

THE NCR ELECTRICAL CREDIT SYSTEM TYPE "F"

INSTRUCTIONS FOR THE CARE AND
MAINTENANCE OF THESE SYSTEMS



SALES SERVICE DEPARTMENT

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Dayton, Ohio, U. S. A.

THE NATIONAL CHARGE PHONE SYSTEM

Instructions for the
care and maintenance
of the Type "F" System

THE NATIONAL CASH REGISTER COMPANY
Dayton 9, Ohio

IMPORTANT INFORMATION

The National Charge Phone System represents the very best electrical equipment and time spent keeping it in good condition is repaid by better service.

In each establishment some person should be selected whose duty it will be to keep the system working properly at all times.

Many users have found it advisable to inspect their entire equipment, including the telephones, wiring and switchboards every week. While this is not absolutely necessary, it insures the proper operation and long life of the system.

The following instructions have been prepared for the guidance of those who will attend to this work. The study of this information will enable them to become thoroughly familiar with the few fundamentals on which this system is operated and maintained.

THE NATIONAL CASH REGISTER COMPANY
Dayton 9, Ohio

TYPE "F" NATIONAL CHARGE PHONE CREDIT SYSTEM

The Type "F" Credit System has been especially designed for coordinating "charge authorization" with the Cycle Billing operations. It provides fast, pleasing service for the customer ... with safety and economy for the store.

THE EQUIPMENT

The system is composed of an authorizer's switchboard, stamping phones and power supply equipment.

The SWITCHBOARD, consisting of from one to ten units, is usually placed between or adjacent to the cycle billing files so that it will be near the particular group of accounts it is intended to serve. If desirable, the same person who regularly works on the files may also do the authorizing. However, it may be more efficient to have one regular authorizer and a file clerk to assist or relieve the authorizer whenever necessary.

The STAMPING PHONES are distributed throughout the store in the various departments. They are used in the selling departments by the clerks or wrappers in getting a printed authorization on the sales-slip and a perforated authorization in the address labels. The phones should be placed near the wrapping desks so that the clerks can conveniently reach and answer the phones while wrapping the purchased articles. The stamping phones are equipped with a one-line printing device and a perforating die.

POWER for operating the system may be supplied from either motor generators or rectifier. The voltage and current generated is 35 volts D.C. at two to ten amperes, depending upon the size required.

DIRECT CALL AND SELECTIVE CALL SYSTEMS

DIRECT CALL

The Direct Call System has only one button on the stamping phone and calls from all phones are received at one switchboard unit. The authorizer at the switchboard then answers all calls.

In the direct call system, only three wires are needed to each phone; the "ring and stamp", the "talk" and the "common", as the talk wire is also used for signaling.

SELECTIVE CALL

The Selective Call System permits arranging the alphabet in two or more divisions and allows the salesperson to "select" the proper division by pressing the corresponding button on the stamping phone.

Thus the first button would represent the first division and would set up a signal on the No. 1 switchboard. The second button would signal the second division or No. 2 switchboard. The operators authorize only the accounts in their divisions.

If the system consists of more than two divisions, there will be as many buttons on the stamping phones as there are divisions; each button representing a division. The number of the button pressed selects the corresponding switchboard. This construction enables the user to arrange the work or divide the alphabet according to the demand.

A Transfer Key is also provided so that all calls can be automatically transferred to one board if desired. This permits all work to be transferred to one board during the early morning hours or late in the evening when calls are few in number.

All boards are equipped with a Buzzer Key and a Divide Key. The buzzer key is used to control an audible signal by which the operator's attention will be called whenever a signal light appears on the board. The divide key is used so two operators may work on one board or division at the same time. See Figure #1 on page #6.

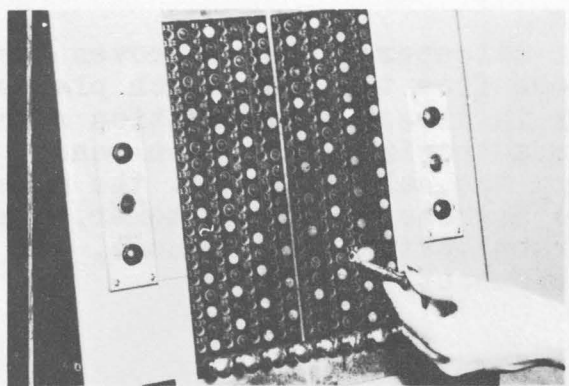
HOW THE NATIONAL CHARGE PHONE SYSTEM OPERATES



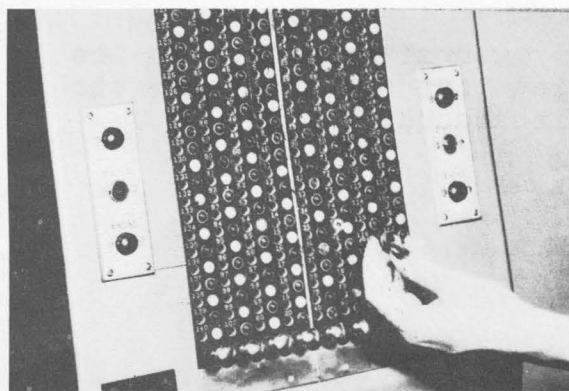
1. The salesperson places the sales-slip in the stamping phone. The sales-slip does not leave the department.



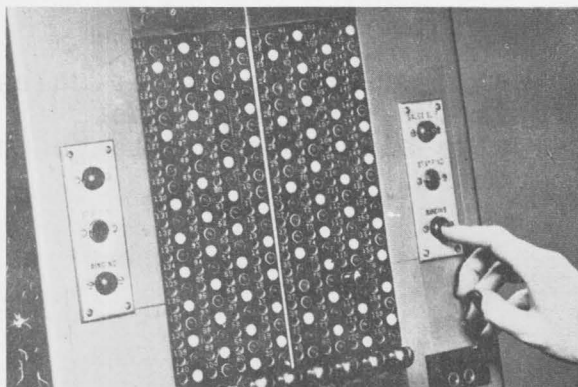
2. Then she signals the authorizer by pressing a button.



3. Instantly a signal light appears on the authorizer's switchboard.



4. The authorizer answers the call by putting a connecting plug in the hole beside the light.



5. Next the authorizer presses the ringing key to signal to the salesperson who may meanwhile be wrapping the merchandise.



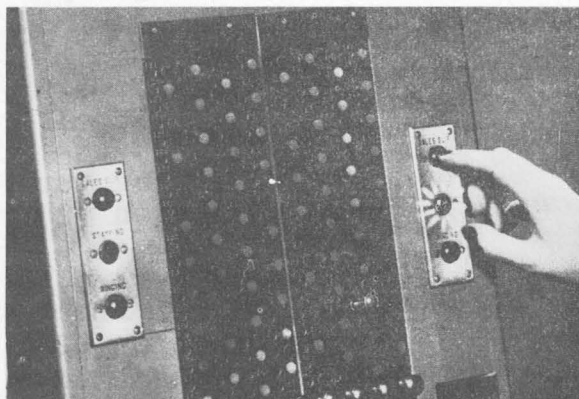
6. A buzzing sound in the telephone receiver notifies the salesperson that the authorizer is ready to answer her call.



7. The salesperson then removes the phone from the hook which places her in direct communication with the authorizer, and then reads from the sales-slip ... the name and address of the customer, the person making the purchase, and the amount.



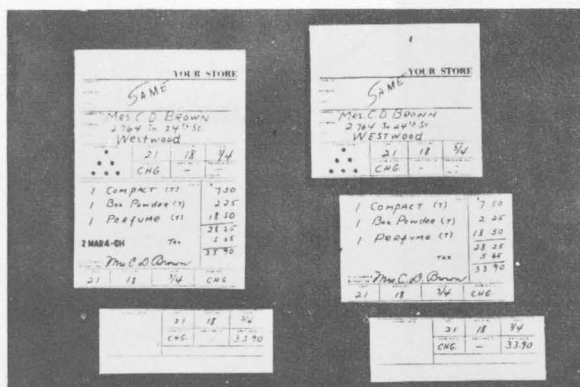
8. The authorizer refers to the files that are kept near the switchboard.



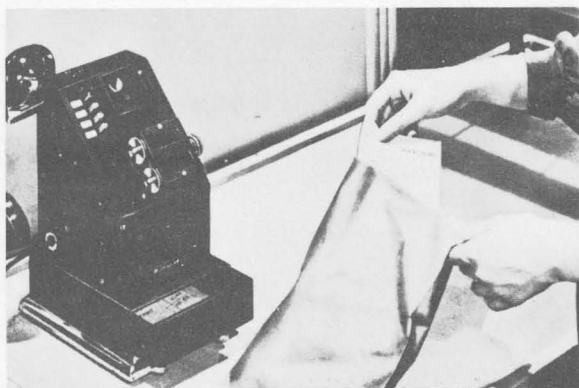
9. If the account is in good standing, the authorizer simply presses the stamping button. The red light indicates to the authorizer that the slip is properly inserted in the phone for stamping.



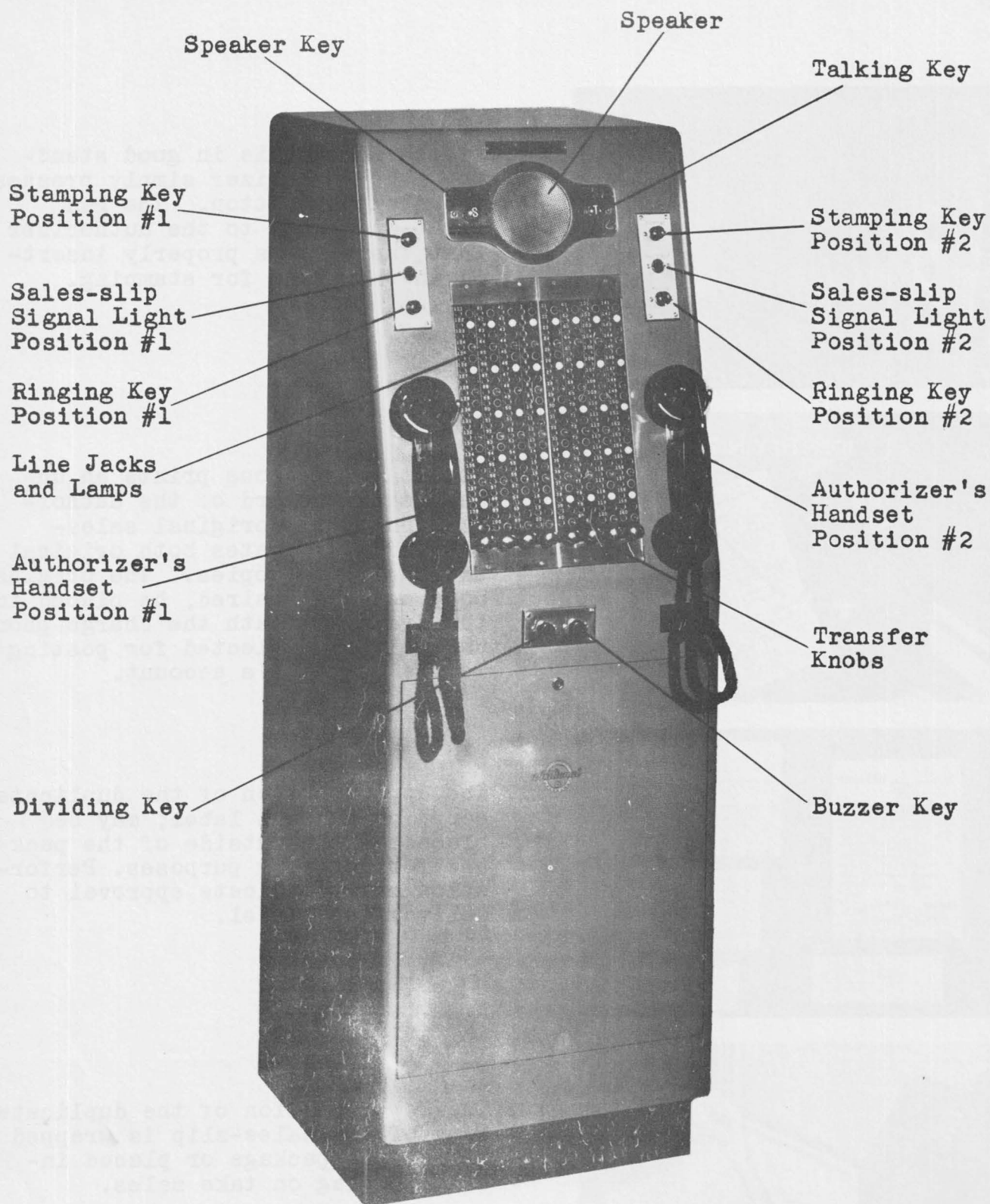
10. The stamping phone prints an unchangeable record of the authorization on the original sales-slip and perforates both original and duplicate copies. The original copy can, if desired, be placed in the drawer beneath the charge phone until it is collected for posting to the customer's account.



11. The upper portion of the duplicate copy, or address label, may be placed on the outside of the package for delivery purposes. Perforation marks indicate approval to deliver the parcel.



12. The lower portion of the duplicate copy of the sales-slip is wrapped inside the package or placed inside the bag on take sales.



Front of Switchboard
Figure #1

LINE JACKS

Figures 2 and 3 show line jacks of the selective type in both normal and transfer positions. The jack springs have been numbered for convenience in explaining the various functions. Each strip or line jack contains 20 lines.

1. Ring and stamp line to stamping chargephone.
2. Operator's talking common.
3. Signal multiple contact.
4. Positive power supply common.
5. Signal transfer contact.
6. Transfer multiple contact.
7. Talking line to stamping chargephone.
8. Ringing and stamping common.

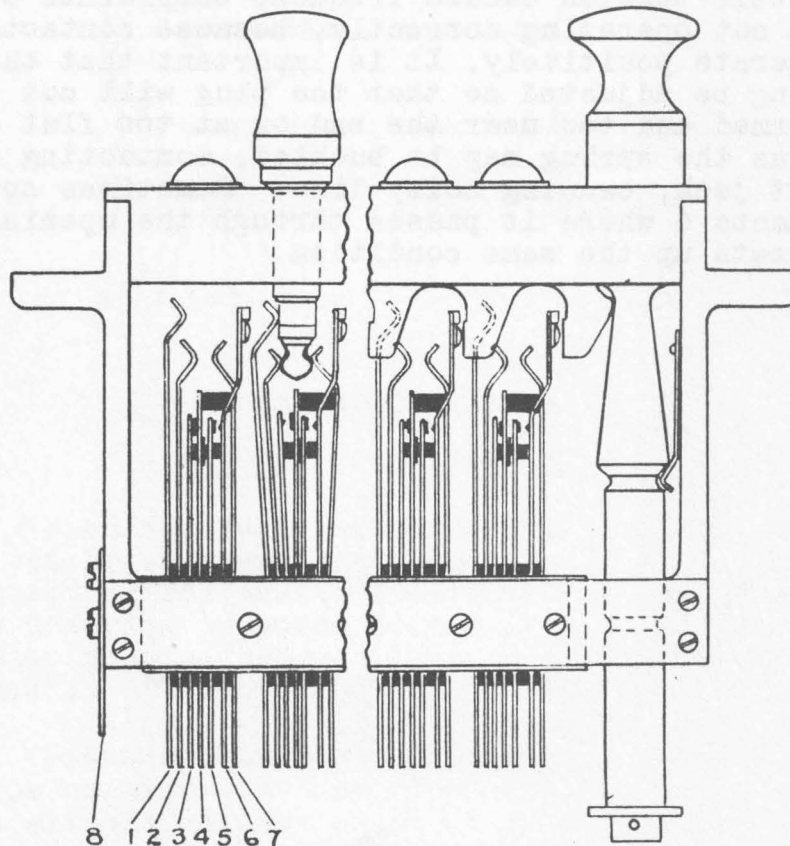


Figure 2 - Normal

NORMAL POSITION

In Figure #2, which is the normal position, the springs numbered 2 and 7 are adjusted to position directly under the tip of the plug and to contact firmly when plug is in position. Inserting the plug spreads 2 and 7 apart, and 4, being under tension towards 7, moves to the right, opening the contact between 3 and 4, which puts out the signal lamps. When the plug is removed, 2 and 7 return to normal; the tension of 7 being greater than 4, spring spacer mounted between 4 and 7, moves 4 to the left contacting 3 and re-establishing that part of the signal circuit.

Care should be used in adjusting the jack springs to see that just enough tension is given to safely accomplish results desired. Excess tension causes the flexibility of the springs to break down. Too little tension causes frequent complaints of the system not operating correctly, because contacts do not operate positively. It is important that the No. 1 spring be adjusted so that the plug will not contact the formed end too near the end or at too flat an angle as the spring may be buckled, contacting spring in next jack, causing noisy line. Sometimes spring 7 contacts 6 where it passes through the opening, which sets up the same condition.

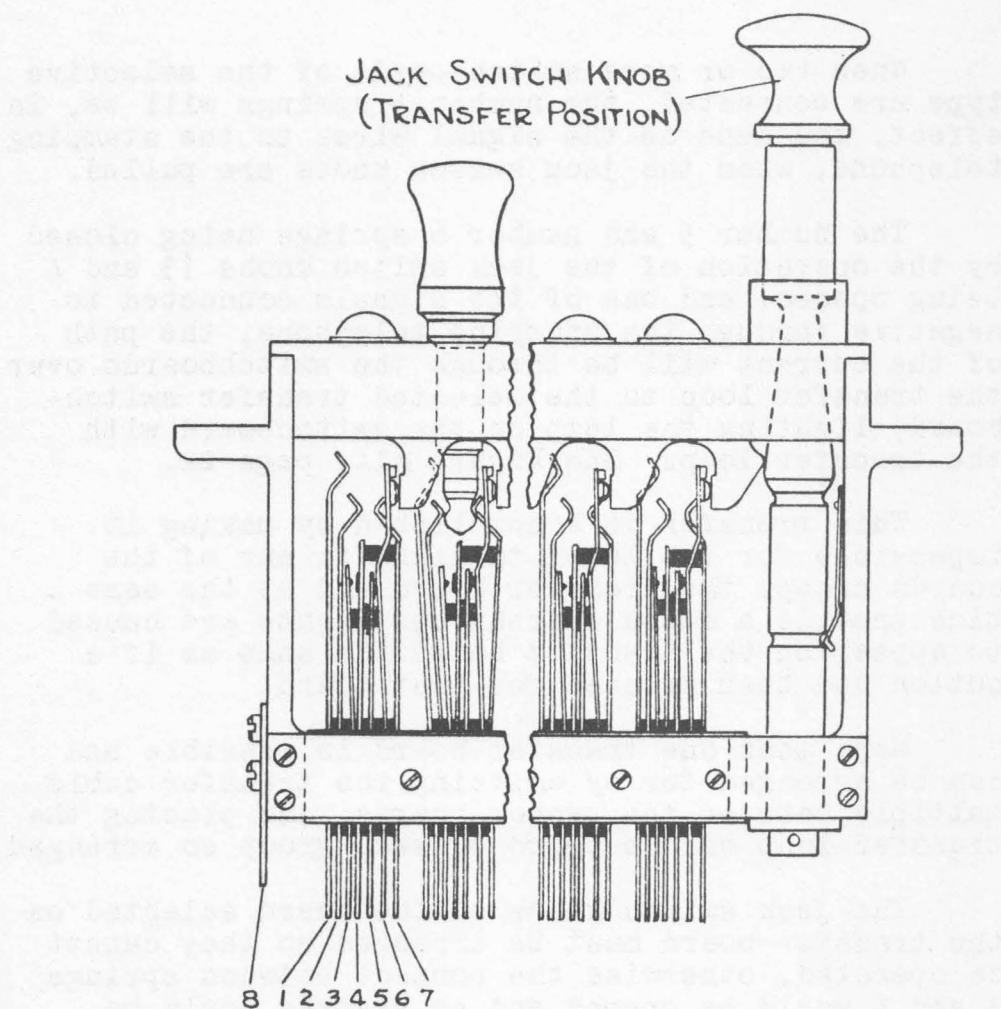


Figure 3 - Transfer

When the jack switch knob is pulled, the jack switch lever moves the number 6 spring to the left, contacting the number 5 spring. At the same time the 3 spring is moved to the left by the spring spacer mounted between 6 and 3, opening contacts 3 and 4.

Opening this contact either puts out the signal lamps or prevents them from being lighted through the circuit in that switchboard.

When two or more switchboards of the selective type are connected, the number 5 springs will be, in effect, the same as the signal wires to the stamping telephone, when the jack switch knobs are pulled.

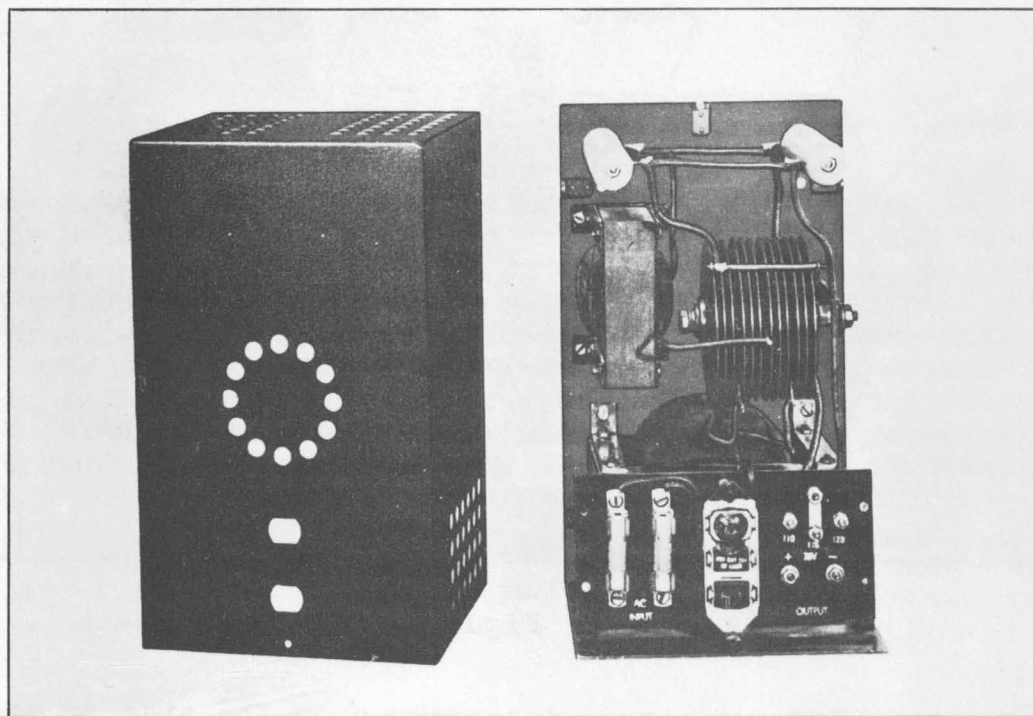
The number 5 and number 6 springs being closed by the operation of the jack switch knobs (3 and 4 being opened) and one of the signals connected to negative through the stamping telephone, the path of the current will be through the switchboards over the transfer loop to the selected transfer switchboard, lighting the lamp on the switchboard with the transfer loop. See Figure #14, page 22.

This transfer is accomplished by making it impossible for the lamps to light in any of the boards except the transfer board and at the same time provide a means whereby the lights are caused to appear on the transfer board the same as if a button had been pressed for that board.

More than one transfer board is possible and can be arranged for by omitting the transfer cable multiple between the proper boards, and placing the transfer loop on one board of each group so arranged.

The jack switch knobs on the board selected as the transfer board must be arranged so they cannot be operated, otherwise the contact between springs 3 and 4 would be opened and no signals would be received. A collar of the proper length slipped over the shaft and retained by the washer and cotter pin is the most practical method.

POWER SUPPLY



RECTIFIER POWER SUPPLY

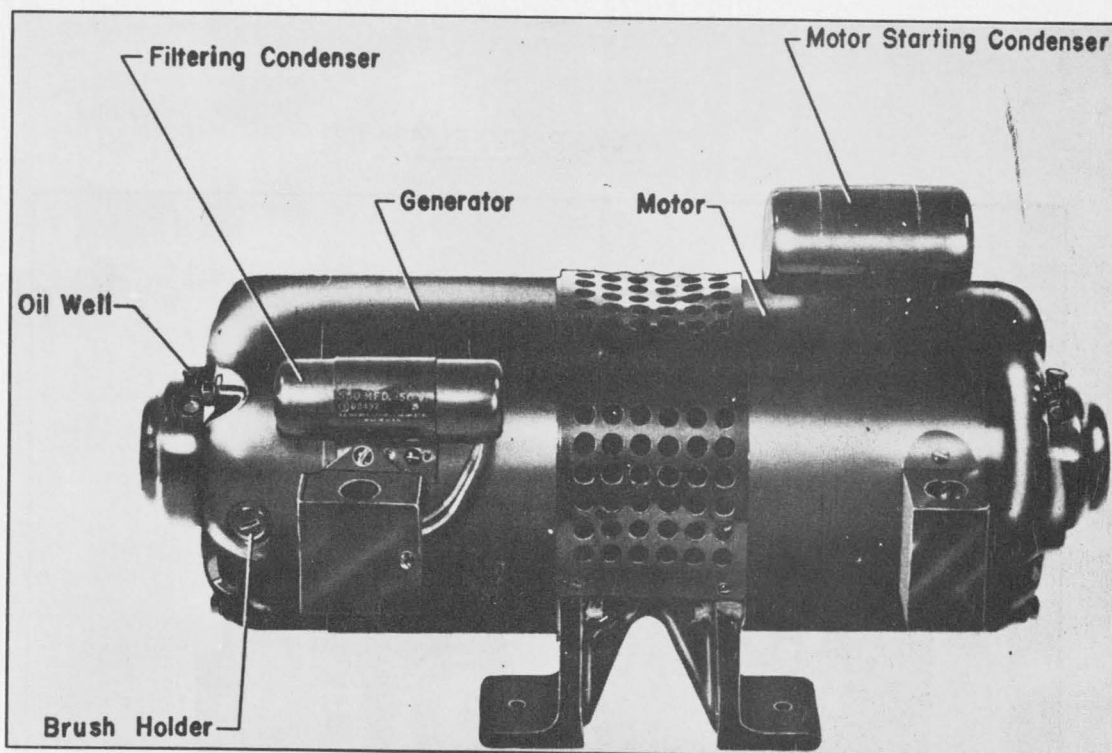
Figure 4

The Rectifier power unit, usually furnished with this system, requires very little attention as there are no moving parts to become worn or damaged. It is used to convert an A.C. current supply to 35 volts D.C. current.

The rectifier should be located in a clean, dry and easily accessible place, and should not be placed in boxes or tightly enclosed places as they may become very hot, due to poor air circulation.

IMPORTANCE OF PROPER ATTENTION

Lack of care often means the difference between good service and poor service from the system. The maximum service cannot be expected unless the instructions in this book are carefully followed.



MOTOR GENERATOR
Figure 5

In some cases, depending upon the size of the system and whether the source of supply is D.C. voltage, motor generator sets may be furnished in place of the rectifier. It is best practice to use these generating sets alternately every other day, but when they are started in the morning both sets should be tried out to make sure that the reserve set is in good order.

Should either set fail to generate the proper voltage, wipe the generator commutator with a cloth moistened with kerosene. An invisible film may be formed over the commutator, insulating it from the brushes. Do not leave any kerosene on brushes or commutator after cleaning in this manner. Also see that the brushes are free in the holders and shaped to the commutator.

Any chattering or sparking of the brushes can be plainly heard in the telephone. The tension of the brush spring should be just enough to hold brushes in contact with the commutator, without unnecessary friction, which would cause wear and scoring of the commutator.

BRUSHES

An extra set of brushes should be kept on hand, as unavoidable delays sometimes prevent new material from being received before unnecessary damage has been done. New ones should be ordered from the National Cash Register Company, as we cannot be responsible for the operation of the machines with brushes other than those regularly supplied. New brushes should be sanded to fit the curvature of the commutator. This can be done by holding a piece of sandpaper (00) tightly around the commutator under the brushes, and turning the commutator back and forth.

When ordering spare parts of any kind, always give the serial number of the motor generator set, as shown on the name plate.

OILING

Be sure the oil wells are kept filled with a good lubricating oil. Use good oil - enough and no more.

CLEANING

The whole outfit should be kept clean and free from moisture, dirt and surplus oil. The brushes and commutators on direct current machines should be kept clean and dry. The commutators should be frequently wiped and polished with a clean cloth. A few drops of kerosene will assist in removing any greasy film which might interfere with commutation. However, a bright burnished blue film on the commutator is normal and indicates that the brushes are supplying the proper amount of their own lubrication.

STAMPING AND PERFORATING PHONE

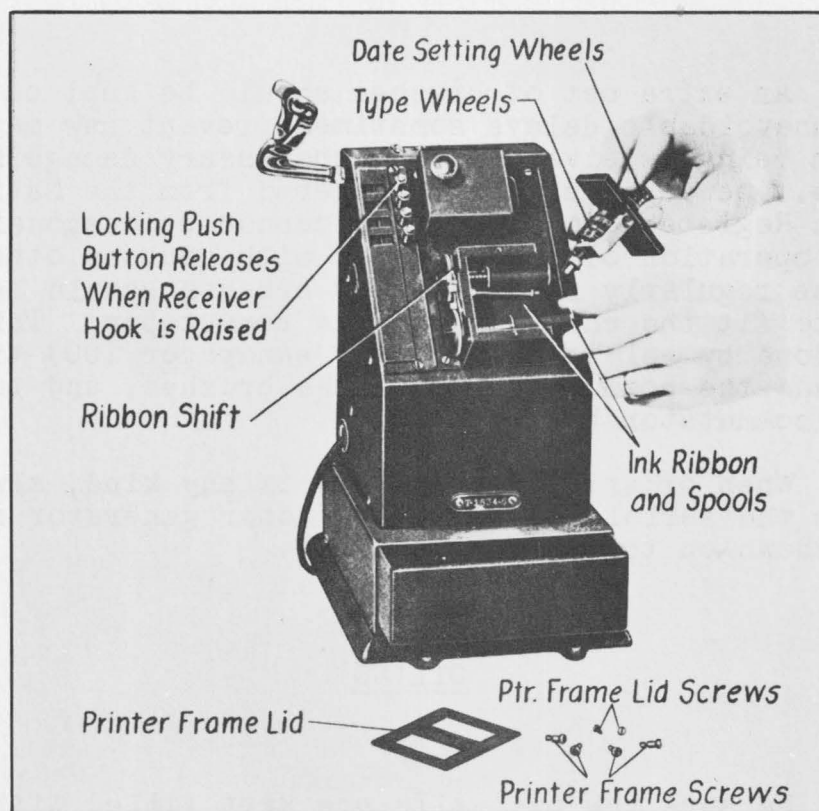


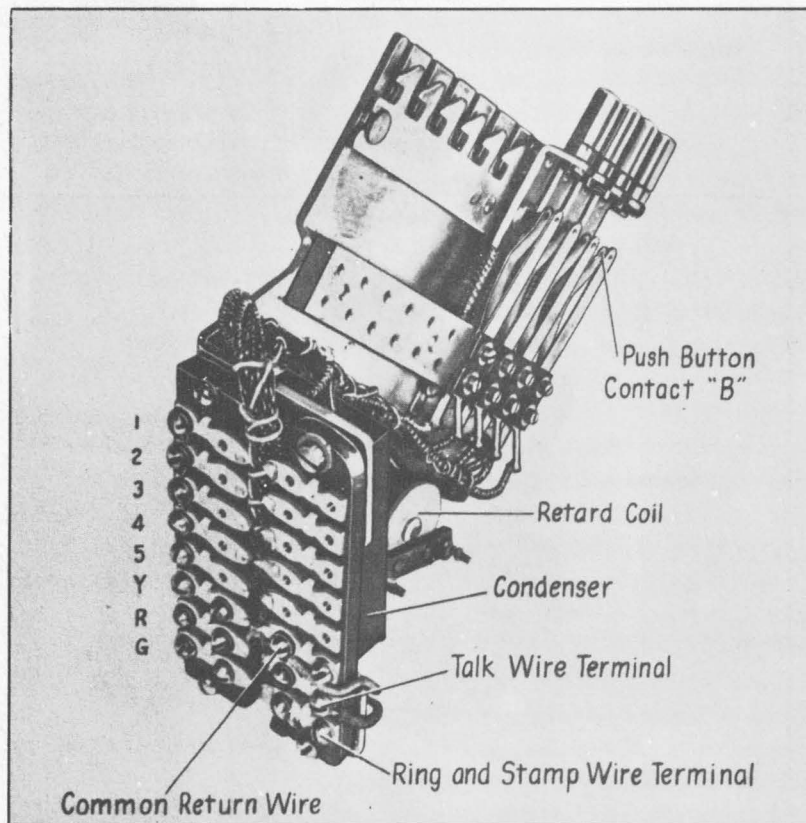
Figure 6

This instrument requires very little attention other than daily setting of the stamp. The ribbon shift turns in either direction and requires but a touch to turn it sufficiently. Shift the ribbon every day to lengthen its life and insure good printing.

The above illustration shows the method of replacing the ribbon and how to remove the type wheels for cleaning. Use an ordinary toothbrush and benzine to clean type.

KEY UNIT

The mechanism of the stamping phone is divided into two parts - the key unit and the stamping and perforating unit.



Key Unit
Figure 7

As we make other types of systems, all key units are arranged so they can be equipped with more than one key, depending upon the size and type of system.

Terminals marked 1 to 10 connect to corresponding buttons 1 to 10. Terminals "W", "R" and "B" connect respectively to the white, red and black wires of the hand telephone set. Terminal "C" connects to negative power supply Common terminal; terminal "T" to Talking wire; terminal "R" and "S" to Ringing and Stamping wire, as shown on the wiring diagram which follows.

STAMPING & PERFORATING UNIT

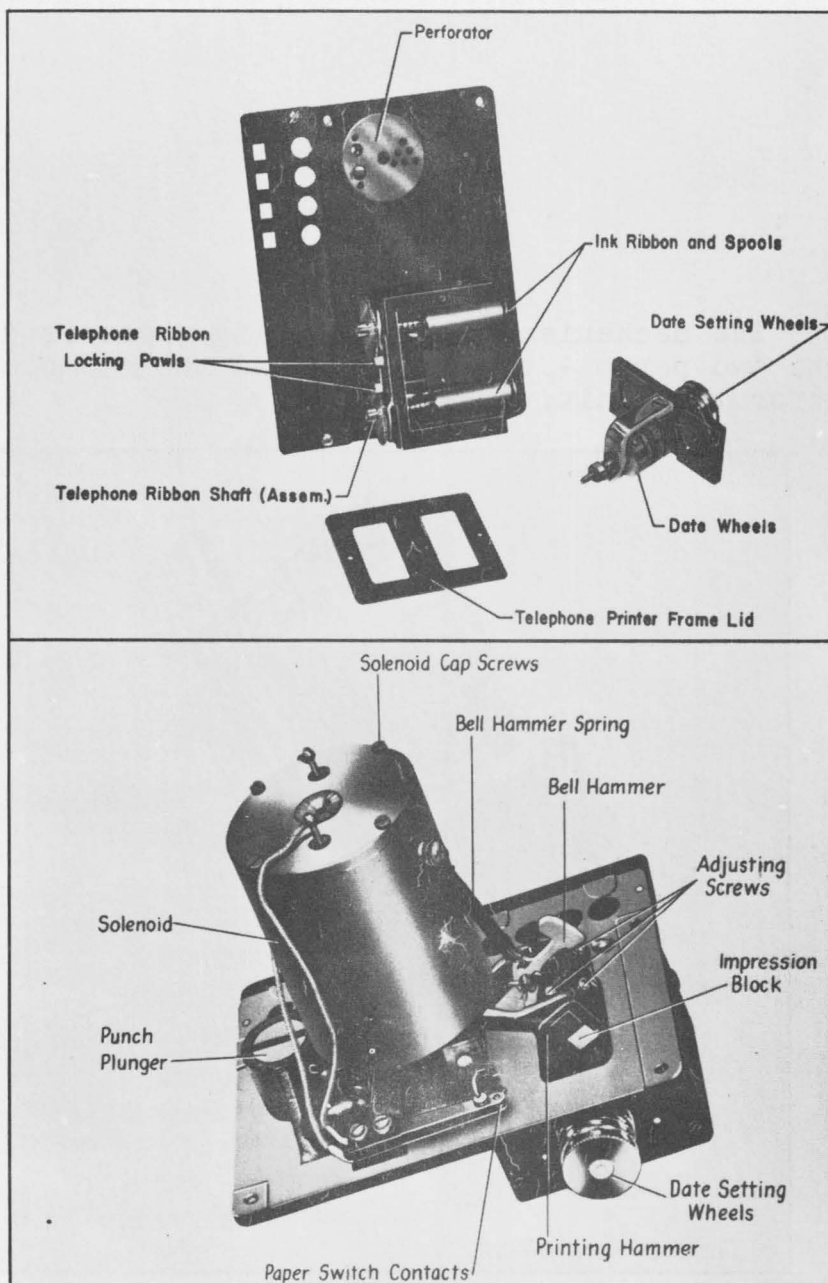


Figure 8

The stamping and perforating unit is very simple in construction, there being but two adjustments. The rubber impression block is arranged with adjusting screws, so that it may be made to strike the type evenly. Care should be used to see that impression rubber is not raised enough to prevent punch from perforating charge slip.

The perforator punch and solenoid plunger should be removed and examined when trouble is experienced due to stamp binding or hanging up. This complaint may be caused by either mechanical or electrical conditions.

HOOK SWITCH

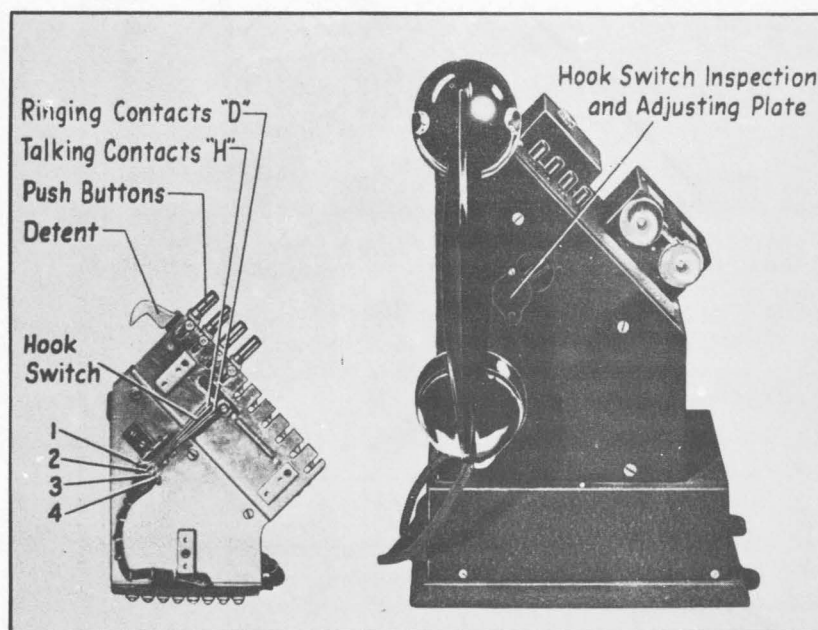
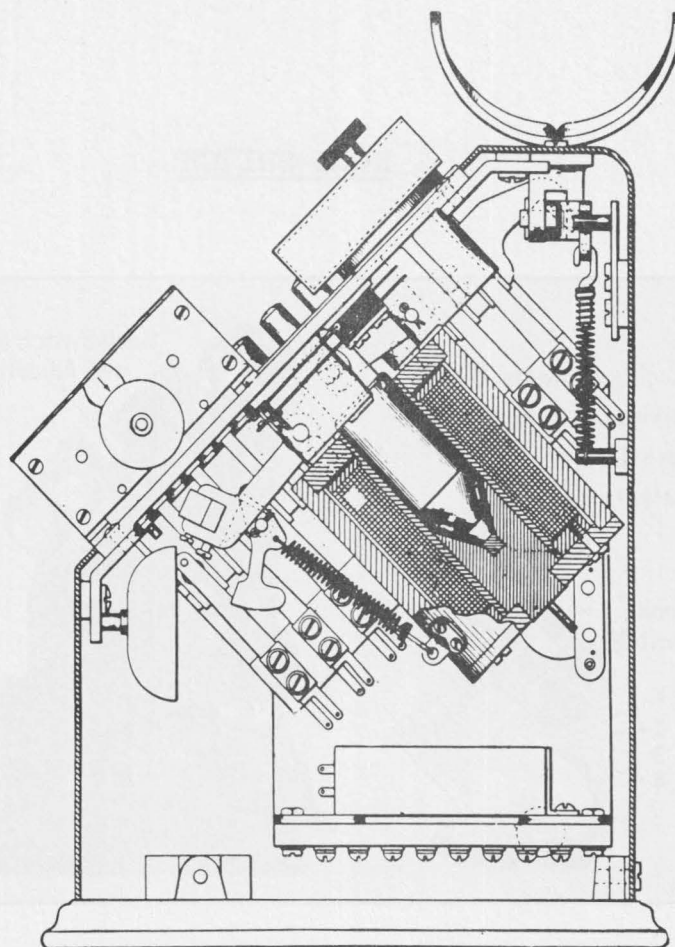


Figure 9

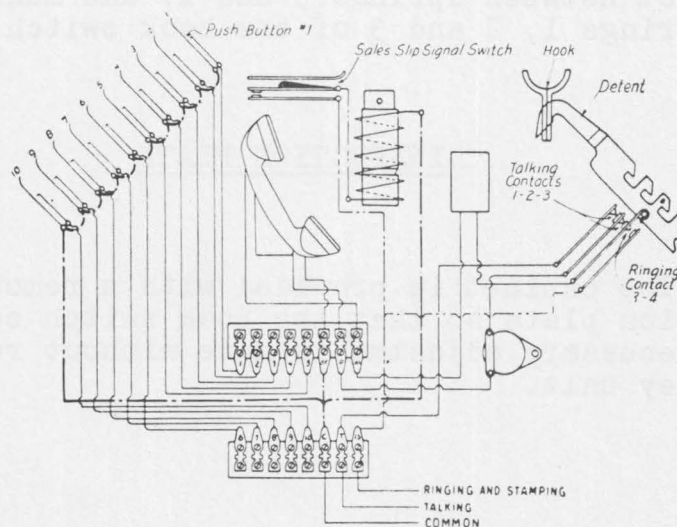
The hook switch is located on the back of the key unit. Each time the telephone is removed from the hook, the detent is forced upward, releasing the push button. At the same time this breaks the contact between springs 3 and 4, and makes contact on springs 1, 2 and 3 of the hook switch.

INSPECTION PLATE

The cabinet is provided with a removable inspection plate so that the hook switch can be seen and necessary adjustments made without removing the key unit.



Showing the mechanical details of the stamping phone
Figure 10



Wiring details of the stamping phone
Figure 11

CIRCUIT DIAGRAMS

The electrical circuits of this system may be divided into five principal circuits and are named according to the functions they perform:

- (1) Signal Circuit
- (2) Ringing Circuit
- (3) Talking Circuit
- (4) Stamping Circuit
- (5) Power Supply Circuit

SIGNAL CIRCUIT

There are three different signal circuits used with the different types of switchboards:

- (1) Direct Call - one switchboard (page 20)
- (2) Direct Call - two switchboards (page 21)
- (3) Selective Call - two to ten switchboards (page 22)

SIMPLIFIED DRAWINGS

On the following pages are simplified circuit drawings, in which details not necessary to the circuit have been omitted to simplify them as much as possible.

ONE DESK DIRECT CALL SIGNAL CIRCUIT

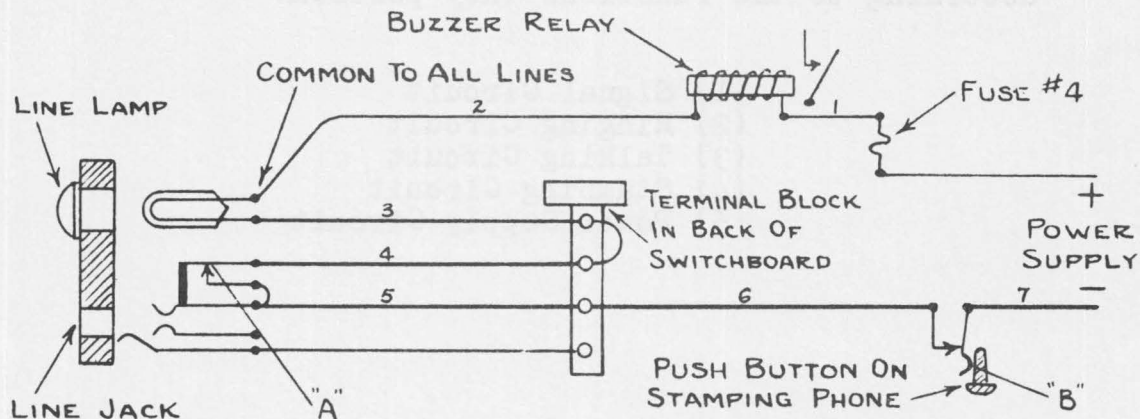


Figure 12

Referring to the above illustration, it will be seen that when the push button is pressed on the stamping phone, it closes the circuit through contact "B".

The direction and path of the current is then as follows:

From positive (+) terminal of the power supply to the bus bar and fuse No. 4, wire (1), buzzer relay, wire (2) to line lamp, wire (3) to loop, wire (4) through contact "A", wire (5), wire (6), contact "B" and wire (7), completing the circuit and lighting the line lamp.

The loop between wires (3) and (4) must be put in at the time the system is installed.

For convenience in explanation, we shall refer to the terminal strips in the back of the switchboards as if numbered from 1 to 4, from the back towards the front of the switchboard.

TWO DESK OR MULTIPLE DIRECT CALL SIGNAL CIRCUIT

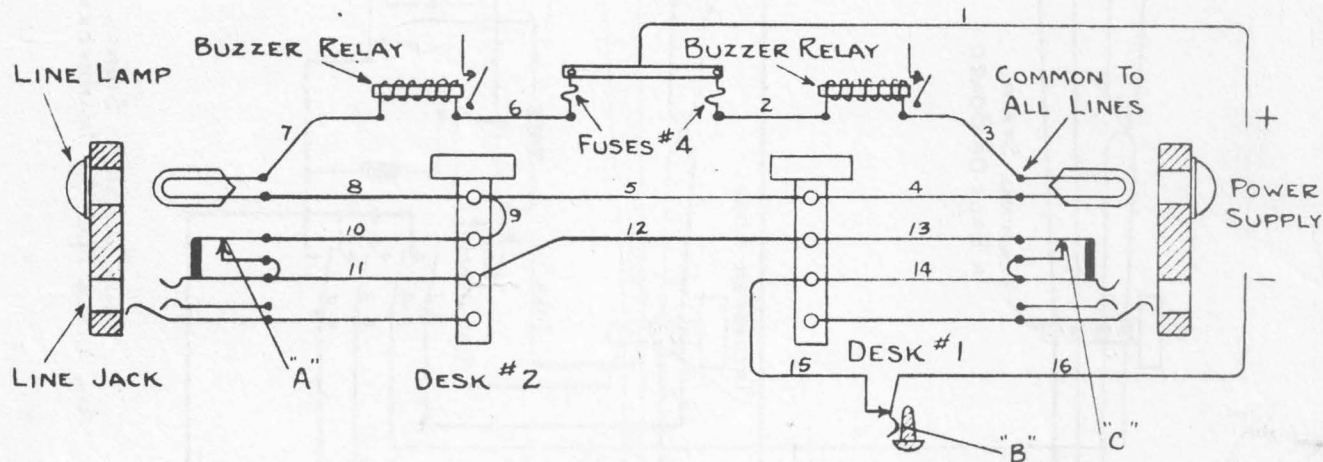
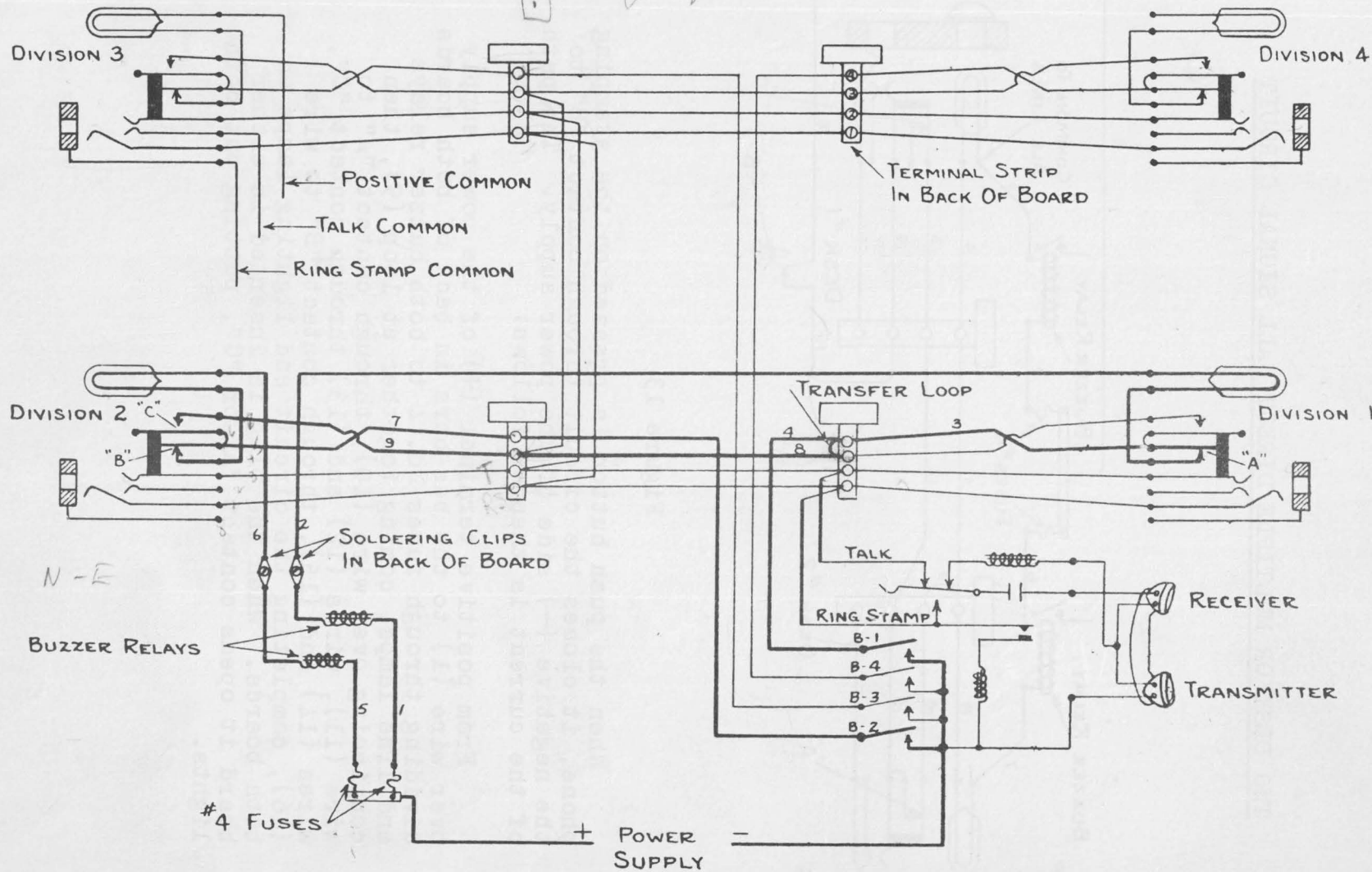


Figure 13

When the push button is pressed on the stamping phone, it closes the circuit through contact "B" to the negative (-) side of the power supply. The path of the current is then as follows:

From positive terminal (+) of the power supply over wire (1) to the bus bars in back of both boards dividing through fuses No. 4 to both buzzer relays and line lamps, coming together at loop (9), then continuing over wire (10), through contact "A" to wire (11), wires (12) and (13) through contact "C", wires (14) and (15), through contact "B" to wire (16), completing the circuit and lighting lamps on both boards. When the plug is inserted in either board it opens contact "A" or "C", putting out both lights.



FOUR DIVISION SIGNAL CIRCUIT
ALL LINES MAY BE TRANSFERRED TO DIVISION 1

FOUR DIVISION SELECTIVE SIGNAL CIRCUIT

The selective system is arranged so the clerk using the stamping telephone may select or call any particular division of the switchboard by pressing the corresponding button on the phone. Therefore, when button #1 is pressed, it lights the lamp on division No. 1. When button #2 is pressed, it lights the lamp on division No. 2, and so on with #3 and #4.

By referring to the illustration on page 22; when the push button B-1 is pressed, the circuit is closed to the negative (—) side of the power supply and the path of the current will be as follows:

From the positive (+) side of the power supply to the bus bar and fuse No. 4, wire (1) to buzzer relay, wire (2) through line lamp to contact "A", wire (3) to terminal strip of Division 1, wire (4) connecting with push button B-1 at the stamping phone, completing the circuit and lighting lamp on Division No. 1.

Pressing button B-2, the path of the current will be the same to the bus bar, then fuse No. 4, wire (5) to buzzer relay, wire (6) through line lamp to contact "B" and wire (7) to terminal strip of Division 2, and then connecting to push button B-2 at the stamping phone completing the circuit and lighting the lamp on Division No. 2.

Switchboards 3 and 4 are signaled in exactly the same way by pressing buttons B-3 and B-4. The positive connection for divisions 3 and 4 have been eliminated from this drawing for simplicity. Actually each division connects through buzzer relay, fuse #4 and bus bar similar to that shown for Divisions 1 and 2.

When there are two or more switchboards of the selective type, the transfer can be used to switch all calls to one switchboard. This is accomplished by placing a loop or jumper between terminals 3 and 4 of the terminal strip on the board selected as the transfer board, which in this case is shown as switchboard #1.

Push buttons B-1, B-2, B-3 and B-4 on the phones will operate as before, but when the transfer switch knobs are pulled on boards 2, 3 and 4, and the B-2, B-3 or B-4 buttons are pressed, the signals will be automatically transferred to Division 1.

Pressing button B-2 will close the circuit to negative as before, but operating transfer switch knobs have now opened contact "B" and closed contact "C" at Division 2. Therefore, the path of the current will be as follows:

From positive (+) power supply to the bus bar and fuse #4, wire (1) through buzzer relay and wire (2) to line lamp of division 1, through contact "A", wire (3) over transfer loop, wire (8) to terminal strip at division 1, wire (9), contact "C", wire (7) which is connected to B-2 completing the circuit and lighting the lamp at Division 1.

When buttons B-3 and B-4 are pressed, the circuit is similar: the transfer merely being a means of connecting the buttons together as though they were one B-1, the loop being on Division 1. The loop could be placed on any of the four divisions; the location being a matter of choice in the operation of the system.

All transfer knobs on the switchboard used as the Transfer Board must be blocked so they cannot be operated, otherwise contact "A" would be opened, preventing any signals from being received.

RINGING OSCILLATOR

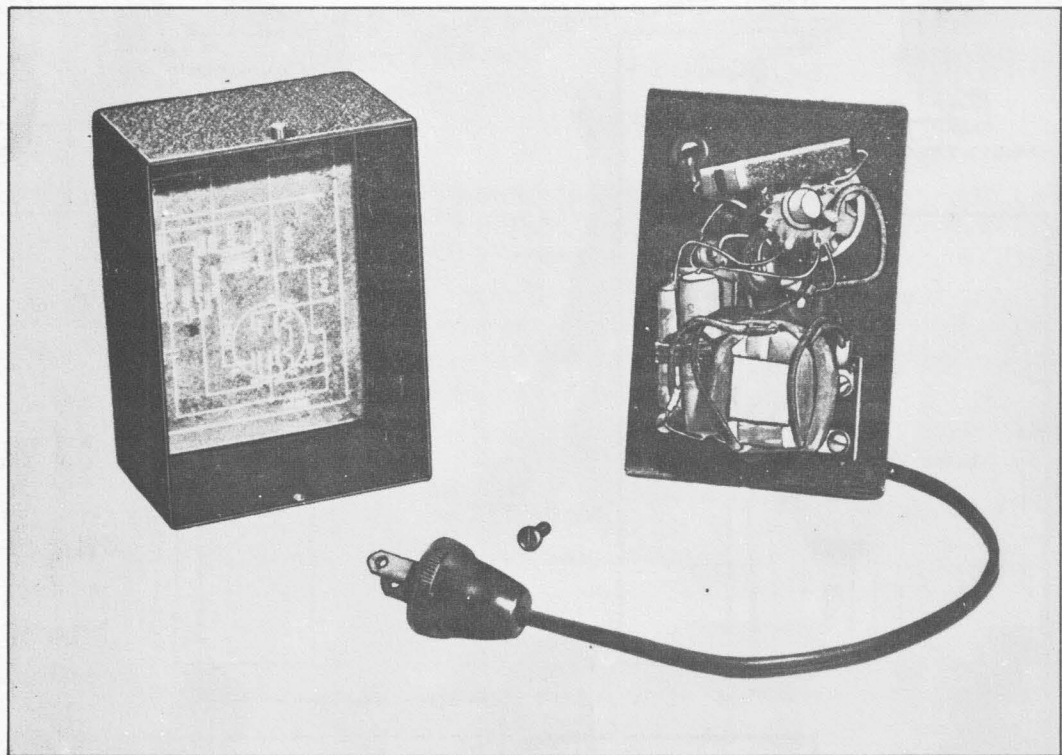
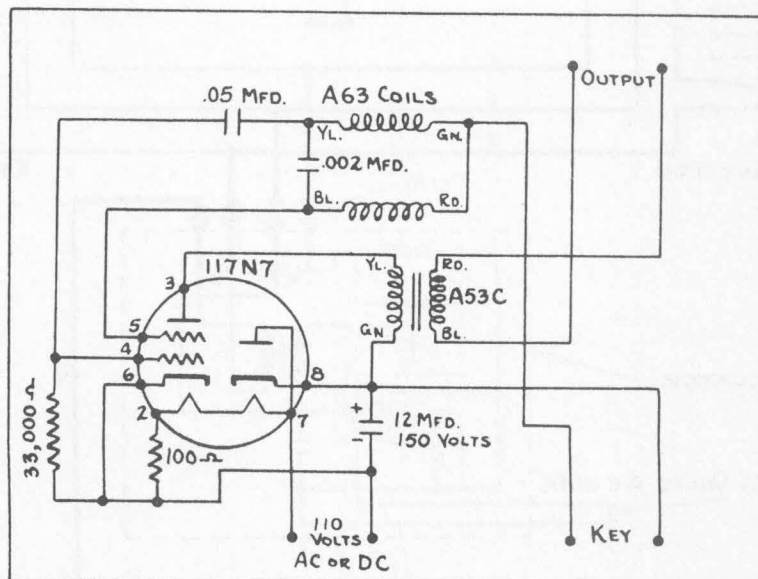


Figure 15



Oscillator Circuit Diagram
Figure 16

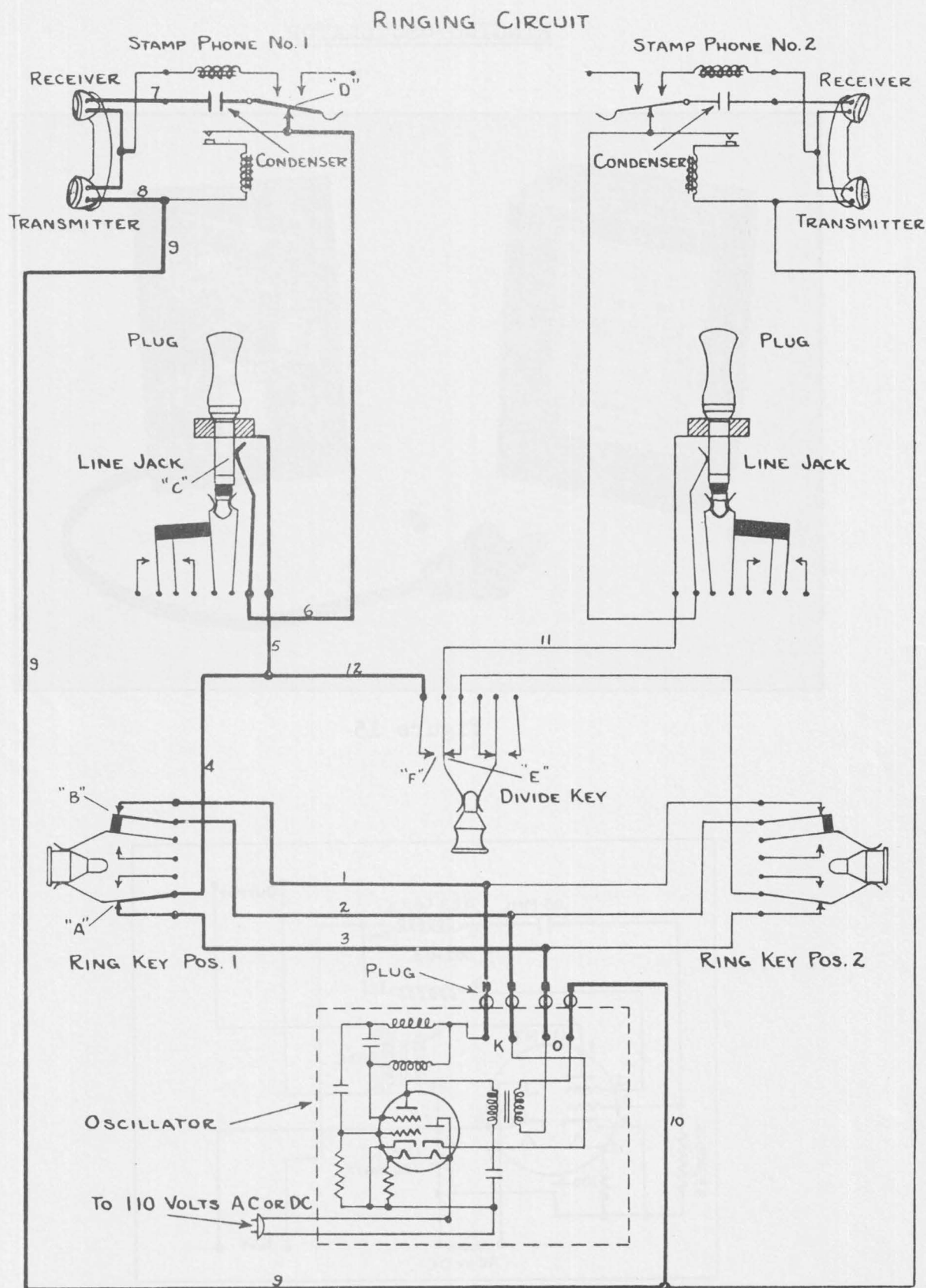


Figure 17

RINGING CIRCUIT

When the ring key of position No. 1 is pressed, it closes the oscillator key circuit from wire (1), through contact "B" over wire (2) to oscillator. From the oscillator, the ringing circuit is then over wire (3) to contact "A", wires (4) and (5) to contact "C" of the line jack, wire (6), contact "D" of the hook switch, through the condenser over wire (7) through the receiver and the transmitter, over wire (8), and returning over wires (9) and (10) to the negative side of the oscillator, completing the circuit. This oscillator produces a ringing tone in the receiver of the stamping phone of approximately 2000 cycles.

From the circuit diagram, it will be seen that position No. 2 will operate in the same identical manner except that the circuit passes through contact "E" of the divide key, so that when the divide key is pressed, both stamping phones No. 1 and No. 2 can be called by the ring key on position No. 1, as the ringing common wire (11) is then disconnected from the ring key of position No. 2 at contact "E", and is connected to the ringing common wire (12) of position No. 1 at contact "F".

The ringing oscillator is so designed that in the event of any trouble, the complete oscillator unit may be easily removed from the switchboard and taken to a radio repairman or returned to the factory for servicing. A new oscillator may be quickly and easily installed in its place. Under no circumstances should the serviceman inexperienced in radio or electronics, attempt to make repairs or adjustments on this unit, other than replacing a defective tube.

TALKING CIRCUIT

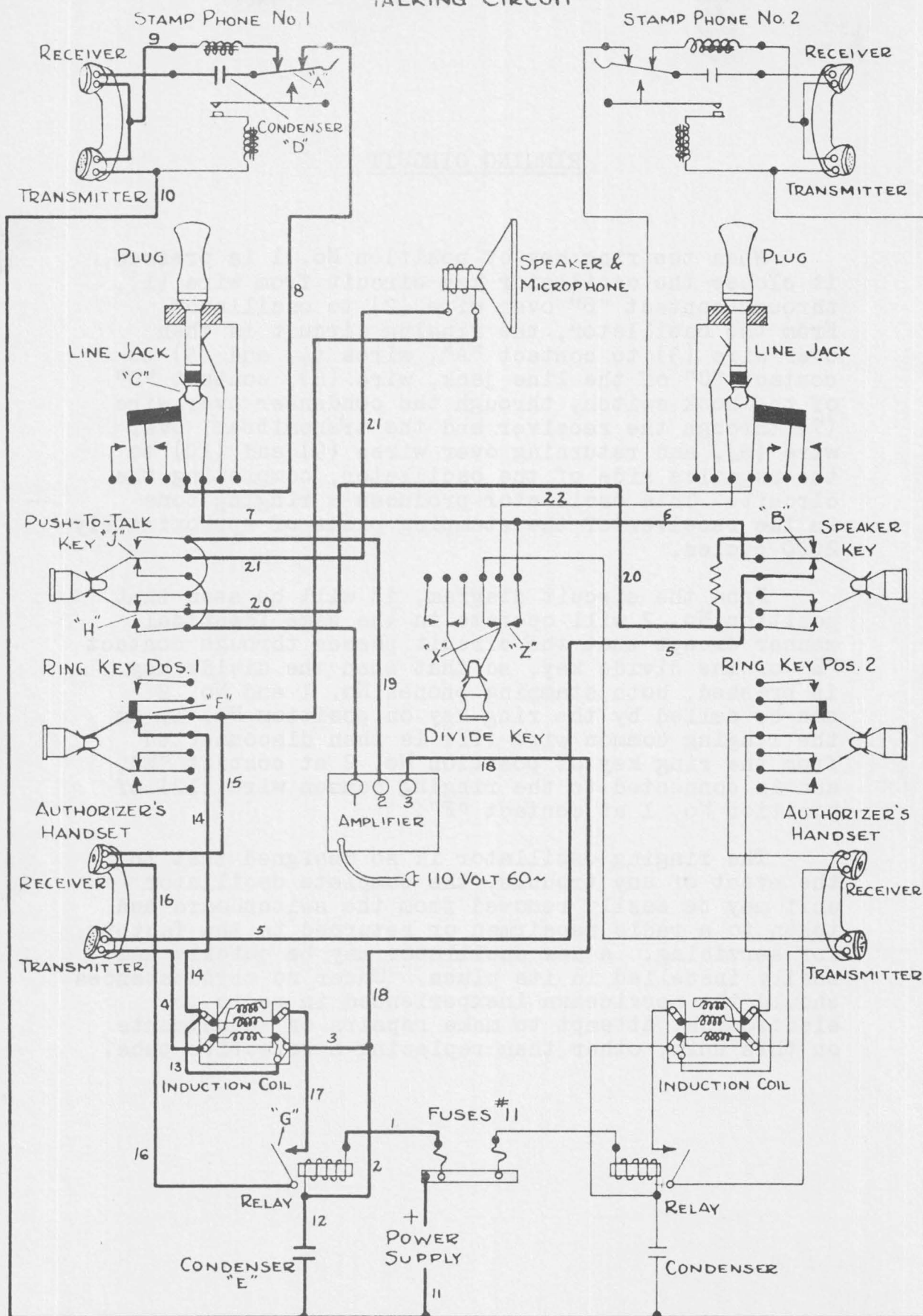


Figure 18

TALKING CIRCUIT

When the receiver is removed from the hook of the stamp phone, closing contact "A", and the plug is in the line jack, direct current from the power supply flows through the circuit as follows:

From the positive (+) side of the power supply to the bus bar and talking fuse #11, wire (1) to the relay coil, wires (2) and (3) to the lower winding on the operator's induction coil, wire (4), transmitter, wire (5) to contact "B" of the speaker key, wire (6) and wire (7) to contact "C" of the line jack, wire (8) to contact "A", retard coil and wire (9) to transmitter, wire (10) and wire (11) to negative (-) side of the power supply. This circuit supplies the transmitters with direct current.

The voice causes the transmitter diaphragm to vibrate. The transmitter then converts these mechanical vibrations into current variations or pulsations. These pulsations or voice currents travel through the circuit as follows:

From the transmitter of the authorizer's telephone handset, wire (5) to contact "B" of the speaker key, wire (6), wire (7), contact "C" of the line jack, wire (8), contact "A" of the hook switch, condenser "D", receiver, transmitter, wire (10), condenser "E", wires (12), (2) and (3), wire (13), wire (14) to contact "F" of the ring key, wire (15) to receiver, wire (16), relay contact "G", wire (17) to center winding on operator's induction coil, through center and top windings to wire (4) and back to the transmitter of the handset.

The direct current circuit, established when the receivers are removed from the hooks, is a carrier current - i.e., unless this circuit is complete, it will be impossible to talk. Therefore, when testing the talking circuit, it is necessary to determine first whether the direct current circuit is completed.

The talking circuit of position No. 2 will operate in the same manner just described, except that the circuit passes through contact "X" of the dividing key. When the dividing key is pressed, both stamping phones No. 1 and No. 2 can be talked to from the authorizer's telephone handset on position No. 1. The talking wire (22) is disconnected from the authorizer's telephone handset on position No. 2, at contact "X", and connected to talking wire (7) on position No. 1 at contact "Z".

The talking circuit just described, functions when the authorizer at the switchboard is using the handset in her conversation with the salesperson at the stamping phone and the speaker key is pulled in the "out" position. If the authorizer does not use the handset but prefers to use the loudspeaker, the talking circuit then is as follows:

Pushing the speaker key "in" actually disconnects the handsets and at the same time connects the speaker. The circuit is then from the positive (+) side of the power supply to the bus bar and talking fuse #11, wire (1) through relay coil, wire (2), wire (18) to the input terminal #3 of the amplifier. Continuing the circuit from the amplifier from #2 terminal, wire (19), push-to-talk key contact "H", wire (20) through the resistor at speaker key, contact "B" as speaker key is in the "in" position, wire (6), wire (7) to contact "C" of the line jack, wire (8), contact "A", retard coil, wire (9), transmitter, wire (10), wire (11) to negative (-) side of the power supply.

If the authorizer desires to talk to the salesperson without using the handset, she simply presses the push-to-talk key, holding it only while actually talking. The speaker then responds as if it were actually a microphone. This talking circuit is then as follows:

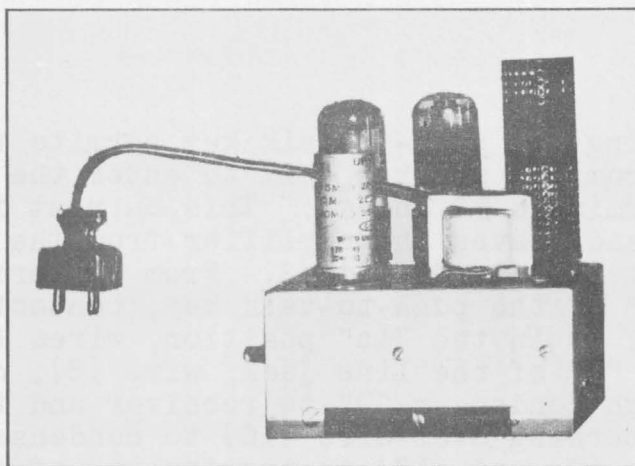
Pressing the push-to-talk key permits the voice currents from the speaker coil to enter the amplifier through terminals #2 and #3. This current is then amplified and leaves the amplifier from the output amplifier terminals #1 and #3. From #1 terminal to contact "H" of the push-to-talk key, contact "B", as speaker key is in the "in" position, wires (6), (7) to contact "C" of the line jack, wire (8), contact "A", through condenser "D" to receiver and transmitter, returning over wire (10) to condenser "E", wires (12), (2) and (18) to terminal #3 of the amplifier.

When the switchboard is divided so that two authorizers are answering calls, it is then necessary to use the handsets only. The speaker cannot be used if two persons are answering calls for the obvious reason of interference between the two conversations in front of the speaker.

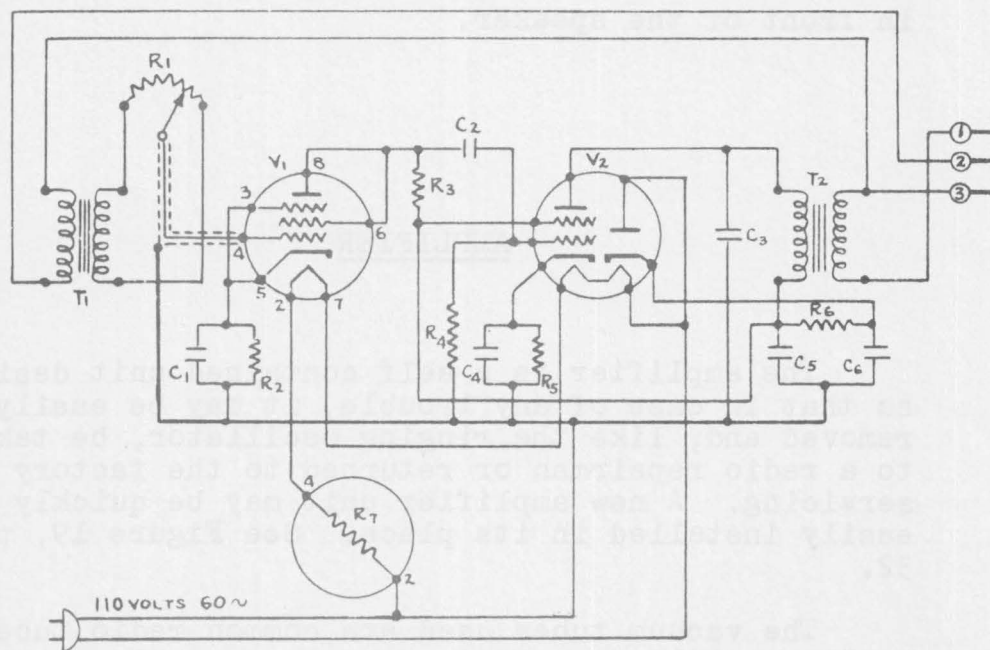
AMPLIFIER

The amplifier is a self contained unit designed so that in case of any trouble, it may be easily removed and, like the ringing oscillator, be taken to a radio repairman or returned to the factory for servicing. A new amplifier unit may be quickly and easily installed in its place. See Figure 19, page 32.

The vacuum tubes used are common radio tubes 12SJ7 and 70L7, and if necessary for replacement, they may be purchased from any radio tube dealer. Under no circumstances should the serviceman inexperienced in radio or electronics, attempt to make repairs or adjustments on this amplifier unit, other than replacing a defective tube.



Amplifier
Figure 19



R1 - 25,000 Ω
R2 - 1,000 Ω
R3 - 100,000 Ω
R4 - 270,000 Ω
R5 - 270 Ω
R6 - 1,500 Ω
R7 - 252 Ω

C1 - 10mfd. 25v.
C2 - .002mfd. 600v.
C3 - .004mfd. 600v.
C4 - 20 mfd. 25v.
C5 - 15mfd. 250v.
C6 - 15 mfd 250v.

T1 - STANCOR
#A-4744
T2 - STANCOR
#A-38Z3
V1 - 12SJ7
V2 - 70L7

Amplifier Circuit Diagram
Figure 20

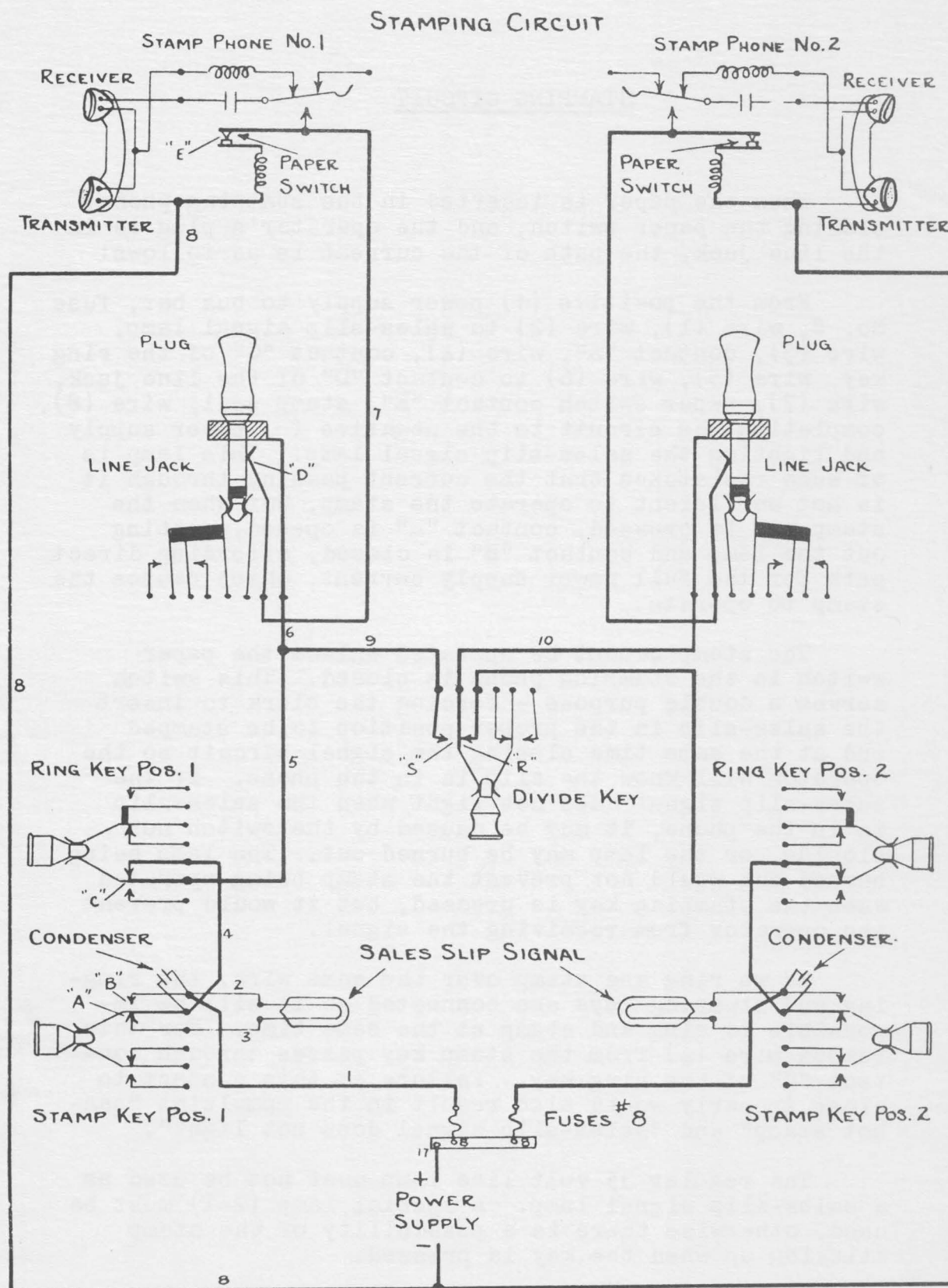


Figure 21

STAMPING CIRCUIT

When the paper is inserted in the stamping phone, closing the paper switch, and the operator's plug is in the line jack, the path of the current is as follows:

From the positive (+) power supply to bus bar, fuse No. 8, wire (1), wire (2) to sales-slip signal lamp, wire (3), contact "A", wire (4), contact "C" of the ring key, wire (5), wire (6) to contact "D" of the line jack, wire (7), paper switch contact "E", stamp coil, wire (8), completing the circuit to the negative (-) power supply and lighting the sales-slip signal lamp. This lamp is of such resistance that the current passing through it is not sufficient to operate the stamp, but when the stamp key is pressed, contact "A" is opened, putting out the lamp and contact "B" is closed, affording direct path for the full power supply current, which causes the stamp to operate.

The stamp cannot be operated unless the paper switch in the stamping phone is closed. This switch serves a double purpose - forcing the clerk to insert the sales-slip in the proper position to be stamped and at the same time closing the signal circuit so the operator will know the slip is in the phone. If the sales-slip signal does not light when the sales-slip is in the phone, it may be caused by the switch not closing, or the lamp may be burned out. The lamp being burned out would not prevent the stamp being operated when the stamping key is pressed, but it would prevent the operator from receiving the signal.

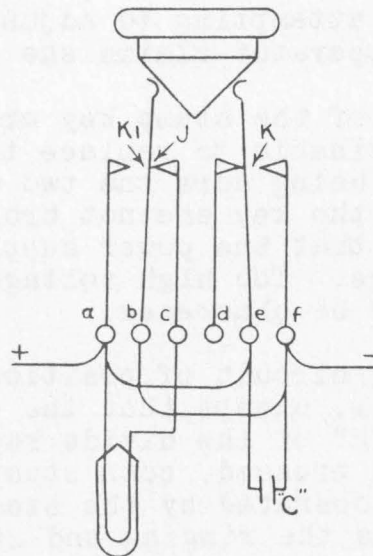
As we ring and stamp over the same wire, the ringing and stamping keys are connected so it will be impossible to ring and stamp at the same time. For this reason wire (4) from the stamp key passes through contact "C" of the ring key. Failure of this contact to close properly would also result in the complaint "cannot stamp" and "sales-slip signal does not light".

The regular 35 volt line lamp must not be used as a sales-slip signal lamp. A special lamp (2-T) must be used, otherwise there is a possibility of the stamp sticking up when the key is pressed.

On complaints of the stamp sticking up when the key is pressed, first examine the sales-slip signal lamp. In the case of two or more switchboards, operate the stamp from all boards. If it sticks on one board only, replace the lamp in that board, even if it is the proper lamp, as the resistance may be too low. If it sticks on all switchboards examine the stamp for mechanical binds, sluggishness, rust, dirt, etc.

The construction of the stamp is such that it requires considerable current to start the operation but a great deal less to hold it in the operated position. Therefore, the special sales-slip signal lamp is used to limit the amount of current so the stamp will not be held up when the stamp key returns to normal position.

The complete contact connections of the stamp key, is used here to make clear the adjustments to overcome a condition not often encountered, but which is necessary to thoroughly understand. Sometimes the complaint is received, "Sales-slip signal lamp burns out." From this it is understood they burn out more frequently than they should. When this complaint is received, examine the operation of the stamp key very carefully. See Figure 22.



Stamp Key
Figure 22

When the push button is normal, the main switch springs "b and e" should contact springs "c and d" firmly and there should be a clearance of at least 1/16" between springs "a and b" and "e and f".

When the button is pressed, the springs "b and c" and "d and e" should open before "a and b" and "e and f" close. It is intended that contacts "K and K1" will open and close as nearly simultaneously as possible.

Springs "a and e" and "b and f" are connected in multiple to afford a path of less resistance to the heavy stamping current and also to reduce the sparking across the contacts when the circuit is opened. Condenser "C" is connected across contacts "K and K1" to absorb the spark and prevent burning of the points.

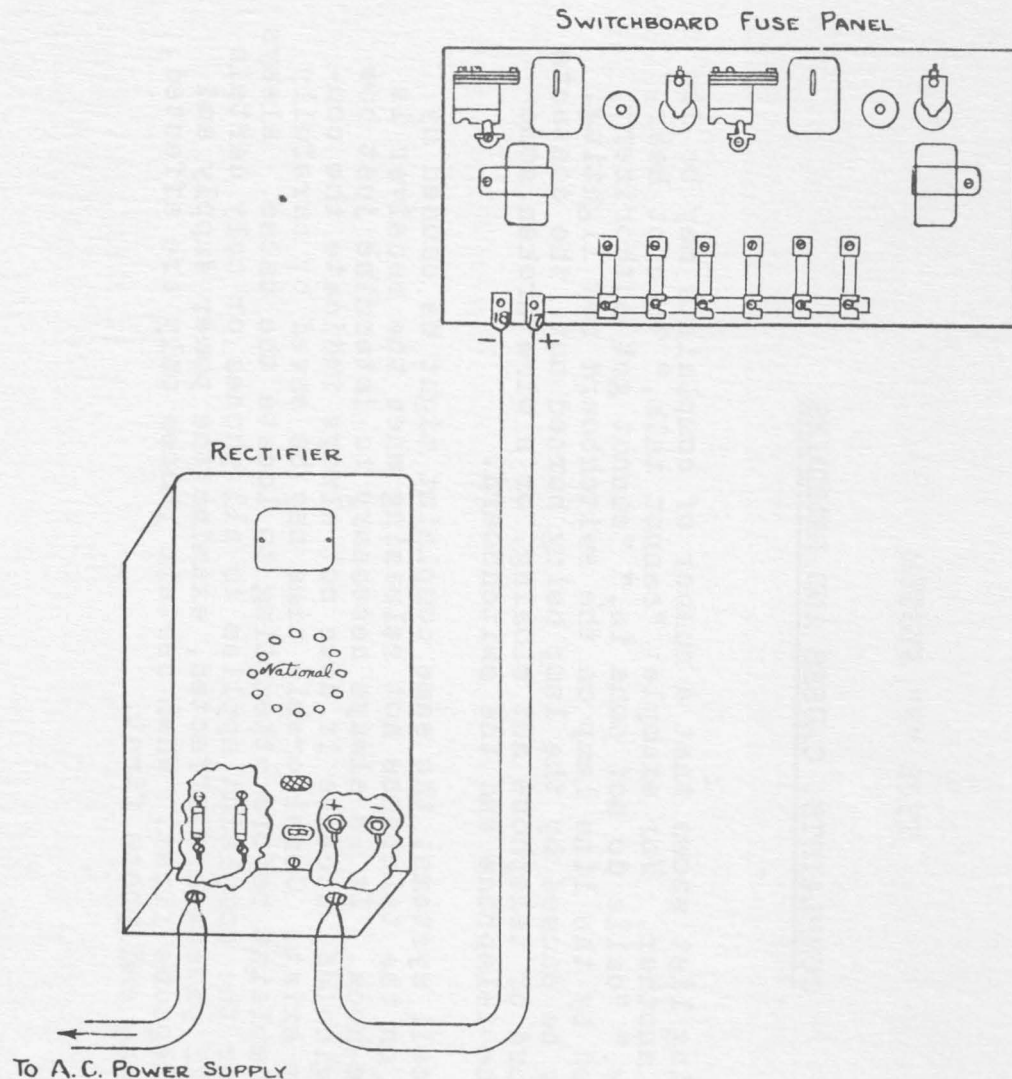
If contact "J" is closed before or at the same time contact "K" or "K1" opens, the force of the spark will pass through the lamp instead of the condenser, as the lamp will be in multiple with the condenser across the contacts, and this spark discharge will soon burn out the lamp.

Evidence of the above condition will be noticed in the sales-slip lamp flaring up brilliantly for a fraction of a second as the stamp key is released. This is not a natural complaint, but is apt to be brought about by attempting to adjust the stamping key because the operator claims she cannot stamp.

If contacts of the stamp key are blackened or burned, it is advisable to replace the condenser "C", at the same time being sure the two wires connecting the condenser to the key are not broken. It is also advisable to see that the power supply is not more than rated voltage. Too high voltage would cause the contact points to be blackened.

The stamping circuit of position No. 2 operates in the same manner, except that the circuit passes through contact "R" of the divide key, so that when the divide key is pressed, both stamping phones No. 1 and No. 2 can be operated by the stamping key in position No. 1; as the ringing and stamping wire (10) is disconnected from the ring and stamp keys of position No. 2 at contact "R" and connected to the ringing and stamping common wire (9) at contact "S".

POWER SUPPLY CIRCUIT



Power Supply Connections
Figure 23

The power supply circuit consists of two wires running from the rectifier to the switchboard fuse panel which is located to the front of the switchboard. The installer usually makes these two hook-up connections. Polarity of connections must be carefully observed.

TYPE "F" SYSTEM

COMPLAINTS, CAUSES AND REMEDIES

The following list shows that a number of complaints may be due to one cause or another. For example: "cannot talk," "cannot hear," "does not answer," "calls do not come in," "cannot get authorizer", may all be caused by the line lamp on the switchboard not lighting. This in turn may be caused by the lamp being burned out, the contacts in the switchboard or telephone not closing, or a wire broken somewhere between the telephone and the switchboard.

On direct call systems, the same complaint might be caused by the push button on the telephone not releasing when the receiver is removed from the hook. It is always necessary to determine just how a complaint originated, because it does not always indicate the condition which may exist. Considerable time may be saved by carefully analyzing the complaint before attempting to locate the cause. Always determine whether the complaint applies to all phones or only certain phones. When all phones are affected, examine the power supply and authorizer's telephone first. When certain phones only are affected, examine jack, line and phone first.

SIGNAL CIRCUIT - DIRECT CALL

<u>Complaint</u>	<u>Cause</u>	<u>Remedy</u>
Cannot get authorizer.	Lamp burned out.	Replace lamp.
Does not answer.	Lamp is in jack sideways.	Replace lamp properly.
Call does not come in.	Contact "B" not closed when push button is pressed.	Adjust switch springs.
	Contact "A" not closed.	Adjust jack springs.
	Positive power supply lead to line lamp broken.	Locate break by test lamp, for broken wire or loose connection is not always visible.
	Wires broken or connections loose, rosin joint, etc.	Locate break by means of test lamp.
	Fuse loose or blown.	Tighten screws or replace fuse.
Line lamp lights - push button not pressed - slip in phone.	"Ring and Stamp" and "Talk" crossed on connecting strip in bottom of phone.	Trim wires and connect so insulation covers wires except under screw heads.
Cannot put line lamp out.	Jack contact "A" not opening when plug is inserted.	Adjust jack springs.
	Lamp crooked and contacting frame of jack.	Replace lamp properly.
	Lamp spring contacting operator's common spring when plug is in.	Adjust lamp springs to clear all other jack springs.

<u>Complaint</u>	<u>Cause</u>	<u>Remedy</u>
Cannot put line lamp out.	Push button not releasing when receiver is removed.	Remove bind in push button or detent.
	Jack spring spacer out.	Put in new spring spacer.
Another line lamp burns when plug is in the line calling.	Lower lamp spring contacting operator's common talk spring.	Straighten lamp springs.

SIGNAL CIRCUIT - SELECTIVE CALL

Remove lamp caps when testing signal circuit. Sometimes lamps are burning too dimly to be seen through the lamp cap.

<u>Complaint</u>	<u>Cause</u>	<u>Remedy</u>
Does not answer.	Contacts "A" or "B" not closed.	Adjust contacts to close.
Cannot get authorizer or call does not come in.	Push buttons contacts in stamping phone not closing.	Adjust contacts to close.
	Fuse blown.	Replace fuse.
	Common connections in bottom of phone open.	Inspect short bare wire between two connecting strips.
Cannot put line lamp out.	Contacts "A" or "B" not opening when plug is inserted.	Adjust contacts to open.

Complaint

Cause

Remedy

Line lamps light on board with transfer loop as soon as plug is inserted.

Insulator out of transfer spring and spring contacting jack switch lever.

Replace insulator.

Sales-slip signal lights with no plug in jack.

Line lamp shade touching transfer spring in board with sales-slip signal and false transfer contact in another board.

Locate and clear both conditions.

Sales-slip signal lights with no plug in jack but with line lamps burning on transfer board.

Insulator out of transfer spring and spring contacting jack switch lever.

Replace insulator.

TALKING CIRCUIT

Complaint

Cause

Remedy

Cannot talk.

Push button not releasing when receiver is removed.

Push button binding.

Cannot hear.
(Direct call system only)

Switch contacts not opening.

Index plate binding.

Cannot talk.

Receiver cord broken.

Replace cord.

Cannot hear.
(Direct or selective call)

Receiver cap loose.

Tighten cap.

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<u>Complaint</u>	<u>Cause</u>	<u>Remedy</u>
Cannot hear. (Direct or selective call)	Receiver diaphragm bent.	Replace diaphragm.
	Retard coil in phone open.	Replace coil.
	Operator's 500 ohm retard relay open.	Replace retard relay.
	Operator's 100 mfd. condenser open.	Replace condenser.
	Telephone hook switch contact "A" not closing.	Adjust hook switch springs.
Noisy	Receiver cords worn or broken so circuit is opened and closed rapidly, causing snapping or frying sound.	Replace worn cords.
	"T" & "C" wires reversed at the stamping phone.	Replace wires correctly.
	Loose connections at power supply.	Tighten connections.

STAMPING CIRCUIT

<u>Complaint</u>	<u>Cause</u>	<u>Remedy</u>
Cannot stamp.	Stamp plunger stick - due to rust or foreign matter.	Clean and inspect stamp mechanism.

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<u>Complaint</u>	<u>Cause</u>	<u>Remedy</u>
Cannot stamp.	Paper switch contact "E" not closing when slip is in.	Adjust switch.
	Contact "C" of ring key not closing.	Examine ring key button to see that it is returning to normal position.
	No. 8 fuse blows.	Replace fuse.
	Contact "B" of stamp key not closing.	Adjust contacts to close properly.
	Contact "B" burned and pitted because of condenser being defective or wires broken.	Clean contacts and replace key if badly burned - if contacts spark badly, a new condenser should be used.
Cannot stamp unless button is pressed at phone.	Talk and Common wires reversed at phone.	Replace wires correctly.
Stamps as soon as plug is inserted.	A line lamp may be contacting lamp jack spring and jack strip at same time. (Applies to direct call only)	Examine all lamps in strip, replace lamp properly.
	Sales-slip signal lamp in jack crooked or defective.	Replace lamp.
	Condenser shorted.	Replace condenser.
	Outside contacts of stamp key not opening.	Inspect key button to see that it is returning after being pressed.

<u>Complaint</u>	<u>Cause</u>	<u>Remedy</u>
Sales-slip signal light is lighted as soon as plug is inserted.	Contact "E" of paper switch permanently closed.	Adjust paper switch to open and close properly.
	Operator's plug shorted.	Replace plug.
Stamp tears charge slip.	Clerk pulls slip before stamp can drop back.	Instruct clerks to operate phone properly.
	Wrong sales-slip signal lamp.	Replace with special lamp.
Stamp does not release until plug is removed.	Mechanical bind in stamp mechanism.	Inspect and adjust lamp.
	Phone magnet armature may be sticking in bottom of phone magnet core.(Inspect)	Raise impression block slightly.
Stamps hangs up.	Insulator out of transfer spring and spring contacting jack switch lever.	Replace insulator.
	Sometimes two operators may answer the same signal. If both plugs are in the same line when the stamp key is pressed, the stamp is apt to stick.	Investigate carefully and determine cause.
	Screw in impression block out far enough to bind on bell. Bell or bell hammer may be bent.	Examine carefully.

RINGING CIRCUIT

<u>Complaint</u>	<u>Cause</u>	<u>Remedy</u>
Rings weak.	Diaphragm loose.	Tighten receiver cap.
	Diaphragm bent or dented.	Replace diaphragm.
Rings in salesperson's ear when receiver is removed from hook.	Contact "D" not opening when receiver is removed from hook.	Adjust hook switch springs.
A particular phone rings too loud. (Sales-slip signal is lighted as soon as plug is inserted)	"Talk" and "Ring and Stamp" wires crossed in jack, line or phone.	Locate and remove cross connection.
Lamp is put out as soon as receiver is removed and relighted as soon as paper is inserted.	Condenser shorted.	Replace condenser.

COMPLAINTS CAUSED BY CONNECTING PHONES WRONG - SELECTIVE SYSTEMS

<u>Complaint</u>	<u>Cause</u>	<u>Remedy</u>
No signal.	"Talk" and "Common" wires reversed at stamping phone.	Reverse wires.
Cannot ring unless receiver is off.		

<u>Complaint</u>	<u>Cause</u>	<u>Remedy</u>
With charge slip in phone, no sales-slip signal unless receiver is off.	"Talk" and "Common" wires reversed at stamping phone.	Reverse wires.
Cannot stamp unless paper is in and receiver off.		
Talk o.k., but noisy if paper is in.		
Signal o.k.		
Sales-slip signal lights when receiver is removed and plug is in jack.	"Talk" and "Ring and Stamp" wires reversed at phone.	Reverse wires.
Cannot ring unless receiver is removed.		
Cannot stamp or talk.		
No signal.	"Ring and Stamp" and "Common" wires reversed at phone.	Reverse wires.
Talk noisy.		
Ring o.k.		
Stamp o.k.		

COMPLAINTS CAUSED BY CONNECTING PHONES WRONG - DIRECT CALL

<u>Complaint</u>	<u>Cause</u>	<u>Remedy</u>
Line noisy with paper in.	"Talk" and "Common" wires reversed.	Reverse wires.
Paper lamp dim with paper in and receiver off.		
Paper lamp o.k. with paper in and button pressed.		
Stamp partially operates with receiver off when stamp is pressed.		
Cannot stamp unless button is pressed.		
Cannot ring unless button is in - receiver off.		
Rings in operator's ear when button is out and receiver on hook.		
Cannot talk - paper lamp dim with receiver off - operator's set dead unless paper is in phone.	"Talk" and "Ring and Stamp" wires reversed.	Reverse wires.
Paper in phone - plug out lights line lamp.		

<u>Complaint</u>	<u>Cause</u>	<u>Remedy</u>
Pressing button with plug in jack lights sales-slip lamp.	"Talk" and "Ring and Stamp" wires reversed.	Reverse wires.
Cannot ring unless receiver off and button out.		
Cannot stamp - blows fuse if button in and stamp key pressed.		
Cannot signal unless button is pressed and paper is in.	"Ring and Stamp" and "Common" wires reversed.	Reverse wires.
Ring o.k. - Stamp o.k.		
Talk very poor - line noisy.		

In the preceding explanation and diagrams we have treated each function as an individual circuit for the purpose of simplicity, but in actual practice, several circuits may use part of the same wire. Therefore, we are also including the exact wiring arrangement of the complete authorizer's switchboard. (See wiring diagram at the rear of this booklet)

SUGGESTED ROUTINE INSPECTION

WEEKLY

Test and inspect each stamping phone as follows:
(5 to 15 minutes required per phone)

Remove paper punchings from box.

See that the ribbon is being shifted daily. Ink occasionally when necessary; using only a small quantity of cash register ink, placing it at points along the entire ribbon. Then roll the ribbon backward and forward from spool to spool, so as to spread the ink the entire length of the ribbon. Be careful not to use too much ink.

Signal the authorizers. See that they receive your signal at the switchboard and you receive their ringing satisfactorily at the phone.

Test the "Sales-Slip Signal" by putting the sales-slip in and out of the stamp several times. See that the authorizer gets the flash at the switchboard on the "Sales-Slip Signal".

Have the authorizer stamp a void sales-slip.

Inspect the printing.

See that the date wheels are being changed correctly and daily.

Save the slips and turn them in to the office with your complaints and suggestions written on them. Also report any repairs made.

Inspect the wiring; see that it is not pulled loose and that there are no loose or temporary connections. This condition is the cause of most complaints. Solder all connections. Replace any missing screws or any other parts.

Test for worn out receiver cord by shaking and bending the cord while the authorizer is on the line. If the cord cuts out or is noisy, replace it with a new one.

If you find anything wrong, fix it at once; don't wait until it interferes with service.

ADDITIONAL INFORMATION

Should further information be required, write our nearest representative or direct to us.

THE NATIONAL CASH REGISTER COMPANY

DAYTON 9, OHIO, U. S. A.

