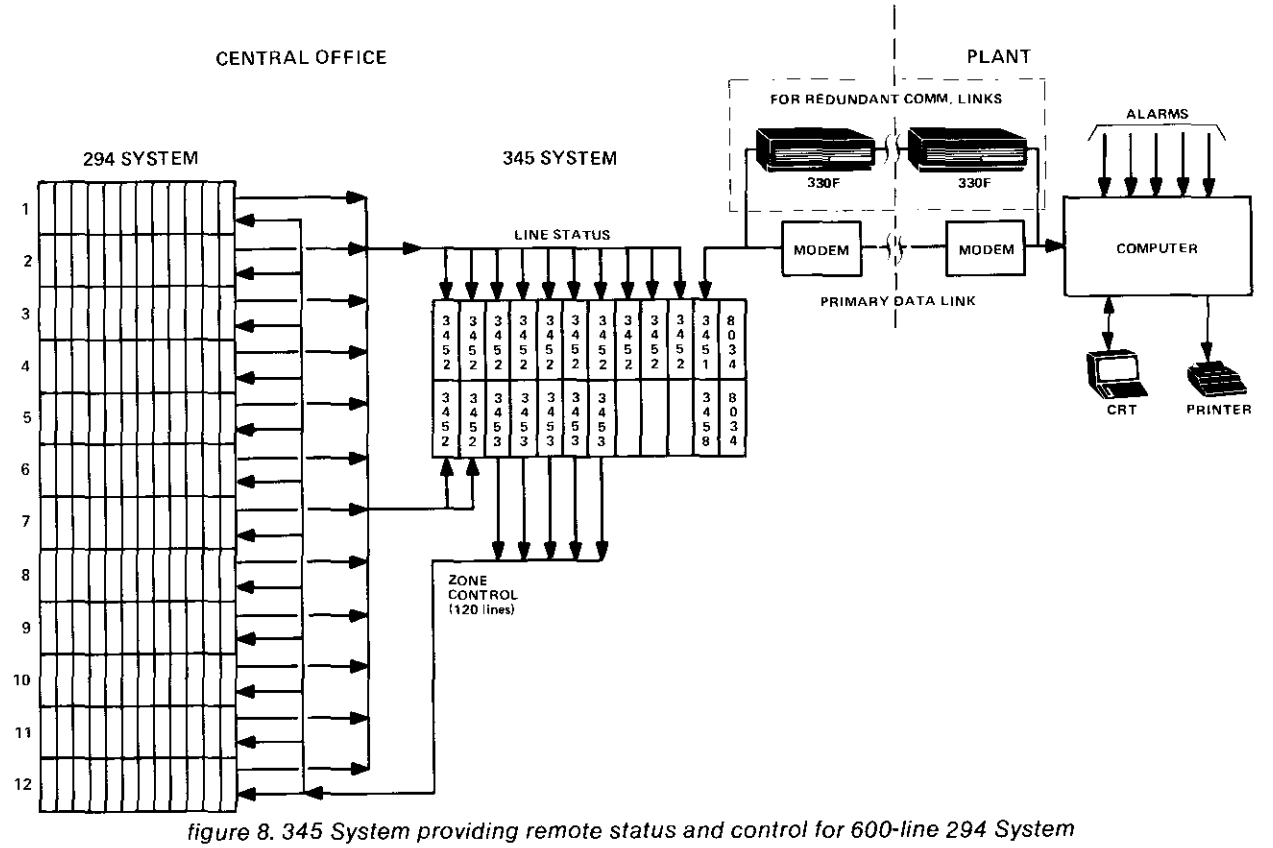

figure 8. 345 System providing remote status and control for 600-line 294 System

1. Program:
   A. * Selection of primary RS-232-C port characteristics (full duplex):
      1. Baud rate: 110 to 19,200bps
      2. Word size: 7 or 8 bits
      3. Parity: Even, odd, or none
      4. Stop bits: 1 or 2
   B. Auxiliary port selection:
      1. Module and port number
      2. Baud rate: 110 to 19,200bps
      3. Word size: 7 or 8 bits
      4. Parity: Even, odd, or none
   C. Trigger identification and response:
      1. Define trigger lines (maximum of 100 sequential inputs)
      2. Range of inputs to be reported as function of triggers
      3. Range of outputs to be set or cleared as function of triggers
   D. Reporting format:
      1. Formatted (stand alone) or packed data (computer interface)
      2. Heading definition for formatted data
      3. Input-to-output cross-connect assignment
2. Examine:
   A. Programmed features noted above
   B. Specified input lines
3. Self-test:
   A. Memory
   B. System (master control) hardware
   C. Input modules (checkerboard pattern)
4. Run:
   Run mode is dependent upon Feature Package used

* Default values of 300 baud, seven-bit ASCII, full duplex, no parity, two stop bits.

table 1. 3451 operating modes

4.02 For all Feature Packages, the 345 System's 3451 module controls the four modes of operation: *examine, program, self-test,* and *run* (see figure 9 and table 1). When the 345 is powered up, it initializes all System variables, performs a self-test on the 3451 Master Control Module, and then enters the mode indicated by the front-panel option switches. Mode-change, programming, and examining options can be programmed from the 3451's front panel, from a CRT terminal, or from a TTY via the RS-232-C serial data communication port of the 3451. Normally, a CRT terminal or TTY is used to operate the 345 System rather than the 3451's front-panel switches and indicators.

4.03 The format of the status information outputted via the 345's RS-232-C communication port is user-selectable. For stand-alone applications (such as those using CRT terminals or printers), the 3451 module provides the required report heading, displays format-control information, and can provide a hard-copy printout (table 2 shows a typical printout). For computer-interface applications, the 3451 provides a packed-data format from the

ALERT IN PROCESS !!!
ZONE NUMBER: 0003
ELAPSED TIME: 00:12:25
ROOMS: 100 to 199

	0	1	2	3	4	5	6	7	8	9
100	A	U	—	A	A	A	U	—	A	U
110	U	A	A	A	A	A	U	—	A	U
120	A	A	B	A	U	A	A	A	—	A
130	U	A	A	A	A	—	U	A	B	A
140	U	A	A	A	A	A	A	A	A	A
150	A	A	U	—	A	A	A	A	A	U
160	U	U	U	A	A	A	A	A	A	U
170	A	A	A	A	U	A	A	A	A	A
180	U	—	A	B	A	A	A	A	—	A
190	A	—	A	—	A	A	A	U	A	A

A = ANS U = UNANS
— = NOT EQUIPPED B = BUSY

table 2. Typical formatted output sent to a CRT terminal or a printer

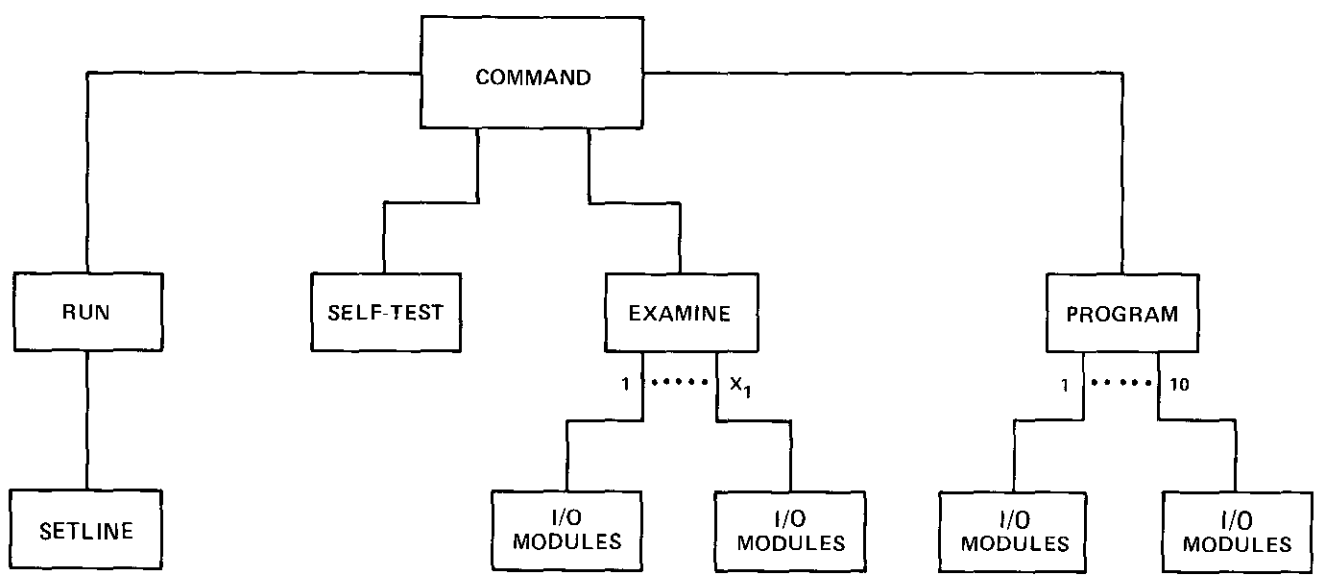

figure 9. 345 System's four modes of operation

Serial Output Format:

NNNN:C	NNNN:C	NNNN:C	NNNN:C	NNNN:C	NNNN:C ..... NNNN:C
NNNN:C	NNNN:C	NNNN:C	NNNN:C	NNNN:C	NNNN:C ..... NNNN:C
NNNN:C	NNNN:C	NNNN:C	NNNN:C	NNNN:C	NNNN:C ..... NNNN:C
NNNN:C	NNNN:C	NNNN:C	NNNN:C	NNNN:C	NNNN:C ..... NNNN:C

Note 1: *NNNN is the line number being reported (0001 through 2000) and C is the condition code for that line.*

condition	code
line was busy	B
line answered	A
line unanswered	U

Note 2: *When a trigger is active, the 345 System formats and displays all lines in the range selected by the trigger. When the trigger is removed, the 345 returns to the idle state.*

table 3. Feature Package 1 (FP1) serial output format

status information being reported, as shown in table 3. The reporting of selected status information is repeated at specific time intervals (such as every 2 minutes) for as long as the initiating trigger remains active.

5. system specifications

system capacity
10 input/output modules, one 3451 module, and one 8034 module per 345A Mounting Assembly; System can be expanded to up to four Mounting Assemblies (40 I/O modules, one 3451, four 8034's, and three 3458 modules)

connections to each I/O module
via 50-pin Amphenol-type female connectors on 345A Assembly backplane

data communication connections
via RS-232-C connectors on 345A Assembly backplane

system control communication port
DTE configured

345A Mounting Assemblies
345A-19: for 19-inch relay racks (houses 12 Type 10 modules)
345A-23: for 23-inch relay racks (houses 12 Type 10 modules)

345A Mounting Assembly construction
brushed aluminum

module connectors
positions 1 through 10: 80-pin, with bifurcated, gold-plated contacts
positions 11 and 12: 56-pin, with bifurcated, gold-plated contacts

power requirements
dc input voltage: −21 to −56Vdc, filtered, ground-referenced
dc input current (per 345A Mounting Assembly):
- **system idle, 0.5 ampere maximum at −48Vdc**
- **system active, 0.5 ampere maximum at −48Vdc**

operating environment
32° to 122°F (0° to 50°C), humidity to 95% (no condensation)

dimensions (for both 345A-19 and 345A-23)
5.92 inches (15.04cm) high
17.50 inches (44.45cm) wide (excluding mounting ears)
7.32 inches (18.57cm) deep

weight
345A-19 Mounting Assembly (empty): 5.25 pounds (2.39 kg)
345A-23 Mounting Assembly (empty): 6.25 pounds (2.84 kg)

mounting
prewired 345A Mounting Assembly: 19-inch or 23-inch relay rack (6 inches of vertical rack space is used)

6. warranty information

6.01 Tellabs warrants the 345 Status/Control Concentrator System to be free of defective components, workmanship, and design for a period of two years from the date of manufacture, when applied as outlined in our practices, subject to handling and installation commensurate with industry standards for solid-state electronic equipment. If the 345 System does not prove to be free of defective components, workmanship, and design under these criteria, Tellabs will replace or repair it free of charge.

Note: *Warranty service does not include removal of permanent customer markings on the front panels of Tellabs modules, although an attempt will be made to do so. If a module must be marked defective, we recommend that it be done on a piece of tape or on a removable stick-on label.*

6.02 For additional information on the 345 System, please contact Tellabs Customer Service at your Tellabs Regional Office or at our Lisle, Illinois,

or Mississauga, Ontario, Headquarters. Telephone numbers are as follows:

US central region: (312) 969-8800
US northeast region: (412) 787-7860
US southeast region: (305) 645-5888
US western region: (702) 827-3400
Lisle Headquarters: (312) 969-8800
Mississauga Headquarters: (416) 624-0052

connections to near end (345 System)	connections to far end	
	for DTE	for DCE
GND	GND	GND
TXD	RXD	TXD
RXD	TXD	RXD
CTS (see note)	DTR	CTS

Note: *If the far end does not have the appropriate control line for CTS, then CTS at the near end can be connected to DTR at the near end.*

table 4. 345 System far-end DTE/DCE connections

7. appendix

serial data port configuration

7.01 Connections to the 345 System (near end) and to the far end depend upon whether the configuration used at the far end is DTE or DCE (see table 4). For further reference, the RS-232-C pin assignments for the 3451 module are given in table 5.

RS-232-C pin numbers	signal definitions	line abbreviations	3451 pin numbers
1	frame ground	GND	46
2	transmit data "out"	$\overline{TXD_1}$	48
3	receive data "in"	$\overline{RXD}$	50
4	request to send "out"	RTS	52
5	clear to send "in"	CTS	54
6	data set ready "in"	DSR	56
7	signal ground	GND	32
8	carrier detect "in"	CD	34
20	data terminal ready "out"	DTR	43
13	spare transmit data "out"	$\overline{TXD_2}$	44

Note: *$\overline{TXD_2}$ is a spare transmit data output line that can be used to display printed output on two output devices at the same time.*

table 5. RS-232-C pin assignments for the 3451 module

Tellabs Incorporated
4951 Indiana Avenue, Lisle, Illinois 60532
telephone (312) 969-8800 twx 910-695-3530