

Fig. 1

## The Hall Style "L" Signal

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**T**HE Hall Style "L" Signal is essentially a development of the Lattig Signal patented twenty-five years ago, and owned by the Hall Switch & Signal Company. We have for many years refrained from building this type of signal, owing to its unsatisfactory operation in the early stages of automatic signaling. On the other hand, we religiously adhered to that type of signal in which the motor was not required to run backward when the signal blade was returning to the stop position, it being feared that to overcome the excessive friction a certain degree of safety would be sacrificed.

Within the last few years wonderful development has been made in the production of ball and roller bearings, so that the bearing friction is no longer a matter of grave concern. What was looked upon a few years ago as unsafe and impracticable, has an entirely different aspect today, thanks to absolute accuracy in bearing manufacture.

The original Lattig Signal comprised a motor, a train of gears, which reversed when the signal returned to stop, a hold clear magnet and a snub circuit to retard the movement while returning. In our Style "L" signal we employ nothing more and nothing less, but we have developed and improved it to such an extent that you do not recognize the old original Lattig Signal.

We have a highly efficient slow speed motor, strong rugged stub tooth gears, the most ingenious, free operating and accessible circuit controller yet devised, all assembled in a roomy casing so constructed that all parts are accessible. The motor, gear train, and semaphore spindle bearings are the very highest grade of ball and roller type that can be procured.

These refinements throughout the Style "L" signal guarantee its prolonged, reliable and efficient service.

## GENERAL DESCRIPTION

The signal comprises four general parts shown assembled in Fig. 1

1. The clamp bearing with its U bolts, spindle bearings, operating segment, adjustable stop screws, outside blade stop and lamp bracket.
2. The main case containing the gear train, motor, and circuit controller.
3. The motor with hold clear mechanism.
4. The circuit controller.

### THE CLAMP BEARING

The spindle bearing consists of two flexible roller bearings which run in an oil bath, thereby assuring constant lubrication and preventing any chance of rusting. The oil reservoir which supplies lubricant to the roller bearings is provided with an inlet and an outlet plug permitting a change of oil whenever desired. In addition to this there is located above each bearing a spring top oil cup through which the bearings may be directly oiled if desired. The outer end of the clamp bearing is provided with an oil tight weather plate, and the segment on the rear end of shaft is keyed and pinned in place. A spring top oil cup is located directly over the pinion and segment.

The blade stop and lamp bracket are of R. S. A. design. The bearing is secured to the pole by means of the U bolts.

### THE MAIN CASE

The case is rigidly secured to the clamp bearings by means of three  $\frac{3}{4}$ " tap bolts, the joint being accurately machined and made up with white lead. The door of the case is hinged at the bottom and arranged to swing downward, permitting free access to all parts of the mechanism, and incidently the door when opened provides

a pocket or shelf on which tools or meter may be conveniently laid while working at the signal. The door is held in closed position by means of a suitable spring clamp, which firmly compresses the gasket, rendering the case practically weather proof. The case is also provided with two other doors, one on either side, which admit of free access to train of gears. These doors are fastened from within and can be opened only after opening the main door. The case is provided with a suitable eye bolt in the top so that the signal may be conveniently raised to top of the mast.

The operating wires are brought into the case from a suitable connection in the mast, through a flex duct and an angle fitting, which is attached to the side of the case.

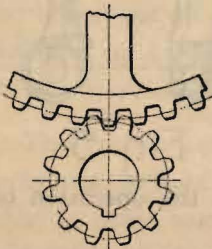


Fig. 2

The gears are cut with the stub form of tooth and the centers dimensioned so as to give a considerable clearance between pitch lines, (see Fig. 2), thus preventing any binding or undue friction. All the gears are keyed and pinned to their respective shafts except the motor pinion which will be referred to later. The bearings are all of the highest grade ball or roller type, and conveniently located oil tubes are provided for oiling them.

An ingenious device in connection with the first gear is provided to prevent operating the blade from without the signal, (Fig. 3). This is furnished at the option of the purchaser. The spider casting, containing the front bearings for gear spindles, is secured to the case by means of four cap screws two of which are provided with dowel bushings, thus insuring perfect alignment of bearings.

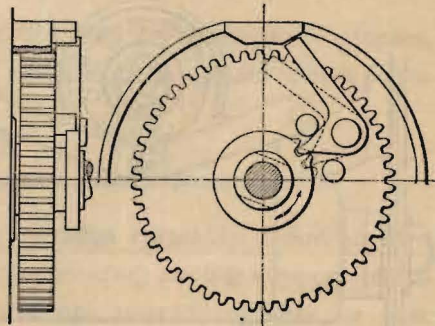


Fig. 3

## THE MOTOR WITH HOLD CLEAR

The motor with its hold clear mechanism is secured in the main case by means of two  $\frac{1}{2}$ " cap screws. The motor is of the bi-polar series type, the pole pieces of which are spiraled, thus obviating the necessity of spiraling the armature. This spiraling, as is well known, will eliminate pulsation of torque during passage of armature teeth. All coils and windings are form wound and impregnated. The bearings are of the same type as used elsewhere in the mechanism.

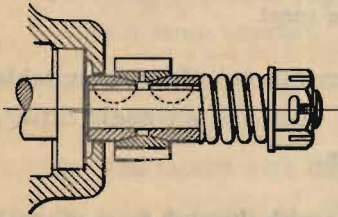


Fig. 4

The pinion is secured to the motor spindle by means of a double cone slip clutch, (Fig. 4), which may be easily adjusted to the required tension. The commutator is of the moulded type and readily accessible;

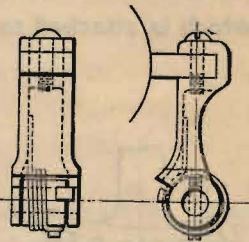


Fig. 5

the carbon brushes, of which there are four, are non-adjustable, (Fig. 5), and the brush holders so designed as to make it impossible for them ever to come in contact with the commutator. The brushes are so located as to be easily renewable without interfering with the operation of the signal.

The hold clear is located in the front, or commutator end, of the motor, behind a door with gasket and spring latch as shown in Fig. 1.

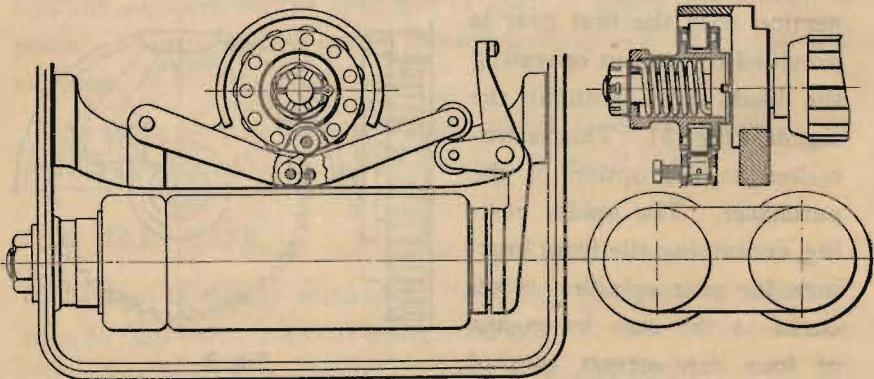


Fig. 6

The hold clear mechanism, (Fig. 6), consists of a latch lever in which is located a spring actuated latch dog.

One end of this lever is pivoted on the bearing frame, and the lever itself is free to swing downward. When this lever is in the operating position, due to the energization of the hold clear magnet, the latch dog referred to above, engages with one roller, of a series of rollers, which are carried in a support, which is flexibly connected to the outer end of the motor spindle.

The armature of the hold clear is pivoted in such a manner that a roller carried on a horizontally projecting arm, engages a roller on the free end of the latch lever. Thus when the armature is pulled against its magnet, the latch lever is raised, forcing its dog into the path of the rollers carried by the roller support on the motor spindle. When the motor has moved the signal to the clear position, and the current is cut off by the controller the mechanism is prevented from backing up by the engagement of one of the rollers and the dog before mentioned.

The flexible connection of the roller carrier with motor spindle, prevents the hold clear from kicking off when the load settles on the dog; in other words when the motor is cut out, and the load causes the roller carrying member to move backward there is a tendency for the heavy moving load of the blade to force the latch lever out of engagement. This is entirely overcome by the action of the buffer spring which connects the roller carrier to the spindle.

A vertically projecting arm of the hold clear armature support, when in the operating position, holds open a contact which is included in the snubbing circuit.

## THE CIRCUIT CONTROLLER

The controller comprises two spindles rotatably mounted in a suitable frame, which frame carries contact spring support of insulating material. These spindles are geared together so that when operated by the pinion which is connected to the main gear spindle, they will move simultaneously. These spindles carry, on their square section, insulated hubs on which are mounted the

contact cams. These cams are provided with screw adjustment, and practically any setting desired may be secured. Tubes of insulating material extend from the lower to the upper section of the controller, and are provided for the purpose of carrying any wires which may be required to pass from one section to the other, thus preventing them from coming in contact with, or fouling, the contact springs.

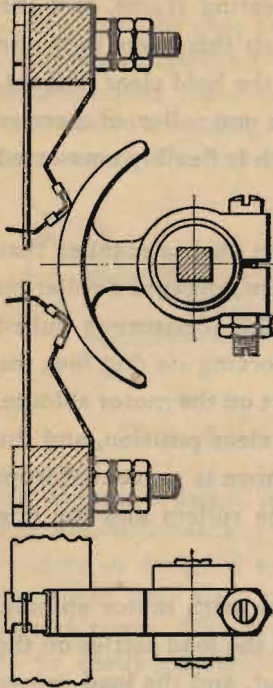


Fig. 7

Fig. 7 shows the design of contacts used on the controller. The contacts have a uniform tension and are non-adjustable, the deflection of the springs in either direction being fixed by the limiting strip.

The controller is mounted on studs secured in the spider casting, and is so designed that it may be removed and replaced again without interfering with the adjustment of cams.

The Style "L" Signal is also made in the bottom post type, arranged to operate either one or two arms. The signal will fit in the standard base of pole mechanism case, and differs from the top post type only in such features as are necessary to adapt it to the base of pole conditions.

One of the controller spindles carries an indicating arm which is adapted to accurately indicate the position of the blade at  $0^\circ$  or stop position, at  $45^\circ$  position and at  $90^\circ$  position. This indicator moves exactly  $90^\circ$ , as does the blade, rendering it unnecessary to note the position of the blade when installing the signal.

The controller is also provided with one or two Veeder counters which are operated by the indicator arm referred to.

Both the top and bottom post Style "L" Signals are also made to operate on 110 volt D. C. Current or on A. C. current of standard voltages and frequencies. In either the D. C. or A. C. Signal, the motor and hold clear constitutes a unit so that to change from D. C. to A. C. current, it is only necessary to change the motors with their hold clears, which may be done by removing two cap screws.

### SUGGESTIONS FOR INSTALLATION

Mechanisms received for installation by the construction forces, if not to be immediately used, should be placed where they may be kept out of the weather and free from moisture. As soon as possible, however, they should be mounted on the poles, and all bearings thoroughly lubricated with some high grade oil which is recommended especially for signals. This Company is prepared to furnish the proper oil. After oiling and before the blade is attached, it would be well to place a large monkey wrench on the spindle and operate the mechanism from stop to clear position ten or twelve times to insure that the oil has worked thoroughly into all bearings. This operation of the signal mechanism by hand should be repeated every few weeks until signals are placed in service.

The wiring of the signal motor and controller should be neatly done, and disposed in such a manner that no surplus wire can foul the gearing, or any part of the controller; the surplus wire should be drawn down out of the case and into the mast. When wiring is completed it should be neatly cabled into as compact a bunch as possible, especially where it enters the wire inlet. We would suggest that the space between the wire cable and the inlet be solidly packed with oakum, thus preventing damp air from flowing up the inlet into the signal case, as it is well known that if the air in the signal case can be kept at a uniform temperature and humidity, there is less liability of frost trouble.

Connections of the motor, (see plan attached to inside of motor door), are made directly to binding posts on the controller. As all local wiring between the controller and the motor is done at the factory, it will not be necessary to interfere in any way with the

interior wire arrangement of the motor. It would be well, however, when operating the signal by hand to thoroughly polish commutator with a clean piece of cloth.

Controllers are adjusted at the factory for operating the signal at an E. M. F. of 8 volts. If the voltage at the signal is found to be more than 8, the operating controller cam may be adjusted back slightly. If the voltage should be slightly under 8, the controller cam may be adjusted ahead slightly. Such adjustments, however, should be made only, if on observation, the signal blade does not move the full distance desired.

The snub cam on the controller is arranged to snub the signal when returning at approximately  $65^\circ$  and releasing at  $48^\circ$ , also to snub when returning below  $45^\circ$  at approximately  $20^\circ$  and releasing at  $3^\circ$ . It should be understood, however, that these cams have been set at the factory and unless they operate unsatisfactorily, should not be changed.

### SUGGESTIONS FOR MAINTENANCE

Assuming that the signal has been properly installed and was operating satisfactorily when turned over for service, it will require very little maintenance. Maintenance will be more in the nature of inspection. There are no delicate adjustments to maintain, and from observation during rigid tests, there are no parts which are liable to get out of order, or cause trouble. However, be sure that all doors are properly closed and pulled tight against their gaskets, thus keeping out moisture, smoke and dust. Be sure that bearings are properly oiled, however, they do not require a great deal of oil. Put just a few drops on occasionally as surplus oil will not stay in the bearings and therefore is wasted. Only as much oil should be placed in the bearings as will be retained therein by capillary attraction. A few drops in each bearing once a month is a great sufficiency. When making inspection, wipe commutator clean with a firm piece of rough cloth, such as drilling. Do not use waste, as particles are sure to be picked off and may lodge under the brushes, causing imperfect commutation. Do not put any oil whatever on commu-

tator, but rather polish clean and smooth with the cloth as before stated.

The motor brushes are fitted to the periphery of the commutator before leaving the factory, and are non-adjustable. Do not attempt to adjust, but note that the screws which clamp the brushes in the brush holders are not loose. Do not attempt to substitute other carbons for the brushes furnished, as exhaustive tests have been made and the most suitable brush supplied. When the brushes become worn down to a point where the brush holder is within  $1/16$  of an inch of the commutator, they should be renewed, since the brush holder is so designed that it will not feed down toward the commutator beyond this point. This is to prevent the metal part of the brush holder from coming in contact with the commutator and causing roughness. Two sets of brushes are employed so that when changes are being made the signal will not be put out of service. To renew brushes, take out clamping screw at top of brush holder, remove old brush, insert new one and replace screw. We again advise that no adjustment be made on the brush tension.

Occasionally put a drop of oil in the controller spindle and gear bearings, and on the pins which support the hold clear mechanism. We suggest that this be done with a small wire and not with the nozzle of the oil can, as too much oil will make a messy looking interior. The controller cams and contacts should be kept clean by means of a small fairly stiff brush, say about  $1/4$ " in diameter. After brushing off the contacts, the brush should be rubbed on a piece of oily cloth, so that a small amount of oil will adhere thereto. The contacts can then be brushed and will retain sufficient oil, for perfect operation, until the next inspection. Always keep the snub contact bright and clean. This may be done by rubbing it with a small piece of No. 00 sand paper. Do not use emery under any circumstances.

If the snub contact needs attention it will be readily discovered by the fact that the signal returns to the stop position a little faster than usual. This, however, would not be serious or damage the

parts in any way, as the over-run of the motor will be taken care of by the slip clutch. This motor pinion is supplied with an oil hole drilled at the base of the teeth into its bore and should be oiled whenever other parts of the signal are oiled. This clutch should also be inspected from time to time to insure its slipping freely.

We recommend that about once a year the intermediate gears and their bearings be taken out for inspection and cleaning. This may prove to be unnecessary after the first cleaning, as it may then be found that there is not sufficient accumulation of dirt to interfere with proper operation. If, due to lightning, the motor should become damaged, we recommend that the entire motor be changed, and that the damaged motor be sent in for repairs. When installing a new motor under these circumstances, be sure that the motor pinion meshes properly with its gear, and that there is ample clearance between pinion and first gear, at the same time inspect the clutch on the new motor and see that it slips freely.

Keep exposed parts of semaphore spindle coated with vaseline to prevent rusting. Keep all other parts of signal painted, for the same reason.

All signals are tested thoroughly at the factory and will operate more efficiently on 8 volts than any other E. M. F., tho the difference between 8 and 10 volts is insignificant. All adjustments are as carefully made as possible, and all air gaps and resistances carefully inspected.

The pick up, release, and operating values are well within the R. S. A. specifications, and we feel that if reasonable attention is paid to the foregoing suggestions, no trouble will be experienced in the maintenance of the STYLE "L" SIGNAL.