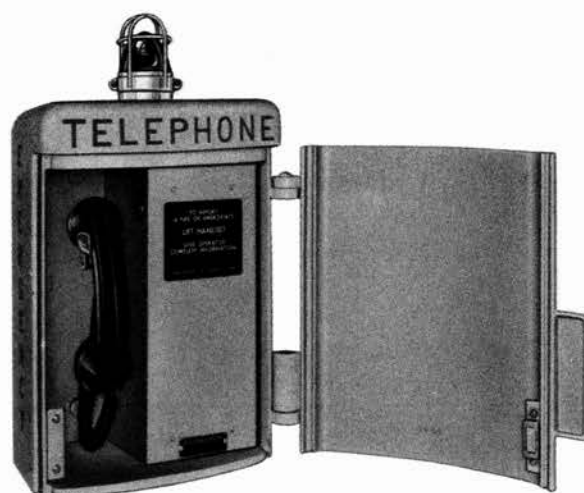


EMERGENCY REPORTING SYSTEM



Technical
bulletin **960-401**

AUTOMATIC ELECTRIC

Subsidiary of

GENERAL TELEPHONE & ELECTRONICS





Factory, development laboratories, and general office at Northlake, Illinois, U.S.A.

AUTOMATIC ELECTRIC COMPANY is an organization of designing, engineering, and manufacturing specialists in the fields of communication, electrical control, and allied arts. For more than sixty years the company has been known throughout the world as the originator and parent manufacturer of the Strowger Automatic Telephone System. Today Strowger-type equipment serves over 75% of the world's automatic telephones. The same experience and technique that have grown out of the work of Automatic Electric engineers in the field of telephone communication are also being successfully applied on an ever-increasing scale to the solution of electrical control problems in business and industry.

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Strowger Automatic Telephone Systems—Complete automatic central-office equipment for exchange areas of any size, from small towns to the largest metropolitan networks.

Community Automatic Exchanges—Unattended automatic units for small rural or suburban areas, with facilities for switching into attended exchanges.

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MUNICIPAL EMERGENCY REPORTING SYSTEM

1. INTRODUCTION

The Municipal Emergency Reporting System is designed to allow individuals to report fires or other emergencies from strategically located outdoor telephones directly to a central call receiving office. The system may be applied as a fire reporting system, a police reporting system, or a combination of both. The system meets the requirements of the National Board of Fire Underwriters Pamphlet 73, which sets forth the standards for installation, maintenance, and use of municipal fire alarm systems. This system utilizes voice reporting which makes it applicable to the reporting of any emergency. A periodic routing network and a supervisory circuit (one for each unit) ensures that the unit is operational at all times.

The supervisory circuit is so designed that the exact status of each line is known at all times. Line faults, acts of vandalism to the instrument, or telephone cord are instantaneously, visually and audibly indicated at the emergency reporting console.

1.1 System Description

The basic emergency reporting system (figure 1) is equipped to perform the following functions:

- Allow a caller to report the fire or emergency.
- Allow a console operator to receive the reported call.

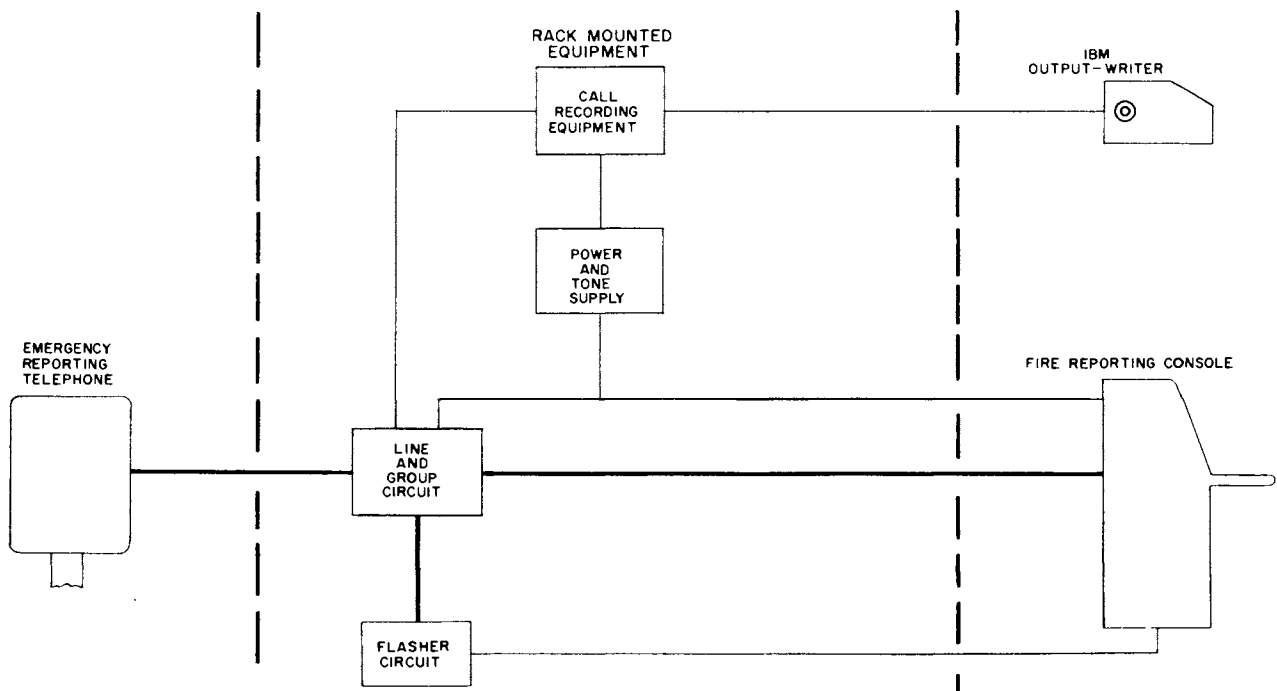


Figure 1. A basic emergency reporting system.

- c. Automatically prepare a printed record of the call.

The equipment for reporting a fire or emergency is the emergency reporting telephone which is connected directly to a fire reporting office. The equipment for receiving the report is a fire reporting console and its associated rack-mounted relay equipment. Together they signal the console operator that there is a call, and then allow the console operator to answer the call. The call recording equipment is a group of functional relay assemblies which automatically cause an IBM output-writer to make a printed record of the number of the calling telephone, the time, and the date of the call. The basic system may be applied as a fire emergency reporting system, a police reporting system or both.

1.2 System Features

Each emergency system is custom engineered to meet the specific requirements of a particular locale. Use is made of standard, functional equipment blocks so that the basic system may later be expanded or have optional features added. The basic system includes the reporting telephones, the reporting console and rack-mounted equipment, the call recording equipment, and the necessary power and tone equipment. Optional features which may be furnished include:

- a. Police reporting consoles.
- b. Transfer equipment which allows police officers to make calls to the police reporting console from emergency reporting telephones.
- c. Supervisor's consoles and dispatcher's consoles.
- d. Tie lines which allow telephone communication between fire and police reporting consoles and/or common battery (manual or dial) lines to a city owned exchange or public telephone exchange.
- e. Trunk telephone equipment which allows incoming calls to be transferred to the public telephone company central office and/or to a private-automatic-exchange (P-A-X).
- f. Public address system control and verification equipment.
- g. Voice recorder controls which allow telephone conversations to be recorded.
- h. Special outdoor emergency reporting telephones equipped with a key-locked dial which allow city employees to use the emergency reporting system to make calls into the city P-A-X.

- i. Line test equipment which allows emergency reporting telephone lines to be tested and monitored.

A fully equipped system (figure 2) consists of outdoor emergency reporting telephones with transfer facilities, fire emergency and police reporting consoles, supervisor's consoles, dispatcher's consoles, call recording equipment, trunk telephone equipment, tie lines and/or common battery lines, public address control and verification system, voice recorders, line test equipment, and the necessary power and tone equipment.

2. EQUIPMENT

The following paragraphs describe each system's component assembly, its function, optional equipment available, and supplementary information. A complete summary of equipment is shown in Table I.

2.1 Emergency Reporting Telephones (Figures 3 and 4)

2.1.1 Physical description.

The emergency reporting telephone consists of a telephone handset and cord, a hookswitch, and a telephone transmission unit mounted in a weatherproof cast aluminum case. The case is closed by a hinged door at the front and is held closed by a magnetic catch. The case measures 11-5/8 inches wide, 16 inches high and 6-5/32 inches deep. The case is finished in bright yellow enamel with red silk-screen lettering. Instructions for use are provided on an instruction plate mounted on the inside of the case. The emergency reporting telephone may be mounted either on a wall, a pole, or on a pedestal; the required mounting hardware is furnished. The telephone also may be fitted with a red lamp to identify the telephone at night (optional).

2.1.2 Optional circuit features.

In addition to the basic telephone, there are two circuit options available for the emergency reporting telephone:

- a. The standard telephone is equipped with a push-button switch which, when operated, actuates transfer equipment to transfer the call from the fire emergency reporting console to the police reporting console.
- b. The standard telephone or the push-button equipped telephone may be equipped with a key-locked dial. This telephone is designed to allow city employees, who have been furnished proper keys, to make calls into the city P-A-X.

2.1.3 Equipment associated with each telephone.

Associated with each outdoor emergency reporting telephone are the following:

- One set of line relays (10 sets of line relays are associated with one set of group relays).
- One line trouble lamp (supervisory) which may be mounted on the fire reporting console or on a supervisor's console.
- Two fire lamps and answer facilities. Each emergency reporting line must have two appearances; these may be on one console, or on both the fire reporting console and a supervisor's console.
- One transfer circuit (optional) with one set of line relays, one police lamp, and answering facilities that appear on the police reporting console.

2.1.4 General functions of the emergency reporting telephone.

The function of the emergency reporting telephone is to allow communication between an individual reporting an emergency and a fire console operator. Each telephone is connected by a wire pair to line and group circuit equipment. With the handset on the hookswitch (normal), a relay in the line and group circuit

keeps open the operate circuit for a trouble lamp (supervisory) on one of the consoles to indicate that the line is continuous and in working order. If the line is opened or grounded, the relay releases and the trouble lamp (supervisory) lights; the lit lamp and an associated buzzer, which operates after a short delay, act as an alarm signal to indicate trouble on the line.

The caller lifts the handset from the hook-switch, causing the line and group circuit to start the fire alarm buzzer and to start the flasher circuit to flash the fire alarm lamp and the fire line lamps on the console. The line and group circuit sends a tone to the caller which indicates that the line is operative. When the console operator answers the call, the fire lamp stops flashing but remains lit, the fire alarm buzzer and lamp indications stop, and the tone sent to the caller is removed from the line. After the emergency is reported the caller hangs up the handset, but the fire line lamp remains locked in until the operator breaks the connection. This lock-in feature prevents the loss of a call caused by excited callers hanging up before completely reporting the emergency.

2.1.5 Functions of a push-button equipped telephone and transfer circuit.

Telephones equipped to allow transfer of calls are furnished when both fire and police consoles

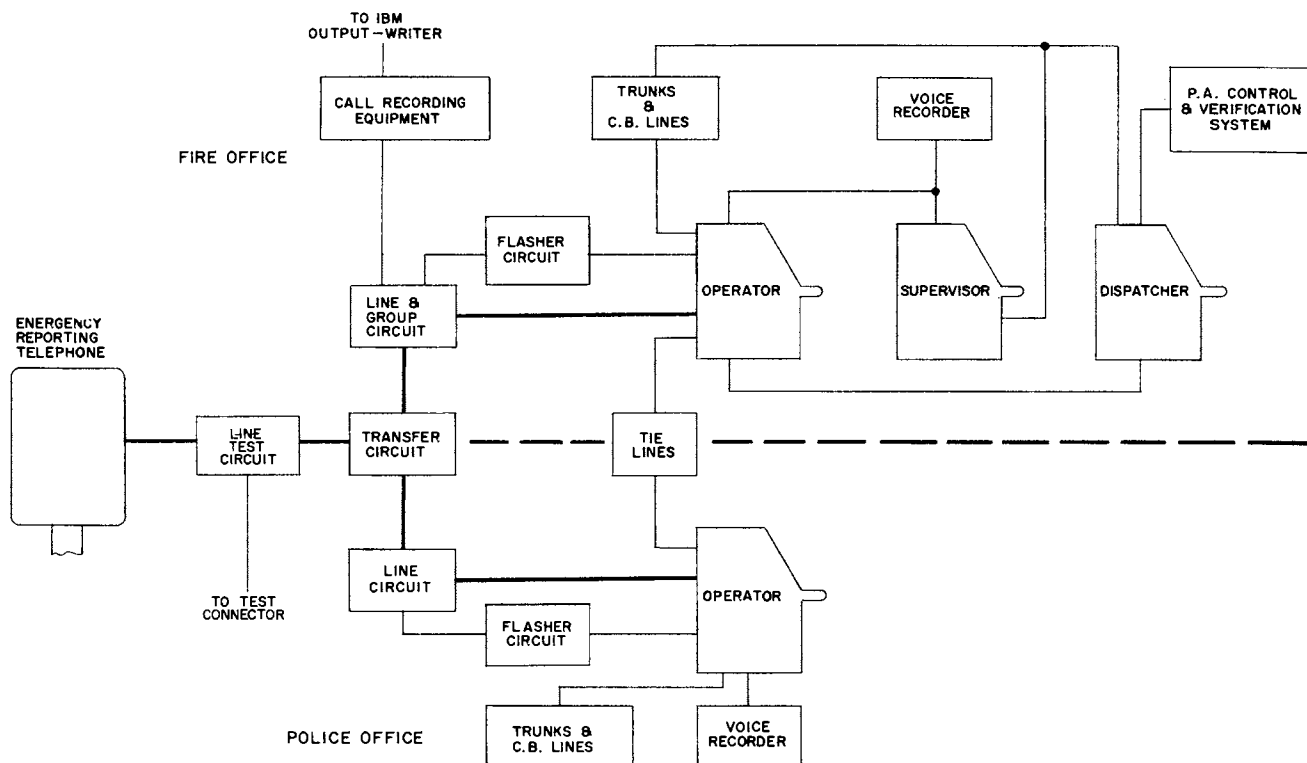


Figure 2. A fully equipped emergency reporting system.



Figure 3. An emergency reporting telephone.

are provided in the system. One transfer circuit is associated with each emergency reporting telephone. Ten transfer circuits are assembled on a relay strip which is mounted on a relay rack in the call receiving office.

In addition to the general functions described in section 2.1.4, the telephone equipped for transfer operation allows the caller to transfer his call directly to the police reporting console. The caller presses and holds the push-button switch and then lifts the handset from the hook-switch while holding the push button. The push button is then released.

The associated transfer circuit transfers the calling line from the fire line and group circuit to the associated police line circuit. The transfer circuit sends a tone to the emergency reporting console to indicate that the calling line is busy with the police console. The police line relays act to signal the console operator and to send a tone to the caller. When the console operator answers the call, the signal stops, tone is removed from the calling line, and the call is locked to the console. When the caller hangs up, the transfer circuit returns to normal.

2.1.6 Functions of the locked dial emergency reporting telephone.

The locked dial telephone, in addition to the functions described in section 2.1.4 allows city employees who have been furnished proper

keys to unlock the telephone dial circuit and make calls into the city owned P-A-X. The dial circuit is locked out until a proper key is inserted into the lock and turned. The caller lifts the handset and is connected directly with P-A-X equipment. When dial tone is heard, the caller dials the desired number. When the call is finished, the caller replaces the handset on the hookswitch and locks the dial mechanism; all associated circuits are then returned to normal.

2.2 Consoles

A console (figure 5) consists of all the equipment necessary to perform a function. For example, an operator's console allows the operator to answer and transfer emergency calls, and observe the status of system equipment. A console is made up of one or more position units. A position unit is that part of a console equipped to be manned normally by one operator.

A console may be designed for the performance of any required function such as the operator's console, the supervisor's console, or the dispatcher's console. Since each emergency reporting system is custom engineered to meet specific needs, the appearance of each console depends on its function, the number of emergency reporting lines served, and the number of manual cord circuits, trunk circuits, tie lines and other optional equipment desired. Each console is designed from a human engineering standpoint, with controls and indicators placed to afford the greatest operator efficiency.

2.2.1 Physical description.

A console consists of one or more operator's position units. The position unit resembles a manual telephone switchboard and measures 26-1/16 inches wide, 49-31/32 inches high, and 40-1/2 inches deep. (End panels add 2-1/2 inches to the total width of the number of operator's positions.)

The unit position is built of a steel angle material framework enclosed by enamel finished steel panels. The sloping (19° from vertical) upper part of the unit (called the face) contains the lamps, jacks, push keys for the emergency lines served, common battery, two-way automatic commercial telephone and P-A-X trunk circuits, tie lines, and the status and alarm indicators for the system. Mounted on the formica work-writing top are the plug shelf, hinged key shelf, dials, and keys which allow the operator to handle incoming and outgoing calls.

The equipment under the key shelf is accessible by simply lifting up the key shelf. The work-

writing top is 29-2/16 inches from the floor and is 18-1/2 inches deep, from the edge to the face panel of the unit. The work-writing top for a console is made in one piece. Unit terminal blocks, to which all internal wiring is led for connection with other equipment and the manual cord equipment, are mounted inside the unit. Access to this equipment is obtained by removing the rear vertical panel or front cord shield.

2.2.2 Basic console equipment.

A basic emergency reporting system consists of the emergency reporting telephones, the operator's console, and the call recording equipment. The equipment supplied with a basic system has controls and indicators associated with it which appear on the operator's console. The controls and indicators enable the operator to observe equipment status, answer incoming emergency calls, and act on the emergency calls.

- a. Operator's position equipment and cord circuits (Table II). The operator's position equipment allows the operator to answer emergency calls, transfer the calls, and

observe the status of the calls. This equipment consists of operator's position equipment and cord circuits. Associated relay equipment is mounted on relay racks remote from the console.

- b. Emergency reporting line equipment (Table III). The emergency reporting line equipment (line lamps, trouble lamps, jacks and push keys) signal the operator, allow the operator to connect position equipment to the calling line, and observe the status of the emergency call and of the calling lines.
- c. Call recording equipment (Table IV). The call recording equipment controls and indicators allow the operator to observe the status of the call recording IBM output-writer and the dater-timer a-c power input. Associated relay equipment is rack mounted.
- d. Signal alarm equipment (Table V). The signal alarm equipment acts as an alarm buzzer which signals the operator in case of incoming trunk calls, and as disconnect supervision in case of transferred calls. Associated relay equipment is rack mounted.

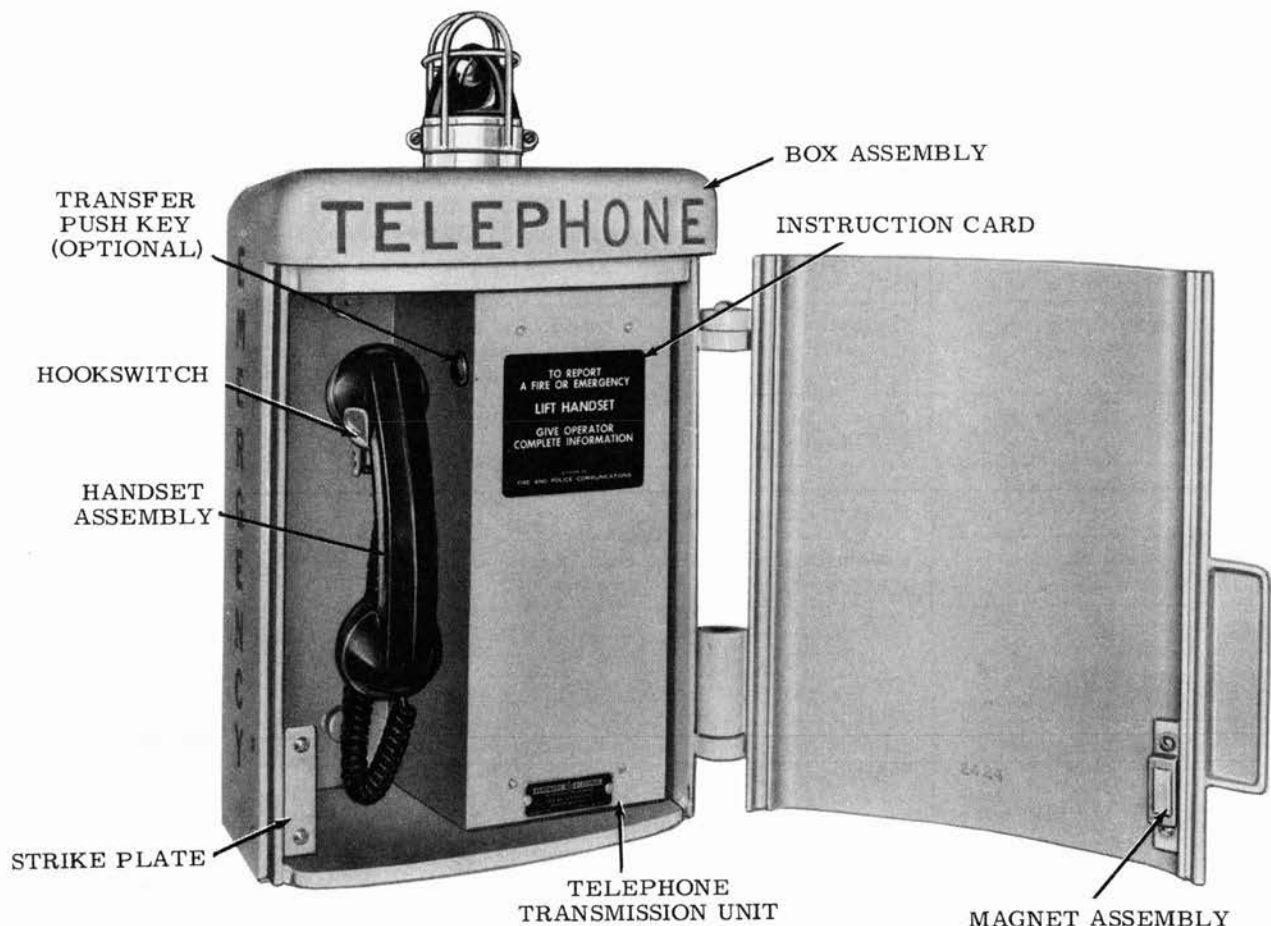


Figure 4. Emergency reporting telephone (door open).

TABLE I: Emergency Reporting System Equipment Summary

Equipment	Purpose	Quantity Required
Emergency reporting telephones.	Emergency reporting input to the system.	1 per calling line required.
Line and group circuit.	On input from emergency reporting telephone, starts fire line call waiting signals, locks fire console to calling line, and starts call recording equipment.	1 per 10 emergency lines in system.
Call recording equipment consisting of:		Used in system where printed record of a call is required, as in fire system.
Gate circuit.	In systems of 100 lines or less starts printer control circuit and prevents double seizure of printer control circuit by line and group circuits. In system of 101 lines or more, starts master gate circuit.	1 per system of 100 lines or less,
Master gate circuit.	In systems of more than 100 lines, starts printer control circuit and prevents double seizure of printer control circuit by gate circuits.	1 per 1000 lines or less in systems of more than 100 lines only.
Printer control circuit.	Controls operation of IBM output-writer.	1 per system.
IBM output-writer.	Records calling line number, time and date.	1 per system.
Dater-timer.	Furnishes time, day and month markings to printer control circuit.	1 per system.
10 IPM source.	Furnishes timed pulses to govern operation of dater-timer.	1 per system.
Operator's console and rack-mounted equipment incorporating:	Conveniently assembles in one place all system controls and indicators required for system operation by operator.	1 per system.
Flasher circuit.	Common to all system indicators. Causes flashing of indicator lamps.	2 per system: 1 primary and 1 auxiliary.
Emergency reporting line controls and indicators.	Indicates call waiting or trouble on line; allows operator to answer call on associated line.	1 set per emergency line.
Trouble alarm relay circuit.	Causes line trouble alarm indications. Common to all emergency lines.	1 per system.
Fire alarm circuit.	Common to all emergency lines. Causes fire call waiting indications.	1 per system.
Equipment status alarm circuit.	Common to all system equipment. Causes equipment status alarm indications.	1 per system.
Monitor circuit (optional).	Allows dispatcher to monitor calls.	1 per system incorporating a dispatcher's console.
Signal alarm circuit.	Causes disconnect supervision indications associated with telephone communication equipment.	2 per console incorporating tie lines, telephone trunk circuits, or CB lines. Otherwise: 1 per console.

TABLE I: Emergency Reporting System Equipment Summary (Continued)

Equipment	Purpose	Quantity Required
Operator's position circuit and operator's telephone circuit.	Allow operator to handle incoming or outgoing calls at console.	2 per console position unit as required.
Cord circuit.	Allows connection of operator's position equipment to incoming or outgoing calls.	As required by expected traffic load.
Police console and rack-mounted equipment incorporating:	Conveniently assembles in one place all controls and indicators required for police system operation.	1 per system as required.
Transfer circuit.	Under control of caller, connects calls from emergency telephones to police console, instead of to emergency reporting console (normal).	1 per emergency line where access to police console is required.
Police line circuit.	Starts police call waiting indications at police console.	1 per emergency line where access to police console is required.
Police alarm circuit.	Causes police call waiting indications.	1 per police system.
Tie line circuits.	Allow two-way telephone communications between fire and police consoles.	As required.
Supervisor's console.	Conveniently assembles in one place all controls and indicators required for supervision of system operation.	As required.
Dispatcher's console.	Conveniently assembles in one place all controls and indicators required by dispatcher.	As required, 1 per system.
Voice recorder.	Provides access to voice recorder which records telephone conversations.	As required.
Public address control and verification circuit.	Controls public address system calls for up to 35 stations.	As required, 1 per system.
Common battery line trunk circuits.	Allow two-way signaling and telephone communication between a console and a manual telephone system or to manual commercial telephone company central office.	As required.
Two-way automatic telephone trunks.	Allow two-way signaling and telephone communication between a console and a city P-A-X or an automatic commercial telephone company central office.	As required.
Power and tone equipment incorporating:		
A 48 volt battery supply.	Supply d-c electricity to system equipment.	1 per system to comply with National Board of Fire Underwriter's.
Battery charger(s).	Maintains charge of 48 volt battery supply.	1 or 2 per system.
Tone supply.	Generates tone which is sent to emergency telephone to indicate to caller that telephone is in operating order, until console operator answers.	1 per system.
Ringing current supply.	Generates ringing ac which is sent to called police console via tie line or to manual CB telephones.	1 per system.
Fuse panel.	Distributes fused d-c electricity to system functional components.	1 per rack of functional relay equipment.

TABLE II: Operator's Position Equipment and Cord Circuit Controls and Indicators

Component	Function
Operators' Jacks	Two pairs of operator's jacks (called "left" and "right" operator's jacks) allow operators to connect headsets or handsets into the operator's position circuit and allow the operator to answer incoming calls.
CORD TRANSFER LEFT OPR - RIGHT OPR lever key	Allows both groups of cord circuits to be put under control of either operator.
PUSH KEY TRANSFER LEFT OPR - RIGHT OPR lever key	Allows both groups of line push keys to be put under control of either operator.
TRK & STA cord (rear)	The TRK & STA cord plug of a cord circuit is connected to a line or trunk jack upon answering a call.
TRK & STA lamp (rear)	The TRK & STA lamp, when the cord circuit is used with trunk and tie lines, lights when the calling party hangs up.
STA cord (front)	The STA cord plug of a cord circuit is connected to the outgoing tie line or trunk jack when the operator is extending a call.
STA lamp (front)	The STA lamp allows answer supervision of the called line or trunk associated with the front cord.
TALK-RING FRONT lever key	When in the TALK position, this key allows the operator to talk with either the called or calling party. When in the RING FRONT position, this key sends ringing current to the called telephone over the front cord (not used when calling into an automatic trunk).
RING REAR lever key	When operated, this key sends ringing current to the called telephone over the rear cord (not used when calling into an automatic trunk).
DIAL REAR-SPLIT lever key	When in the SPLIT position, this key allows the operator to prevent the release of an automatic switchtrain while the TALK-RING FRONT key is in the TALK position, the operator may now talk to the party connected over the front cord. When in the DIAL REAR position, this key allows the operator to dial out (via an automatic trunk) and extend a call over the rear cord (the TALK-RING FRONT key is in the TALK position).
TALK ON SPLIT-DIAL RLS lever key	When operated to the DIAL RLS position momentarily, this key releases a previously dialed automatic switchtrain. When in the TALK ON SPLIT position (also keys DIAL REAR-SPLIT and TALK-RING FRONT operated to the SPLIT and TALK positions), this key allows the operator to talk with the party connected over the rear cord.
Dial	The dial allows the operator to transfer calls via the city P-A-X or public telephone company automatic equipment.

TABLE III: Emergency Reporting Line Controls and Indicators

Component	Function
Line lamps (red) 2 per line	Two lamps (each a separate appearance) are required for each emergency reporting line. When flashing, this lamp indicates that an emergency call is waiting. When steadily lit, this lamp indicates that the operator is locked into the line.
Line trouble lamp 1 per line Line push key 1 per line	When lit, this lamp indicates that the line to the emergency reporting telephone is open or grounded. When operated, this key connects the calling telephone to the operator's telephone. If a locking key is used, this key is released by pulling it straight out. If a non-locking key is used, the connection is released by operation of a COMMON RELEASE key.
Line jack 1 per line	Connects the calling line to the operator's telephone via a cord circuit plug.
COMMON RELEASE push key	Disconnects calls when nonlocking push keys are used.

NOTE: Either the push key or line jack may be used to answer an incoming call, but not both.

TABLE IV: Call Recording Equipment Controls and Indicators

Component	Function
AC OFF lamp (white)	When lit, this lamp indicates that a-c power is not being supplied to the 10 IPM source which supplies the dater-timer. (Another AC OFF lamp in parallel is located on the 10 IPM source relay panel.)
TST PTR ALM lever key	When operated, this key acts to attempt the reset of the printer control circuit after alarm indications have been given.
TIME OUT ALARM lamp (white)	When lit, this lamp indicates that the printer has failed to complete its printing cycle within ten seconds.
PRINTER REMOVED lamp (white)	When lit, this lamp indicates that the IBM output-writer is not connected to the printer control circuit.
TST PTR lever key	When operated momentarily, this key completes a circuit which applies test conditions to the printer control equipment to determine that the printer control circuit can complete its functions within ten seconds.
TEST PRINTER lamp (white)	When lit, this lamp indicates that test conditions are being applied to the printer control circuit; when the lamp goes out, the test is completed.

TABLE V: Signal Alarm Equipment Controls and Indicators

Component	Function
Signal alarm buzzer	When operated, this buzzer indicates that an incoming trunk or tie line call is waiting, or that the parties on a transferred call have hung up.
SIG ALM lever key	When operated, this key completes a circuit from the auxiliary signal equipment to the signal alarm buzzer which allows the buzzer to be operated by the auxiliary signal circuit.

- e. Fire alarm equipment (Table VI). The fire alarm equipment notifies the operator with visual and audible signals that an emergency call is waiting at the console. Associated relay equipment is rack mounted.
- f. Trouble alarm equipment (Table VII). The trouble alarm equipment notifies the operator (in case of trouble in one of the emergency reporting telephone lines) with visual

and audible signals. Associated relay equipment is rack mounted.

- g. Equipment status alarm (Table VIII). The equipment status alarm equipment notifies the operator, with visual and audible signals, in case of trouble in:

- (1) The printer control equipment.
- (2) The line and group equipment.

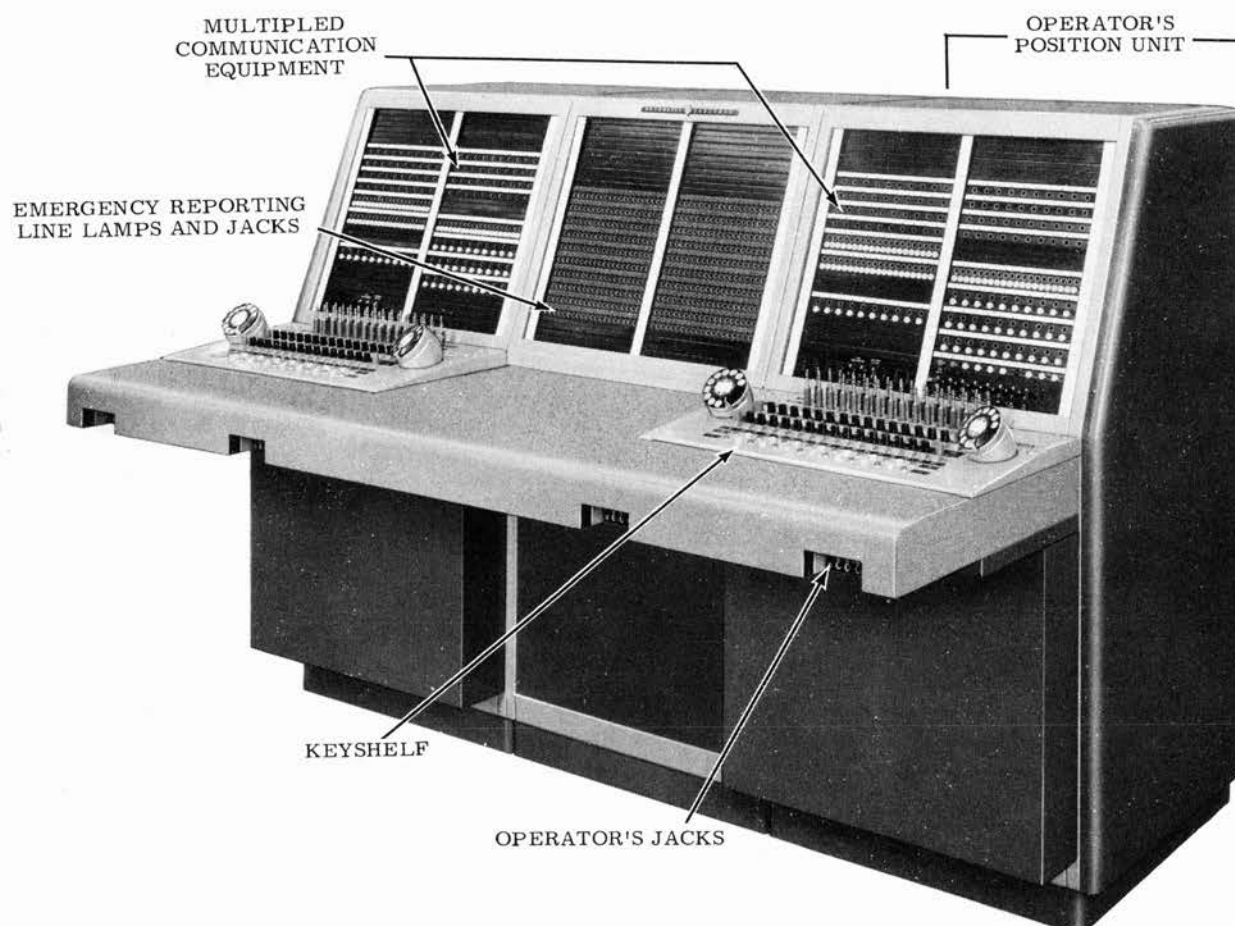


Figure 5. A typical emergency reporting operator's console.

TABLE VI: Fire Alarm Equipment Controls and Indicators

Component	Function
FIRE ALARM lamp (red)	When flashing, this lamp indicates that an incoming call is waiting at the console. When lit steadily, this lamp indicates that the FIRE ALM CO key is operated.
Fire alarm buzzer	When sounding, this buzzer indicates that a fire call is waiting.
FIRE ALM CO - FIRE ALM OFF lever key	When operated to the FIRE ALM OFF position momentarily, this key stops the fire alarm buzzer, stops the flasher, and keeps the FIRE ALARM lamp lit. When in the FIRE ALM CO position, this key prevents operation of the buzzer and keeps the FIRE ALARM lamp lit to indicate that the key is operated.

TABLE VII: Trouble Alarm Equipment Controls and Indicators

Component	Function
TROUBLE ALARM lamp (white)	When flashing, this lamp indicates that trouble exists in one of the emergency reporting lines. When lit steadily, this lamp indicates that the TROUBLE ALM CO key is operated and that the trouble has not been cleared. When the trouble is cleared, the lamp goes out.
TROUBLE ALM CO lever key	When operated momentarily, this key stops the trouble alarm buzzer, stops the flashing of the TROUBLE ALARM lamp, and causes the TROUBLE ALARM lamp to remain lit until trouble is cleared.
Trouble alarm buzzer	When sounding, this buzzer indicates that trouble exists in one of the emergency reporting lines.

TABLE VIII: Equipment Status Alarm Equipment Controls and Indicators

Component	Function
EQUIPMENT STATUS lamp (red)	When flashing, this lamp indicates that trouble exists in one of the fuse alarm circuits, in one of the line and group circuits, or in the printer control circuit. When lit steadily, this lamp indicates that the trouble still exists but that the equipment status alarm buzzer has been cut off. The lamp goes out when trouble is cleared.
EQ STATUS ALM CO lever key	When operated momentarily, this key causes the equipment status alarm buzzer to stop, stops the flashing of the EQUIPMENT STATUS lamp, and causes the lamp to remain lit.
Equipment status alarm buzzer	When sounding, this buzzer indicates that trouble exists in the fuse alarm, line and group relays, or printer control circuit.

(3) The power fuse panels serving the system.

(4) 10 IPM source.

Associated relay equipment is rack mounted.

h. Monitor circuit (Table IX). The monitor circuit consists of a lever key and an associated indicator lamp. This circuit, which is connected to the operator's position equipment, allows incoming emergency calls to be monitored at the dispatcher's console. The dispatcher can then order fire equipment without loss of time. There is no rack-mounted equipment associated with the circuit.

i. Miscellaneous controls and indicators (Table X).

j. Rack-mounted equipment. All rack-mounted equipment associated with the console is assembled into relay strips 23-1/4 inches wide (mounted on standard relay racks). In use, functional components are protected by a metal dust cover individual to each relay strip. All wiring from components is connected to a terminal block on the rear of the relay strip for connection to other equipment. Each relay rack has its own fuse panel where 48-volt battery is further fused for distribution to individual relay strips mounted on the rack. Each fuse is connected to alarm circuitry (in case a fuse blows) which causes visual and audible alarm signal indications at the panel and at the console.

2.2.3 Optional consoles and equipment.

In addition to the basic operator's console, other consoles may be desirable in the system. These include an operator's console for police emergency service, supervisory consoles for either or both fire and police service, and a dispatcher's console for either or both fire and police service. The equipment depends on the specific requirements of the customer and would probably include many of the equipment features found on the basic operator's console.

a. Supervisory console. A fire supervisory console contains multiples of the fire line equipment, the line trouble lamp and other system status indicators and alarms.

b. Police console. A police reporting console is equipped similar to the fire reporting console. However, the line lamps have only one appearance and the trouble lamps are not necessary. Tie lines and telephone trunks are furnished as optional equipment.

c. Dispatcher's console. A dispatcher's console contains equipment which allows a police or fire dispatcher to monitor incoming calls and dispatch equipment as required. Provision for mounting and controlling radio equipment may be designed into this console. Optional equipment includes a public address control and verification system and voice recorder control equipment.

2.3 Line and Group Circuit

2.3.1 Physical description.

The line and group circuit is an assembly made up of the five or six relays associated with each of 10 outdoor emergency reporting telephones (line relays). The four group relays common to the 10 sets of line relays and a red alarm lamp. All of the relays and electrical hardware are assembled on a steel strip 23-1/4 inches wide and 9-3/8 inches high. The strip mounts on a standard relay rack.

In use the equipment mounted on the relay strip is protected by a metal dust cover. One assembly is required for each ten outdoor emergency reporting telephones served; there are no options.

2.3.2 Equipment associated with each line and group circuit.

Associated with each line and group circuit are:

a. Ten outdoor emergency reporting telephones.

b. Twenty fire lamps on consoles (two appearances for each line served).

c. Ten line trouble lamps on consoles.

d. Twenty line call answering facilities (10 push keys and 10 jacks) on consoles.

e. Tone supply.

f. Flasher circuit.

g. Call recording equipment.

2.3.3 Function of the line and group circuit.

The line relays act, when a caller removes the handset, to send a tone to the caller, to start the flasher circuit, to start the fire alarm circuit, to flash the FIRE ALM lamp, and to start the common group relays. The relays mark the calling line number in the call recording equipment, and start the call recording equipment.

After the calling line number is recorded, the group relays are released by the call recording

TABLE IX: Monitor Controls and Indicators

Component	Function
MONITOR lamp	When lit, this lamp indicates that the MON key is operated and the circuit to the dispatcher's console is complete.
MON lever key	When operated, this key placed the dispatcher's telephone equipment in parallel with the fire console operator's telephone.

NOTE: The above components are duplicated on the dispatcher's console and serve the same purpose; either key completes the monitor circuit.

equipment so that they are available to handle calls on any of the other nine associated groups of line relays. When the console operator answers the call, the line relays remove the tone to the caller, stop the flashing of the line lamp but keep the lamp lit, stop the fire alarm indications, and remain locked in to the calling line until released by the operator. When the caller hangs up and the operator disconnects, the line relays are returned to their normal state. If the line or group relays become in-operative for any reason, an alarm relay is released causing the red alarm lamp on each mounting strip to light and start the equipment status alarm relay circuit.

2.4 Flasher Circuit

2.4.1 Physical description.

The flasher circuit used with the emergency reporting system consists of two identical pairs of relays, and a transfer key. One pair

of relays makes up the primary flasher, and the other pair makes up the auxiliary flasher. The relays and associated electrical hardware are mounted on a steel strip together with other relay equipment; the assembled strip is called miscellaneous alarm relay equipment. The strip is mounted on a standard relay rack and the associated transfer key AUX FLASH is mounted on the operator's console.

2.4.2 Function of the flasher circuit.

On input from the line and group circuit flasher circuit, relay F2 operates which removes a shunt around relay F1 which operates. Operated, relay F1 releases relay F2. Released, relay F2 sends an input to operate the fire lamps on the consoles and short circuits relay F1 causing it to release. This cycle is repeated until the input is removed. When the operator answers, the input to the flasher circuit is removed and the circuit returns to its normal state. The operator may transfer the

TABLE X: Miscellaneous Controls and Indicators

Component	Function
AUX FLASH lever key	When operated, this key transfers from primary equipment operation to auxiliary equipment operation.
SYSTEM FUSE lamp (white)	When lit, this lamp indicates that one of the relay rack fuses has blown. (A red fuse alarm lamp is associated with each fuse, and is located on the fuse panel on each relay rack. All red alarm lamps are connected in parallel with the SYSTEM FUSE lamp on the operator's console.)

flasher functions from the primary flasher relays to the auxiliary relays by operating key AUX FLASH on the console. The operation of the auxiliary relays is exactly the same as the operation of the primary relays. The flasher is so arranged that a lamp will always light, even in case of flasher failure.

2.5 Call Recording Equipment

Call recording equipment (figure 6) is provided as part of the basic system when it is required that a printed record be made of all incoming emergency calls (as when the system is used for fire emergency reporting). The call recording equipment includes:

- a. One gate circuit for every 10 line and group circuits in the system (one gate circuit per 100 emergency reporting lines served) which allows only one line of the 100 to access the printed control circuit at one time.
- b. A master gate circuit for each 10 gate circuits (101 emergency reporting lines require two gate circuits and one master gate circuit) which allows only one of 1000 lines to access the printer control circuit at one time. The master gate circuit is not required for systems serving 100 emergency reporting lines or less.
- c. A printer control circuit which controls the operation of the 12-key IBM output-writer.
- d. A dater-timer which furnishes the time and date to the printer control circuit when called for by that circuit. The dater-timer is fed timed pulses by an associated 10 IPM pulse source.

The printed record of the call consists of the

calling emergency reporting telephone number, the time and the date of the call. This information is printed on standard typewriter width roll paper.

On typewriter paper the printed record would appear as follows:

315 11:15 5/15/60

2.6 Gate Circuit

2.6.1 Physical description.

Each gate circuit consists of a group of 10 relays (G1-G0) and, if the system serves more than 100 lines, a relay STP. These are all assembled together with the necessary electrical hardware to the front of a common mounting strip. The mounting strip measures 23-1/4 inches wide and 3 inches high and is bolted to a standard relay rack. In use the mounted relay equipment is protected by a metal dust cover. All internal wiring is led to the terminal block on the rear of the strip for connection with other equipment.

2.6.2 Function of the gate circuit.

The gate circuit, by means of an interlock chain (G relays), allows only one of 100 lines to have access to the master gate circuit or to the printer control circuit. (If the system serves more than 100 lines, access to the printer control circuit is gained via a master gate circuit.) This prevents seizure of the printer by more than one calling line at a time. The gate circuit starts the master gate or the printer control circuit, marks the calling line number tens digit, and then under control of the printer control circuit, releases the calling line and group circuit. The gate circuit functions to prevent double seizure of the printer control circuit.

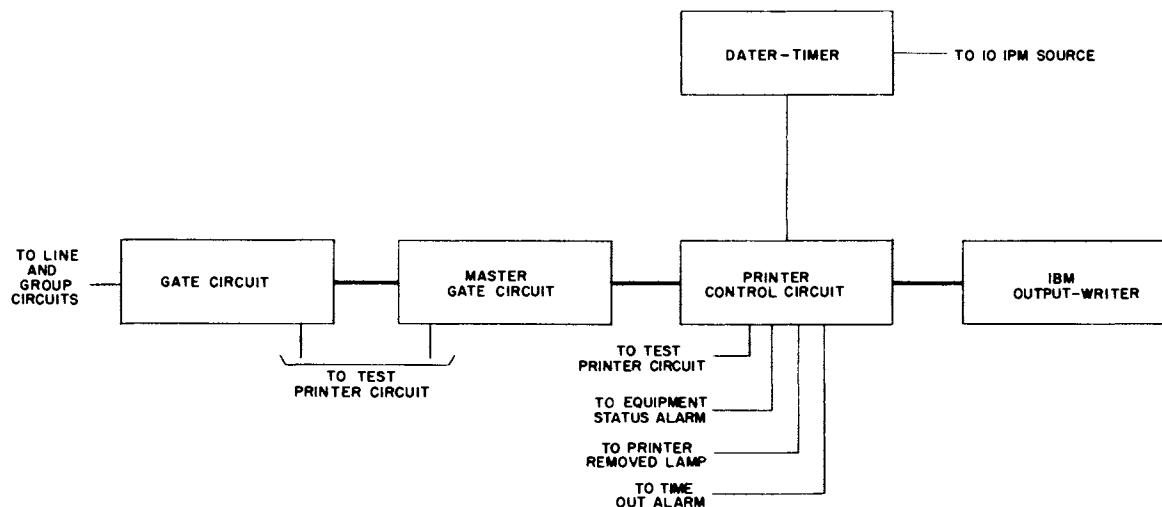


Figure 6. Call recording equipment block diagram.

2.7 Master Gate Circuit

2.7.1 Physical description.

The master gate circuit is a group of 21 relays (GS 1-0, GSS 1-0, and STP) assembled together with the necessary electrical hardware to the front of a relay mounting strip. The mounting strip measures 23-1/4 inches wide and 6-3/16 inches high, and is bolted to a standard relay rack. In use the mounted relay equipment is protected by a metal dust cover. All internal wiring is led to the terminal block on the rear of the strip for connection with other equipment.

2.7.2 Function of the master gate circuit.

The master gate circuit, by means of an interlock chain in conjunction with the gate circuit, allows only one of 1000 emergency reporting lines to have access to the printer control at one time. The master gate operates like the gate circuit, except that it allows printer control access by only one gate circuit (100 lines each) at one time. This circuit is not required in systems of less than 100 lines. The master gate circuit functions to prevent double seizure of the printer control circuit.

2.8 Printer Control Circuit

2.8.1 Physical description.

The printer control circuit (figure 7) consists of:

- a. A 25-point rotary stepping switch which controls the sequential operation of the 12-key IBM output-writer, by gating information stored on marking relays, in the dater-timer and in its own banks to the output-writer, one mark per step. The stepping switch is under control of a timing circuit.
- b. A group of control relays which control the timing and operation of the relays and the stepping switch.
- c. A group of line number marking relays, which, under control of the rotary stepping switch, gate stored markings directly to the printer magnets.
- d. A group of four relays which translates coded information from the dater-timer into numerical markings, under control of the time and date marking relays, and sends the markings to the printer magnets.
- e. A group of time and date marking relays which, under control of the stepping switch, gates information stored in the dater-timer to the code relays for translation.

- f. A group of typewriter function control relays, which under control of the stepping switch, operates punctuation character printing magnets and space and carriage return solenoids in the output-writer.
- g. A transistorized time delay circuit which causes alarm signals if the call is not recorded within 10 seconds.
- h. Alarm relays which cause alarm indications in case of output-writer or printer control circuit malfunction.
- i. A capacitor timing network which governs the operation of the control relays.

All components, together with the necessary electrical hardware, are mounted on the front of a steel strip 23-1/4 inches wide and 7-25/32 inches high; the strip is bolted to a standard relay rack. The mounted components are protected by a steel dust cover. All internal wiring is led to a terminal block on the rear of the mounting strip for connection with other equipment. There are no options for this equipment.

2.8.2 Function of the printer control circuit.

The printer control circuit controls the operation of the IBM electric output-writer by (a) controlling the proper sequence of printing information to be recorded, and (b) controlling printing speed by coordinating the motion of the rotary switch with the motion of the output-writer carriage.

The gate or master gate circuit starts the printer control circuit and the transistor time delay circuit. The timing control relays cause the rotary stepping switch to step around its bank terminals. With each step, a character is printed or a typewriter operation such as spacing or carriage return is performed. After the calling line number has been printed, the printer control circuit releases the gate circuit, the master gate circuit and the line and group circuit.

When all information has been recorded, the control relays return the printer control circuit, to its normal state. If all operations have not been performed within 10 seconds, the transistor time delay circuit starts the equipment status alarm relay circuit and the time out alarm. If the output-writer fails for any reason or if it becomes disconnected, alarms are sounded at the operator's console.

The following controls and indicators are associated with the printer control circuit:

- a. TST PTR ALM key.
- b. TIME OUT ALARM lamp.

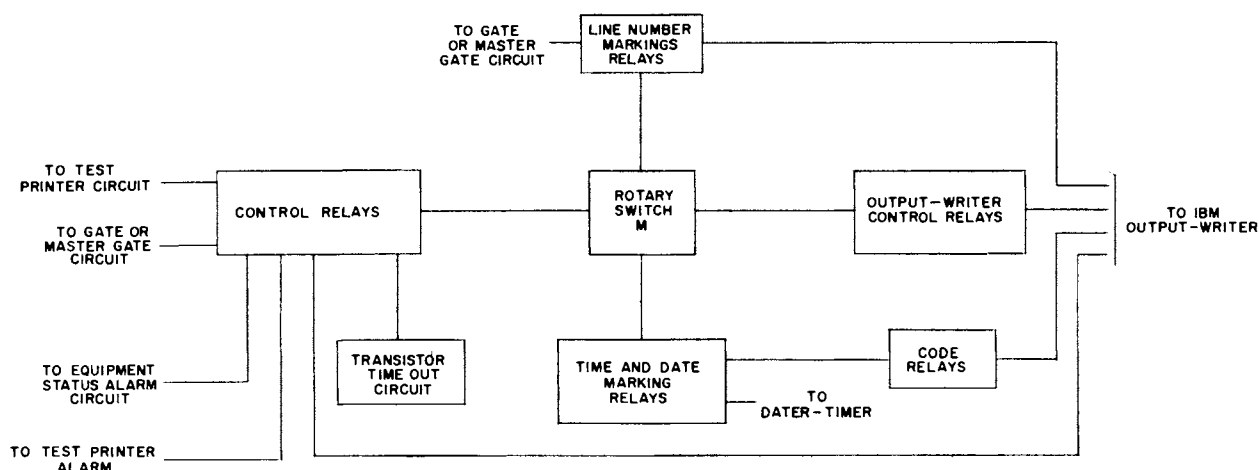


Figure 7. Printer control circuit block diagram.

- c. Equipment status alarm relay circuit.
- d. Test printer relay circuit, TEST PRINTER lamp, and TST PTR key. The test printer equipment's function is to apply test conditions to the printer control circuit to determine whether it can perform its functions within 10 seconds.

2.9 Dater-timer and 10 IPM Pulse Source (Tables XI and XII)

2.9.1 Physical description.

The dater-timer consists of:

- a. Seven step-by-step rotary switches which, on timed pulse input from the pulse source, step around their bank terminals to mark the time of day, the day and month.
- b. A group of control relays which control the operation of the dater-timer functions.
- c. A group of code (W, X, Y, Z) relays which translate information stored in the rotary switch banks for display on lamps.
- d. An escutcheon (figure 8) which contains controls and indicators for displaying information stored, and for setting the dater-timer.

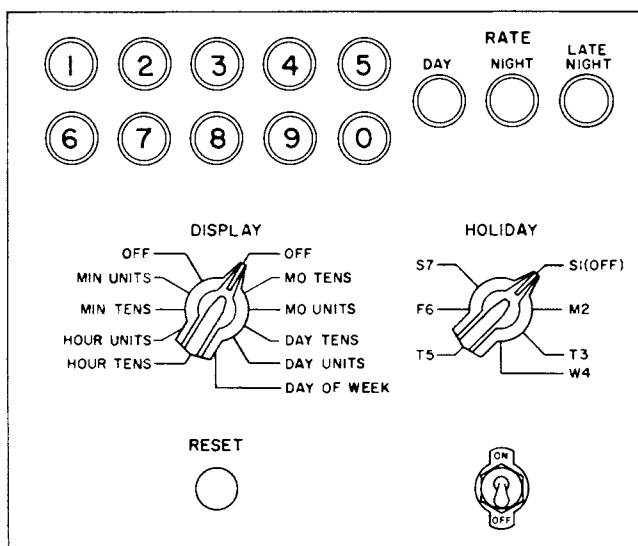
All of the components, together with the necessary electrical hardware, are assembled on a relay mounting strip measuring 27-1/4 inches wide and 10-5/16 inches high (bolted to a standard relay rack). In use, all relay equipment is protected by steel covers. All internal wiring is led to the terminal block mounted on the rear of the relay strip for connection with other equipment.

The 10 IPM source consists of a step-down transformer, an electric motor fitted with a

rotary cam interrupter, the necessary electrical hardware, and controls and indicators. They are all assembled on a relay mounting strip 23-1/4 inches wide and 4-3/4 inches high. In use, the components are protected by a metal dust cover. The mounting strip is bolted to a standard relay rack. Internal wiring is led to a terminal block on the rear of the strip for connection with other equipment.

2.9.2 Function of the dater-timer and 10 IPM source.

When both the dater-timer and the 10 IPM source are turned on, the pulse source sends 10 pulses per minute to the dater-timer. The pulses cause the rotary stepping switches to step once per pulse to mark the passage of time



NOTE:
HOLIDAY AND RATE
CONTROLS AND
INDICATORS ARE
NOT USED.

Figure 8. Dater-timer control escutcheon.

TABLE XI: Dater-timer Controls and Indicators

Component	Function
Display lamps 0-9	The display lamps light to show the digit stored for a given function when the rotary switch DISPLAY is turned to that function, for example units digit for the month.
RATE lamps	Not used.
HOLIDAY rotary switch	Not used.
DISPLAY rotary switch	Used to set the function for which a display of the stored information is required.
RESET push button	Used to pulse stepping switches to change stored information; used when setting time and date.
ON-OFF toggle switch	Turns dater-timer on or off by opening or closing the pulse train from the 10 IPM pulse source.

and store markings on a group of leads which are connected to the printer control circuit. The printer control circuit, when required, calls for the stored markings and causes them to be printed by the output-writer.

2.10 IBM Electric 12-key Output-writer

2.10.1 Physical description.

The IBM Electric 12-key Output-writer (figure 9) is a standard model IBM electric typewriter fitted with a clear plastic key cover and a 12-position output magnet actuating unit. The output magnet actuating unit is compactly mounted beneath the keyboard. The output magnet actuating unit consists of printing magnets, and typewriter function solenoids. When pulsed, the magnets cause the printing of numerals and punctuation characters. When pulsed, the function solenoids actuate machine functions such as space or carriage return. A special adapter necessitated by the actuating unit increases the standard typewriter height by 1-1/2 inches. All other external dimensions

are the same as the standard IBM typewriter.

2.10.2 Function of the output-writer.

The printer control circuit (section 2.8) sends pulses to the output-writer magnets and solenoids. When a print magnet receives a pulse, an armature on the print magnet moves toward the magnet core, moving a pushrod and printing the character. The typewriter operating functions are actuated by pulses sent to the function solenoids. The solenoid plunger pulls directly on the associated key lever to accomplish the function.

2.11 Power and Tone Equipment

Power and tone equipment supplied in any emergency reporting system meet the standards of the National Board of Fire Underwriters for municipal fire alarm systems. It should be noted here that since each system is custom engineered to meet specific requirements, use is made of any existing power equipment owned by the customer wherever possible.

TABLE XII: 10 IPM Pulse Source Controls and Indicators

Component	Function
AC OFF lamp (white)	When lit this lamp indicates that the a-c supply to the pulse source is inoperative.
10 IPM ON-OFF toggle switch	Turns dater-timer on or off by closing or opening the a-c power to the motor and pulse train to the dater-timer.

In general, power and tone equipment consists of:

supply and for the charger, tone, ringing and distribution equipment.

- a. A 48-volt battery supply of sufficient capacity to operate the system and to comply with Fire Underwriters' standards. This requires that enough battery is available to allow the system to operate on battery only at normal load for 24 hours when two independent, reliable sources of charging current are used, or to operate on battery only at normal load for 60 hours when only one charging source is used.
- b. A battery charger or chargers (see above) to maintain a continuous floating charge on the 48-volt battery supply.
- c. A tone supply, usually telephone dial tone, which is fed to the outdoor emergency reporting telephones to notify a caller that he is not calling on a dead telephone.
- d. A ringing current supply to furnish 20 cycle ringing ac for ringing distant parties when transferring a call via common battery lines.
- e. A power distribution panel where battery power is fused. The fused power is then distributed to the fuse panel on each relay equipment rack, and to the consoles. Each relay rack is equipped with its own fuse and alarm panel and distributes 48-volt power to components on that rack.
- f. Mounting racks suitable for the battery

2.12 Optional Equipment

In addition to the basic system equipment described in the preceding sections, optional equipment which greatly increases the versatility and value of an emergency reporting system is available. This equipment includes:

- a. Communication equipment which enables the console operator to transfer calls to the police emergency console via tie lines, or to allow the console operator to transfer calls to the city P-A-X or to the public telephone company's central office.
- b. A public address system control and verification circuit designed to allow announcements to be made from the console to a maximum of 35 outlying points at district fire stations via a public address system. The circuit allows stations to verify receipt of a call.
- c. Controls for commercial voice recorder (provided by the customer) which allows conversations on emergency reporting lines, trunks, and tie lines to be recorded.
- d. Line test equipment which allows testing and monitoring of emergency telephone lines via a test connector and Type 23 Test Set.

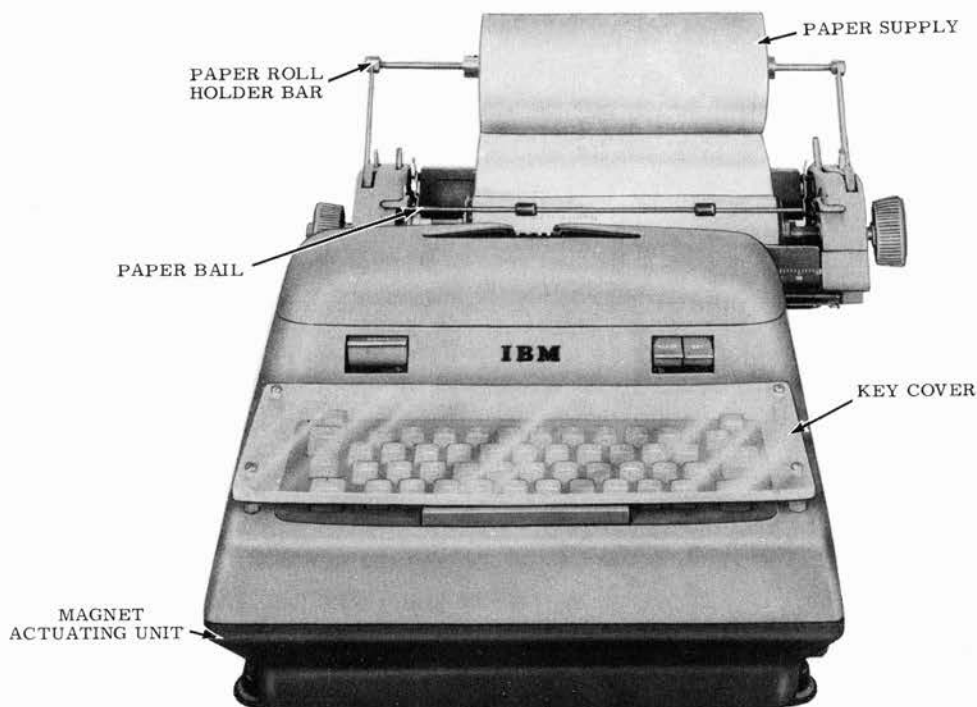


Figure 9. IBM electric 12-key output-writer.

2.12.1 Tie lines and common battery (manual board) lines (Table XIII).

The tie lines are direct (manual-to-manual) lines to an associated police console. Relay equipment and electrical hardware are rack mounted, but input points and indicators associated with each circuit are mounted on the console(s). Trunks and tie lines may be multiplied to all related consoles as controls and indicators for a given line are the same at each appearance.

When an operator connects a cord plug into the associated jack on the console face, the relay equipment completes the circuit to the distant end of the line at the police console for instance, and lights the BUSY lamp at the console, signals the operator by lighting the line lamp at the distant console, and starts the signal alarm circuit (section 2.2.2d). The BUSY lamp at the console lights when the called console operator completes the connection with a cord plug and the line lamp goes out. The operators may ring or converse as necessary by operating cord circuit controls.

2.12.2 Trunk circuits.

A trunk circuit is a direct line to the city owned P-A-X or to the public telephone company's central office. Relay equipment is rack mounted and input points and indicators are mounted on the console face. The controls and indicators are the same as those for manual lines (see Table XIII).

When an operator connects a plug into the associated trunk jack, relay equipment acts to seize automatic telephone equipment. When dial tone is heard, the operator dials the called number into the central office or P-A-X equipment

which automatically finds, connects, and rings the called line. When the operator disconnects, the automatic switch-train is released and the trunk relay equipment is restored to its unoperated state.

2.12.3 Public address system control and verification circuit (Table XIV).

The public address system control and verification circuit consists of controls, indicators, a rack-mounted control relay circuit, and a rack-mounted station relay circuit for each remote station. This equipment is used to control public address equipment furnished either by the purchaser or by A. E. Co. This circuit allows the console operator to communicate directly with the remote fire stations and to receive verification replies from the stations. The operator may call all stations at once, or may select one station at a time.

2.12.4 Voice recorder control equipment (Table XV).

The voice recorder control equipment consists of a lever key and input leads from the console operator's telephone circuit to a voice recorder furnished either by the customer or by A. E. Co. The tape recorder is turned on when the operator connects the rear cord plug of a manual cord circuit into an emergency line jack, a tie line or trunk jack. If the operator does not want the conversation to be recorded, the lever key is operated, opening the circuit to the voice recorder.

2.12.5 Line test equipment.

The Emergency Reporting System provides facilities for testing lines to emergency reporting telephones. These facilities are optional

TABLE XIII: Tie Line and Trunk Circuit Controls and Indicators

Component	Function
Line jack	Allows connection of console equipment cord circuit plug which completes a circuit from a calling line (via the line jack, the rear cord, the front cord and the tie line or trunk line jack) to the equipment at the distant end of the tie line or trunk.
Line lamp (white)	When lit, the line lamp indicates to the called console operator that a call is waiting. This lamp goes out when the call is answered. When flashing, this lamp indicates that the operator is being recalled.
Busy lamp (red)	When lit, the busy lamp indicates that the tie line or trunk is busy. This lamp lights at all multiple appearances when a call is answered or extended.

TABLE XIV: Public Address System Control and Verification
Circuit Controls and Indicators

Component	Function
ALL STA push key	When operated this key allows the operator to call all stations at once.
PA ON push key	When operated, momentarily, this key connects the amplifier output to the transmission line, and lights the PA ON pilot lamp.
PA OFF push key	When operated, momentarily, this key removes the amplifier from the transmission circuit and lamp PA ON goes out.
VERIF RLS push key	When operated, momentarily, this key stops all station verification indicators.
LP TST push key	When operated this key tests continuity of all station lamps.
PA ON lamp (white)	When lit, this lamp indicates that the transmission lines to the stations are closed.
Station push key (1 per associated station)	When operated, momentarily, this key closes the transmission path to the associated station only.
Station lamp (white) (1 per associated station)	When lit, steadily, this lamp indicates that the transmission path to the associated station is closed. When flashing this lamp indicates that the called station has verified the call by momentarily opening or shorting the transmission path to the station loud-speaker.

and include line test circuits and test connectors. A line test circuit is associated with each line to an emergency reporting telephone, and a test connector is associated with a group of line test circuits. For large installations, test distributors are used to access a group of test connectors.

All tests are made with the Type 23 Test Set which is connected to the test connector or test distributor. When trouble is indicated on an emergency reporting telephone line, the line test equipment is used to access the line so

tests may be made with the test set to determine the trouble. Any call in progress may be monitored; but calls can not be initiated from an emergency reporting telephone when its line is being tested.

3. SYSTEM OPERATION

The following sections describe the operation of all system components. Operating instructions, where necessary, will be summarized in the form of procedural steps. The operation of the system is arranged in chronological sequence.

TABLE XV: Voice Recorder Control

Component	Function
STOP VOICE RECORDER lever key	When operated this key opens the circuit to the associated voice recorder. (The voice recorder automatically records a conversation when the cord circuit TALK-RING FRONT key is operated to the TALK position.)

3.1 Originating a Call from an Emergency Reporting Telephone (Figure 10)

The caller lifts the handset from the hookswitch which completes a low resistance loop to the line and group circuit. The line and group circuit is activated and:

- a. Sends a tone back to the calling telephone which indicates that the line is operative.
- b. Starts the flasher circuit to flash the calling line lamps on the console.
- c. After short delay, locks in the calling party.
- d. Starts the fire alarm circuit which causes the fire alarm buzzer to sound and (via the flasher circuit) causes the FIRE ALARM lamp on the console to flash.
- e. Marks the calling line number units digit in the call recording equipment.
- f. Starts the call recording equipment.

All indicators remain operated until the console operator answers the call.

3.2 Recording the Call

3.2.1 Gate circuit.

On input from the line and group circuit, a gate circuit relay G (associated with the line and group circuit) operates and prevents seizure by any other line and group circuit by means of a

chain interlock. Operated relay G marks the calling line number tens digit in the printer control circuit, and starts the master gate circuit. If the system serves 100 lines or less, the gate circuit starts the printer control circuit. The gate circuit remains locked in its operated state until released by the printer control circuit or by the master gate circuit.

3.2.2 Master gate circuit.

In systems serving more than 100 lines, an input from the gate circuit operates relay GS associated with the operated gate circuit which prevents seizure of the master gate circuit by any other gate circuit via a chain interlock. Operated relay GS prepares a release path for the gate circuit, operates an associated relay GSS, and marks the calling line number hundreds digit in the printer control circuit. Operated relay GSS connects the calling line number units digit marking to the printer control circuit, starts the printer control circuit, and locks out the test printer circuit to prevent its operation during printing.

3.2.3 Printer control circuit.

A signal from the master gate circuit operates the printer control circuit (see figure 7) start relay. Operated, the start relay:

- a. Starts the transistor time-out circuit which by means of capacitor discharge through a transistor, times a period of 10 seconds. If printing is not completed in this interval, alarm indications are given at the console.

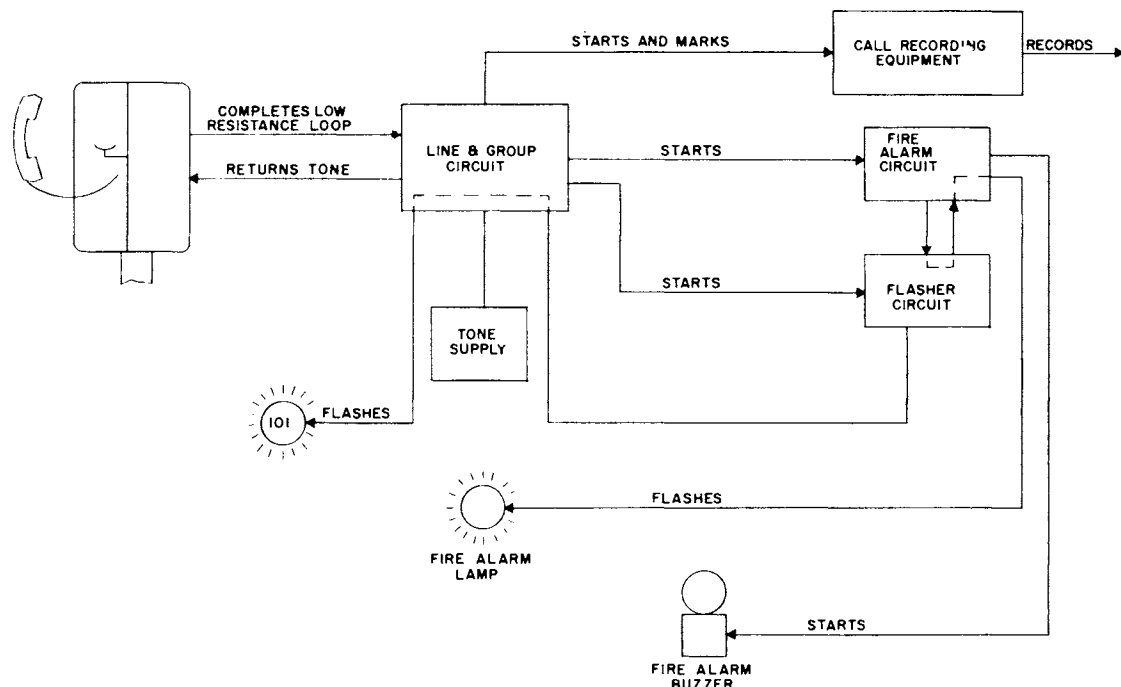


Figure 10. Caller lifts handset from hookswitch in emergency reporting telephone.

- b. Starts a timing circuit consisting of relays PA, PAS and RG. This timing circuit is necessary to coordinate the operation of rotary switch M and the output-writer.

The relay timing circuit sends pulses to energize rotary switch M, which steps after each pulse. Each step places rotary switch M at one of its bank terminals where it causes the operation of a relay which gates a character marking to the output-writer. The first three characters are the digits of the calling line number. These are followed by a space bar function. A three-pulse delay after the space bar function is necessary because the output-writer function solenoids require a longer time to complete their operation than do the printer magnets. After the calling line number has been recorded, the printer control circuit causes the release of the gate circuit, the master gate circuit and the test printer lockout circuit. While these circuits are resetting to normal, the printer control circuit causes the printing of the time and date.

3.2.4 Release of the gate and master gate circuits.

On signal from the printer control circuit, a stop relay operates in the master gate circuit. In the master gate circuit, the operated stop relay releases the line and group circuit, and removes the markings to the printer control circuit. The line and group circuit releases the gate circuit and master gate circuit by shunting the operated G and GS relays. This shunting prevents seizure by another calling line until the gate and master gate are completely released. In systems serving 100 lines or less, the printer control circuit operates the gate circuit stop relay which then removes markings to the printer control circuit and releases the line and group circuit from the call recording equipment. The line and group relays shunt the operated gate circuit G relay to prevent seizure by another calling line. After a short delay (one pulse), the operated stop relay (in the master gate or gate circuit) is released, and the gate and master gate circuits are returned to normal.

3.2.5 Release of the line and group circuit by the call recording equipment.

On signal from the gate or master gate circuit, a relay in the line and group circuit (RG) operates. This relay causes the removal of all markings and signals to the call recording equipment. The call waiting indications to the console operator remain operated. When the gate or master gate circuit stop relay is released, the group relays are reset and may be seized by another calling line.

3.2.6 Recording the time and date in the printer control circuit.

The dater-timer circuit sends four-relay code markings of the time, month and day to the printer control circuit at all times. The printer control circuit switch M now operates the time and date marking relays which gate this information to the four relays. The four code relays act to translate the code markings into decimal code markings which operate the output-writer printer magnets. A colon separates the hour and minutes characters. A space bar function follows the printing of the time and a three-pulse delay is again necessary to allow the space bar function solenoid to complete its operation. The month and day markings, separated by a slant bar, are printed in the same manner as the time. The year, separated from the day mark by a slant bar, is recorded from markings gated to the printer by two control relays A and B. (Relays A and B send pulses to strapped terminals on the output-writer connector plug. The customer changes strapping yearly.) After the last character is printed, the output-writer carriage is returned, the start relay is released, a signal is sent to the test printer circuit to indicate that the call is recorded, the transistor time out circuit is stopped, and the rotary switch steps self-interruptedly to its normal position. Released, the start relay stops the timing relay circuit and the printer control circuit is returned to its normal state, ready for the next incoming call.

3.3 Answering the Emergency Call at the Console (Figure 11)

The console operator answers the call by operating the line push key or by connecting a TRK & STA (rear) cord circuit plug into the line jack associated with the flashing line lamp. The plug or the operated push key operate a line circuit relay (CO) which:

- a. Removes the tone from the calling line.
- b. Stops the flasher circuit, which in turn stops the flashing of the line lamp.
- c. Stops the fire alarm circuit which in turn stops the fire alarm buzzer and the FIRE ALARM lamp unless another call is coming into the console.
- d. Locks on line lamp under control of operator. The operator moves TALK-RING FRONT lever key to TALK position. Operator and caller may now converse (figure 12).

3.4 Extending the Call (figure 13)

To extend a call via a tie line, a two-way manual trunk circuit or a common battery line, the operator connects the STA (front) plug of the cord circuit which is already connected to the

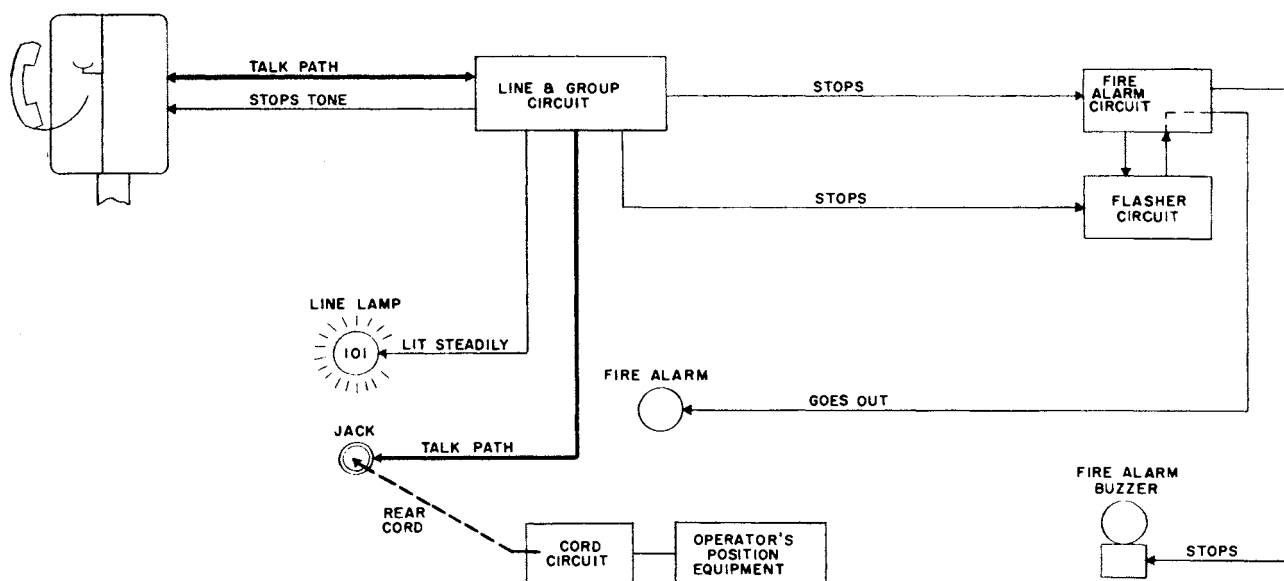


Figure 11. Operator answers call by (A) operating line push key or (B) plugging a rear cord into line jack.

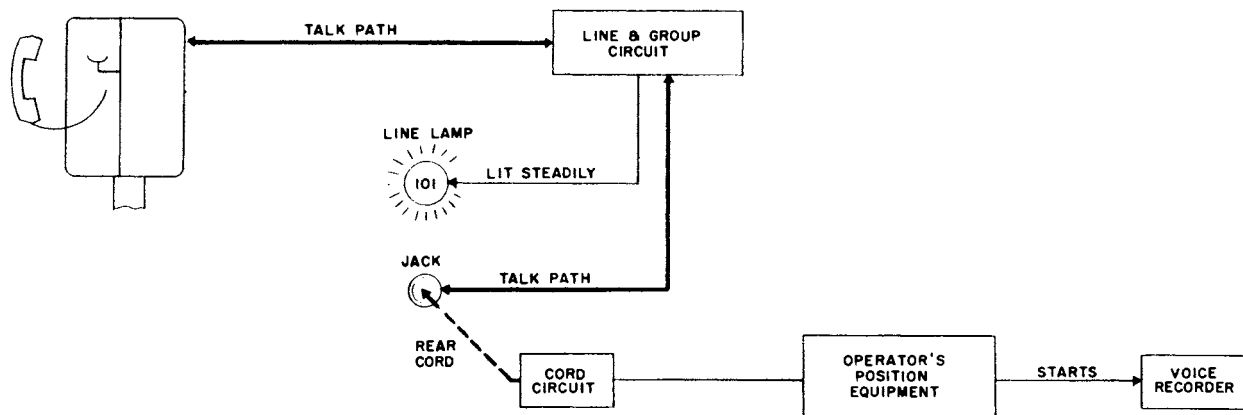


Figure 12. Conversation in progress, cord circuit talk key operated.

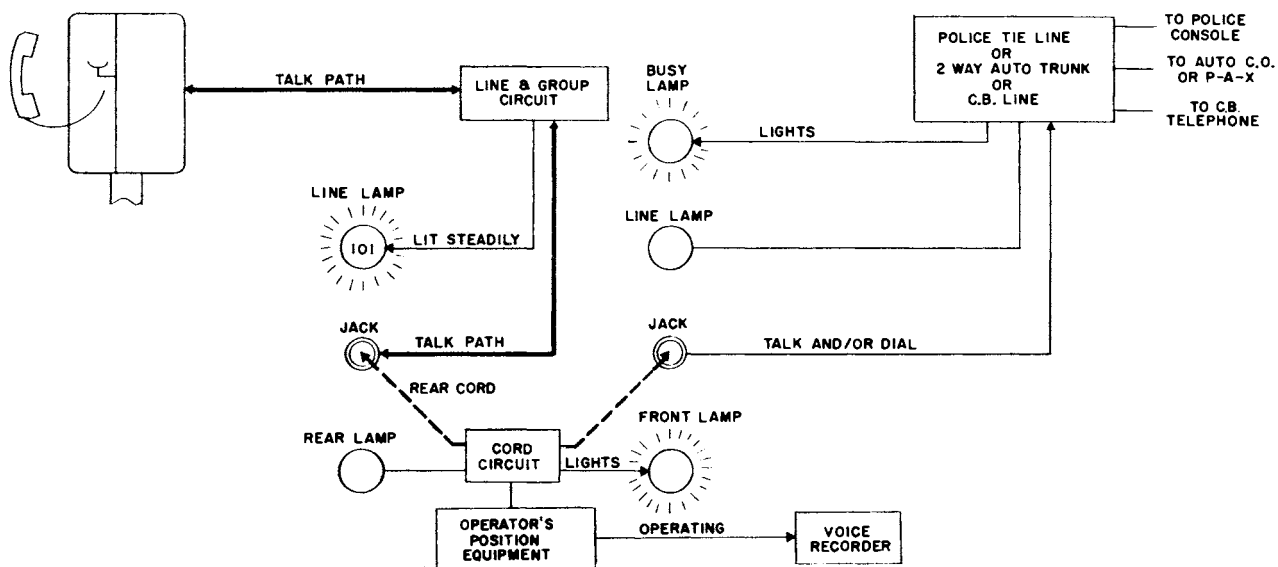


Figure 13. Call extended via trunk or tie line. Operator plugs front cord into called line jack and operates ring key momentarily or dials call number (auto trunk only).

SUMMARY: To Answer the Call at the Console

Operation	Indication
Operate line push key associated with the flashing line lamp or connect a TRK & STA (rear) cord plug into the line jack.	Line lamp and FIRE ALARM lamp flashing and fire alarm buzzer sounding.
Operate TALK-RING FRONT key to TALK position. Conversation now take place.	Line lamp remains lit but stops flashing, fire alarm buzzer stops FIRE ALARM lamp goes out.

calling line and connects it to an idle line or trunk jack. The plug completes a circuit to the line or trunk equipment and seizes the line or trunk circuit. The seized circuit acts to light any busy lamps associated with the line or trunk, to prepare the circuit for ringing the distant party, and for transmission. The STA (front) cord circuit lamp lights to give answer supervision. The operator operates the TALK-RING FRONT key to the RING FRONT position, momentarily, ONLY when calling on a manual CB line to send ringing current to the distant party. When the called party answers (figure 14), the STA cord circuit lamp goes out.

If the call is being extended to a P-A-X or to an automatic central office, the operator plugs into the appropriate trunk jack. Upon receiving dial tone, the operator dials the desired num-

SUMMARY: Extending a Call from the Console

To Manual Line	
Operation	Indication
Connect STA (front) cord plug to idle jack.	The busy lamp light and the STA lamp lights.
Operate TALK-RING FRONT key to RING FRONT momentarily.	(Manual CB lines only. Do not ring on tie line.)
Called party answers.	STA lamp goes out.

To Automatic Trunk

Operation	Indication
Connect STA (front) cord plug to idle jack.	The busy lamp lights and the STA lamp lights.
When dial tone is heard, dial the number.	
Called party answers.	STA lamp goes out.

ber. When the called party answers, the STA cord circuit lamp goes out. (Note: Bell system central offices will not give answer supervision inputs.) The operator releases the TALK-RING FRONT key to complete the connection.

3.5 Disconnecting After Call Is Finished

When the called party hangs up (figure 15), the STA lamp lights. When the caller hangs up (figure 16), the TRK & STA lamp lights. Both lamps furnish an input to the auxiliary signal circuit causing the signal alarm buzzer to sound. This signal is stopped by releasing the SIG ALM lever key on the console or by disconnecting the cord circuit plugs from the jacks. The operator disconnects (figure 17) the STA cord and the STA lamp goes out. The operator disconnects the TRK & STA cord and the TRK & STA lamp and the line lamp (which has remained lit) goes out. The line and group circuit now releases and is ready for the next call. The trunk or line circuit and the cord circuit are restored to their normal state.

SUMMARY: Disconnecting After a Call

Operation	Indication
Called party hangs up.	STA lamp lights.
Calling party hangs up.	TRK & STA lamp lights; signal alarm buzzer sounds.
STA cord is disconnected.	STA lamp goes out.
Operator disconnects TRK & STA cord.	TRK & STA lamp goes out; the signal alarm buzzer stops; and the line lamp goes out.

3.6 Answering an Incoming Line or Trunk Call (from P-A-X, Central Office or Police Console)

An incoming call operates line or trunk equipment which signals the operator by lighting the associated line lamp on the console face. The operator connects a rear cord circuit plug into the associated jack, operates the TALK-RING FRONT key to the TALK position, and receives information necessary to complete the call. The call is extended in the same manner as described in section 3.4. The operator disconnects after the call is finished in the same manner as described in section 3.5.

SUMMARY: Answering an Incoming Trunk or Line Call

Operation	Indication
Calling line rings in.	Line lamp associated with the line or trunk lights.
Operator plugs rear TRK & STA cord into associated jack.	Busy lamp lights.
Operator moves TALK-RING FRONT key to TALK position.	
Operator extends call as necessary.	See section 3.4.
Operator disconnects call.	See section 3.5

3.7 Testing the Printer Control Circuit

To initiate a test of the printer control circuit, operate the TST PTR key momentarily. This operates a relay in the test printer relay circuit which lights the TEST PRINTER lamp, marks the calling line number as 000 in the printer control circuit, and starts the printer control circuit. The printer control circuit operates as described in sections 3.2.3 and 3.2.6.

After the calling line number (000) has been printed, the printer control circuit causes the test printer relay circuit to release and the TEST PRINTER lamp goes out.

When the time and date have been printed, the printer control circuit restores automatically to its normal state. If the printer control circuit does not complete its function within 10 seconds, an equipment status alarm occurs and the printer TIME OUT ALARM lamp lights.

SUMMARY: Testing the Printer Control Circuit

Operation	Indication
Operate TST PTR key momentarily.	TEST PRINTER lamp lights; the output-writer records the calling line number 000 and the date.
Printer passes (operations performed with time limit).	TEST PRINTER lamp goes out.
Printer fails.	TIME OUT ALARM lights, EQUIPMENT STATUS lamp lights, equipment status alarm buzzer sounds.

3.8 Voice Recorder Control

The voice recorder start input is connected to the operator's telephone equipment and is led through the STOP VOICE RECORDER key on the console. When the operator answers an incoming call, the voice recorder starts and the call is recorded automatically. If desired, the voice recorder may be stopped by operating the STOP VOICE RECORDER key; the call will not be recorded. The voice recorder is connected again by releasing the STOP VOICE RECORDER key.

SUMMARY: Voice Recorder Control

Operation	Indication
Operate STOP VOICE RECORDER key.	Voice recorder removed from the operator's telephone circuit. Calls are NOT recorded.
Release STOP VOICE RECORDER key.	Voice recorder is connected to operator's telephone circuit. Incoming calls are recorded.

3.9 Public Address System Control and Verification Circuit Operation

To turn on the public address control and verification circuit, operate the PA ON key momentarily. This causes the PA ON lamp to light and connects the amplifier output to the control relay circuit.

To select a particular station to receive a message, operate the station key associated with that station momentarily. This connects the amplifier output to the associated station relay circuit, starts the flasher circuit, and lights the associated station lamp.

To select all stations to receive simultaneously, operate the ALL STA key momentarily. This causes all station lamps to light and connects the amplifier output to all associated station relay circuits. The dispatcher or console operator delivers the message via the public address system. The called station(s) acknowledges the call by momentarily opening or shorting the transmission path which causes the station lamp to flash. After the station(s) has acknowledged the call, operate the VERIF RLS key momentarily to restore the called station's relay circuit, stop the flasher circuit, and cause the lit station lamp(s) to go out.

To turn off the public address control and verification circuit, operate the PA OFF push key momentarily. This causes the PA ON lamp to go out and restores the control relay circuit to its normal state. To determine that all the lamps are operative, the LP TST push key is held operated momentarily. All operative station lamps light. Release of the LP TST key restores the test circuit.

3.10 Alarms

3.10.1 Emergency reporting line trouble alarm.

If the line to an emergency reporting telephone becomes open or shorted, a normally operated relay in the line and group circuit releases, lighting the associated line trouble lamp and, after a short delay, causing the trouble alarm circuit to operate. The trouble alarm relay circuit starts the flasher circuit which flashes the TROUBLE ALARM lamp and starts the trouble alarm buzzer. Momentary operation of the TBL ALM CO key stops the trouble alarm buzzer and stops the flashing of the TROUBLE ALARM lamp which remains lit steadily. When the trouble in the line is corrected, the trouble alarm relay circuit restores and the TROUBLE ALARM lamp goes out.

3.10.2 Signal alarm.

The signal circuit acts as an alarm signal for incoming trunk and tie line calls and as disconnect supervision of calls extended through the cord circuits. On input caused by an incoming call or on disconnect by both parties to a call, the auxiliary signal circuit operates to start the signal alarm buzzer. The buzzer stops and the auxiliary signal circuit restores when the operator answers the incoming call or removes

SUMMARY: Operating the Public Address Control and Verification Circuit

Operation	Indication
Operate PA ON key.	Control relay circuit operates; PA ON lamp lights.
To select a station, operate the associated station key.	Associated station lamp lights.
To select all stations to receive, operate ALL STA key.	All station lamps light.
Deliver message, Stations verify (acknowledge) receipt.	Selected station lamps flash.
Release station relay circuit and verification circuit; operate the VERIF RLS key.	Selected station lamps go out.
Operate PA OFF key.	PA ON lamp goes out; control relay circuit is restored.
Operated LP TST key.	All operative station lamps light.
Release LP TST key.	Lit station lamps go out.

the cord circuit connections after both parties have hung up. The buzzer may be locked out of operation by operating the SIG ALM key.

3.10.3 Fire alarm.

The fire alarm circuit operates on input from the line and group circuits in the case of an incoming emergency call. The fire alarm circuit causes the fire alarm buzzer to sound and starts the flasher circuit to flash the FIRE ALARM lamp. When the operator answers the call, the fire alarm circuit restores, the FIRE ALARM lamp goes out, and the fire alarm buzzer stops.

If for some reason the indications do not stop when the operator answers the call such as several calls at one time, the operator may move the FIRE ALM OFF-FIRE ALM CO key to the FIRE ALM OFF position. The buzzer will stop and the FIRE ALARM lamp will remain

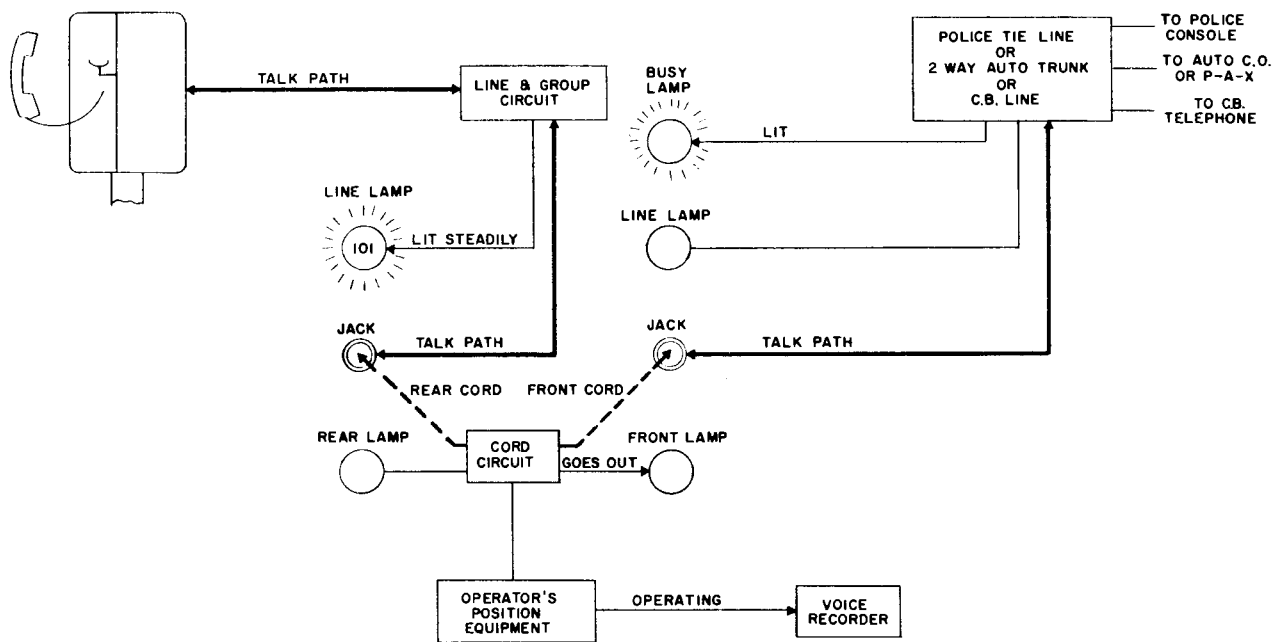


Figure 14. Called party answers. Conversation proceeds.

lit, but stops flashing. When the fault is cleared, the fire alarm circuit restores and the FIRE ALARM lamp goes out. To prevent operation of the FIRE ALARM lamp and the fire alarm buzzer, move the FIRE ALARM OFF-FIRE ALM CO key to the FIRE ALM CO position. The FIRE ALARM lamp will light and remain lit to indicate that the alarm is cut off until the key is moved to its neutral position.

3.10.4 Equipment status alarm.

If any of the system fuses blow, if the printer

control circuit times out, or if any of the line and group circuits fail, the equipment status alarm relay circuit operates. Operated, the equipment status relay circuit starts the equipment status buzzer and starts the flasher circuit to flash the EQUIPMENT STATUS lamp. Momentary operation of the EQ STATUS ALM CO key stops the buzzer and stops the flashing of the EQUIPMENT STATUS lamp, which remains lit steadily. When the trouble is cleared, the equipment status alarm relay circuit restores and the EQUIPMENT STATUS lamp goes out.

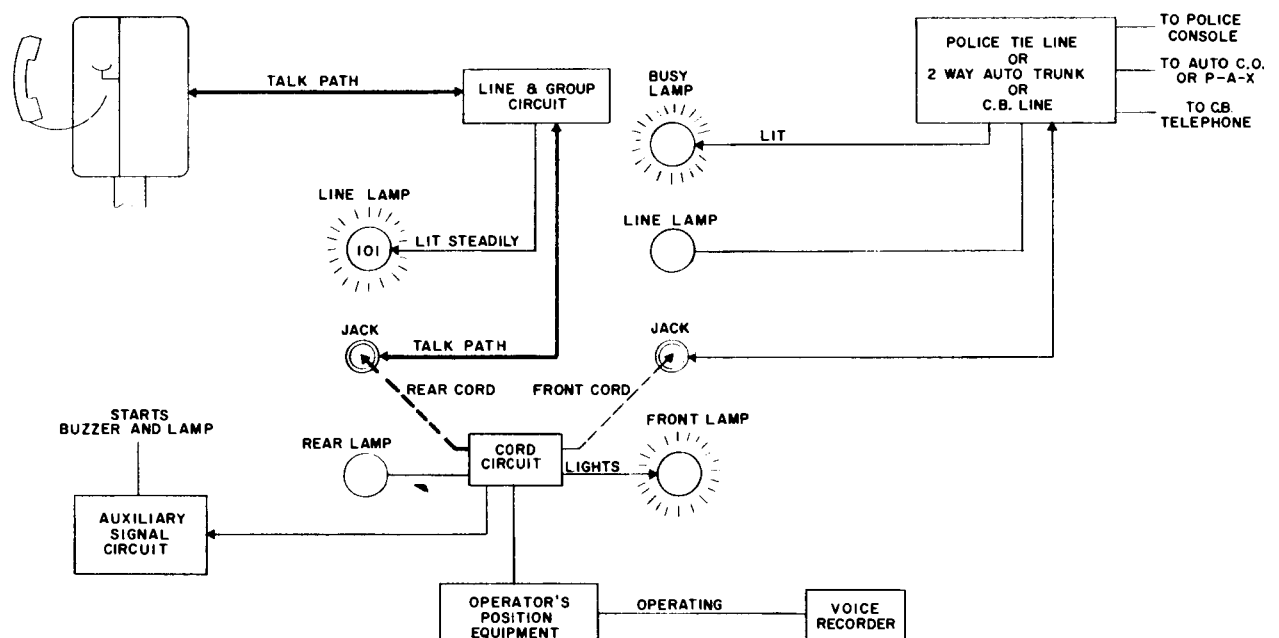


Figure 15. Called party hangs up.

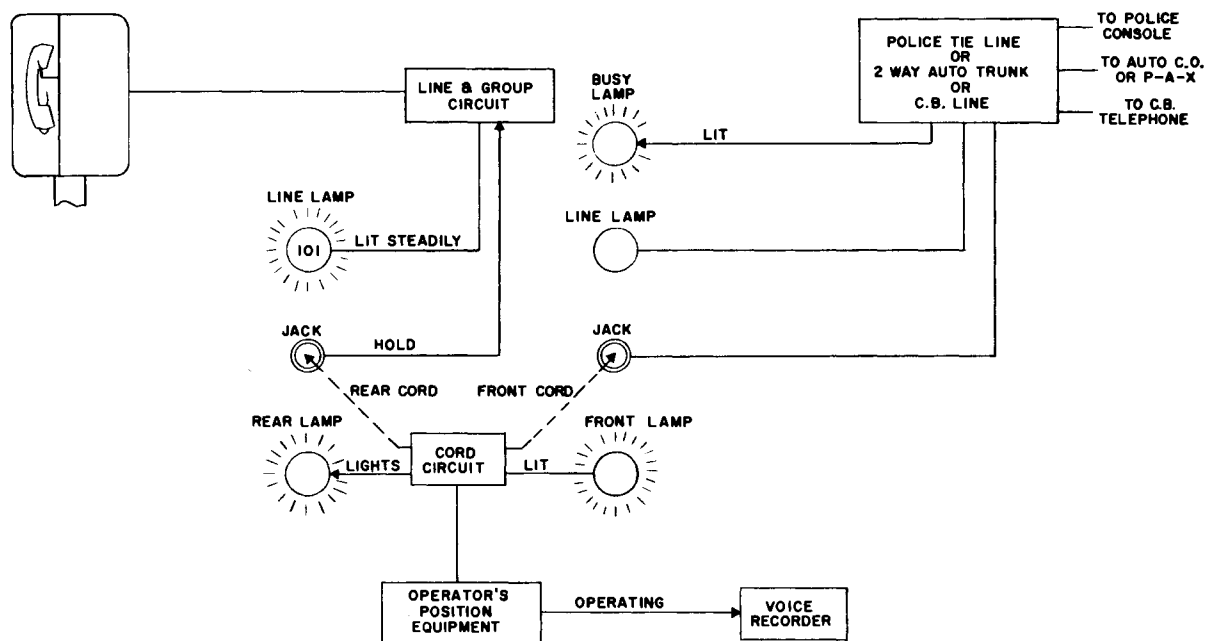


Figure 16. Caller hangs up.

3.10.5 A-c off alarm.

If the a-c power to the 10 IPM source is stopped for any reason, the AC OFF lamp on the console lights and an AC OFF lamp on the 10 IPM source relay strip also lights. When a-c power is restored, the AC OFF lamps go out.

3.10.6 Time out alarm.

If the printer control circuit does not complete its operations within ten seconds after starting, the time out alarm relays in the printer control

circuit operate, starting the equipment status alarm relay circuit and lighting the TIME OUT ALARM lamp. The operator immediately operates the TST PTR ALM key to attempt reset of the printer control circuit. When the printer control circuit is restored to normal, the TIME OUT ALARM lamp goes out and the equipment status alarm indications are stopped.

3.10.7 Printer removed alarm.

If the IBM output-writer becomes disconnected from the printer control circuit, a relay in the

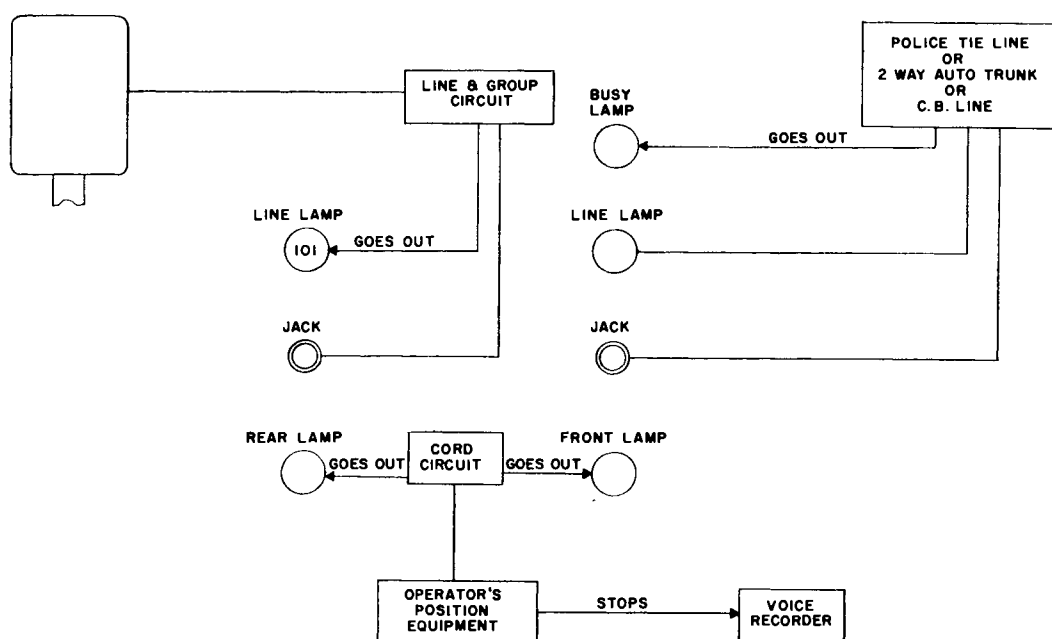


Figure 17. Operator disconnects front and rear cords.

printer control circuit lights the PRINTER REMOVED lamp. When the circuit to the output-writer is completed, the relay restores and the PRINTER REMOVED lamp goes out.

3.10.8 Fuse alarm.

If any of the system power fuses (located on each relay rack) blows, the associated fuse alarm lamp on the fuse panel lights and the common fuse alarm circuit operates. Operated, the fuse alarm circuit lights the SYSTEM FUSE lamp and starts the equipment status alarm relay circuit (section 3.10.4). When the blown fuse is replaced with a good fuse, the SYSTEM FUSE lamp goes out and the equipment status alarm relay circuit restores, removing the equipment status alarm indications.

3.10.9 Line and group circuit alarm.

If the group relays fail to start the call recording equipment, or if the group relays are not released after printing, a normally operated group circuit alarm relay lights an alarm lamp located on the failing line and group circuit relay strip, and starts the equipment status alarm relay circuit (section 3.10.4). When the trouble is cleared, the alarm lamp goes out and the equipment status alarm relay circuit restores, removing the equipment status alarm indications.

3.11 Setting the Dater-timer

To set the dater-timer to the proper time, day and month, turn the DISPLAY switch knob to

the function to be set. The lamps display the digit stored in the stepping switch for that function. To change the stored digit, operate the RESET push button the number of times necessary to cause the correct digit to be displayed. Repeat these operations for each function until the proper digits are displayed for all functions.

SUMMARY: Setting the Dater-timer

Operation	Indication
Turn DISPLAY switch to function to be checked and set.	One lamp lights to display the digit stored.
To change stored digit, operate the RESET push button.	A lamp lights to display the next higher digit, which is now stored.
Continue to operate the RESET push button until the proper number is displayed.	A lamp displays the proper digit.
Turn DISPLAY switch to next function to be checked or set and repeat operations above.	
When all functions are correct, turn DISPLAY switch to either of the two OFF positions.	

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