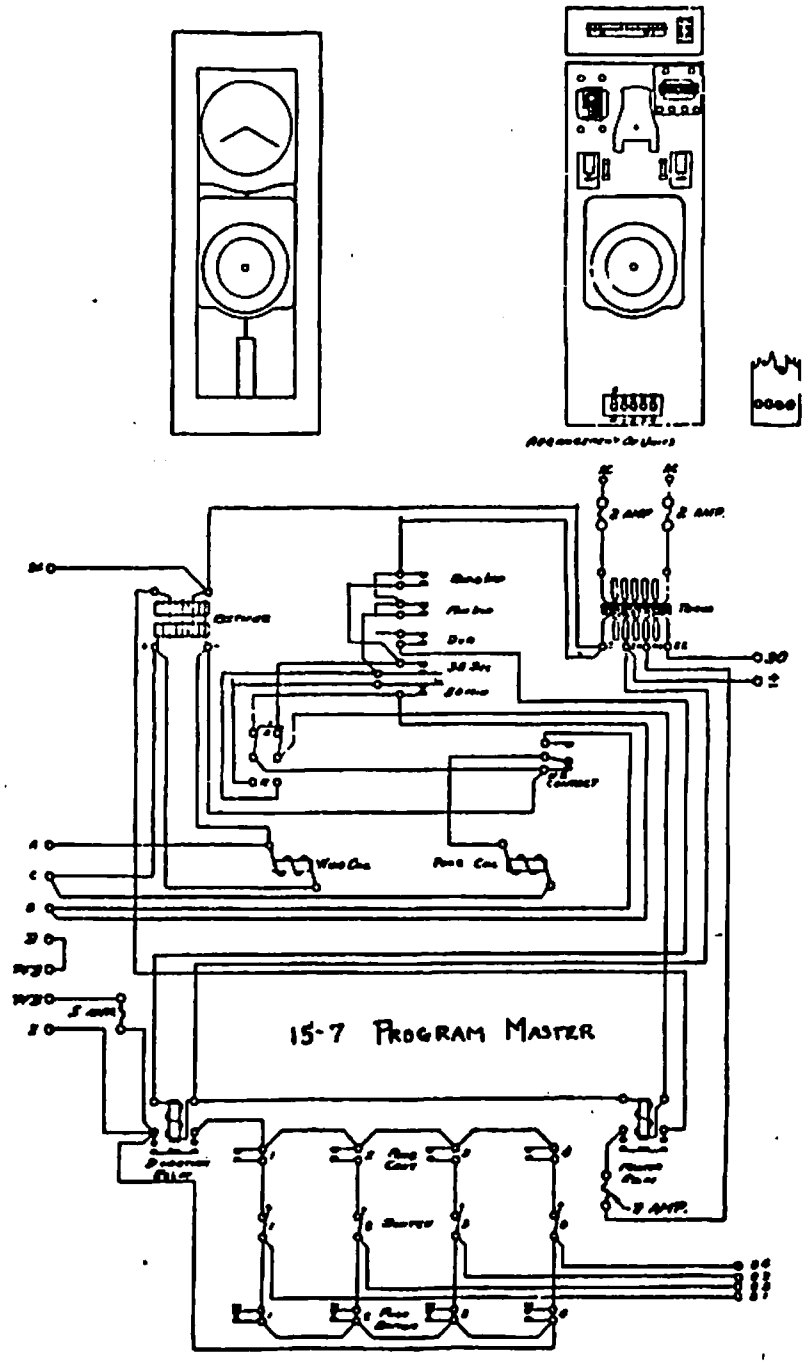


Printed in U.S.A.

PROGRAM DEVICES

Description

A device for controlling the operation of signals, such as bells, horns and whistles, eliminating time on job time recorders, or performing any other function according to any predetermined schedule is known as a Program Device.

The program device is operated on the minute jump principle and receives its time sense from either a master clock or synchronous motor which closes a contact once each minute, thus impulsing the program device once each minute.

Installation

Program devices are furnished in metal cabinets for master clock operation or in self-contained units operated by a master clock or synchronous motor. The location should be convenient from the standpoint of wiring. If the unit is of the self-contained master clock type the location should be one free of dust, dirt, moisture, vibration, and extreme temperature changes. If the device is timed by a synchronous motor it should be connected to a source of supervised alternating current which cannot be turned off.

Setting

If the clock is synchronous-motor operated, the hands are connected directly to the motor. A setting lever or knurled knob is provided at the rear of the movement directly back of the hands, for setting purposes. *Always set the hand so that it is pointing at a minute marker when the program drum advances.*

The program device is impulse driven, receiving an impulse and advancing one minute at a time. To advance the program device, press and release the armature slowly or depress the armature and turn the drum slowly in a counter-clockwise direction. Never attempt to turn the drum in a clockwise direction.

The minute indication on the program drum is when the contact pins pass under the contact fingers. The front disc of the drum is graduated in minutes and marked at each fifteen minute position. Always check to see that the minute indicated by the contact operating levers agrees with the time as indicated by the clock dial.

Printed in U.S.A.

A small or calendar drum, which is located directly above the minute drum indicates the days of the week and the six hour periods of the day. That is, the calendar drum is divided into seven days and each day into six hour periods. The upper contact operating levers are likewise the indicating point for the correct six hour period. Always check to see that the indication agrees with the day and the period in which the program device is being set.

Advancing the Calendar Drum

If the large drum has not advanced beyond two or eight, operate the small lever which projects below the contact block assembly. By pressing toward the left as far as it will go and then releasing same, the calendar will be advanced one space (6 hours).

If the large drum has advanced more than two hours since the calendar drum automatically advanced, press the calendar setting lever and turn the calendar drum carefully in a *clockwise* direction to the desired six hour period. After having set the calendar drum in this manner, make certain that the retaining pawl has dropped in the proper tooth of the ratchet.

Regulation

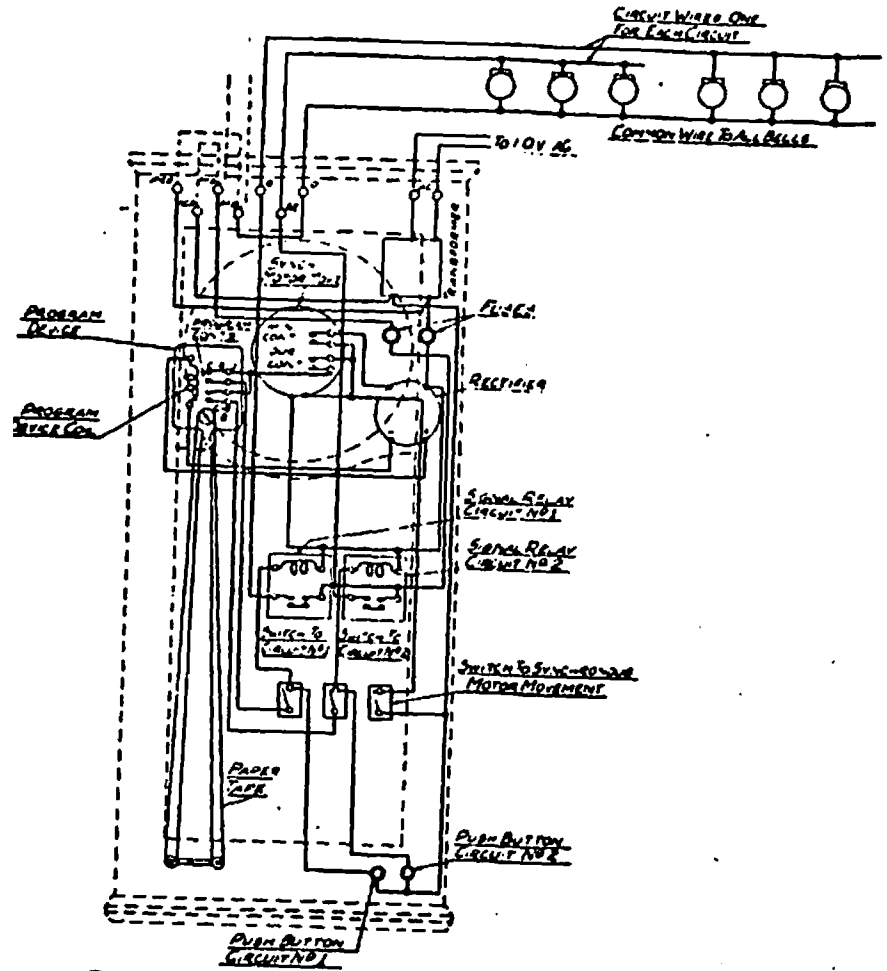
If the device is timed by a synchronous motor, the time element or clock movement operates in synchronism with the frequency of the alternating current, therefore, requires no regulating. In fact, the regulating is done at the power house. If the clock gets slow it is because of the fact that the power has been interrupted. When the power is interrupted the program device will stop and immediately start again when the power is restored. It will then be necessary to advance both the clock hands and the program device as many minutes as the power has been interrupted.

If the program device receives its time sense from a pendulum clock, regulation is accomplished by screwing the pendulum bob up or down as the case may require. Turning clockwise raises the bob and makes the clock run faster and vice versa.

Adjusting Duration of Ring

If a timing relay is used, raise the weight (by loosening the thumb screw) on the pendulum of the timing relay to shorten the duration of ring,

metal cabinet. The program device would then control the circuits to the coils of these relays which would be 24 volts A.C. and the contact points for the relays would control the circuit to the signaling devices regardless of the voltage.



Synchronous Motor Paper Tape

Fig. 17

Printed in U.S.A.

WIRING DIAGRAM

Fig. 16 is a wiring diagram showing the complete wiring as well as the proper method of connecting this program device. If the signaling devices are already installed and operate on 24 volts or less, this program device may be used for controlling them. Extra terminals are provided on the top of the cabinet so that the power for the signaling devices need not be taken from the transformer, but may be the same source as is now used. However, we recommend changing the signals to operate from the transformer incorporated in the program device. This transformer furnishes 24 volts A.C.

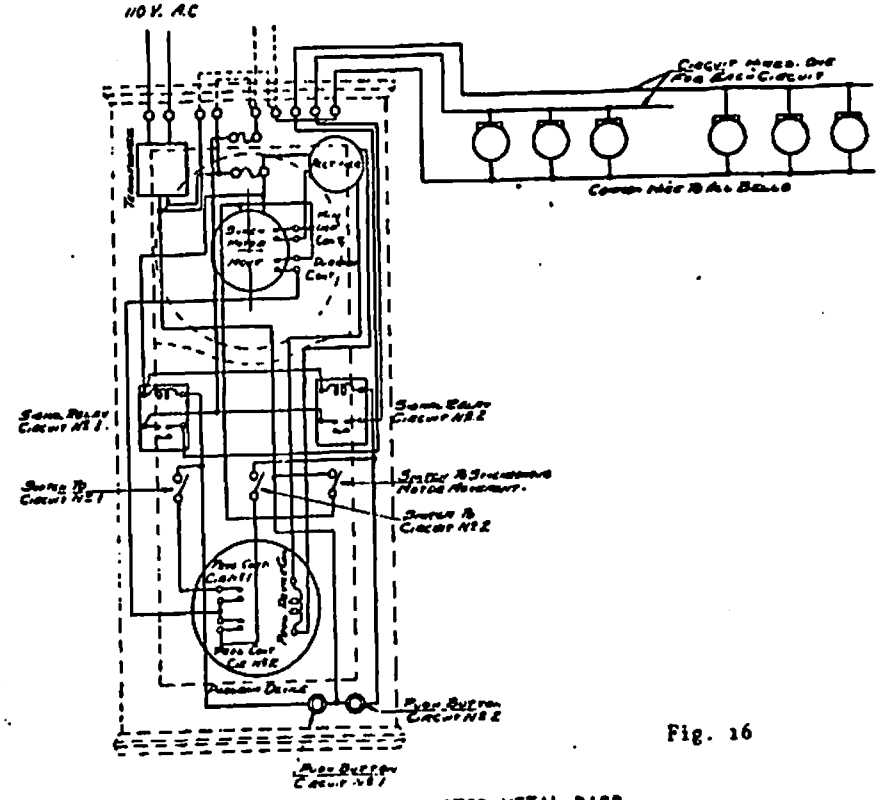


Fig. 16

SYNCHRONOUS MOTOR METAL DISC

If the signaling system already installed operates on a voltage in excess of 24 volts and same signals and source of power are to be used, it will be necessary to install a relay for each circuit in an independent

Printed in U.S.A.

and lower the weight to lengthen the duration of ring. Tighten the thumb screw in the weight after the setting has been determined. Be sure that the head of the thumb screw is toward the front of the relay.

If a duration contact in the Master Clock is used to control the duration of the signals it is necessary to remove the clock hands and dial in order to gain access to the contact. This, being a rather delicate procedure, requires the services of a skilled mechanic. Therefore, it is recommended that a representative of the company be called to make the necessary adjustment.

The duration or rear contact on the synchronous motor movement is operated by a split cam and the duration of the signal may be lengthened or shortened as desired. To lengthen the duration of the signal move one cam until the point is farther away from the point of the other cam. To shorten the duration of the signal move one cam until the points are closer together.

EQUIPMENT

The equipment in each program cabinet is as follows: Synchronous motor indicating clock with special cam contacts; transformer; rectifier; main switch; a relay; switch and push button for each circuit; and eight disc program device.

The synchronous motor movement drives the clock hands and the cams which operate two independent contacts which close once each minute. One of these contacts is made for approximately two seconds and closes the circuit to advance the program device. The other cam contact remains made from eight to ten seconds and is used for controlling the duration of the signals.

Transformer

The transformer is used to change the 110 or 220 volt alternating current to 24 volt alternating current so that all equipment will operate on low voltage, thus simplifying the wiring. This transformer furnishes the power for operating the program device, relays and signaling devices.

Rectifier

The rectifier acts as a trap or filter to let the low voltage alternating current flow in one direction, the better to operate the impulse electro-magaet of the program device. The rectifier is not used for any other purpose.

Printed in U.S.A.

Main Switch

The main switch controls the power to the synchronous motor, rectifier and signal relays. When the switch is in the "off" position the program device is inoperative, however, the signals may be sounded by the push buttons.

Relay

The relays are used to close the circuit to the signaling devices. The contacts of the program device and the duration contacts on the synchronous motor movement are necessarily of light construction, therefore, only enough current is passed through them to energize the coils of the signal relays. The contact points of the signal relays are heavy silver contactors and will safely carry several amperes to operate the signaling devices.

Circuit Switches

A switch is connected in each relay coil circuit. This switch is useful in preventing the relays from operating so that irregular schedules may be complied with. When the switch is turned on, the signals will operate normally according to the schedule set up on the program device. When the switch is turned off, the relays and the signaling devices will not operate. These switches should be turned off during vacation. It is not necessary to turn them off during week-ends, as the program device automatically silences the signals at any time desired provided this time occurs regularly each week.

Push Button

Push buttons are connected in parallel with the program contacts and when depressed operate the signal relays in exactly the same manner as the program. They are useful in controlling irregular schedules and may be also used to sound a pre-determined code for fire alarm drills, etc.

Circuits and Schedules

The drum type or universal program is much more flexible and positive in operation than any other program device on the market. It is designed to meet the most exacting requirements as it will handle very complicated schedules. It consists of a number (8 or 12) of slotted discs forming a drum-like stack. Each disc has 360 slots, or one for each minute during

Printed in U.S.A.

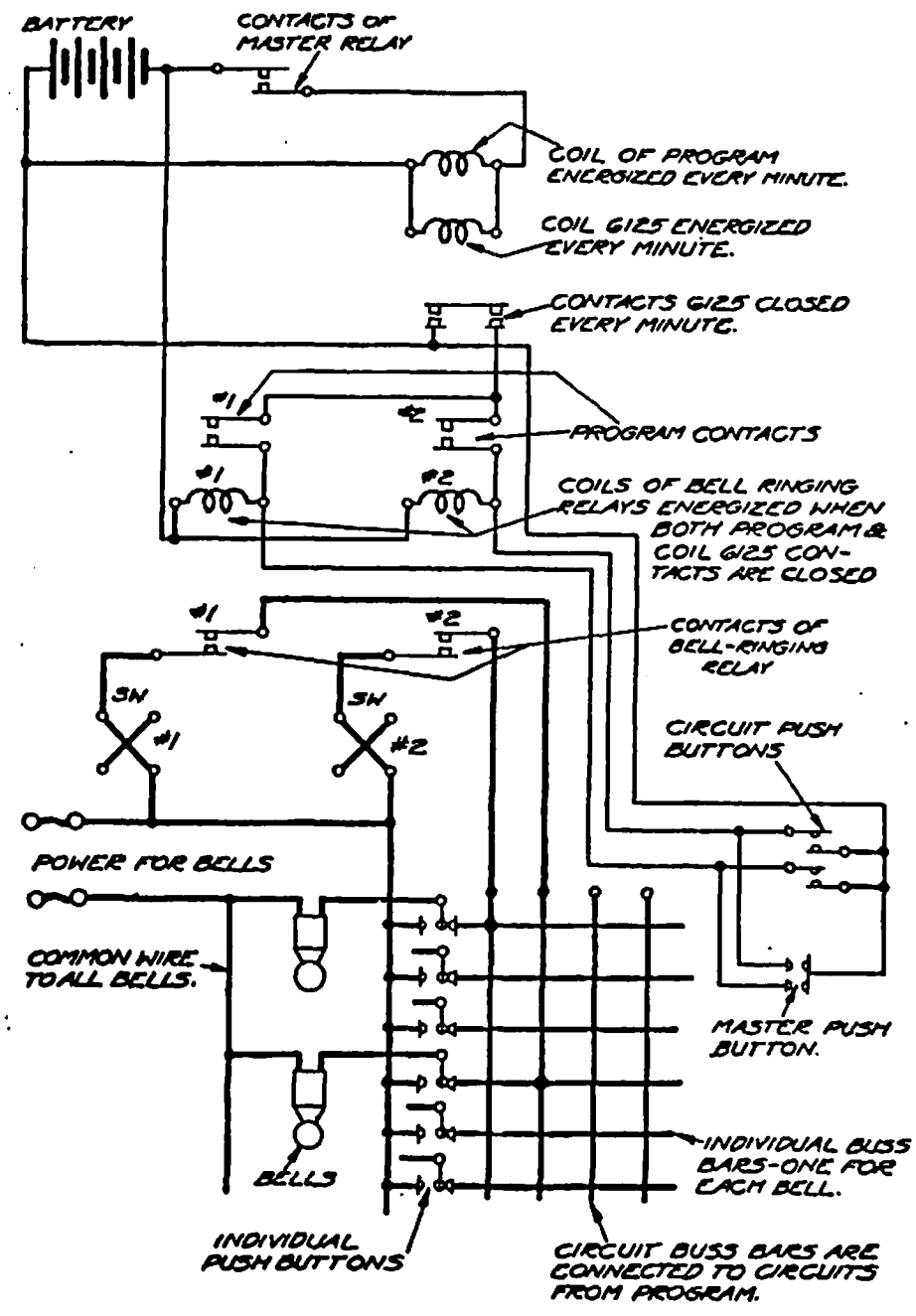


Fig. 15

Printed in U.S.A.

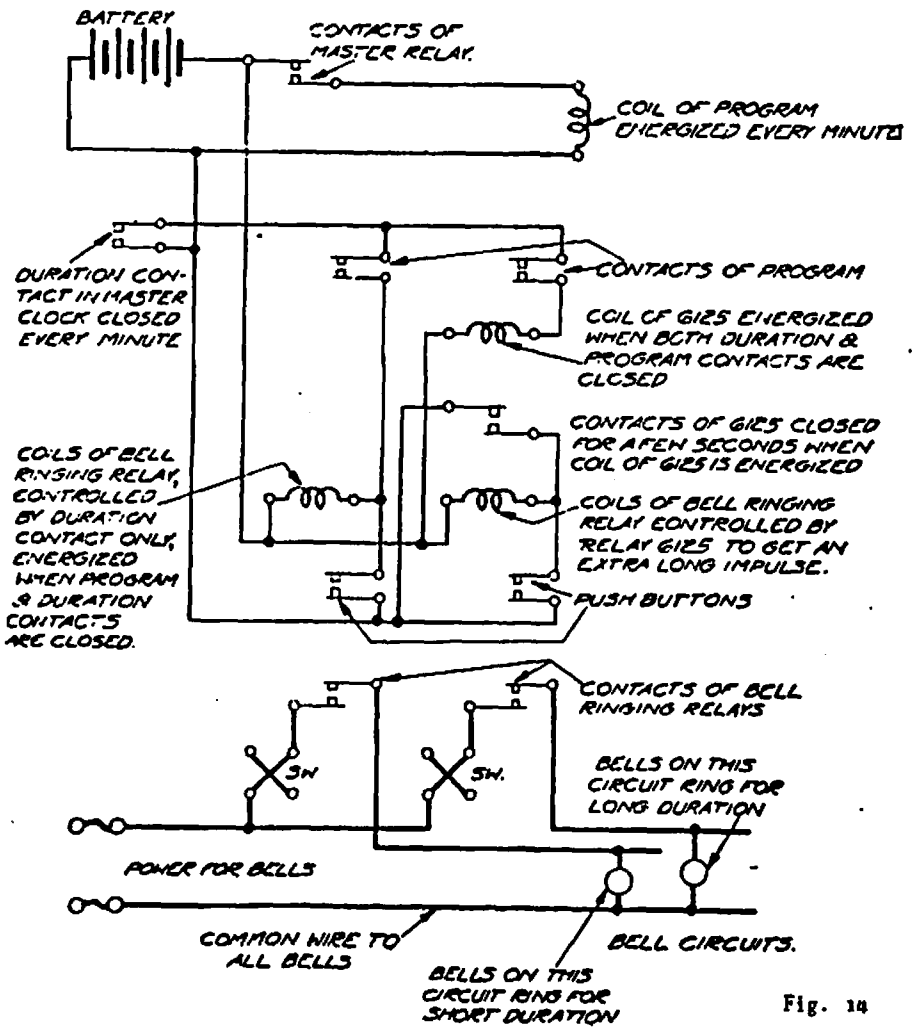


Fig. 14

The operation of the cross connecting plug board can be better understood from the following diagram.

It will be seen that the individual push buttons are of the three point type; the bell being disconnected from its circuit before it is thrown across the line, thus preventing all of the bells on that circuit from ringing.

a six-hour period. These are supported on an iron base which also carries the driving magnet, the calendar attachment, the contacts, etc. The calendar drum is made up of discs in the same manner as the big drum but instead of being divided into minutes, it is divided into six-hour periods covering one week, one slot for each six-hour period, making 28 slots in all. The program schedules are set by inserting metal pins into these slots wherever a signal is desired. These pins projecting from both discs operate on the same set of contacts to ring the bells or perform other operations. The conditions under which both pins will press together on the same set of contacts is determined as follows: The larger drum which is advanced every minute makes one revolution in six hours. This means that one disc takes care of a six-hour period only. The calendar drum makes one revolution a week, being advanced one space every revolution of the large drum by a cam wiper dropping from a cam attached to the large drum. It is apparent, therefore that a pin, when inserted in a slot on the calendar drum, will determine the particular six-hour period of each day in which the signals, sets up on the large disc directly in line with it, will operate. (See Fig. 1).

It is easy to see that if another set of signals is to occur during the following six-hour period of the same day, a pin must be inserted in the next succeeding slot of the next small calendar disc, the signals, of course, being set up with pins on the large disc in line with the second calendar disc.

It is obvious that a schedule set up on the large disc will be repeated automatically every six hours, if the clips or pins are placed in the calendar disc for the six-hour period.

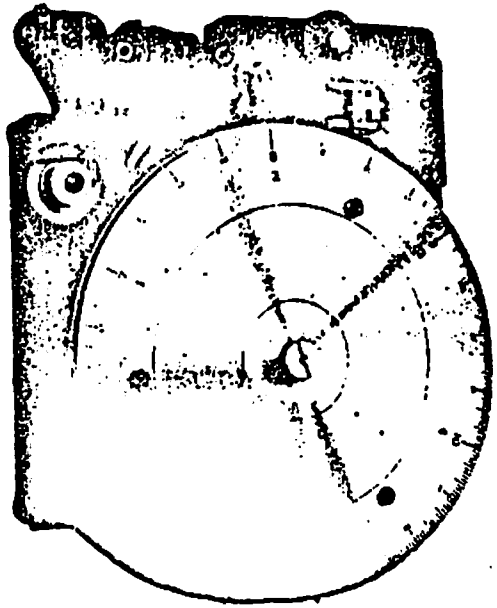
In order to fully understand the operation and flexibility of the Program Device, the difference between a program schedule and a program circuit must be thoroughly understood.

A program circuit may be defined as one where all bells and signals ring together and can be controlled from one push button or one automatic control. The only thing that limits the number of bells or signals on one circuit is the carrying capacity of the relay used.

One program circuit may ring the bells on several program schedules, that is, the same circuit could be used for Monday, Tuesday and Wednesday on one schedule and also operate signals on an entirely different schedule for the remainder of the week.

Printed in U.S.A.

A separate circuit must be provided for signals that are to be operated when the other signals are silent. This holds true even though but one bell is required to be silent on a single day although it rings during the other days on the same schedule as all other bells.



Only such bells can be included on one circuit as ring in unison on all schedules, in other words, the schedule that applies to one bell on a circuit must apply to every bell on that circuit without variation or exception.

For example, supposing in a school program, the yard gong must ring at 9 A.M. every day except Saturday and Sunday, and in the school rooms the bells must ring every half hour from 9 A.M. to 4 P.M. every day except Saturday and Sunday.

It is plainly seen that, if made into one circuit, all bells including the yard gong, would operate each half hour.

To handle a twelve-hour schedule, for instance, any combination of signals between 6 A.M. and 6 P.M. for one day, two discs are required. Likewise, an eighteen-hour schedule requires three discs and a twenty-four-hour schedule four discs, all because of the fact that one revolution of the big drum controls only a six-hour period.

Printed in U.S.A.

completed through the program contacts to the coils of the 6125 relay. While the armature of the 6125 relay is attracted, the safety contact is held open thus preventing the bells from ringing until the minute impulse is completed. When the minute impulse is completed, the 6125 armature starts to release and closes the safety contact. A circuit is then completed through the 6125 contact and the coil of a circuit closing relay. When the circuit closing relay armature is attracted, power is thrown on the bell circuit.

The following diagram covers the circuits when both a duration contact and timing relay are used to get a long ring on one circuit and a short ring on another circuit. When both a duration contact and timing relay are used, the timing relay does not have the safety contact as the duration contact is always set to make just after the minute impulse contact is broken. Both contacts are used for securing a short ring on one circuit and a long ring on another or when a schedule of long rings and a schedule of short rings, either separate or interspersed are desired on the same circuit.

The 6125 relay may be operated direct from the minute impulse circuit every minute or it may be operated only when a ring is desired. When operated every minute, it plays the same part in the circuit as a duration contact.

NOTE: We do not recommend operating the timing relay every minute whenever it can be avoided. Use a duration contact wherever possible.

When a program device is used for school work, a cross connecting plug board is frequently used. The purpose of the cross connecting plug board is to enable any bell in the school to be transferred from one circuit to another without disturbing connections or wiring. An individual push button for each bell may also be supplied as well as circuit push buttons for each circuit and a master push button for all circuits.

Printed in U.S.A.

The preceding diagram gives the circuits when the bells are controlled from a duration contact. In this case a circuit is completed through the duration contact, program contact and coils of circuit closing relay. The armature of the circuit closing relay is held attracted as long as the duration contact is made. When the relay armature is attracted, power is thrown on the bell circuit.

The following diagram gives the circuits when the bells are controlled by a timing relay. When this is the case, the minute impulse circuit is

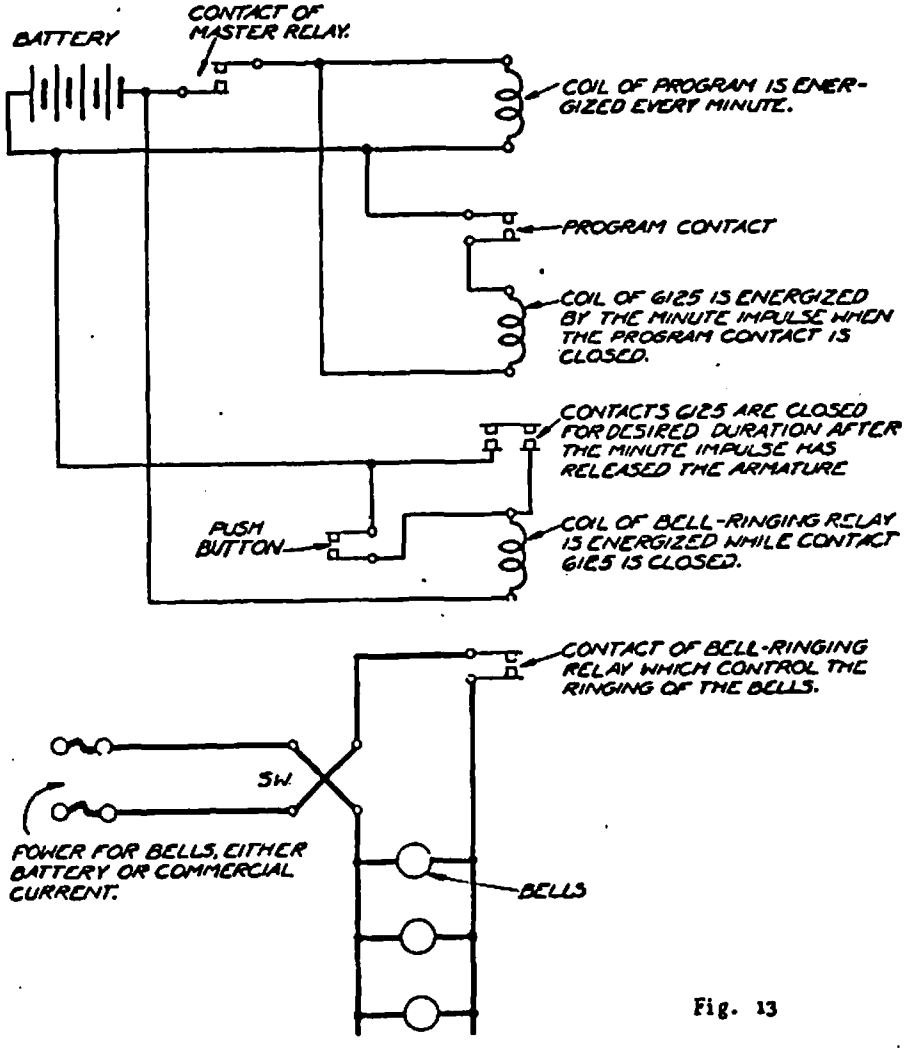


Fig. 13

Printed in U.S.A.

If the schedule of signals varies on certain days of the week, additional discs must be used for the changed schedule on the basis of one disc for every six-hour schedule. If on a twelve-hour schedule the signals must operate on a different schedule on any one day, two additional discs are required, and if they are to operate on an entirely different schedule Saturday morning, an additional disc must be used, making five in all. It is understood that these signals will be silenced at night, Saturday afternoon and Sunday by leaving pins out of the proper section of the calendar drum.

Another important thing to bear in mind is that a schedule that is operated on a given circuit for one day cannot be transferred to operate on another circuit on some other day, from the same disc. Each individual circuit must be connected permanently to enough discs to handle all the schedules of signals required by that circuit. There is no way by which a calendar drum can shift a schedule from one circuit to another.

To better understand the procedure of laying out a schedule properly, study the following example.

Assume that bells are to be rung as follows:

High school bells at 9:00 A.M., 9:30 A.M., 11:00 A.M., 12 M., 1:15 P.M., 3:00 P.M. and 5:20 P.M., on Monday, Tuesday and Wednesday, and at 9:15 A.M., 9:45 A.M., 11:15 A.M., 12:15 P.M., 1:30 P.M., 3:15 P.M., and 5:30 P.M. on Thursday and Friday.

Grammar school bells at 9:30 A.M., 10:15 A.M., 11:00 A.M., 11:45 A.M., 1:15 P.M., 2:00 P.M. and 2:45 P.M., on Monday, Tuesday, Wednesday and Thursday, and at 9:30 A.M., 10:15 A.M., 11:00 A.M., 11:45 A.M., 1:15 P.M.; 1:55 P.M. and 2:35 P.M., on Friday.

Outside gongs at 8:45 A.M., 8:55 A.M., 12:00 M., 1:00 P.M., 1:10 P.M., and 5:20 P.M., on Monday, Tuesday and Wednesday, and at 9:00 A.M., 9:15 A.M., 12:15 P.M., 1:15 P.M., 1:25 P.M. and 5:30 P.M. on Thursday and Friday.

All bells are to be silent on Saturday and Sunday.

After studying the above program, it will be noted that no two of the schedules are the same. If we attempt to put any part of the two schedules on the same circuit, the bells would be ringing at the wrong time and place, causing confusion.

Printed In U.S.A.

As each disc will take care of only a six-hour period and each schedule covers a twelve-hour period, it will be apparent that an eight-disc program device would not be sufficient and that a twelve-disc program device would be required to handle the above program.

Assuming the calendar change to be regular (approximately three minutes past 6 and 12) the twelve-disc program device would be wired in three circuits of four discs each; the first four discs for the High School circuit, the next four for the Grammar School circuit and the last four for the outside circuit.

We will set the schedules for the various circuits, starting with the High School.

Insert pins at the following places:

On the large drum: 9:00, 9:30, 11:00 and 12:00 in the first disc; 1:15, 3:00 and 5:20 in the second disc; 9:15, 9:45 and 11:15 in the third disc; 12:15, 1:30, 3:15 and 5:30 in the fourth disc.

On the calendar drum; the second A.M. section of the first disc for Monday, Tuesday and Wednesday; the first P.M. section of the second disc for Monday, Tuesday and Wednesday; the second A.M. section of the third disc for Thursday and Friday; the first P.M. section of the fourth disc for Thursday and Friday.

The schedule for the Grammar School is set up as follows:

On the large drum: 9:30, 10:15, 11:00 and 11:45 in the fifth disc; 1:15, 2:00 and 2:45 in the sixth disc; 1:15, 1:55 and 2:35 in the seventh disc.

On the calendar drum: the second A.M. section of the fifth disc for Monday, Tuesday, Wednesday, Thursday and Friday; the first P.M. section of the sixth disc for Monday, Tuesday, Wednesday and Thursday; the first P.M. section of the seventh disc for Friday.

It will be noted that the Grammar School schedule for the program period from 6:03 to 12:03 is the same for all days of the week. Therefore, there will be no pins in the eighth disc of either the large or small drum as the schedule for Friday morning is taken care of by inserting a pin in the second A.M. section of the fifth disc on the calendar drum for that period. Just the schedule for the six hour period that deviates from the regular schedule is all that needs to be set on a separate disc.

Printed in U.S.A.

cording to whether or not its contact points are open or closed. In other words, on each alternate impulse, the contacts are opened or closed. As the contact finger pin rides on the top of its tooth, the contacts are closed and when the pin follows down in the bottom of the tooth, the contacts are opened. When the 6121 contacts are closed, the minute impulse circuit is completed through the coils of the 6101 relay. In this case the 6101 relay acts as a master relay, operating the job time recorders when the 6121 contacts are closed and stopping them, or eliminating time, when the 6121 contacts are open.

If more job time recorders are to be operated than the carrying capacity of the 6101 relay, a standard distribution cabinet may be used.

The program device under class No. 3 is used for ringing bells and gongs. This type of program device is the most widely used and a number of combinations of hook-up may be secured. Either the 6125 relay or a duration contact in the master clock, or both, are used.

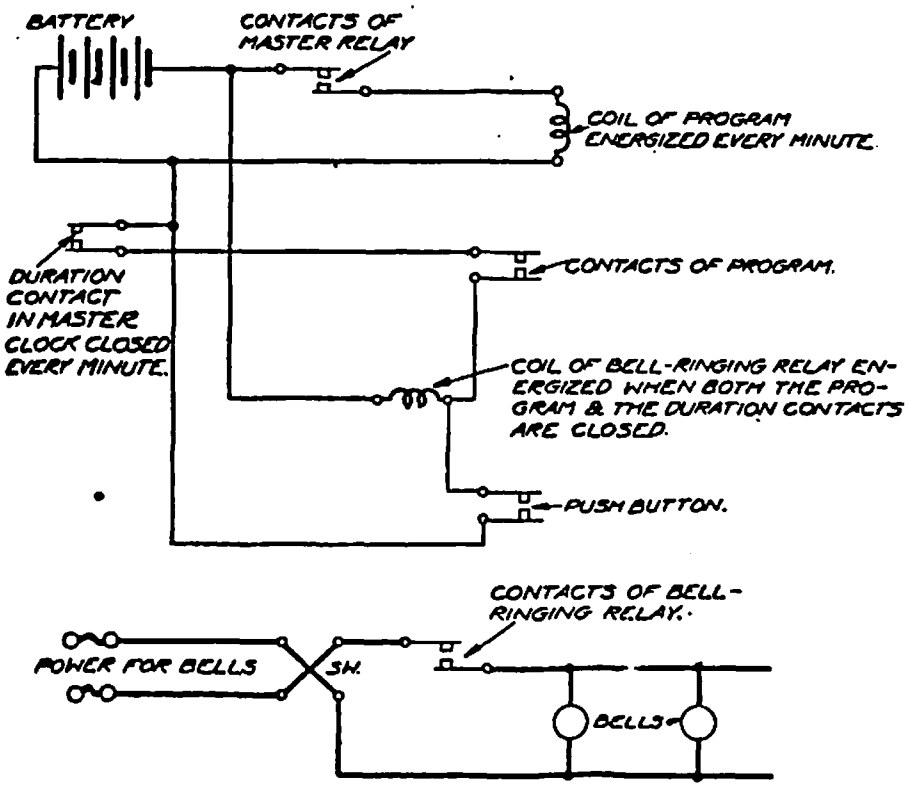


Fig. 12

Printed in U.S.A.

3. A long or sustained impulse of about five to fifteen seconds several times during the day.

Program devices under Class No. 1 are used for tripping auto call systems, changing the two color ribbon on metal case job time recorders and operating the clutch on the elapsed time recorders. The following diagram gives the circuits for a one circuit program device under the above class. When the program contacts are closed, the regular minute impulse circuit is completed through the coils of the 6101 relay in the program cabinet. When the 6101 relay attracts its armature, the irregular impulse circuit is completed.

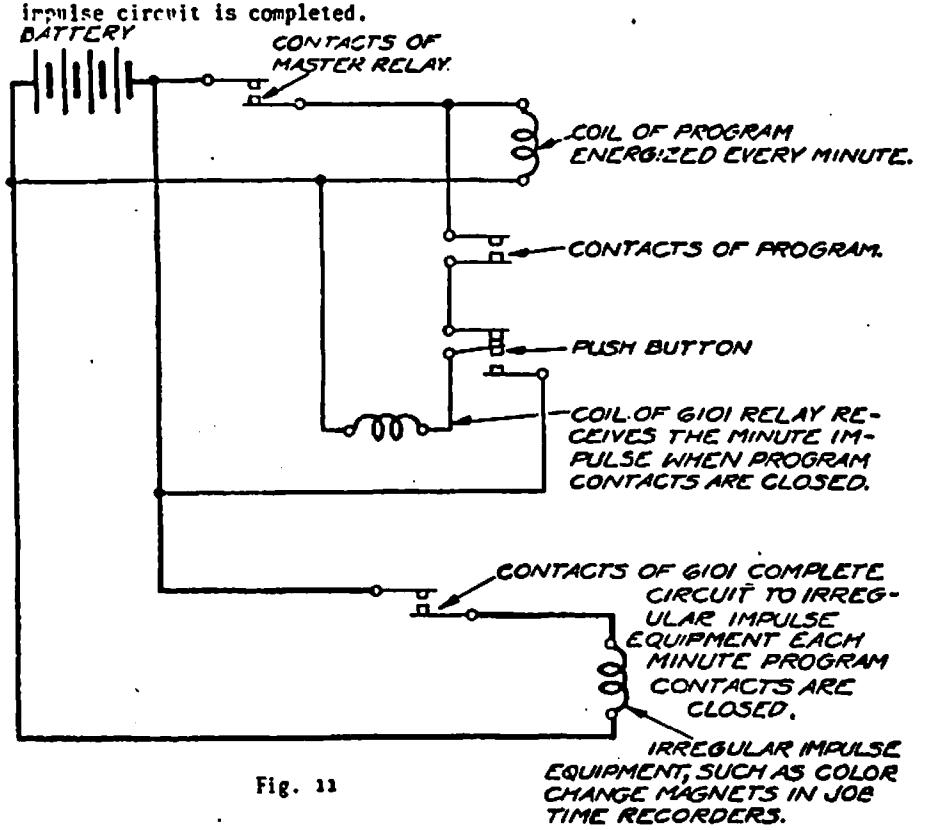


Fig. 11

Program devices under class No. 2 are used for eliminating time on job time recorders. The following diagram gives the circuits for a program device under class No. 2. This program device makes use of the 6121 or make and break relay. When the program contacts are closed, the minute impulse circuit is completed through the coils of the 6121 relay. When the 6121 relay receives an impulse, it opens or closes the circuit ac-

Printed In U.S.A.

The schedule for the outside gongs is set as follows:

On the large drum: 8:45, 8:55 and 12:00 in the ninth disc; 1:00, 1:10 and 5:20 in the tenth disc; 9:00 and 9:15 in the eleventh disc and 12:15, 1:15, 1:25 and 5:30 in the twelfth disc.

The pins in the calendar discs are placed at the following positions:

Second A.M. section of the ninth disc for Monday, Tuesday and Wednesday; first P.M. Section of the tenth disc for Monday, Tuesday and Wednesday. Second A.M. section of the eleventh disc for Thursday and Friday and the first P.M. section of the twelfth disc for Thursday and Friday.

No pins are placed in the calendar device at the positions for Saturday and Sunday. Thus the signals are silent during these days.

This very clearly shows that as the big drum revolves, the calendar drum does likewise and as a pin on the big drum reaches the specified time, it closes the contact and at the same time the other contact is closed by the pin on the calendar drum, completing the circuit for a signal.

CHANGING A SCHEDULE

The usual practice is to call the circuit controlled by the outside group of discs No. 1, the second group of discs from the front No. 2, etc. The discs of the program device that control any one circuit are generally grouped together. The number of discs on any circuit may be ascertained by checking the connections to the contact fingers. (See Fig. 2). One side of the contacts is common and all are connected together. The other side of the contacts are connected together according to circuits. As each contact represents a disc, the number of contacts connected together represents the number of discs on that particular circuit. To change the number of discs in a circuit all that is necessary is to change the contact connections.

The actual change in schedule is accomplished by pulling out a clip (using small pliers) and replacing it in the proper slot of the proper disc. Always pinch the prongs of the clip slightly to insure its fitting snugly into the disc and then tap the clip gently into position. Make certain that it is properly seated in its slot. (See Fig. 3).

The disc on the front of the drum is marked with the hours and minutes to assist in locating the pins in the proper slots. The calendar

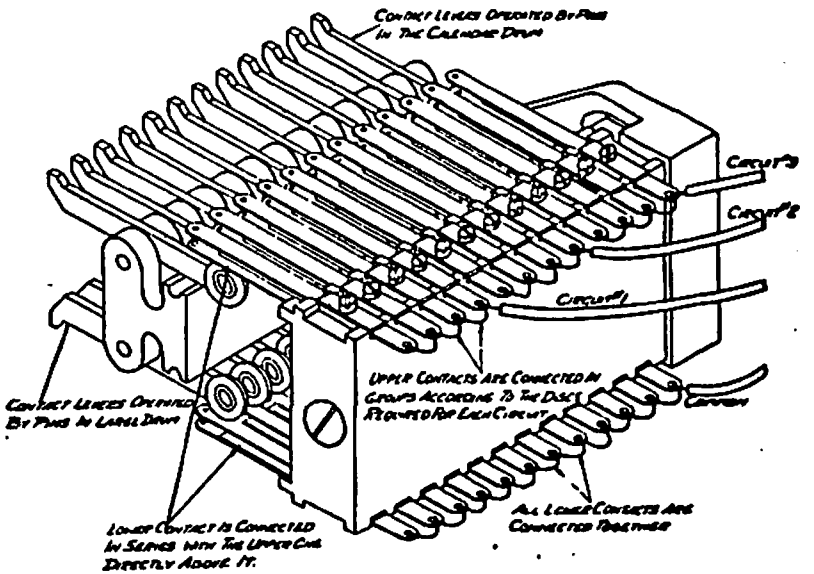


FIG. 2

device is also marked with arrows pointing to the sections covering six-hour periods. (See Fig. 4). The pins in the calendar drum determine which discs in the large drum are operative. Before changing any pins in the large drum first determine which disc controls the schedule for the time the change is required. This may be determined by checking the location of the pins in the calendar drum.

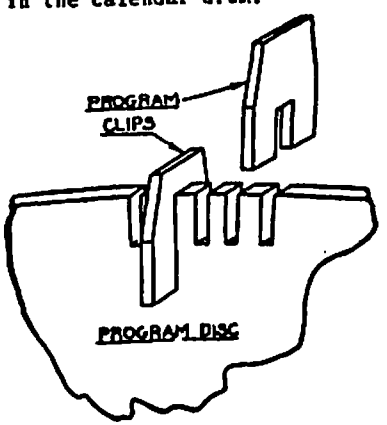


FIG. 3

Printed In U.S.A.

the contact blocks and brush contacts. When a hole in the paper tape passes under a brush, contact is made with the contact block, thus setting up a circuit which, when completed by the closing of a duration contact, operates relays to close the feed circuit to the signal devices thus causing them to function.

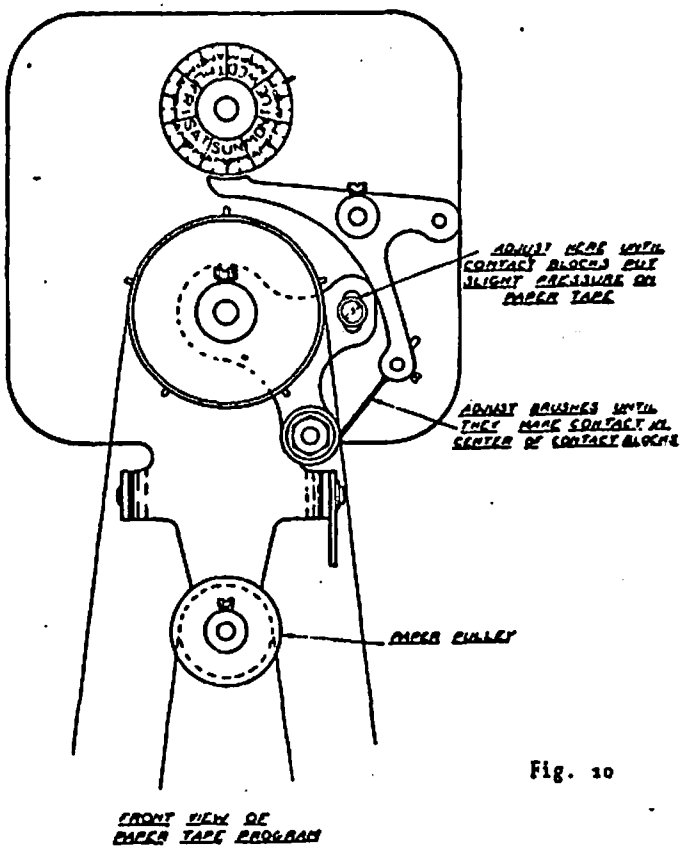


Fig. 10

APPLICATION OF PROGRAM DEVICES

In general there are three kinds of impulses required of program devices.

1. A short impulse of about two seconds duration several times during the day, either every day or on certain days of the week.

2. A short impulse every minute for certain hours of the day and not at other hours.

Printed in U.S.A.

ROTOR DRIVE

All adjustments of the metal disc rotor drive program device are self-evident when the figure below is studied. Use extreme care when making adjustments so that the mechanism will not be damaged.

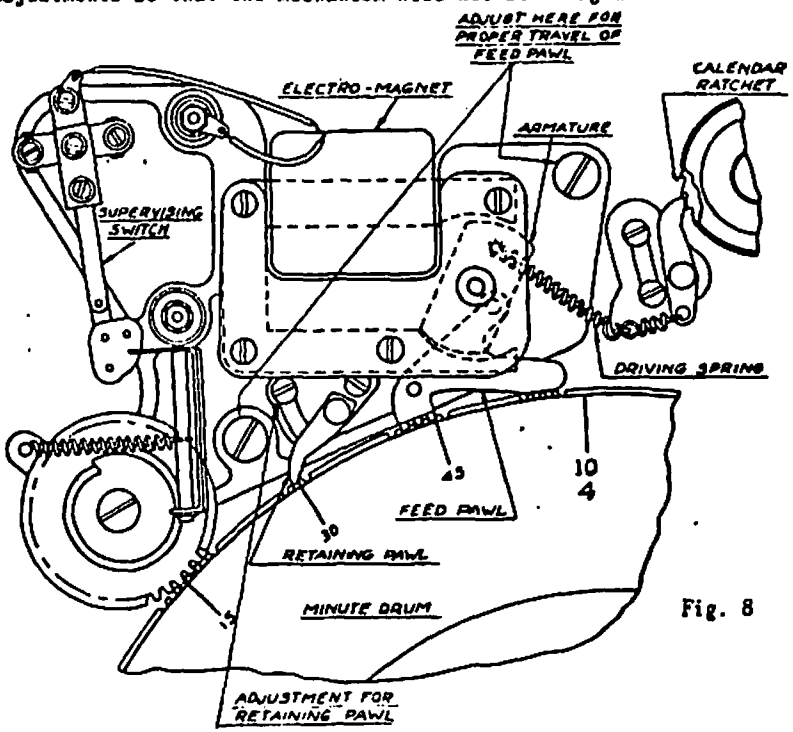


Fig. 8

PAPER TAPE PROGRAM MACHINE

The paper tape program machine, as applied to electric clock systems, is one on which the schedule of operation is controlled by punched holes in a paper tape. This type of program machine consists of our No. 562 secondary drive mechanism, a calendar drum and associated feed levers, gears necessary to operate same, a paper feed drum and a set of brush contacts. Idler pulleys are used to keep the proper tension on the tape.

Sections representing minutes are marked off on the tape to facilitate punching holes at the proper locations to operate signal devices in accordance with whatever schedule is desired. The tape having been placed in its proper position on the machine is advanced periodically by the driving mechanism and passes between contact brushes and the contact blocks. The unpunched portion of the tape thus forms an insulation between

Printed in U.S.A.

To determine the proper slot in which to insert the pin, ascertain first whether the set of bells (circuit) is to be operated through a duration contact in the Master Clock or through a timing relay.

If operated from a duration contact which is usually the case, the pin should be inserted in the slot in line with the minute on which the ringing of the bells is to occur. This holds true if a timing relay is used in conjunction with the duration contact to give an extra long ring on one or more circuits, such as yard gongs, etc., also if the timing relay operates every minute.

If a timing relay is used instead of a duration contact the pin should be inserted in the slot one minute prior to the time the ringing is to occur.

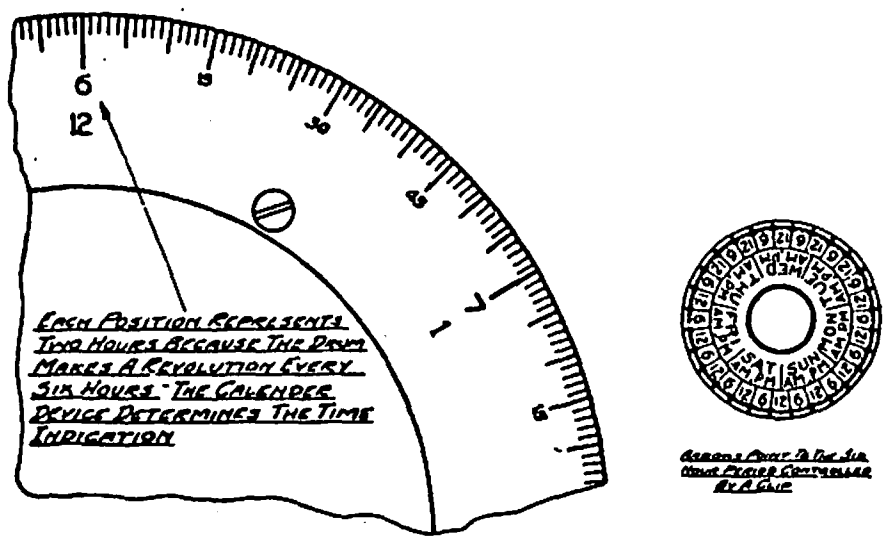


Fig. 4

SUPERVISING SWITCHES

All International secondary units may be hourly supervised so they are always in agreement with the Master Clock. The supervising switches must be adjusted as follows:

The switch cam is properly timed at the factory and should not require changing, however, the timing of the switch may be adjusted by shifting the entire switch block assembly. The secondary unit or recorder

Printed in U.S.A.

should transfer to the "B" wire just before it reaches the 59th minute. A quick drop of the lever from the cam is essential. If the lever rides down the face of the cam there is danger of a poor contact.

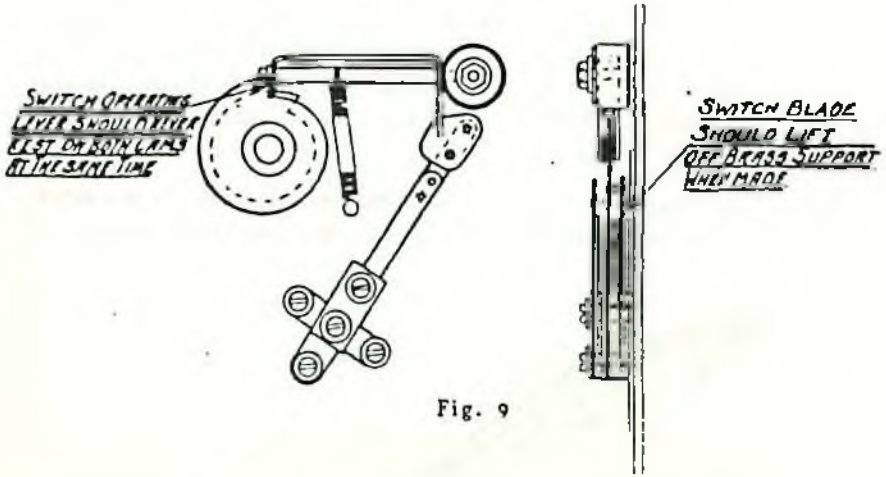


Fig. 9

Make certain that the center switch blade does not touch both the "A" and "B" switch blades at the same time. The brass supports for the "A" and "B" switch blades should be adjusted so that the center switch blade makes equal and positive contact with each and so that the switch operating lever never rides on both cams at the same time. This assures that the full tension of the switch operating lever spring is applied to the switches.

CARE

If the clock and program device lose time it is probably due to power failures, either on the electrical system or locally in the institution. If the power failure is general it will be necessary to reset the equipment after each power failure. However, if the power failure is local to the institution, connecting the program device to another circuit that cannot be opened will overcome the difficulty.

Each program cabinet is equipped with two fusetrons located on the inside of the case near the top. If one fusetron is blown the signals will not operate and if the other fusetron is blown the clock will stop and the program device will not operate.

We recommend giving the program equipment a complete inspection, cleaning and oiling once a year. This work requires the services of a skilled mechanic and one can be obtained by calling our local service office.

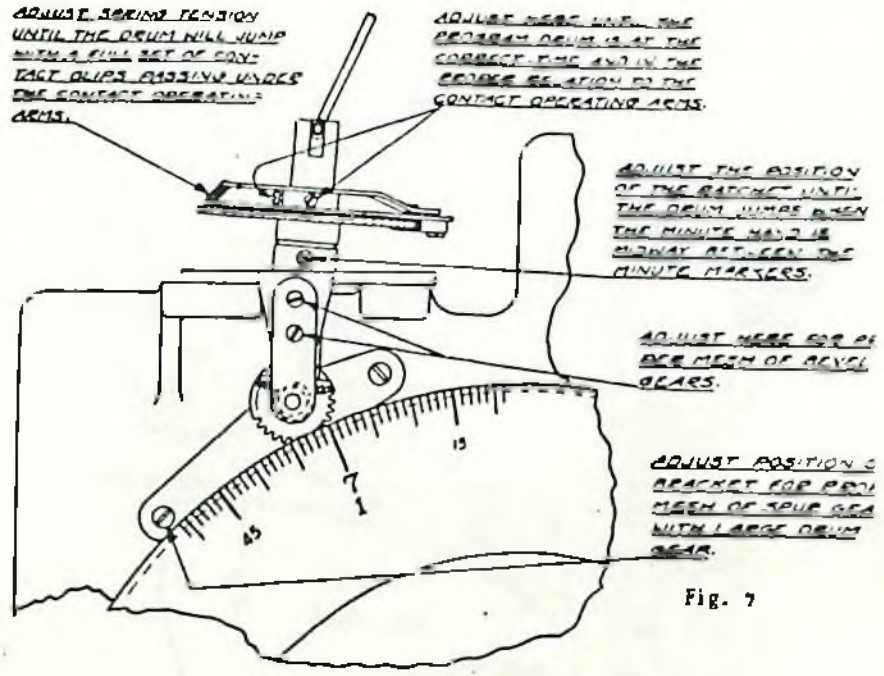


Fig. 7

ADJUSTMENTS ON SPRING DRIVE PROGRAM

1. Contact and calendar adjustments are the same as on electric driven programs.

2. Adjust the driving gears for a minimum of backlash, yet have freedom of movement.

3. Adjust the position of the ratchet until the drum jumps when the minute hand is midway between the minute markers.

4. Adjust the position of the minute jump mechanism on the driving shaft until the program drum is at the correct time and in the proper relation to the contact operating arms.

5. Adjust the spring tension on the minute jump mechanism until the drum will move when a full set of pins are passing under the contacts at the same time.

6. Adjust the duration contact to make at exactly the even minute mark on the dial.

Printed in U.S.A.

one tooth pinion is meshed in the first tooth of the fan gear: This insures spring tension enough to run the clock until the one tooth pinion hits the stop at the end of the fan gear.

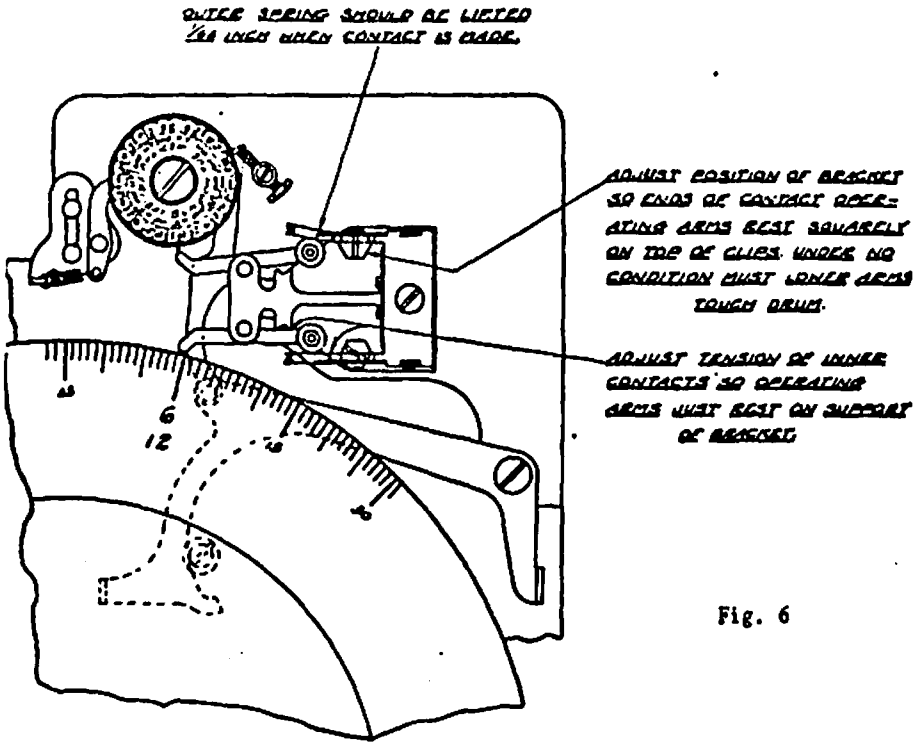


Fig. 6

CAUTION: As there are no lock pawls on the main driving gears, never remove the clock movement from the frame or the cover from the gear box without first releasing all tension from the main spring. This is accomplished by removing the verge and letting the clock run down. Always remove the switch bracket to relieve the first 1-1/2 turns spring tension.

This movement may be equipped with a minute impulse contact for the operation of secondary apparatus. In this case a battery is always required. The movement is always equipped with a duration contact. This contact was formerly operated from a sixty point cam placed on the drive shaft near the upper connector. It is now operated from a cam which is geared to the cannon pinion. These contacts are adjustable for the desired length of ring.

Printed in U.S.A.

WHEEL TYPE PROGRAM

The wheel type consists of a large gear wheel about 10" in diameter which makes one complete revolution in 24 hours. Near the periphery of the wheel is cut a "T" shaped annular groove adapted to receive small screws which hold adjustable blocks. These blocks are used to bring the program contacts together and may be moved to any position on the gear wheel. As this wheel makes only one revolution in 24 hours, the blocks must be very carefully placed at the particular minute an impulse is required, as there are 1440 positions on the wheel. To assist in setting the blocks, the program wheel has marks engraved on it at 15 minute intervals and an auxiliary dial is provided on which a hand indicates the exact minute.

The program wheel is advanced by a ratchet and pawl movement. Placed just above the program wheel is a smaller wheel or disc which is divided into seven sections and each section in four spaces, making 28 spaces in all. The seven sections represent the seven days of the week and are so marked. The four spaces in each section represent four 6 hour periods of the day and are also marked accordingly. This disc is known as the calendar attachment and is advanced every six hours. By having a contact so arranged that the contact points are opened when a pin is inserted in any space in the calendar disc, it is possible to eliminate any six hour period from the ringing schedule.

Mounted on the frame is a pair of insulated fingers which make contact as they pass over the adjustable blocks on the program wheel. A circuit is then complete, provided that there are no pins in the calendar attachment to open the circuit at this time. By setting the blocks on the program wheel in conjunction with the pins in the calendar wheel, it is possible to provide a schedule to suit most requirements. It should be remembered that when the circuit is completed, it remains closed for one minute. The duration of the signal is determined by some other means.

ADJUSTMENTS
(With old style contacts)

1. Contact points and contact feet must be in perfect alignment.

2. Shift contact block until upper contact feet just touch the discs in the calendar drum.

3. Adjust lower stop for contacts, so that contact feet just clear the program discs. Pins in the large drum must not hit on the stop for contacted fingers.

Printed in U.S.A.

4. Adjust stop for calendar feed pawl so that the pins in the calendar discs will rest squarely on the feet of the upper contacts.

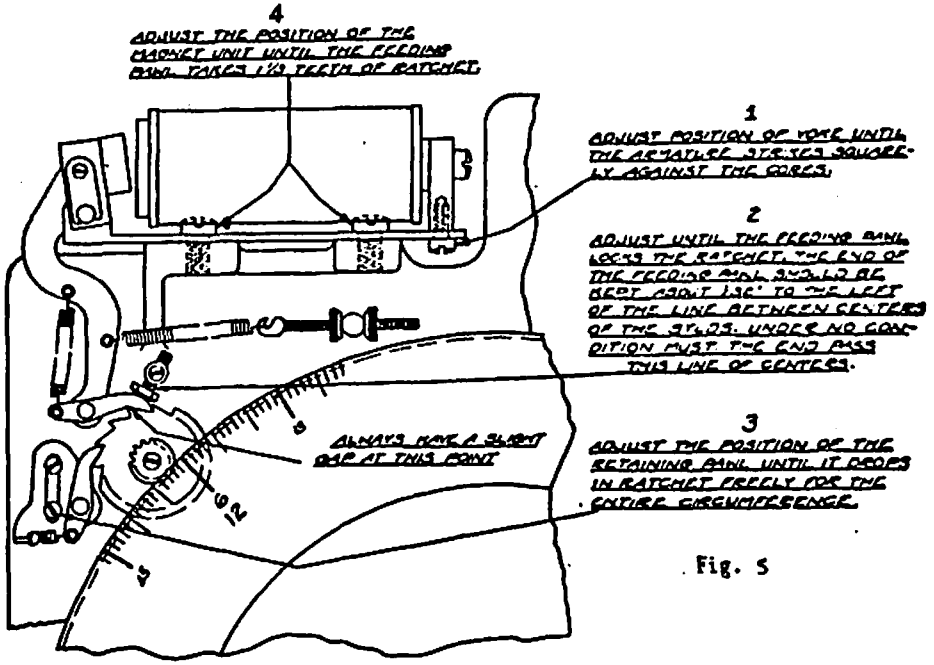


Fig. 5

5. Adjust calendar retaining pawl so that it will drop freely the entire circumference of the ratchet.

6. Adjust fibre stop between contact fingers so that both upper and lower contacts will rest against it with equal tension.

7. Shift the position of the magnet assembly and adjust the position of the feeding pawl stop until the feeding pawl takes 1-1/3 teeth in the ratchet.

8. Adjust the retaining pawl so that it drops freely into the ratchet for its entire circumference.

9. Change the mesh of the program drum with its driving gear until the pins in the program drum rest directly under the lower contact feet. This adjustment is very critical and if not properly made will result in a double ring. On the minute before the ring, the pins should be up close to the contact feet, but not touching it and on the minute after the ring, the contact feet should have dropped from the pins.

10. Adjust the armature return spring for satisfactory operation on a 25% drop in voltage.

ADJUSTMENTS
(With new style contacts)

The gear ratio has been changed on all program devices with the new style contacts. There are now 360 teeth on the large gear or one for every minute of the six hour drum. It is not possible to change the relation of the contact pin to the contact operating arm by changing the mesh of the gears as was the adjustment before. Rather adjust as follows:

1. Adjust the position of the contact assembly until the contact operating arms rest squarely on the top of the pins in the minute drum. The minute before the contact is made, the pins should be just touching the contact operating arm.

2. Adjust the contact block assembly centrally between the minute and calendar drums, but under no condition must the contact operating arms touch the minute drum.

3. Adjust the stop for the calendar feed pawl until the calendar pins rest squarely on top of the contact operating arms.

4. Adjust the tension of the inside contacts so that they just hold the contact operating arms against the die cast support. Too much tension may stop the program.

5. The outside contacts must be in perfect alignment. When contact is made, they should be lifted at least 1/64" from their brass support.

Any program device for ringing bells and buzzers or operating money time recorders may be spring driven. In this case no batteries are required as the relays and bells or money value time recorders are operated direct from commercial current. For operating signals the A.C. commercial current may be stepped down to 10 or more volts with a bell ringing transformer.

The clock movement may be either 60 or 72 beat and hand or motor wound. When motor wound, it is equipped with a fan gear, one tooth pinion and switch very similar to the one explained in the section on motor wound master clock. The adjustments are the same except the meshing of the one tooth pinion with the fan gear. On this style of clock the main springs are wound equivalent to 1-1/2 turns of the one tooth pinion, before the