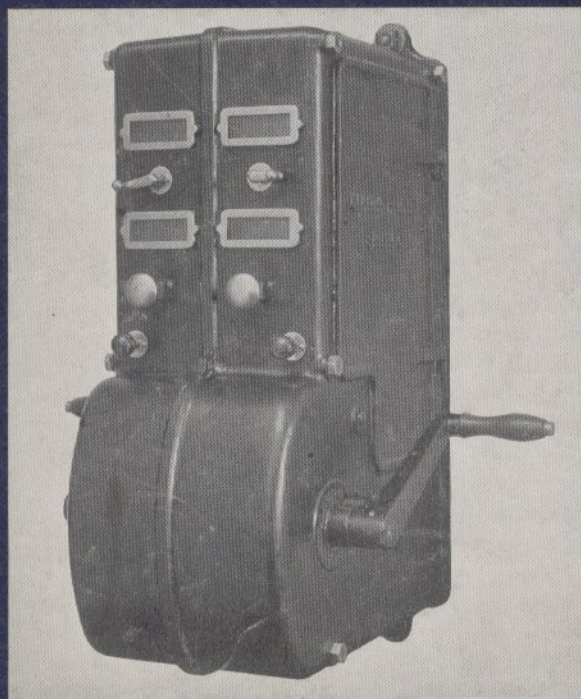


# GENERAL RAILWAY SIGNAL COMPANY

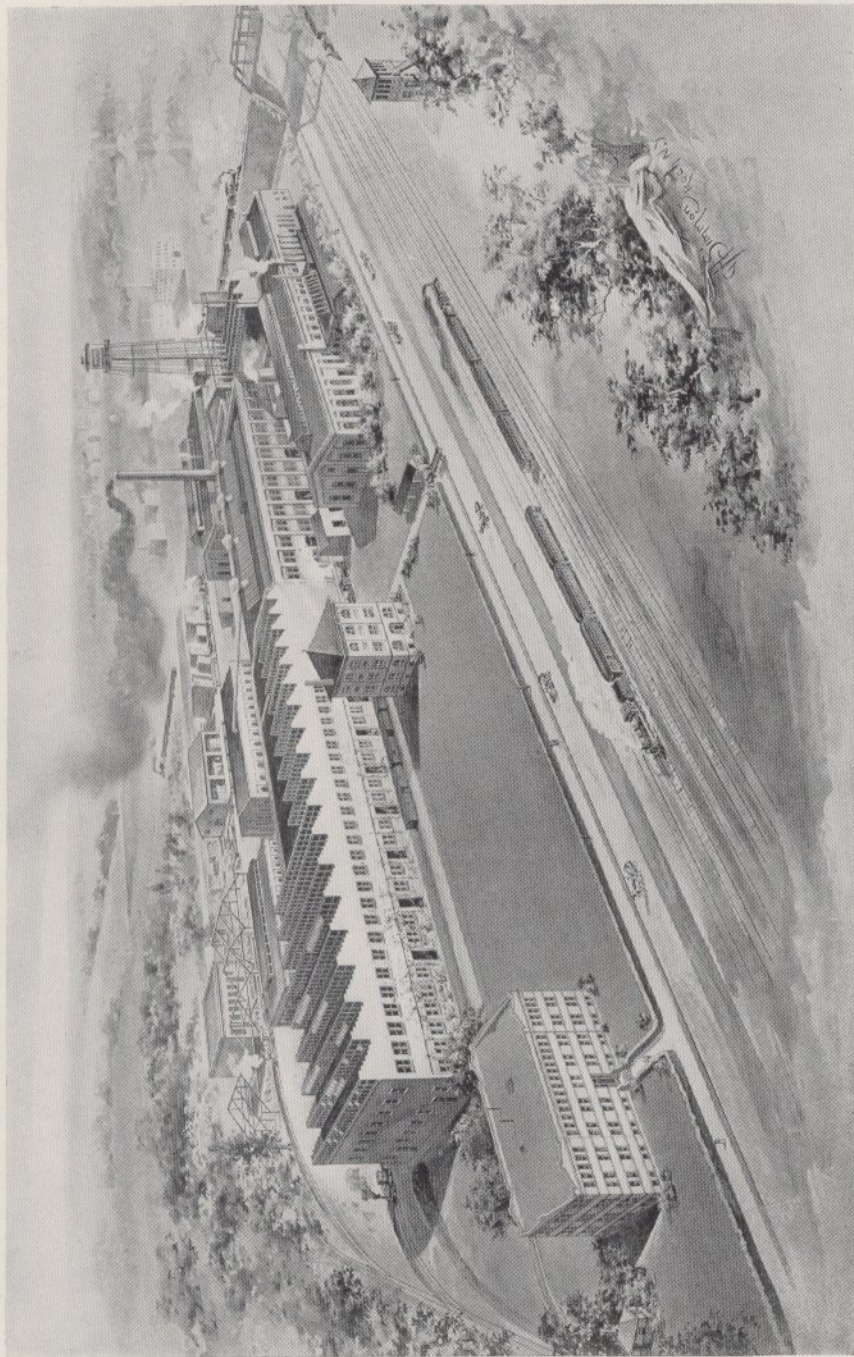
## 1909

### BULLETIN No. 112



CONTROLLED MANUAL BLOCK SYSTEM  
STATION BLOCK INSTRUMENTS





MAIN OFFICE AND FACTORY OF THE GENERAL RAILWAY SIGNAL CO., AT ROCHESTER, N. Y.

# GENERAL RAILWAY SIGNAL COMPANY

MAIN OFFICE AND WORKS, ROCHESTER, N. Y.

CHICAGO  
1339 MONADNOCK BLOCK

NEW YORK  
708 NIGHT AND DAY BANK BUILDING

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**BLOCK SIGNALS**  
AUTOMATIC  
SEMI-AUTOMATIC  
CONTROLLED MANUAL  
FOR  
STEAM AND ELECTRIC ROADS

---

**INTERLOCKING**  
ELECTRIC  
PNEUMATIC  
ELECTRO-PNEUMATIC  
MECHANICAL  
OR COMBINATIONS OF ABOVE  
TO MEET ALL CONDITIONS

---

**TUNNEL SIGNALS**  
THE MOST EFFICIENT AND COMPACT MADE

---

**CROSSING GATES**  
MECHANICAL AND ELECTRICAL

---

PLANS, ESTIMATES, PROPOSALS, AND  
DESCRIPTIONS UPON REQUEST



## STATION BLOCK INSTRUMENT NECESSITY

**I**T is generally recognized that train accidents are of too frequent occurrence on our railways. By no one is this realized more keenly than by the operating officers of such railways, and undoubtedly by no one is more energetic effort expended to prevent accidents than by these same operating officials. Naturally, they turn to signaling for the prevention of certain classes of accidents, and while it is understood that it is theoretically possible to so signal a railroad, single or double track, to absolutely protect every foot of rail for all classes of traffic, it is equally well understood that the expense of installing, operating, and maintaining the necessary signaling equipment with all its adjuncts, to provide such complete protection, would be so enormous as to be prohibitive on all but a very few of the railroads of this country. In many cases this expense would exceed the net revenues, and in not a few cases the gross revenues, of the road.

Practically, it is also a fact that no device or system of devices known is applicable alike to all railways, or even to all sections or divisions of any one railway operating under widely varying conditions. A system which is in every way suitable to the traffic requirements of one line may, for a number of reasons, be quite unsuited for use on another. Furthermore, several systems may be needed to fulfill the requirements on different divisions of the same road, and while the installation of elaborate, extensive, and complicated devices may be justified by the traffic conditions at one point, different conditions may not warrant the use of the same elaborate system at another. For instance, on a double-track line the requirements of traffic may necessitate the complete institution of a system of automatic signals, whereas, on a single-track line the traffic may be such that a system of automatic signals would be neither economical nor offer any increase in the facility of train movements. Therefore, the necessity of providing protection on single-track roads, by means of a system which shall at once be economical and safe, with a tendency to increase facility, is one that is felt by many.

### OBJECT

The majority of the mileage of railways in this country is single track, and on the major part of this mileage the movement of trains is handled with success under the simple Telegraph Block System which is, in effect,

a manually operated block system without any check other than individual care and watchfulness on the part of the operator. When traffic increase, however, it is deemed inadvisable to depend upon this system alone, since there is always the possibility of an operator becoming lax in the performance of his duties, especially in cases where other duties about a station are assigned to him. He may, through carelessness or forgetfulness, neglect to consult the operator at the opposite end of the block, or fail to properly record train movements and give clear signals when none should be given. There is, however, in this simple system a great flexibility advantageous to the movement of traffic, and if the system can be safeguarded by adding to it a suitable means to compel the joint and simultaneous action of the operator at both the entrance to and exit from a given block before it would be possible to clear the signal for a train approaching it, the dangers of the simple manual-controlled block would be greatly lessened, at the same time preserving all of its facility and advantageous feature. It is the object of the **STATION BLOCK INSTRUMENT**, herein catalogued and described, to provide this safeguard to the Telegraph Block System.

### **GENERAL DESCRIPTION**

As stated above, the object of the **STATION BLOCK INSTRUMENT** is to compel the co-operation of the signalmen at each end of a given block before a proceed signal can be displayed in either direction. The object is accomplished by means of a combined signal operating and locking device, contained in one case suitably locked to prevent unauthorized manipulation, the whole being mounted upon the wall of station building in such manner to readily permit mechanical connections to be made to the signal. The instrument, in its case, is shown in Figure I, and the usual methods of mounting and connecting to an ordinary double-arm train-order signal is shown in Figures III and IV. A view of the interior of the instrument is shown in Figure II. The upper part of the case contains the electric locking and release device, and the lower part houses the signal operating mechanism. The locking and release feature is very simple and compact, and consists of a rotary switch for closing and opening the controlling current, and a pair of electro-magnets which, when properly energized, effects the unlocking of a plunger connected to a mechanical lock on the signal operating mechanism. By pulling the plunger out after its electrical release, the signal operating lever is un-



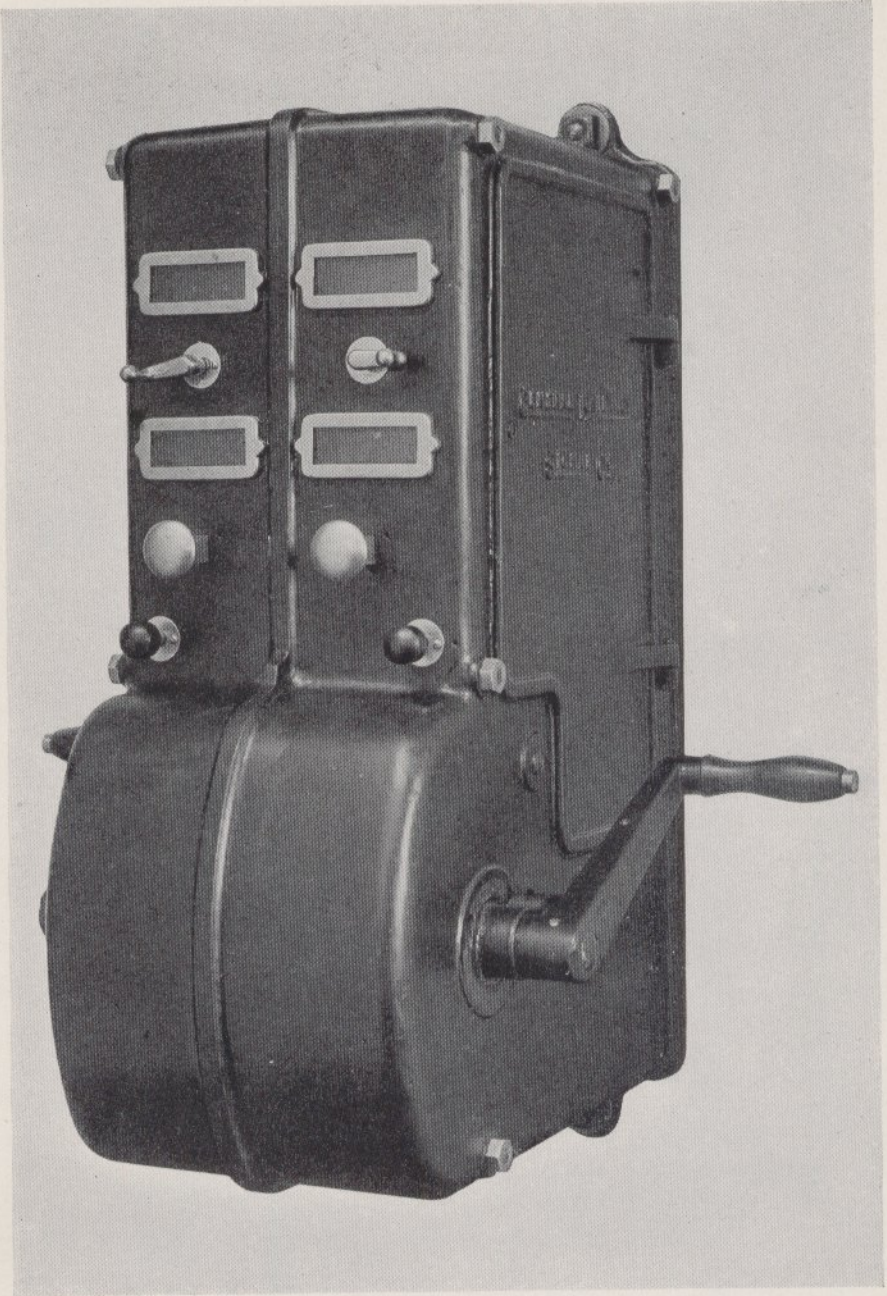


FIG. 1.

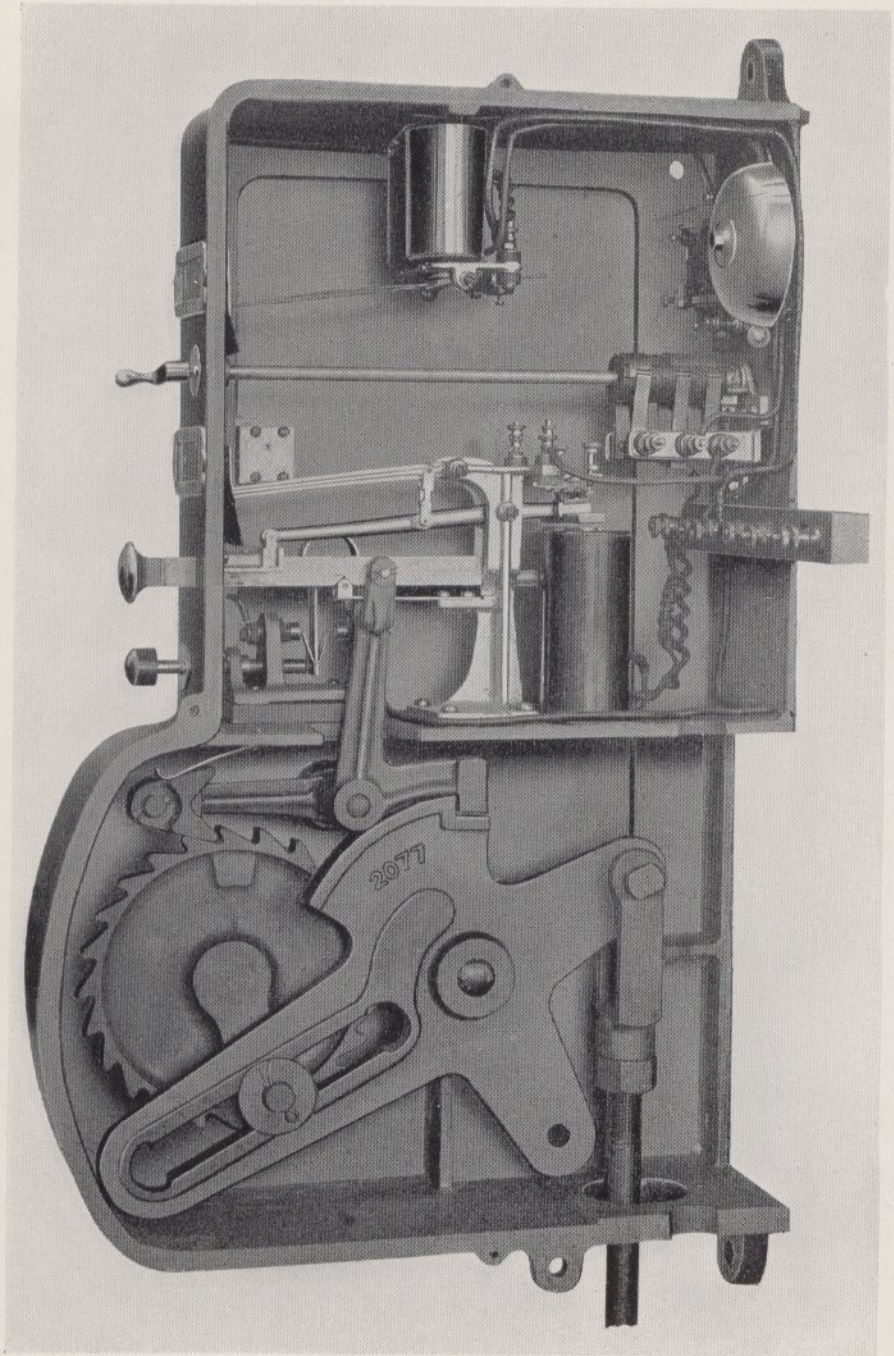


FIG. II.



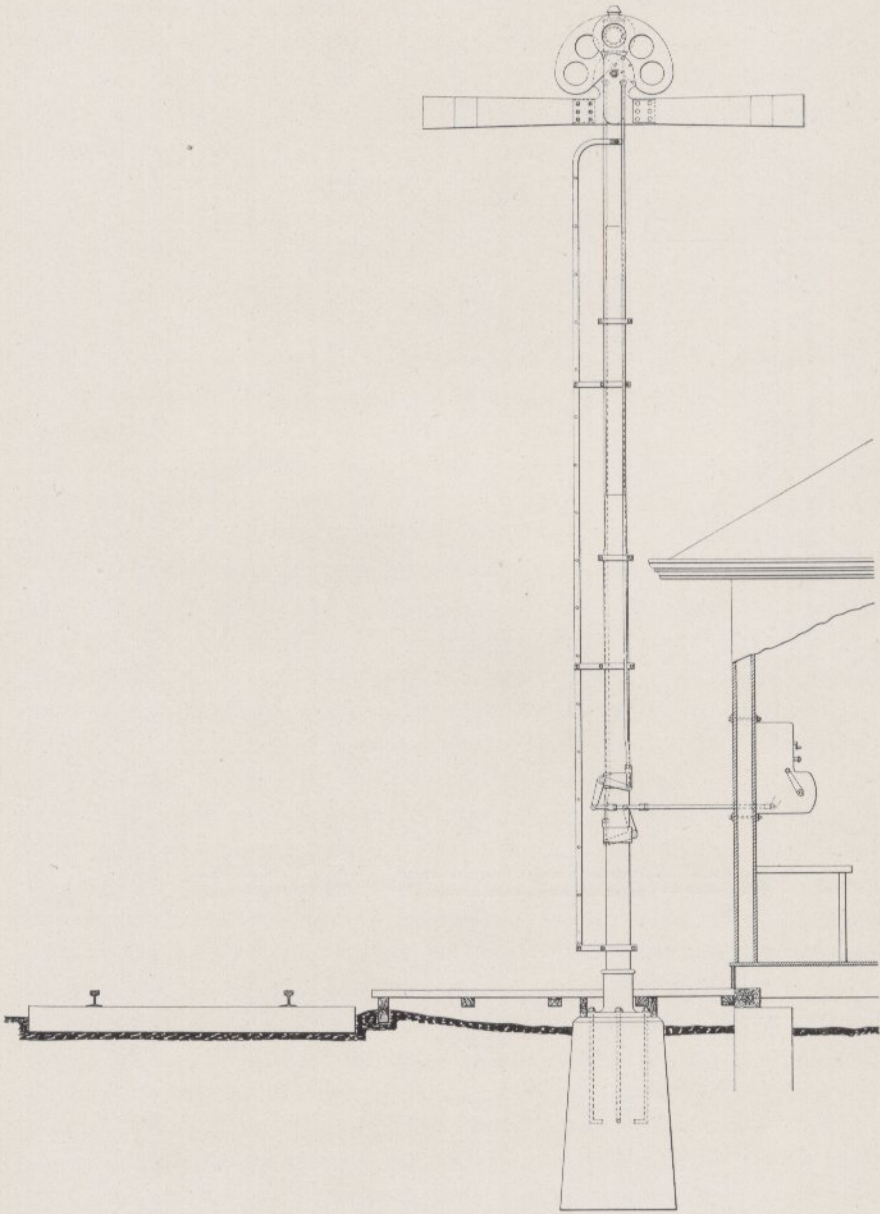


FIG. III.



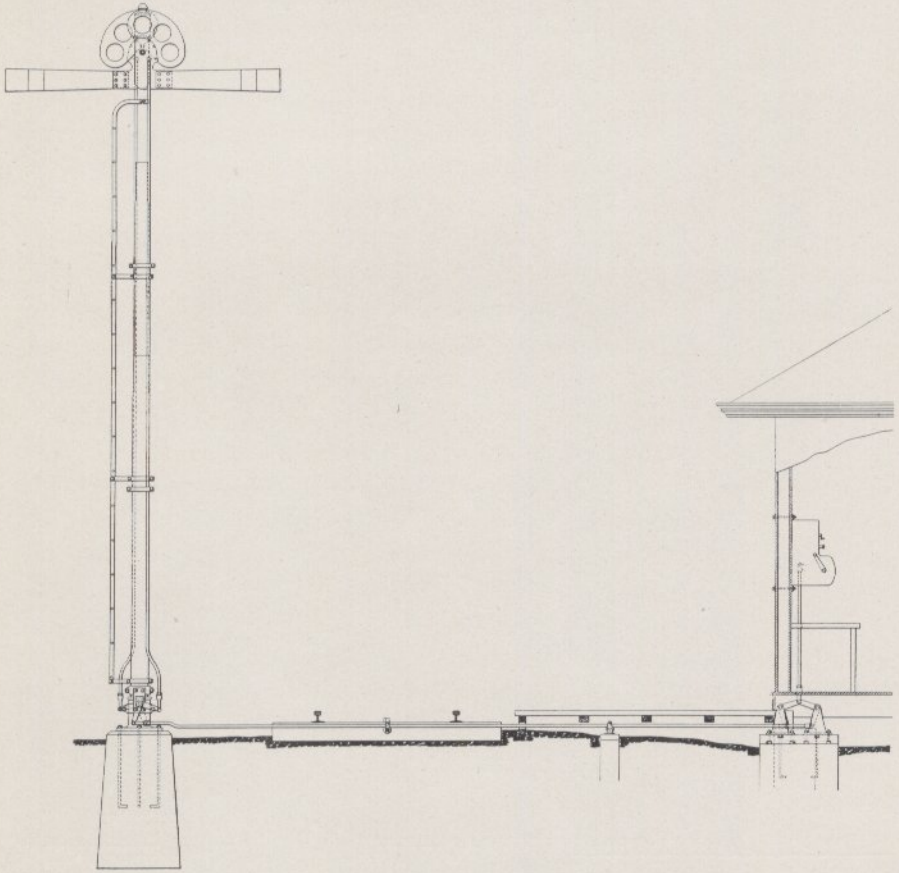


FIG. IV.

locked, permitting same to be rotated. By means of a suitable cam crank the rotation of the lever 180 degrees moves the signal arm to the proceed position. By means of the same cam crank, a further rotation of the operating lever in the same direction to its normal position restores the signal arm to its stop position. The signal operating lever is prevented from being rotated, except in the right direction, by means of a ratchet wheel and pawl suitably arranged in the lower part of the case. There is also an attachment which forces the mechanical lock into engagement when the lever is returned to its normal position, which compels the securing of another electrical release before the signal can again be cleared. This latter attachment is one of the special safety features of the instrument.

In the upper part of the case is also an electric indicator for the purpose of indicating to the operators at each end of the block when a release has been given and received. There is also room in the upper part to house call bells and push buttons when required, although the bells and push buttons are generally installed independently of the instrument.

The instruments are usually assembled in pairs in one case for convenience in operation and connection to double-arm signals on the same mast, but they admit of being mounted singly for the operation of single-arm signal. The operating mechanism is capable of handling the ordinary pipe-connected mechanical train-order signals located anywhere from six to four hundred feet distant from the instrument. It is also capable of operating signal arms in two or three positions.

The electric releasing device requires a battery of from 10 to 20 volts at each station, depending upon the length of the block, one battery serving for releases in either direction. A current of about one-tenth of an ampere for one or two seconds is required to effect a release, so that the battery consumption is a very small item. Installed in its simplest form — that is, for the mere purpose of compelling co-operation of operators at both ends of a block before a signal in either direction can be cleared — but one line wire, usually a No. 8 bare iron, through the block is required, the ground being used for return. The circuit employed is of the open type and is extremely simple. A detail description of the simple circuit and the operation of the device is given on pages 15-18.

Such adjuncts as semi-automatic (slotted) signals with short track circuits for automatically restoring signals to stop, continuous track circuits through the block for preventing release while block is occupied and intermediate automatic signals (as described on page 18),



may be used in connection with the STATION BLOCK INSTRUMENT, but gratifying results will be obtained by the use of the instruments installed without these adjuncts.

### RESULTS OBTAINED

There are upwards of 3,000 miles of single-track railroad equipped with these STATION BLOCK INSTRUMENTS, notably on the Illinois Central R. R., Chicago, Burlington & Quincy R. R., and the Great Northern Railway. The first installation was made on a 100-mile district on the Illinois Central early in 1905. As indicative of the results obtained by the use of the instruments the following letter, written May 31, 1905, to a general officer of the Illinois Central by the trainmaster on the 100-mile district first equipped, will, perhaps, better describe results than anything else that might be said.

“As per your request, I hand you herewith, statement of one month's performance on the Paducah district before the controlled manual block was put into effect, and for one month since. I selected the months of August, 1904, and April, 1905, as business for those two months was nearly the same, and I find the total number of trains moved in the month of August, 1904, was 1,148, an average of  $37\frac{1}{31}$  trains per day, and in April, 1905, we moved 1,134 trains, an average of  $37\frac{4}{5}$  trains per day. The average time over the district for dead freight trains in the month of August was 10 hours and 45 minutes, for manifest trains 6 hours and 30 minutes. In the month of April the average time for dead freight trains was 8 hours and 20 minutes, and the schedule for manifest trains 5 hours and 30 minutes over the district. Passenger trains are scheduled for 2 hours and 40 minutes. They invariably make up time on the schedule. The overtime for the month of August, 1904, was \$2,160.09; in April, 1905, \$148.82. It required in the month of August, 1904, 2,917 train orders, or  $94\frac{3}{31}$  per day, and in the month of April, 2,184, an average daily of  $72\frac{4}{5}$ , showing a decrease of 22 orders per day. There was also a decided decrease in the number of engine failures for the month of April as against the month of August the preceding year, due to the fact that engines were not on the road so long, while the mileage made by the engines was materially increased. In the month of August, 1904, engines averaged 110 miles per day, while in April, 1905, they averaged 150.

“You understand this district is 100 miles long, and I think every man that works on the district will agree with me that the block system has made a wonderful improvement. This prevented several collisions where train crews had overlooked orders. We have only had two accidents since the block was put into effect, and the damage was very slight:

## GENERAL RAILWAY SIGNAL COMPANY

these were caused by following trains moving under caution cards and violating the block rule governing the use of such cards, the men not moving under control.”

As an indication of direct savings effected in operation, there is quoted the following report, compiled by the railroad company, showing results obtained during the 15 months immediately preceding and the 15 months immediately following the installation of the controlled manual block on a 100-mile district:

	FOR 15 MONTHS	
	Before Blocking	After Blocking
Total number head-on collisions, . . . . .	4	0
Total number rear-end collisions, . . . . .	7	1
Total damage from collisions, . . . . .	\$32,040.00	\$984.00
Average monthly damage from collisions, . . . . .	2,136.00	65.60
Average monthly overtime, trainmen, . . . . .	1,432.63	349.53
Average monthly overtime, enginemen, . . . . .	1,506.12	423.01
Average monthly decrease in cost of collisions and overtime, . . . . .		4,236.61
Average monthly cost operation and maintenance of block, including interest at 5 per cent. on investment, . . . . .		1,810.64
Average monthly net decreased cost of train operation, . . . . .		2,425.97
Yearly net decreased cost of train operation per 100 miles, . . . . .		29,111.64
Yearly net decreased cost of train operation per mile, . . . . .		291.12

In this statement is shown one case of collision, a rear end, which, as in the cases named in the trainmaster's letter cited, was due to violation by trainmen of the block rule governing the use of caution cards. It should here be noted that such "permissive" blocking is allowed only in the case of following freights and never in the cases where passenger trains are concerned.

This tabulated statement does not take into account the benefits derived from largely increased engine performance and car mileage and roundhouse and shop efficiency. No data have been prepared to show, in money value, the large economies due to marked improvements in these items, though they make an uncomputed amount strikingly noticeable.

It should be noted, also, that this district originates a large traffic and that the statement of overtime includes not only the time due to trains being delayed beyond their schedule but that due to constructive mileage,



turn around trips, mine switching, and like service. The improvement is therefore due largely to the added facilities for the handling of trains secured by the additional block operators employed, and no similar improvement could have been obtainable under an automatic system.

In considering these results, it should also be noted that the damage resulting from 11 collisions, amounting to \$32,040, is relatively small. The record here given was selected in preference to certain others, to avoid showing an abnormally high saving due to elimination of accidents. It is a fact perfectly well understood by every experienced railway operating officer that it is absolutely impossible to foretell what damage in money value may result from a collision. The location, speed, and character of trains involved in such accidents are factors that constantly change, and hence one collision may cost only \$10 and another, due to identically the same cause, may cost a half million or more. The point to be considered in comparing one period of operation with another is, therefore, not so much how many dollars' saving is shown in the accident account on any given section of line, through the adoption of a given safety device, as what reduction is shown in the number of such accidents. In the case under consideration, the number of such accidents was reduced from 11 to 1, and this one occurred through no defect in the devices adopted. Nor was the record of accidents during the 15 months prior to the installation of the controlled manual block on this particular 100 miles of line an abnormally high one, as, during the 12 months ending October 31, 1903, there occurred on the same 100 miles of line 10 butting and 10 rear-end collisions, the total cost of which was approximately \$75,000.

A summary of the principal results in operation obtained by the use of controlled manual block on this single-track line may be stated briefly as follows:

1. Reduction in number of butting and rear-end collisions by more than 90 per cent.
2. Reduction in engine and train crew overtime by more than 73 per cent.
3. Increase of more than one-third in engine mileage.
4. Increase of from 20 to 30 per cent. in capacity of line.

### COST

Owing to the varying local conditions under which it may be desired to install the STATION BLOCK INSTRUMENTS, it is difficult to

present any definite data as to the cost of installation without having at hand all information regarding conditions which may affect such cost. Some idea, however, is given of the cost under circumstances similar to those under which the system was installed on the 100-mile district on the Illinois Central R.-R. in the following:

The cost of installation of the controlled manual block on this 100-mile district was \$20,554. Prior to the installation of the controlled manual block, the plain telegraph block was in use; there being 12 block stations, 8 of which were day and night blocks, and 4 of which were day only. It was decided to open 11 additional block stations and to change the 4 "day only" block stations to "day and night," making a total of 23 day and night block stations. It was further decided to make use of exactly the same type of signals as had been used previously. The cost above given, therefore, includes the following:

- 11 block office buildings.
- 11 2-arm semaphores, in place.
- 100 miles T. B., W. P., No. 9 copper wire, in place.
- 100 miles H. D. bare No. 9 copper wire, in place.
- 2,300 feet 10-conductor office cable, in place.
- 23 double station block instruments, in place.
- 210 cells 60 A. H. portable storage battery.
- 1 velocipede car for block inspector.

This installation cost might obviously have been reduced by changes in detail of construction. For example, instead of using No. 9 weatherproof copper wire, on one line, a bare copper wire of smaller size, or, if preferred, a weatherproof iron or bare iron wire might have been used. Instead of using an expensive storage battery, a cheaper form of battery might have been furnished. But even with the expensive type of construction actually installed it was found that the cost of installation, per mile, was \$205.54, and that, at the end of 12 months, a net saving in operation due to reduction in engine and train crew, overtime, and accidents alone was \$291.12 per mile, an amount sufficient to pay off the entire initial investment and leave a balance of \$85.58 per mile.

## DESCRIPTION OF OPERATION AND CIRCUITS

Referring to the diagram in Fig V, A, B, and C represent three stations on a single-track line defining the limits of two adjacent blocks. Stations A and C are equipped with single and Station B with double



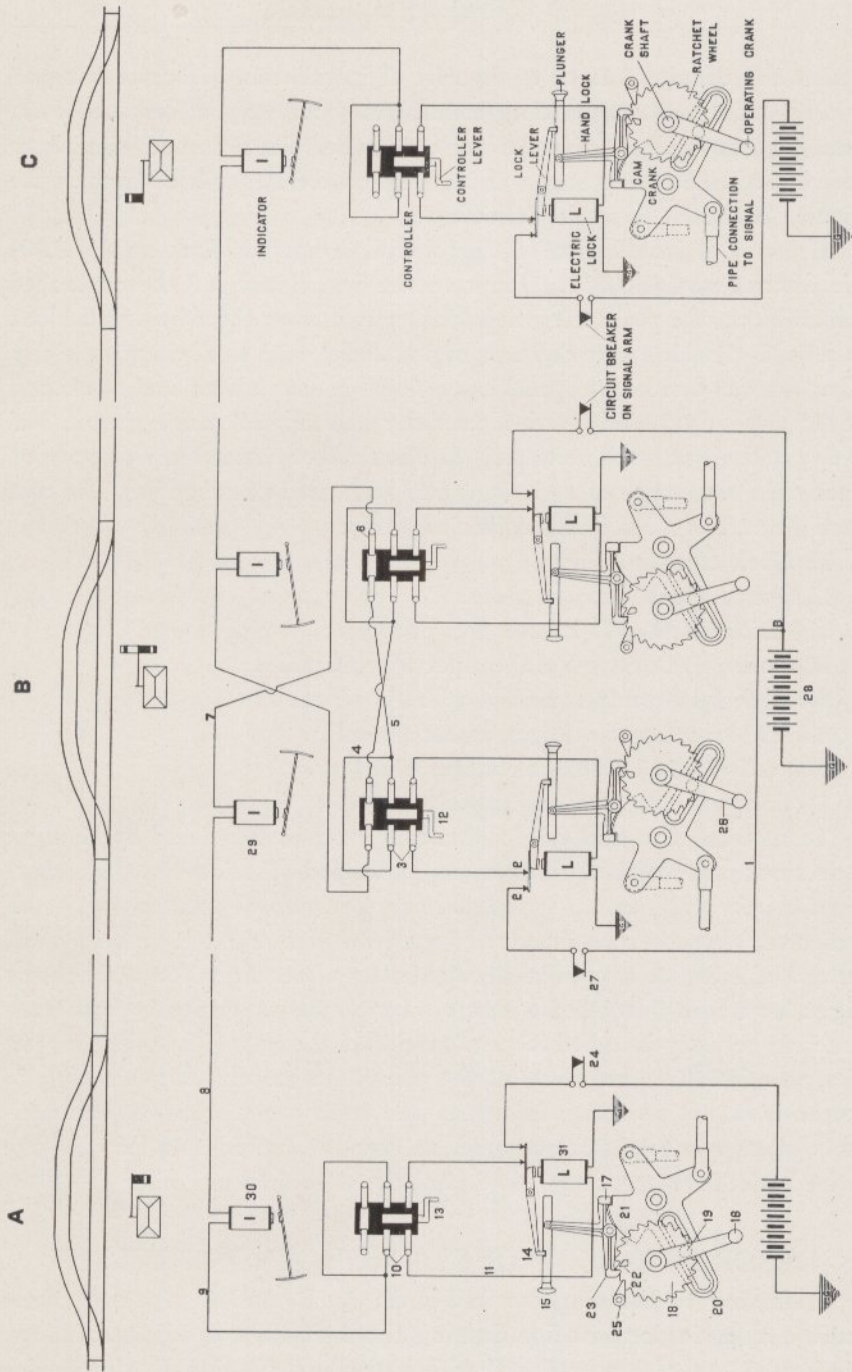


FIG. V.

STATION BLOCK INSTRUMENTS operating and controlling ordinary train order or station block signals. The instruments are shown diagrammatically with circuits for the simple control of same. The operation is as follows:

In order to display a "proceed" signal for a movement from, say, A to B on the diagram, it is first necessary for the operator at A to ask B to release his machine, which he does by means of a call bell provided for that purpose. No train being in the block and the opposing signal at B being at "stop," the operator at B so manipulates his unlocking key as to close an electric circuit from a battery at B through the interlocking key, held in its proper position, and the coils of an electro-magnet at A. This action releases a hand lock, which is moved to unlock the signal crank, allowing the operator at A to clear his signal. After the train has entered the block and has been so reported, the signalman at A must return his signal to the danger position. In doing so the lock on the operating crank is forced home, thereby compelling the operator to obtain another release in order to again clear the signal.

Referring to the same diagram, the description of the circuit is as follows:

The operator at A wishes to clear signal for train from A to B. A asks B to unlock A's machine; the conditions being right, B closes circuit controller by moving handle 12. The opposing signal at B being in the danger position and operating lever 26 locked, circuit breakers 27 on signal arm and 2 on electric lock are closed. The operator at A now closes contact 10 by moving handle 13. Current then flows from battery 28 at B over wire 1, contacts 27-2, contact 3, wire 8 through magnet coils in indicator 29 at B, and magnet coils on indicator 30, contact 10, wire 11, coils of unlocking magnet 31 to ground. The unlocking magnet 31 is now energized to release the lever of plunger lock 15. Plunger 15 being moved in turn releases the lock 17 on signal lever 19. The operator at A may now move lever 19 one-half revolution to clear the signal. After the train has passed the signal is restored to the "stop" position by the operator. To restore the signal to stop position, the lever 19 is moved in the same direction as to clear the signal, the revolution being completed.

To prevent the lever from being turned except in the proper direction, a ratchet wheel 18 is mounted on the crank shaft. On this ratchet wheel a lug 22 is fixed, which, when the signal lever 19 is almost



restored to its normal position, so engages with arm 23 as to force the lock 17 home, thereby preventing the signal from being again cleared until it has been again unlocked.

In this particular arrangement of the system no semi-automatic device is used to restore the signal to the stop-position after the train has passed it. To obviate the danger arising from the neglect of a signalman to restore his signal to the normal position, there is usually embodied in the rules one that when enginemen do not see a signal change from "stop" to "proceed," such a signal must be regarded as an imperfectly displayed signal, and be governed accordingly. That is, enginemen and trainmen must see the signal change from "stop" to "proceed," otherwise must not pass it irrespective of the position of the signal. Inasmuch as enginemen and trainmen must be depended upon for the proper observance of the block signals, this rule is considered sufficient for the purpose.

While it is not claimed that the device in this manner installed affords absolute protection in the movement of trains, the large measure of safety obtained by the use of this system, which holds two signalmen responsible for the proper display of signals at each end of the block, must be appreciated. Its use, furthermore, compels the signalmen to keep their wits about them at all times.

### ADJUNCTS

If desired, the signals may be made semi-automatic by the use of electro-mechanical "slots" used in connection with either short track circuit sections to merely restore signal to stop after train has passed, or with continuous track circuit through the full length of block to hold signal in stop position while block is occupied and to serve as an additional check against a simultaneous lapse of memory on the part of both operators at each end of the block. Where the system is used "permissively" for the movement of following trains, it has been customary to issue caution cards permitting one train to follow another through the block under signal in stop position. The rules governing the use of such cards requiring that a train operating under caution card shall move through block under such control as will enable it to be brought to a stop before colliding with preceding train. It has been the almost universal experience that trainmen cannot be wholly depended upon to observe such a rule; that they are too apt to assume that the preceding

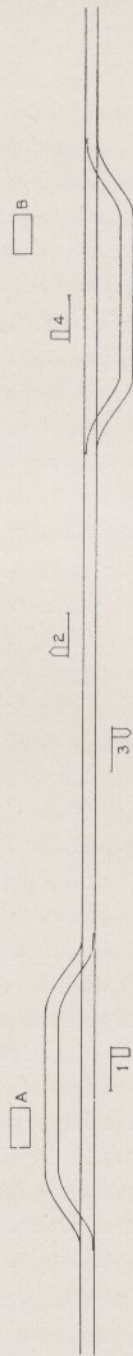


FIG. VI



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train is making regular time. If, as sometimes happens, the preceding train loses time, or is brought to a stop at an unexpected place, a collision may occur when the block is used permissively. To dispense with the necessity, in busy times, for using caution cards, a simple addition of conveniently located intermediate automatic signals is installed. This adjunct, which, by the way, has given very gratifying results wherever installed, is described briefly, as follows:

Referring to the diagram, Fig. VI. A and B are regular block stations at meeting points. The Signals 1 and 4 are the regular block signals, but are slotted by means of track circuits, the slot control for Signal 1 being the track circuit from Signal 1 to Signal 2, and for Signal 4 the track circuit from that signal to Signal 3. Signals 2 and 3 are purely automatic, the former controlled by the track circuit between it and Signal 1, and the latter by the track circuit between it and Signal 4.

Assuming the line from A to B to be unoccupied by any train and that the operator at A desires to put a train through to B. He secures from B his release of lock controlling Signal 1 in the usual manner, clears Signal 1 and the train thereupon enters the block. Immediately upon entering the block section, Signal 1 is automatically restored to its stop position. So long as any portion of this train is between Signals 1 and 3, no one of the Signals 1, 2, or 4 can be cleared. Upon arriving at Signal 3 the train finds that signal at "proceed" and enters the section of block between 2 and 3. Immediately upon doing so, Signal 3 is set to the "stop" position, and so long as any part of the train is between Signals 2 and 3 all the Signals 1, 3, 2, and 4 are locked in the "stop" position and none of them can be set at "proceed." When the train passes wholly out of the section between Signals 2 and 3 and into the section between Signals 2 and 4, the operator at A can again clear Signal 1 for a following train, which may then enter the block and proceed to Signal 3, which will be found at "proceed" if the first train shall in the meantime have passed wholly off the main line between Signals 3 and 4, but which will otherwise be at "stop" until the first train shall do so. For movements in the reverse direction the operation is similar, but in the reverse order.

In other words, this briefly described arrangement, while preserving the distance from A to B between opposing trains, admits of running two trains, each under the protection of a positive "stop" signal, in the same direction, at the same time, between block stations A and B,

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thereby combining all the advantages of the controlled manual for opposed movements with those of the automatic block for movements in the same direction. This arrangement evidently very greatly increases the capacity of a line so equipped, and, where required, the arrangement may obviously be modified to permit more than two trains to move simultaneously between A and B.

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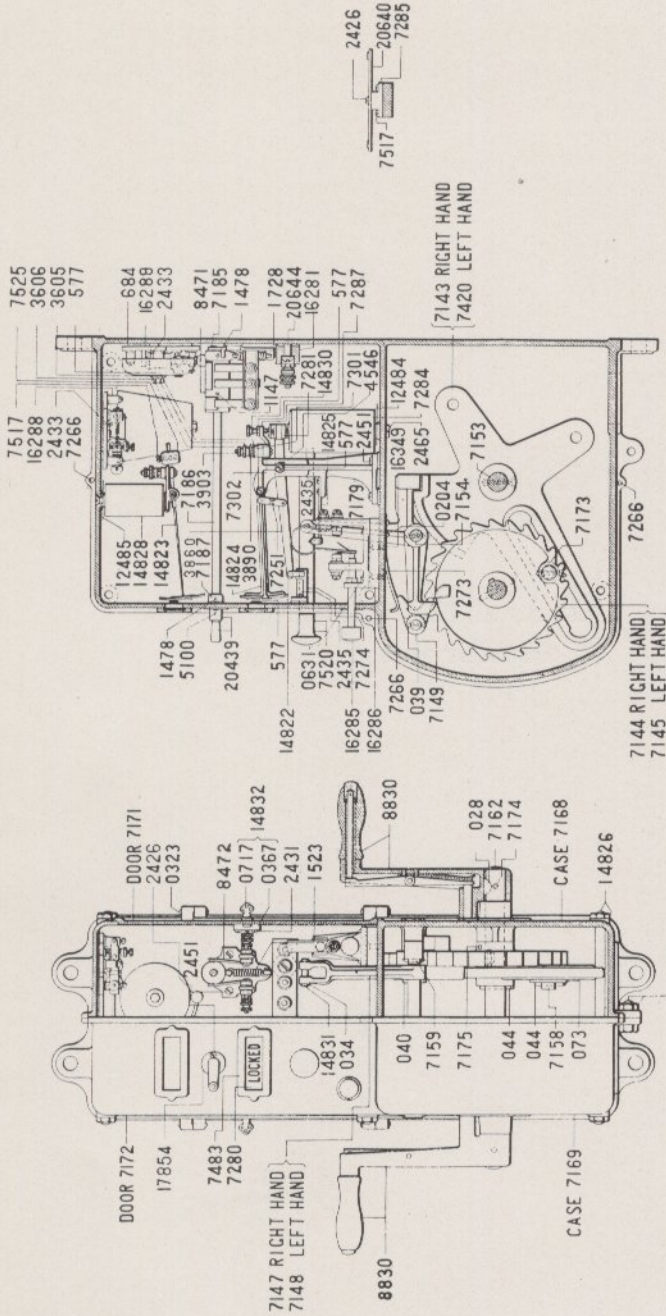
Rochester, N. Y., March 1, 1909.



# ORDER SECTION

ORDER BY NAME AND NUMBER

# STATION BLOCK INSTRUMENT



**16280**



**GENERAL RAILWAY SIGNAL COMPANY**

**STATION BLOCK INSTRUMENT**

Order No.	DETAILS	List Price
16280	Station Block Instrument, Complete, with Bells and Bell Keys, . . .	\$310.00
7142	Station Block Instrument, Complete, without Bells or Bell Keys, . .	280.00
028	Woodruff Key No. A, $\frac{1}{4}$ " x $\frac{7}{8}$ ", for 7162, . . . . .	.08
034	Cotter Pin, $\frac{3}{32}$ " x $\frac{1}{2}$ ", for 14831, . . . . .	.008
039	Cotter Pin, $\frac{1}{8}$ " x $\frac{3}{4}$ ", for 7159, . . . . .	.008
040	Cotter Pin, $\frac{1}{8}$ " x $1\frac{1}{4}$ ", for 7154, . . . . .	.008
044	Cotter Pin, $\frac{3}{16}$ " x $1\frac{1}{2}$ ", for 7153, . . . . .	.008
073	$\frac{3}{4}$ " Washer for 7158, . . . . .	.02
0204	Rivet, $\frac{3}{16}$ " x $\frac{1}{2}$ ", Rd. Hd., for fixing 7273 to Case, . . . . .	.01
0323	Rivet, $\frac{3}{16}$ " x $1\frac{1}{2}$ ", Rd. Hd., for Door Hinges, . . . . .	.01
0367	Corbin Door Lock, . . . . .	1.20
0717	Key for Door Lock, . . . . .	.40
577	Brass Nut, . . . . .	.02
1147	Pin, $\frac{1}{8}$ " x $1\frac{1}{4}$ ", for fixing 8471 to 7186, . . . . .	.02
1478	Pin, $\frac{1}{8}$ " x $\frac{3}{4}$ ", for fixing 7185 and 7187 to 7186, . . . . .	.02
1523	Spring for Hand Switch, . . . . .	.20
1728	Asbestos Washer for 3874 or 16281, . . . . .	.03
2426	Screw, 6-32 x $\frac{1}{4}$ ", Rd. Hd., for fixing 17854 to Case, . . . . .	.01
2431	Screw, 8-32 x $\frac{5}{8}$ ", Rd. Hd., for 0367, . . . . .	.01
2435	Screw, 10-32 x $\frac{3}{8}$ ", Rd. Hd., for fixing 7274 to Case, . . . . .	.01
2451	Screw, $\frac{1}{4}$ "-24 x $\frac{5}{8}$ ", Rd. Hd., for fixing 7179 to Case, . . . . .	.02
2465	Screw, $\frac{5}{16}$ "-24 x 1", Sq. Hd., Cap., . . . . .	.04
3605	Brass Nut, . . . . .	.06
3606	Brass Nut Lock, . . . . .	.05
3860	Pin, $\frac{3}{32}$ " x $\frac{9}{16}$ ", for 7251, . . . . .	.03
3890	Brass Washer, . . . . .	.01
3903	Brass Terminal Screw, 10-32 x $1\frac{3}{4}$ ", . . . . .	.20
4546	Pivot Point Screw, . . . . .	.16
5100	Screw, 6-32 x $\frac{9}{16}$ ", Special, . . . . .	.12

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**STATION BLOCK INSTRUMENT**

Order No.	DETAILS	List Price
7143	Cam Crank, Right Hand, . . . . .	\$ 2.00
7144	Wheel, Right Hand, . . . . .	2.00
7145	Wheel, Left Hand, . . . . .	2.00
7147	Lock Lever, Right Hand, . . . . .	2.00
7148	Lock Lever, Left Hand, . . . . .	2.00
7153	Shaft, 1" x 10 $\frac{7}{8}$ ", C. D. Steel, . . . . .	.90
7154	Shaft, $\frac{3}{8}$ " x 10 $\frac{7}{8}$ ", C. D. Steel, . . . . .	.80
7158	Stud, $\frac{3}{4}$ " x 2 $\frac{5}{16}$ ", for 7144 and 7145, . . . . .	.20
7159	Stud, $\frac{9}{16}$ " x 2 $\frac{1}{2}$ ", for fixing 7149 to Case, . . . . .	.20
7162	Shaft, 1" x 5 $\frac{1}{4}$ ", C. D. Steel, for Signal Lever, . . . . .	.90
7168	Case, Right Hand, . . . . .	20.00
7169	Case, Left Hand, . . . . .	20.00
7171	Door, Right Hand, . . . . .	3.00
7172	Door, Left Hand, . . . . .	3.00
7173	Roller, 1 $\frac{1}{8}$ " x 1 $\frac{3}{8}$ " x $\frac{3}{4}$ ", . . . . .	.20
7174	Pin, $\frac{1}{4}$ " x 1 $\frac{3}{4}$ ", for Signal Lever, . . . . .	.08
7175	Pin, $\frac{1}{4}$ " x 2 $\frac{1}{8}$ ", . . . . .	.03
7179	Bracket for Indicator, . . . . .	6.00
7186	Shaft, $\frac{3}{8}$ " x 15 $\frac{1}{4}$ ", C. D. Steel, for Hand Switch, . . . . .	.40
7187	Collar, $\frac{3}{8}$ " x $\frac{3}{4}$ ", for 7186, . . . . .	.16
7251	Lower Indicator Link, . . . . .	.40
7266	Dowel Pin, $\frac{1}{4}$ " x $\frac{5}{8}$ ", for 7168 and 7169, . . . . .	.02
7273	Spring, $\frac{1}{16}$ " x $\frac{1}{2}$ " x 4 $\frac{1}{8}$ ", for Pawl 7149, . . . . .	.40
7274	Lock Bracket, . . . . .	.80
7280	Glass, 1 $\frac{1}{4}$ " x 3 $\frac{1}{4}$ ", for 7483, . . . . .	.06
7281	Armature, . . . . .	1.20
7284	Single Magnet Coil, . . . . .	7.00
7285	Insulator Block, . . . . .	.30
7149	Pawl for 7144 and 7145, . . . . .	.50
7185	Spring Collar for Hand Switch, . . . . .	.40

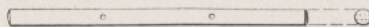
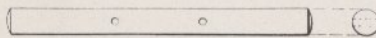
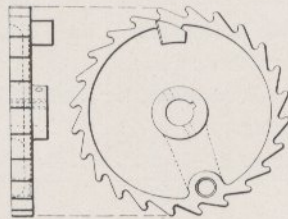
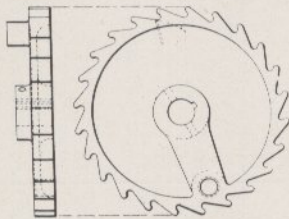
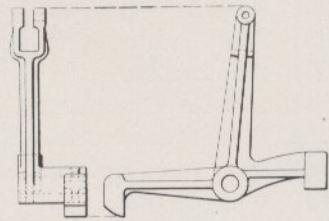
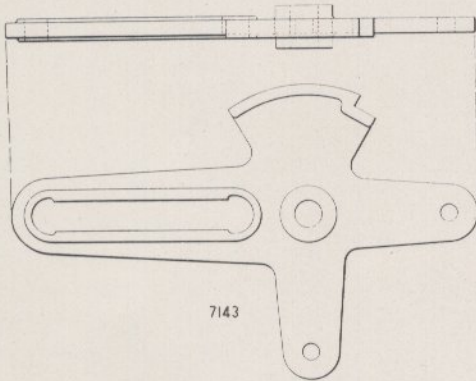
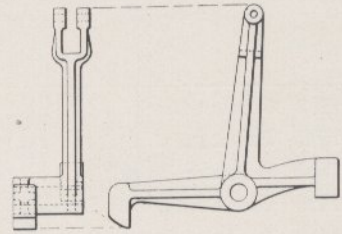
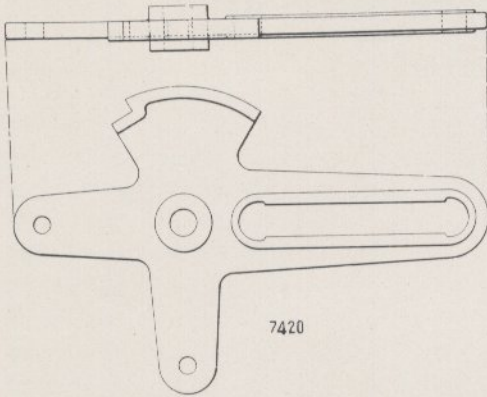


**GENERAL RAILWAY SIGNAL COMPANY**

**STATION BLOCK INSTRUMENT**

Order No.	DETAILS	List Price
7287	Contact Block, . . . . .	\$ .16
7301	Bushing, . . . . .	.12
7302	Insulator Block, . . . . .	.40
7420	Cam Crank, Left Hand, . . . . .	2.00
7483	Indicator Frame Complete, . . . . .	.90
7517	Screw, 6-32 x $\frac{3}{8}$ " Rd. Hd., . . . . .	.01
7520	Locking Slide Complete, . . . . .	3.00
7525	Counterweight, . . . . .	.40
8471	Commutator Complete, . . . . .	2.20
8472	Contact Springs Complete, . . . . .	8.00
8830	Signal Lever Complete, . . . . .	14.00
12484	Fibre Insulator, . . . . .	.14
12485	Fibre Insulator, . . . . .	.14
14822	Lock Lever Complete, . . . . .	2.20
14823	Upper Indicator Complete, . . . . .	3.50
14824	Lower Indicator Complete, . . . . .	3.20
14825	Spring Complete, . . . . .	.90
14826	Bolt, $\frac{1}{2}$ " x $1\frac{1}{8}$ ", Complete, . . . . .	.50
14827	Cap Screw, $\frac{1}{2}$ " x $1\frac{1}{4}$ ", with Hex. Nut, . . . . .	.18
14828	Magnet Complete, . . . . .	13.00
14830	Screw, with Silver Point, . . . . .	.50
14831	Pin, $\frac{1}{4}$ " x $1\frac{3}{16}$ ", for 7147 and 7148, . . . . .	.05
14832	Corbin Lock and Key Complete, . . . . .	1.60
16281	Slate Base Complete, for 7142, . . . . .	2.60
17854	Escutcheon Plate, . . . . .	.10
20439	Crank Complete, for Hand Switch, . . . . .	2.70
20640	Spring, . . . . .	1.50
20644	Screw, $\frac{5}{16}$ "-18 x 1", Rd. Hd., for fixing 3874 or 16281 to Case, . . . . .	.04

# STATION BLOCK INSTRUMENT DETAILS



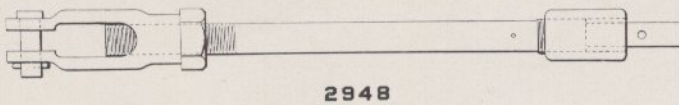
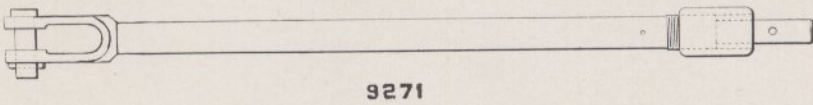
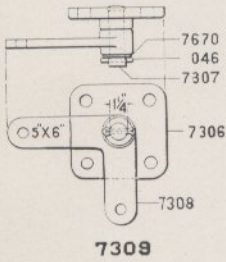
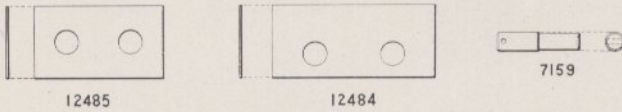
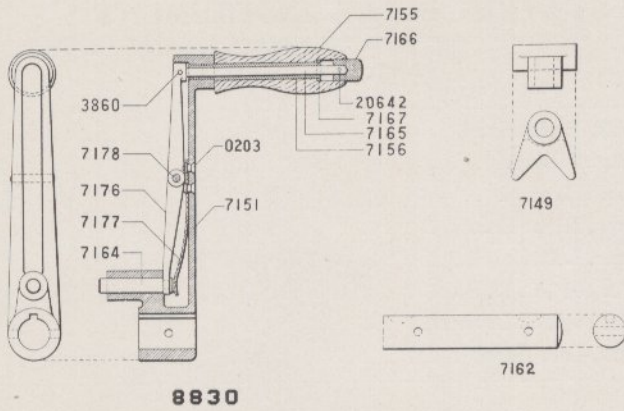


**GENERAL RAILWAY SIGNAL COMPANY**

**STATION BLOCK INSTRUMENT**

Order No.	DETAILS	List Price
7143	Cam Crank, Right Hand, . . . . .	\$2.00
7144	Wheel, Right Hand, . . . . .	2.00
7145	Wheel, Left Hand, . . . . .	2.00
7147	Lock Lever, Right Hand, . . . . .	2.00
7148	Lock Lever, Left Hand, . . . . .	2.00
7153	Shaft, 1" x 10 $\frac{7}{8}$ ", C. D. Steel, . . . . .	.90
7154	Shaft, $\frac{5}{8}$ " x 10 $\frac{7}{8}$ ", C. D. Steel, . . . . .	.80
7420	Cam Crank, Left Hand, . . . . .	2.00

# STATION BLOCK INSTRUMENT DETAILS



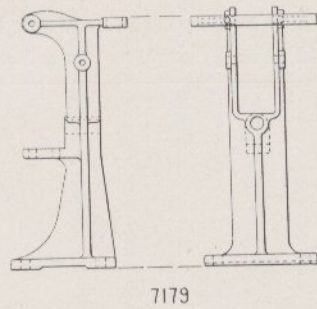
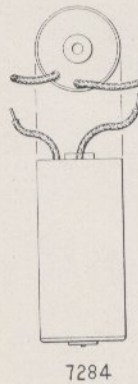
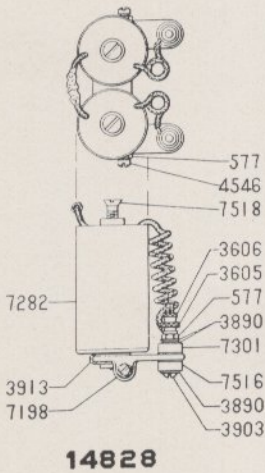
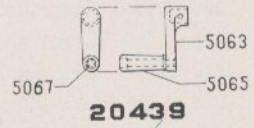
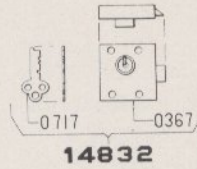
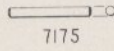
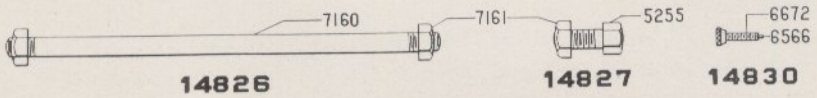
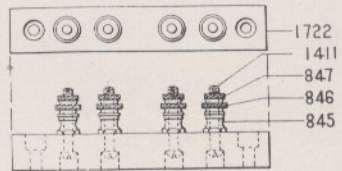
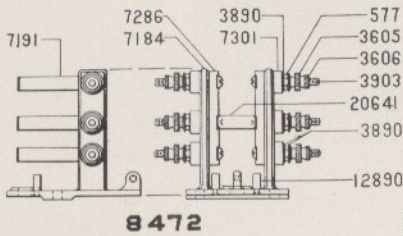


**GENERAL RAILWAY SIGNAL COMPANY**

**STATION BLOCK INSTRUMENT**

Order No.	DETAILS	List Price
046	Cotter Pin, $\frac{3}{16}$ " x 2", for 7307, . . . . .	\$ .008
0203	Rivet, $\frac{3}{16}$ " x $\frac{3}{8}$ ", Rd. Hd., for fixing 7177 to 7151, . . . . .	.01
2948	1" Screw Jaw Complete, with Tang End, . . . . .	1.08
3860	Pin, $\frac{3}{32}$ " x $\frac{9}{16}$ ", for fixing 7165 to 7176, . . . . .	.03
7149	Pawl, . . . . .	.50
7151	Signal Lever, Casting Only, . . . . .	5.00
7155	Walnut Handle, . . . . .	.30
7156	Hallow Shaft, . . . . .	.50
7159	Stud, $\frac{9}{16}$ " x 2 $\frac{1}{2}$ ", for fixing 7149 to Case, . . . . .	.20
7162	Shaft, 1" x 5 $\frac{1}{4}$ ", for Signal Lever, . . . . .	.90
7164	Latch Bolt, $\frac{7}{16}$ " x 2 $\frac{5}{16}$ ", . . . . .	.06
7165	Releasing Shaft, . . . . .	.20
7166	Knob, . . . . .	.30
7167	Washer, Special, for 7156, . . . . .	.20
7176	Latch Lever, . . . . .	1.00
7177	Latch Spring, . . . . .	.30
7178	Pin, $\frac{1}{4}$ " x 1 $\frac{7}{16}$ ", for fixing 7176 to 7151, . . . . .	.03
7306	Pin Plate, Casting Only, for 7309, . . . . .	.52
7307	Stud, 1" x 3 $\frac{11}{16}$ ", for 7306, . . . . .	.18
7308	5" x 6" Crank, for 7309, . . . . .	.90
7309	5" x 6" Crank and Pin Plate Complete, . . . . .	1.64
7670	1 $\frac{1}{4}$ " Washer, for 7307, . . . . .	.02
8830	Signal Lever Complete, . . . . .	14.00
9271	1" Solid Jaw Complete, with Tang End, . . . . .	.77
12484	Fibre Insulator, for Lower Magnet, . . . . .	.14
12485	Fibre Insulator, for Upper Magnet, . . . . .	.14
20642	Pin, $\frac{3}{32}$ " x $\frac{3}{4}$ ", for fixing 7166 to 7165, . . . . .	.03

# STATION BLOCK INSTRUMENT DETAILS





**GENERAL RAILWAY SIGNAL COMPANY**

**STATION BLOCK INSTRUMENT**

Order No.	DETAILS	List Price
0367	Corbin Door Lock, . . . . .	\$ 1.20
0717	Key for Door Lock, . . . . .	.40
577	Brass Nut, . . . . .	.02
845	Base for Binding Post, . . . . .	.08
846	Thumb Nut for Binding Post, . . . . .	.06
847	Lock Nut for Binding Post, . . . . .	.05
1147	Pin, $\frac{1}{8}$ " x $1\frac{1}{4}$ ", for fixing 8471 to 7186, . . . . .	.02
1411	Terminal Screw, 14-24 x $1\frac{3}{4}$ " Rd. Hd., . . . . .	.08
1722	Slate Base for 3874, . . . . .	.90
1728	Asbestos Washer for 3874, . . . . .	.03
2431	Screw 8-32 x $\frac{3}{8}$ " Rd. Hd., for 0637, . . . . .	.01
3605	Brass Nut, . . . . .	.06
3606	Brass Lock Nut, . . . . .	.05
3890	Brass Washer, . . . . .	.01
3903	Brass Terminal Screw, 10-32 x $1\frac{1}{4}$ ", . . . . .	.20
3913	Brass Screw, 6-32 x $\frac{1}{2}$ ", . . . . .	.01
4546	Pivot Point Screw, . . . . .	.16
5063	Crank for 20439, . . . . .	2.00
5065	Handle for 20439, . . . . .	.30
5067	Stud for 20439, . . . . .	.40
5100	Screw, 6-32 x $\frac{3}{16}$ " (Special), for fixing 20439 to 7186, . . . . .	.12
5255	Cap Screw, $\frac{1}{2}$ " x $1\frac{1}{4}$ ", for 14827, . . . . .	.07
6566	German Silver Point, $\frac{1}{16}$ " x $\frac{1}{4}$ ", for 14830, . . . . .	.20
6672	Screw, . . . . .	.20
7160	Bolt, $\frac{1}{2}$ " x $11\frac{1}{8}$ ", for 14826, . . . . .	.30
7161	$\frac{1}{2}$ " Hex. Nut for 14826 and 14827, . . . . .	.10

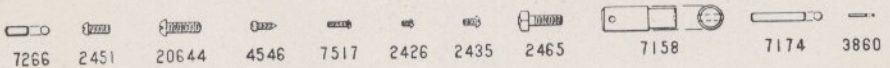
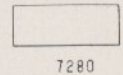
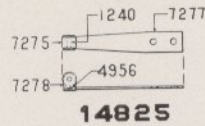
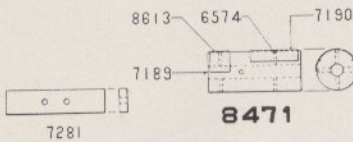
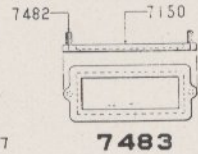
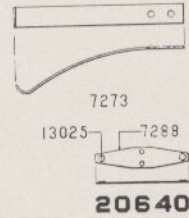
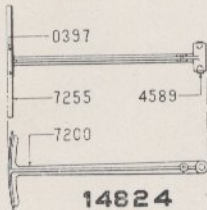
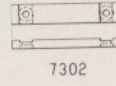
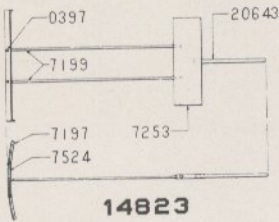
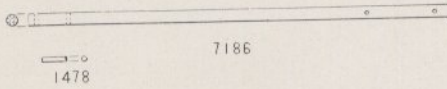
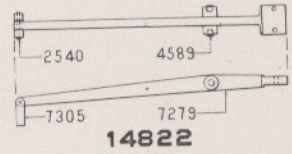
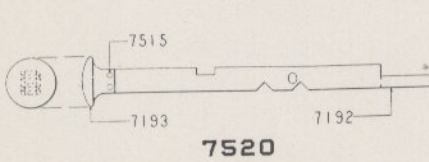
**GENERAL RAILWAY SIGNAL COMPANY**

**STATION BLOCK INSTRUMENT**

Order No.	DETAILS	List Price
7175	Pin, $\frac{1}{4}$ " x $2\frac{1}{8}$ ", for 7144 and 7145, . . . . .	\$ .03
7179	Indicator Bracket, . . . . .	6.00
7184	Contact Bracket, . . . . .	2.20
7191	Contact Spring, . . . . .	.20
7198	Upper Indicator Bracket, . . . . .	1.50
7282	Single Magnet Coil (Indicator), . . . . .	5.00
7284	Single Magnet Coil (Lock), . . . . .	7.00
7286	Hard Rubber Block, $\frac{1}{4}$ " x $\frac{3}{8}$ " x $2\frac{5}{8}$ ", . . . . .	.40
7301	Bushing, . . . . .	.12
7516	Washer, . . . . .	.10
7518	Screw, $\frac{1}{4}$ " x 1", for 14828, . . . . .	.02
8472	Contact Spring Complete, . . . . .	8.00
12890	Stud, $\frac{3}{16}$ " x $\frac{11}{16}$ ", for 8472, . . . . .	.06
14826	Bolt, $\frac{1}{2}$ " x $11\frac{5}{8}$ ", with Two Hex. Nuts, . . . . .	.50
14827	Cap Screw, $\frac{1}{2}$ " x $1\frac{1}{4}$ ", with Hex. Nut, Complete, . . . . .	.18
14828	Pair of Magnets Complete, . . . . .	13.00
14830	Thumb Screw, with Silver Point, Complete, . . . . .	.50
14831	Pin, $\frac{1}{4}$ " x $1\frac{9}{16}$ ", for 7147 and 7148, . . . . .	.05
14832	Corbin Lock, with Key, Complete, . . . . .	1.60
16281	Slate Base, with Binding Posts, Complete, . . . . .	2.60
17854	Escutcheon Plate, . . . . .	.10
20439	Crank Complete, for Hand Switch, . . . . .	2.70
20641	Connector for 8472, . . . . .	.20



# STATION BLOCK INSTRUMENT DETAILS



**GENERAL RAILWAY SIGNAL COMPANY**

**STATION BLOCK INSTRUMENT**

Order No.	DETAILS	List Price
073	$\frac{3}{4}$ " Washer for 7158, . . . . .	\$ .02
0397	Brass Rivet for 7197, 7524, 7255, and 7200, . . . . .	.02
1240	Pin, $\frac{1}{8}$ " x $\frac{1}{2}$ ", for fixing 7275 to 7278, . . . . .	.05
1478	Pin, $\frac{1}{8}$ " x $\frac{3}{4}$ ", for fixing 7185 and 7187 to 7186, . . . . .	.02
1523	Spring for Hand Switch, . . . . .	.20
2426	Screw, 6-32 x $\frac{1}{4}$ ", Rd. Hd., . . . . .	.01
2435	Screw, 10-32 x $\frac{3}{8}$ ", Rd. Hd., . . . . .	.01
2451	Screw, $\frac{1}{4}$ " x $\frac{5}{8}$ ", Rd. Hd., . . . . .	.02
2465	Cap Screw, $\frac{5}{16}$ " x 1", Sq. Hd., . . . . .	.04
2540	Pin, $\frac{3}{32}$ " x $\frac{3}{16}$ ", for fixing 7305 to 7279, . . . . .	.02
3860	Pin, $\frac{3}{32}$ " x $\frac{9}{16}$ ", for 7251, . . . . .	.03
4546	Pivot Point Screw, . . . . .	.16
4589	Pivot Point Bearing, . . . . .	.12
4956	Brass Rivet, $\frac{1}{8}$ " x $\frac{3}{16}$ ", . . . . .	.02
6574	Brass Rivet, . . . . .	.04
7150	Frame for Indicator Glass, . . . . .	.80
7158	Stud, $\frac{3}{4}$ " x 2 $\frac{5}{16}$ ", for 7144 and 7145, . . . . .	.20
7173	Roller, 1 $\frac{1}{8}$ " x 1 $\frac{3}{8}$ " x $\frac{3}{4}$ ", for Cam Crank, . . . . .	.20
7174	Pin, $\frac{1}{4}$ " x 1 $\frac{3}{4}$ ", for Signal Lever, . . . . .	.08
7185	Spring Collar, . . . . .	.40
7186	Shaft, $\frac{3}{8}$ " x 15 $\frac{1}{4}$ ", for Hand Switch, . . . . .	.40
7187	Collar, $\frac{3}{8}$ " x $\frac{3}{4}$ ", for 7186, . . . . .	.16
7189	Contact Block, . . . . .	1.20
7190	Movable Contact for Hand Switch, . . . . .	.30
7192	Locking Slide, . . . . .	1.50
7193	Knob for 7192, . . . . .	1.10
7197	Upper Indicator Plate, . . . . .	.80
7199	Brass Rod for 14823, . . . . .	.04



**GENERAL RAILWAY SIGNAL COMPANY**

**STATION BLOCK INSTRUMENT**

Order No.	DETAILS	List Price
7200	Lower Indicator Lever, . . . . .	\$1.00
7251	Lower Indicator Link, . . . . .	.40
7253	Armature, . . . . .	1.00
7255	Lower Indicator Plate, . . . . .	1.20
7266	Dowel Pin, $\frac{1}{4}$ " x $\frac{3}{8}$ ", for 7168 and 7169, . . . . .	.02
7273	Spring, $\frac{1}{16}$ " x $\frac{1}{2}$ " x $4\frac{1}{8}$ ", for Pawl 7149, . . . . .	.40
7274	Lock Bracket, . . . . .	.80
7275	$\frac{3}{8}$ " Roller for 14825, . . . . .	.10
7277	Slide Spring for 14825, . . . . .	.30
7278	Roller Bracket for 14825, . . . . .	.20
7279	Lock Lever, . . . . .	1.20
7280	Glass, $1\frac{1}{4}$ " x $3\frac{1}{4}$ ", for 7483, . . . . .	.06
7281	Armature, $\frac{1}{4}$ " x $\frac{3}{4}$ " x $3\frac{1}{16}$ ", . . . . .	1.20
7285	Insulator Block, . . . . .	.30
7286	Insulator Block, . . . . .	.40
7287	Contact Block, . . . . .	.16
7288	Contact Spring, . . . . .	.30
7301	Bushing, . . . . .	.12
7302	Insulator Block, . . . . .	.40
7305	Lock Slide, . . . . .	.40
7482	Stud, 10-32 x $\frac{5}{8}$ ", for 7483, . . . . .	.05
7483	Indicator Frame Complete, with Studs, . . . . .	.90
7515	Pin, $\frac{1}{8}$ " x $\frac{7}{8}$ ", for fixing 7193 to 7192, . . . . .	.02
7516	Washer, . . . . .	.10
7517	Screw, 6-32 x $\frac{5}{8}$ ", Rd. Hd., . . . . .	.01
7520	Locking Slide Complete, . . . . .	3.00
7524	Strap for Upper Indicator, . . . . .	.10
7525	Brass Counterweight for 14823, . . . . .	.40

GENERAL RAILWAY SIGNAL COMPANY

**STATION BLOCK SIGNAL**

Order No.	DETAILS	List Price
8471	Commutator Complete, . . . . .	\$2.20
8613	Contact for 8471, . . . . .	.20
13025	Platinum Contact, . . . . .	.30
14822	Lock Lever Complete, . . . . .	2.20
14823	Upper Indicator Lever Complete, . . . . .	3.50
14824	Lower Indicator Lever Complete, . . . . .	3.20
14825	Spring with Roller Complete, . . . . .	.90
20640	Spring with Contacts Complete, . . . . .	1.50
20643	Brass Rod for 14823, . . . . .	.03
20644	Screw, $\frac{5}{16}$ " x 1", Rd. Hd., for fixing 3874 to Case, . . . . .	.04

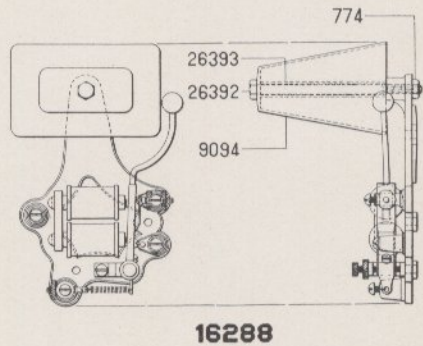
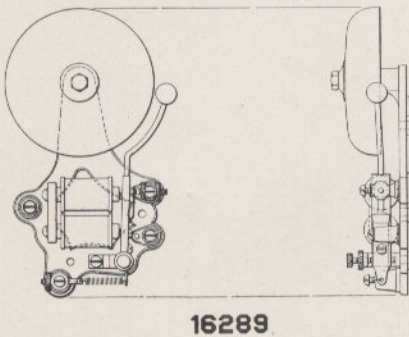
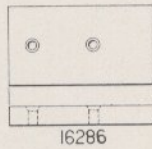
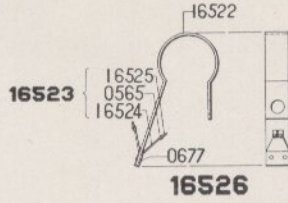
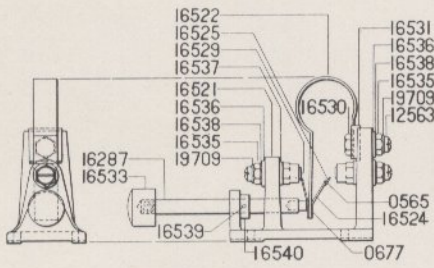
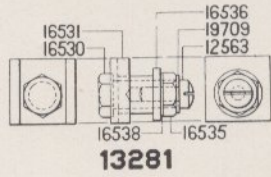
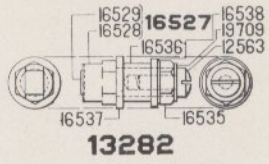
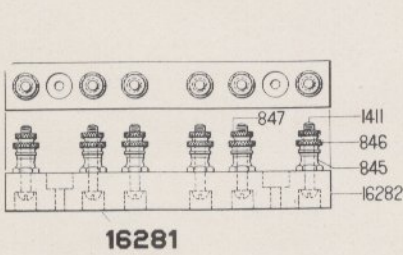


**GENERAL RAILWAY SIGNAL COMPANY**

**ADDITIONAL FITTINGS FOR STATION  
BLOCK INSTRUMENT 16280**

Order No.	DETAILS	List Price
0565	Pin, .035" x $\frac{3}{8}$ ", . . . . .	\$ .01
0631	Wood Screw, No. 10 x $\frac{3}{4}$ ", Rd. Hd. Br., . . . . .	.01
0677	Pin, .065" x $\frac{1}{2}$ ", . . . . .	.01
684	Fibre Washer, $\frac{1}{16}$ " x $\frac{1}{2}$ "-.165", . . . . .	.02
774	Hex. Nut, $\frac{1}{4}$ "-24, for 26392, . . . . .	.02
845	Binding Post Brace, . . . . .	.08
846	Nut for Binding Post, . . . . .	.06
847	Nut for Binding Post Lock, . . . . .	.05
1411	Terminal Screw, 14-24 x $1\frac{3}{4}$ ", . . . . .	.08
2433	Machine Screw, 8-32 x $\frac{7}{8}$ ", Rd. Hd., . . . . .	.02
9094	Cow Gong for 16288, . . . . .	3.00
12563	Machine Screw, 10-32 x $\frac{1}{2}$ ", Fil. Hd., . . . . .	.08
13281	Binding Post Complete, . . . . .	.80
13282	Contact Post Complete, . . . . .	.86
16281	Binding Post Block Complete, . . . . .	2.60
16282	Base, . . . . .	1.00
16285	Bell Key Complete, . . . . .	6.00
16286	Insulating Block, . . . . .	.20
16287	Plunger, . . . . .	.40
16288	Bell Complete, fitted with Cow Gong, 9094, . . . . .	20.00
16289	4" Bell Complete, . . . . .	15.00
16349	Machine Screw, 10-32 x 1", . . . . .	.02

# STATION BLOCK INSTRUMENT DETAILS





**GENERAL RAILWAY SIGNAL COMPANY**

**ADDITIONAL FITTINGS FOR STATION  
BLOCK INSTRUMENT 16280**

Order No.	DETAILS	List Price
16521	Frame for Bell Key, . . . . .	\$ 1.50
16522	Contact Spring, . . . . .	
16523	Contact Finger Complete, . . . . .	.50
16524	Contact Finger, . . . . .	
16525	Contact, . . . . .	
16526	Contact Spring Complete, . . . . .	1.50
16527	Contact Screw Complete, . . . . .	.60
16528	Special Screw, $\frac{3}{8}$ "-28 x $\frac{3}{32}$ ", . . . . .	.30
16529	Contact, .028 x $\frac{1}{4}$ " x $\frac{5}{16}$ ", . . . . .	.30
16530	Screw, $\frac{3}{8}$ "-28 x $\frac{3}{32}$ ", . . . . .	.30
16531	Insulating Block, . . . . .	.24
16533	Push Button, . . . . .	.36
16535	Hex. Nut, $\frac{3}{8}$ "-28 x $\frac{3}{16}$ ", . . . . .	.05
16536	Bushing, $\frac{3}{8}$ "- $\frac{11}{16}$ " x $\frac{1}{32}$ ", . . . . .	.05
16537	Washer, $\frac{3}{8}$ "- $\frac{5}{8}$ " x $\frac{3}{32}$ ", . . . . .	.05
16538	Washer, $\frac{3}{8}$ "- $\frac{9}{16}$ " x $\frac{1}{32}$ ", . . . . .	.02
16539	Pin, $\frac{3}{32}$ " x $\frac{5}{8}$ ", . . . . .	.02
16540	Bushing, $\frac{3}{8}$ "- $\frac{5}{8}$ " x $\frac{1}{4}$ ", . . . . .	.10
19709	Washer, $\frac{1}{32}$ " x $\frac{7}{32}$ " x .045", . . . . .	.01
26392	Machine Screw, $\frac{1}{4}$ -24 x $4\frac{1}{2}$ ", Hex. Hd., . . . . .	.20
26393	Spacer, $\frac{1}{8}$ " Pipe $3\frac{3}{8}$ ", . . . . .	.10

