

NO. 10 KEY TURRET
DESCRIPTION

1. GENERAL

SEE ADDENDUM

1.01 This section describes the No. 10 Key Turret and associated equipment which has been standardized to meet the service requirements of customers for key turrets which will permit one or more persons to (1) answer, originate or hold telephone calls on a common group of central office, P.B.X. or private lines appearing before one or more attendants, or; (2) intercept, originate or hold calls on a common group of central office or P.B.X. extension lines appearing before one or more attendants.

1.02 The lines terminated in this turret may be of three general types, common battery central office lines, P.B.X. extension lines and two-way ringdown private lines.

1.03 The lines multiplied into this turret for intercepting purposes may be of two general types, common battery central office lines and P.B.X. extension lines. Two types of intercept service may be provided. The first type, employing the intercepting line circuit, enables the attendant to intercept, originate and hold calls on the lines and provides, where desired, for the automatic cutoff of the attendant when the station answers. The second type, employing the non-locking intercepting circuit, only enables the attendant to intercept or originate calls on the lines.

1.04 The equipment consists of two major parts, the turret, buzzer and talking equipment which mounts on the customer's desk and the relay equipment which mounts either in an apparatus cabinet located elsewhere or, in the case of the non-locking intercepting circuit, in an equipment box located on or near the customer's desk.

2. DESK EQUIPMENT

(A) Turret

2.01 The turrets are small walnut finished wood boxes arranged to mount on the top of an office desk, and may be assembled in eight varieties from three types of units and two types of unit turret covers. These assemblies provide single and double face turrets which will terminate, in multiples of 10, a capacity of from 10 to 40 lines.

2.02 The face equipment of each turret unit consists of a metal plate in which are mounted the necessary keys and lamps. The "Line and Busy" lamps are equipped with white lamp caps and indicate incoming calls or talking on the lines. The "Hold" lamps are equipped with a green lamp cap and indicate held lines. The line keys are of the 3-position locking type, each key containing two talking positions, one for each of the two lines terminated on it. The common "Flash or Ring and Hold" key contained in the originating units is a 3-position non-locking key operating in one direction for flashing on common battery lines and ringing on private lines and in the other direction for establishing holding on the lines. The right originating unit contains in addition, the "Battery Cutoff" and "Buzzer Cutoff" keys which are of the two position, rotary, locking and indicating type.

2.03 The face plate with keys and lamps may be easily detached from the framework of the turret for maintenance and inspection by removing the turret cover panel for the particular unit involved. The designation strips for "Line" and "Busy" lamps may be changed by removing the face plate from the turret framework and sliding the celluloid and paper strip out toward the side.

(B) Terminals

2.04 The terminals on which the cabling from the keys and lamps of each turret unit terminate are located on a panel mounted on top of the metal framework of the turret unit, and access to them may be gained by removing the turret unit cover panel. In addition to these line terminals, the originating units utilize other terminals, and cord fasteners located on the base of the unit for connections to the operator's equipment, the supplementary units and miscellaneous leads. The supplementary units utilize,

in addition to the line terminals, other terminals for miscellaneous connections to other turret units.

2.05 The cable from the apparatus cabinet or the equipment box is brought into the turret through a hole in the turret cover end panel. Sliding Knockouts are provided in each of the cover end panels to facilitate entering the cable from either or both sides of the turret. There are five conductors per line, namely: T, R, A, LL and H corresponding to tip, ring, answer, line lamp and hold.

(C) Fastening Devices

2.06 With each supplementary unit is furnished a wood stile strip which is finished in mahogany walnut and is fastened between the unit with which it is associated and the unit containing the preceding ten lines. Machine screws in the front frames of the turret units are used for connecting the units and retaining the stile strip. The left side frame of each turret unit is equipped with a connecting clamp which provides an additional means for fastening the two adjacent units together.

2.07 When a double face turret is assembled, the turret units comprising the two faces are fastened back-to-back by brass dowel pins provided in the back edge of each turret unit base. The connection of the turret end panels and the placing of the required number of turret unit cover panels over the turret units completes the connection of the units into a rigid assembly.

(D) Buzzer Equipment

2.08 An A.C. buzzer is used to furnish an audible signal whenever an incoming call is connected to any line. It is intended that the buzzer shall be mounted in some suitable location on the customer's desk. The "Buzzer Cut-off" key, as previously mentioned, is furnished in the right originating turret unit.

(E) Operator's Telephone Equipment

2.09 The operator's telephone equipment may consist of a desk stand, handset or a chest transmitter and head receiver together with suitable subscriber sets. Where out dialing is required in connection with a chest transmitter-head receiver installation, a 4-H type dial mounted

on a 39-A dial mounting may be placed on top of the customer's desk.

2.10 Non-Locking Intercepting Installations: When the turret is used for intercepting service utilizing the non-locking intercepting line circuit, a 584-C subscriber set or its equivalent shall be utilized. For this type of installation either handsets or desk stands may be employed, wired in accordance with standard station practices.

2.11 All Other Installations: When the turret is used for terminating or intercepting service employing all types of line circuits except the non-locking intercepting line circuit, a 534-W subscriber set is utilized. The subscriber set is connected to the turret by a 13 conductor switchboard cable. For installations of this type desk stands, handsets or operators' instruments may be provided as follows.

2.12 Desk Stand Installations: Where desk stands are utilized, a 151-AL or 152-AB desk stand equipped with either a dial or an apparatus blank may be used. The desk stand is connected to the turret by an 8 conductor cord.

2.13 Handset Installations: For a handset installation, the D3 handset mounting with an E2C handset is utilized. Connection with the turret is made as described in 2.12.

2.14 Chest Transmitter-Head Receiver Installations: Where a chest transmitter and head receiver are required, a 396-A (or 234) transmitter, 528 receiver, 137 plug, L4F cord and a jack box are used. The 137 plug connects to two 364 jacks mounted on a 200-A jack mounting in the jack box, which is arranged to be mounted on the side of the customer's desk. The jacks are connected to the turret by two 22 BE & DCC pairs.

3. APPARATUS CABINETS

3.01 For all types of installation, excepting non-locking intercepting installations, the relay equipment associated with the No. 10 Key Turret is mounted in an apparatus cabinet which may be located in any convenient location on the same premises as the turret.

3.02 The cabinets are walnut finished wood boxes having a removable top and front cover or removable front and back panels. Inside the box is a relay gate or a relay rack on which the various types of mounting plate units are mounted. The individual terminal strips associated with the units and the terminal strips upon which the incoming line cables and turret cables are terminated are arranged for connection to each other by means of cross-connecting wire. A "Fuse Alarm" key and lamp and an "Emergency Generator" key are mounted in the side of the apparatus cabinet so as to be visible when the cabinet is closed. A fuse alarm bell and fuse holder are mounted inside on the back of the cabinet. A fuse panel is provided or provision is made for mounting protectors on the back of the cabinet for fusing the incoming battery feed conductors.

3.03 Where the installation is of such size as to require two of the cabinets, the right end panel of each cabinet is removed, one cabinet reversed and the two fastened together end-to-end with a separator panel between. This arrangement permits running cross connections between the cabinets.

4. RELAY EQUIPMENT

4.01 The relay equipment associated with the No. 10 Key Turret has been made available in the form of five types of shop assembled equipment units, four of which are arranged to mount in apparatus cabinets of the type described above. These four units are:

- (1) Central Office, P.B.X. Extension, or Private Line unit.
- (2) Intercepting Line unit.
- (3) Flashing and Fuse Alarm unit.
- (4) Operator's Tripping unit.

4.02 The fifth equipment unit, namely: the Non-Locking Intercepting Line unit is completely wired and mounted in an equipment box similar to those used for housing wiring plan equipment. This unit contains the complete relay equipment for a 20 line intercepting installation of the non-locking type. The unit is furnished arranged and wired for 20 lines, but equipped for 10 or 20 circuits as specified.

5. BATTERY SUPPLY

5.01 The usual source of battery power for the operation of the circuits for small installations is either 24 volt battery feed conductors from the central office or, where available, an 8-cell battery associated with a P.B.X. board on the same premises or a centralized building storage battery.

5.02 The source of power for larger installations will usually consist of a local 8-cell storage battery floated over cable pairs.

5.03 Ringing current for the buzzers and the operators' tripping circuits may be obtained over cable pairs from the central office or, where a P.B.X. is involved, from the generator bus bar at the P.B.X. In furnishing generator to these installations each position is considered the equivalent of one P.B.X. switchboard position.

6. CIRCUITS

6.01 The following table is a list of circuit drawings pertaining to the No. 10 Key Turret. For ready reference, Drawing MS-69007 showing the schematic of all circuits associated with this turret, is included in this section. **SEE ADDENDUM**

TABLE I

<u>Title</u>	<u>Drawing</u>
Schematic - All Circuits	MS-69007
Turret and Operators' Telephone Circuit C.O., P.B.X. Extension and Private Line Circuit	MT-69002
Intercepting Line Circuit	MST-69006
Flashing and Fuse Alarm Circuits	MST-69004
Operator's Tripping Circuit	MST-69003
Non-Locking Intercepting Circuit	MST-69005
Key Sheet	MST-69013
	35-D-61

7. GENERAL DESCRIPTION OF CIRCUIT OPERATION

(A) Central Office, P.B.X. Extension, and Private Line Circuit - MST-69006

7.01 General: This circuit is used for two way terminating service between a No. 10 Key Turret and a Central Office, P.B.X. or a Private Line Station, Monitor, Order Receiving Turret or another No. 10 Key Turret. It is arranged to provide a maximum of 20 appearances of the "Line & Busy" lamp.

7.02 Incoming Call: When an incoming call is connected to the line, and ringing current is applied, the relay equipment operates to connect the flashing circuit to a common flashing relay on the line circuit unit, which flashes the "Line and Busy" lamp as an incoming call signal. The auxiliary buzzer signal is furnished from, and by the operation of, the flashing circuit.

7.03 The incoming call is answered at the turret position by operating the line key associated with the flashing "Line & Busy" lamp to the talking position. This connects the operator's circuit through to the line and causes the line circuit to function to release the flashing circuit and silence the buzzer, and to light the "Line & Busy" lamp steadily as a busy signal. The line is then in the talking condition.

7.04 If the attendant connected to the line desires to hold the connection, the common "Flash or Ring and Hold" key is operated to the holding position. This causes the line circuit to function to extinguish the "Line & Busy" lamp, to close a holding bridge across the incoming line, and to light the "Hold" lamp steadily as a holding signal. The line key may now be restored to normal and the line will remain held until the attendant returns to the line. When the circuit is connected to a private line, the holding bridge is permanently opened to permit the distant party to signal in even though the line is in the holding condition.

7.05 When the attendant returns to the held line by operating the line key to the talking position, the talking connection is reestablished, the relay equipment functioning to extinguish the "Hold" lamp, to remove the holding bridge and to relight the "Line & Busy" lamp steadily as a

busy signal.

7.06 The attendant disconnects from the line by restoring the line key to normal. The line circuit then functions to extinguish the "Line & Busy" lamp and restore the circuit.

7.07 Outgoing Call: Outgoing calls are originated by merely operating the line key to the talking position, which connects the operator's set to the line and lights the "Line & Busy" lamp steadily as a busy signal. On a central office or P.B.X. line, the operator then dials or passes the desired number, depending on the type of connecting equipment. On a private line, the attendant signals the distant party by operating the "Flash or Ring and Hold" key to and from the ringing position.

7.08 To recall the central office or P.B.X. operator on a line to these equipments, the attendant operates the "Flash or Ring and Hold" key to and from the flashing position, signalling the distant switchboard operator.

7.09 If the "Battery Cutoff" key is operated, any incoming calls on the line will not cause the flashing circuit to function, and the signal received will be an intermittent lighting of the "Line & Busy" lamp for as long as the ringing current is applied to the line. ~~SEE ADDENDUM~~

7.10 The line keys are wired in series so that the operator cannot connect to more than a line at any one time. ~~SEE ADDENDUM~~

(B) Intercepting Line Circuit - MST-69004

7.11 General: This circuit is used to provide two-way telephone service between a station and the Central Office or P.B.X., the line having a multiple appearance before the No. 10 Key Turret operator in order to provide a means of intercepting incoming calls when the station is unattended. The circuit is arranged to provide a maximum of 20 appearances of the "Line & Busy" lamp.

7.12 Incoming Call: When an incoming call is connected to the line and ringing current is applied, the relay equipment operates to connect to the flashing circuit, flashing the "Line & Busy" lamp as an incoming call signal. The station ringer is, of course, operated from the ringing current on the line. The auxiliary buzzer signal is furnished from and by the operation of the flashing circuit.

7.13 The incoming call is answered at the station by removing the receiver from the switchhook, which causes the line circuit to function to release the flashing circuit, silencing the buzzer, and to light the "Line & Busy" lamp steadily as a busy signal.

7.14 The incoming call may be intercepted at the turret by operating the line key associated with the flashing "Line & Busy" lamp to the talking position. This connects the operator's circuit to the line and causes the line circuit to function to release the flashing circuit, silencing the buzzer and to light the "Line & Busy" lamp steadily as a busy signal.

7.15 If automatic cutoff of the attendant is desired, a strap applied at the unit terminal strip accomplishes this purpose. Under this condition, when the station answers on the line the circuit functions to release the attendant's telephone equipment, if connected to the line, or to prevent its connection, if unconnected.

7.16 If the attendant desires to hold on the line to which her talking connection is established, the common "Flash or Ring and Hold" key is operated to the holding position. This causes the line circuit to function to extinguish the "Line & Busy" lamp, to close a holding bridge across the incoming line, and to light the "Hold" lamp steadily as a holding signal. The line key may now be restored to normal and the line will remain in the held condition.

7.17 When the attendant returns to a held line by operating the associated line key to the talking position, or when the station receiver is removed from the switchhook, the circuit functions to remove the holding bridge from the line, to extinguish the "Hold" lamp and to light the "Line & Busy" lamp steadily as a busy signal.

7.18 The attendant disconnects from the line by restoring the line key to normal, and the station disconnects by restoring the receiver to the switchhook. In either case, the line circuit functions to restore to normal, extinguishing the "Line & Busy" lamp.

7.19 Outgoing Call: Outgoing calls are originated by the attendant by operating the line key to the talking position and by the station by removing the receiver from

the switchhook. In either case the circuit functions to light the "Line & Busy" lamp steadily as a busy signal.

7.20 To recall the central office or P.B.X. operator to the line, the station user flashes the switchhook in the usual way. The turret attendant recalls the operator by operating the "Flash or Ring and Hold" key to and from the flashing position.

7.21 If the "Battery Cutoff" key is operated an incoming call on the line does not cause the line circuit to lock in, and the signal received is an intermittent flashing of the "Line & Busy" lamp for as long as the ringing current is applied to the line.

(C) Flashing and Fuse Alarm Circuits - MST-69003

7.22 General: The flashing circuit is used to provide a means for flashing the "Line & Busy" lamps of associated line circuits, and to furnish a steadily operated buzzer signal. The fuse alarm circuit provides an audible and visual alarm signal to indicate the operation of a fuse on any associated circuit. One of these units is required per installation and will function with a maximum of 40 Intercepting Line Circuits or 120 C.O., P.B.X., Private Line Circuits.

7.23 Operation: When the flashing circuit is connected to a line circuit, due to an incoming call, the relays operate and release in sequence supplying regularly interrupted battery to the associated line circuit, for operating the relays which will flash the associated "Line & Busy" lamp. During the time the flashing circuit is in operation the buzzer is operated steadily, unless interrupted by the operation of the "Buzzer Cutoff" key. When the incoming call is answered, the flashing circuit is released from the line and restores to normal, silencing the buzzer.

7.24 When a fuse is operated on any of the units associated with the turret, battery is supplied to the "Fuse Alarm" lamp and bell operating both. The bell may be silenced by operation of the "Fuse Alarm" key, but the lamp remains lighted until the operated fuse is replaced, which restores the circuit to normal.

(D) Operator's Tripping Circuit - MST-69005

7.25 General: This circuit is used to provide a means whereby the attendant's telephone instrument may be satisfactorily used in connection with a No. 10 Key Turret, terminating dial or manual common battery lines and ring-down private lines. One operator's tripping circuit is required for each operating position at the installation.

7.26 Operation: When the operator's tripping circuit is connected to a line circuit associated with a common battery line, a bridge is connected across the line, the line circuit is caused to function to furnish a busy lamp signal as previously outlined, and the operator's telephone circuit, which is normally disconnected, is closed through to the line, establishing the talking connection.

7.27 If the circuit is connected to a line circuit associated with a private line, it functions similarly to the above. Under this condition, however, the battery feed retardation coil is substituted for the bridge. The circuit also functions to make ringing current available at the "Flash or Ring and Hold" key for signalling.

7.28 When the line key is restored to normal, the operator's tripping circuit restores to normal, disconnecting the telephone set from the line.

7.29 When the operator's tripping circuit is connected to an intercepting line arranged for automatic cutoff, and the station answers, the relay in the operator's circuit is shunted down, opening the operator's talking connection. If the station is on the line first and the attendant attempts to connect to that line circuit, the operator's tripping circuit will remain inoperative.

7.30 When the operator's circuit is connected to a line circuit and the "Flash or Ring and Hold" key is operated to the holding position, the circuit functions in conjunction with the line circuit to establish holding on the incoming line and to disconnect the operator's talking circuit from the line. The line key may then be restored to normal and the line circuit remains held until the attendant, or the station on an intercepting circuit, returns to the line. The holding relays in the operator's tripping circuit are wired to the "Battery Cutoff" circuit to prevent the establishment of holding on a line after the

"Battery Cutoff" key has been operated.

7.31 In originating an outgoing call on a common battery line, the line key is operated and the circuit functions as previously described. If the line is arranged for dial operation, the operation of the dial opens the operator's talking connection. The return of the dial to normal restores the talking connection.

7.32 If an outgoing call is originated over a private line, the line key is operated and the circuit functions as previously described. It is necessary, in this case, however, for the attendant to operate the "Flash or Ring and Hold" key to the ringing position. This connects ringing current to the line to signal the distant station.

(E) Non-Locking Intercepting Line Circuit - MST-89013

7.33 General: This circuit is also used to provide two-way telephone service between a station and a central office of P.B.X., the line having a multiple appearance before the operator of a No. 10 Key Turret in order to provide a means of intercepting incoming calls when the station is unattended. The circuit is designed for a maximum of two appearances of the line lamp and operates only in conjunction with the turret and operator's telephone circuit shown on Drawing MST-89002.

7.34 Incoming Call: When an incoming call is connected to the line at the central office or P.B.X., the station ringer is operated, and the line circuit functions to light the "line" lamp intermittently in sequence with the incoming ring. An intermittent auxiliary signal buzzer is also provided.

7.35 The attendant intercepts incoming calls by operating the key associated with the line to the talking position, and removing her receiver from the switchhook. The station answers by merely removing the receiver from the switchhook. No busy signal is provided.

7.36 The station disconnects from the line by replacing the receiver on the switchhook. The attendant disconnects by restoring the line key to normal.

7.37 Outgoing Call: Out calls are originated by the station in the usual way and by the attendant by operating the line key to the talking position, removing the receiver from the switchhook and dialing or passing the number as usual.

B. J. P.
COR. 2-20-36
R. A. HOFFMAN
MAY 10, 1933
ISSUE 112.1
IN FIG. 5 (P. 14) LR
REMOVED. (P. 14) LR
BY HOFFMAN
COR. 2-20-36
R. A. HOFFMAN
MAY 10, 1933
ISSUE 112.2

FIG. 2
LINE CIRCUIT FOR
CENTRAL OFFICE, P.B.X. OR PRIVATE LINES

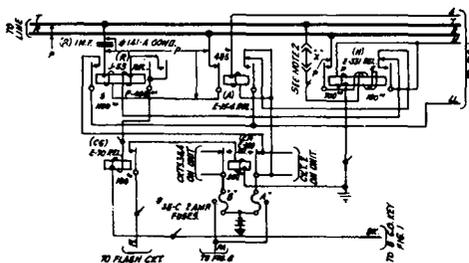


FIG. 3
INTERCEPTING LINE CKT.

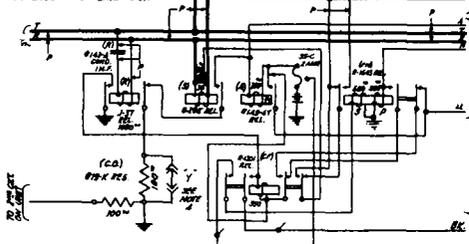


FIG. 7
NON-LOCKING INTERCEPTING LINE CKT
(SEE NOTE 7)

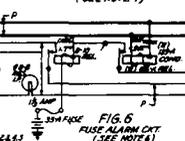


FIG. 5
FLASHING CKT.

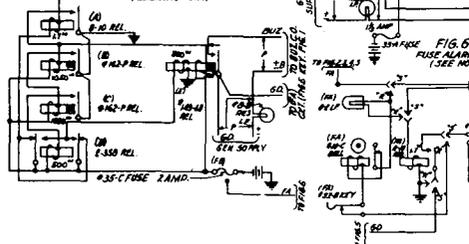


FIG. 6
FUSE ALARM CKT
(SEE NOTE 6)

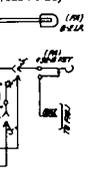


FIG. 4
OPERATOR'S TRIPPING
& TELEPHONE CKT.

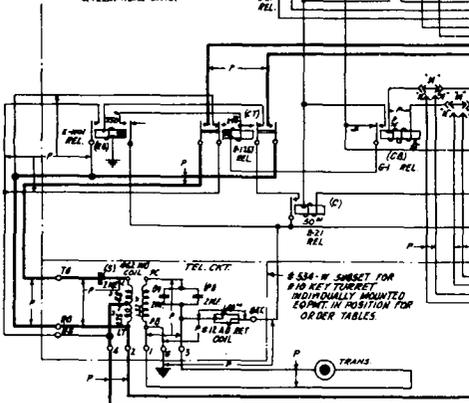
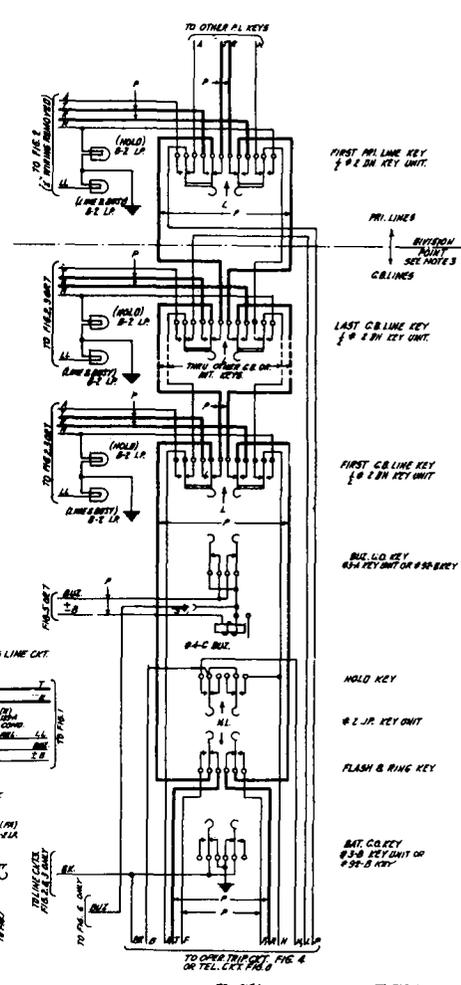


FIG. 1
TURRET WIRING



TO OTHER PL KEYS

TO FLASH CKT FIG. 5

- NOTES -
1. FOR KEYSET OF ASSOCIATED WIRING ASSEMBLY & EQUIPMENT SHALL SEE DRAWING MS-69007
 2. LINE 112 FROM FIG. 1 IS COMMON TO ALL PRIVATE & COMMON BATTERY LINES.
 3. TRIPPING IS NORMALLY PROVIDED AND INTERCEPTING IS USED WITH A PRIVATE LINE "S" TRIP IS PROVIDED.
 4. AT THE DIVISION POINT BETWEEN PRIVATE & COMMON BATTERY LINES, THE "S" LEAD TRIPPING BETWEEN THE TWO KEYS IS PROVIDED AND THE "M" & "L" LEAD CUT IN ALL WIRING.
 5. THE INTERCEPTING CKT FOR FIG. 3 IS NORMALLY FURNISHED WITHOUT "M" WIRING, WHEN THE ASSOCIATED LINE IS TO BE ARRANGED TO AUTOMATICALLY CUT OFF THE ATTENDANT WHEN THE STATION ADDRESS "M" WIRING IS TO BE PROVIDED.
 6. IF "M" IS NOT REQUIRED, PROVIDE "M" WIRING, OTHERWISE USE "M" WIRING.
 7. WIRING FOR PRIVATE KEY TURRET INSTALLATIONS AND "S" WIRING FOR ORDER TABLE INSTALLATIONS.
 8. WHEN THE PRIVATE KEY TURRET TERMINATES ONLY INTERCEPTING LINES USING THE NON-LOCKING CIRCUIT FOR FIG. 7, THE OPERATOR'S TELEPHONE CIRCUIT WILL CONSIST ONLY OF A STANDARD COMMON BATTERY STATION SET AS SHOWN IN FIG. 8.

STATION SYSTEMS
KEY TURRET NO 10 AND ORDER RECEIVING TABLES
SCHEMATIC CIRCUITS