

Gangs Do Signal Maintenance

P. Shepardson

Engineer Signals and Communications
Richmond, Fredericksburg & Potomac

● We obtain high standards of maintenance by using gangs instead of signal maintainers assigned to individual territories. We have had the gang maintenance system for four years, and it meets our requirements. While each man in the gang is an all-around signalman, some become experts on different phases of modern signaling. Thus we utilize these individual talents or specialties to the greatest advantage. For example, a man may become an expert on adjusting coded track circuits, another on carrier circuits, crossing gates, etc. If double occurs or repair is needed, the best suited man can be sent to do the job. We have these specialists in each gang, so they go only in the territory covered by their gang.

Traffic Control All the Way

Before getting into the details, such as how many men are in each gang, etc., I had better tell you something about RF&P signaling. We have 100 per cent traffic control from Richmond to Washington, 110 miles of multiple track mainline. Cab signaling and automatic train control are in service for bi-directional running. Except at interlockings, wayside signals are in service on each track for right-hand running only. Traffic locking is in effect between all interlockings, remote and locally controlled. These interlockings total 17, and in addition we have four remote control yard switch layouts. All mainline and throw switches are equipped with electric locks. All high signals and most dwarf signals are the colorlight type. Some new two-unit searchlight dwarf signals are being installed to replace bridge-mounted colorlight signals.

At Alexandria, Va., just across from Washington, we have a large yard classification facility known as Potomac yard. There are two hump yards: (1) the northward hump yard of 49 classification tracks with power switches and manual retarder controls, and (2) the southward hump

Richmond, Fredericksburg & Potomac has been using gangs for signal maintenance work for four years. Using gangs instead of signal maintainers on individual territories has proved successful on this 110-mile mainline railroad. Editor's note: Mr. Shepardson spoke on gang maintenance at the Signal Section convention in October at Washington. This article contains much of his talk, plus additional material prepared especially for Railway Signaling and Communications readers.

yard which we are rebuilding. This yard has 39 class tracks, automatic switching, radar speed control for automatic control of the master retarder and pushbutton speed selection on the group retarders. In rebuilding the yard, we did not have enough room for the required length of tangent and curve track on which to make rolling resistance measurements essential for automatic control of the group retarders.

In addition to highway crossing protection equipment, interlockings and other standard signal facilities, our gangs maintain two hotbox detector installations. One detector is about 30 miles south of "Pot" yard (Alexandria) to check southbound trains after leaving the yard. The other detector is 30 miles north of Richmond, and checks northbound trains. Wire line carrier brings the detector signals to recorders in the Richmond dispatcher's office.

Do All Types of Signal Work

Our gangs do all types of signal construction and maintenance work. Highway crossing protection, interlockings (new, consolidated and modernized), and pole line relocation, construction and maintenance are some of the many and varied facilities covered by these gangs. At Potomac yard joint maintenance work is carried on with the communications men. For example, the radar units are replaced by signalmen, but are repaired by FCC licensed communications men.

Of the four gangs, three work along the railroad, while the fourth is now engaged in construction work in

modernizing the southbound hump and class tracks at Potomac yard. This yard construction gang and another gang are headquartered at Alexandria, Va. The other two signal gangs are headquartered at Fredericksburg and Richmond.

No Mainline Track Walkers

We have no mainline track walkers. To patrol our mainline we have four men working in pairs—a signalman and a track inspector. Each pair rides a track motor car and covers 25 miles of line every day. One pair is headquartered at Doswell, Va., MP 22 (north of Richmond). The other pair works out of Quantico (MP 79). In addition to inspecting rail bonds, insulated joints, track, switches, pole line and right-of-way structures and facilities, they work together in making switch adjustments and switch obstruction tests. The signalman carries rail bonds with him and replaces bonds when necessary. (We use a Copperweld, 7-strand, 53-in. plug type bond that rides on top of the joint bar bolts, but under the lip of the bar.) These men do any work they can do, the rest is reported to signal or M/W supervisor for gang maintenance.

A foreman is in charge of each gang, and assigns the work to be done each day. The men are signalmen or assistants, we have no helpers. In addition to the foreman, each gang has a lead signalman. The size of the gang depends on the work to be done.

We equip each gang with a one-ton stake body truck and two half-ton pickups. Each gang carries portable telephones that can be hooked on the

message or dispatcher's circuit. For pole line work, the signal gangs help the communications men. We have one pole line truck especially for this work. It is a four-wheel drive truck with an A-frame, pole hole augur and a winch. It is equipped with two-way radio operating on our train-to-wayside frequency. The dispatcher can keep in radio communication with the truck at all times through our wayside radio stations. We have two signal shops: one at Potomac yard and the other at Fredericksburg. Each shop is under the respective gang foreman, and he assigns men to shop work as required. One gang has a relay repairman.

Avoid Routine

The word **routine** when used with signal maintenance is a rather meaningless word that to me could best be defined as **rat**. Any work performed on a **routine** basis, whether the work is needed or not, is wasted effort. A detailed study of signal faults will indicate how effective our maintenance has been, but will not indicate if our **routine** maintenance has been

carried to the point where the cost becomes excessive for the results obtained.

If our **routine** schedule is on the heavy side, how will we know until we have tried that we could get along on half as much? There are two extremes on almost any type of **routine** and neither is always correct. It would seem that in either case, it is worth a little deviation from what we have been doing just to convince ourselves that we are right or that we have been wrong all the time.

I once saw this heading on an article: "Maintenance—The Secret of Cost Reduction." Why this should be a secret I will never know unless because of railroad accounting methods, a large part of signal maintenance expenses is hidden in other accounts. This may be good, but to determine actual maintenance costs for useful comparison, extra bookkeeping is required by the signal department. But this can be well worth the effort.

A detailed examination of one railroad's signal accounts indicated an excessive amount of time charged to "cleaning and oiling." An investigation disclosed that a **routine** had been

established years ago and follow without question. A clean switch with well lubricated plates will operate even if the switch is out of surface. And by the same token, an extra pound or so of air pressure, or an extra cell or two of battery, or the addition of switch point rollers, will result in the switch operating even if the plates lack proper lubrication.

Signal faults caused by dirty contacts are rare. Some **routine** cleaning causes faults. Cleaning bands on interlocking machine will eventually result in lost tension of fingers, a thread from the cleaning cloth can cause an open circuit. The zerk fittings on signal apparatus result in excessive lubrication applied by conscientious signalmen on **routine**. A sub-tower case containing modern signal equipment requires very little **routine** maintenance. Just what is there for a maintainer to do at these locations? If proper records are kept, a man will tell a signalman the condition of a track circuit much quicker than a walk with greater accuracy than walking track, inspecting and pulling broken wires on **routine**.

Skilled manhours are entirely 1

Many Advantages When Signal Maintenance Work Is Done by Gangs

The abolishment of maintenance sections with individual maintainers and the establishment of gangs has many advantages. Here are eleven, with a brief discussion of each:

(1) The skills and knowledge of experts are utilized to the maximum. Each man is an all-around signalman capable of working on all types of equipment. We have some men, for example, who are particularly adept at case wiring, or are specialists in switch machine operation and repair. We can take advantage of the skills of these men by assigning them that type of work whenever possible. This doesn't freeze out others from learning from the specialist, because our men generally work in pairs. Thus the non-specialist (in one type of work) can work with and learn from the specialist.

We have the same number of men doing maintenance as we had with maintainers working on sections. Be-

cause we are able to utilize them better, we get a higher type of maintenance.

(2) Gang maintenance eliminates seniority problems. Under the old system, sections with maintainers were geared to a standard of the least able man. In other words, the bid and seniority requirements for filling vacancies made it essential that the maintenance sections be reduced to the lowest denominator of capacity to accommodate the least qualified man that was eligible to bid on the job. This procedure often resulted in men with exceptional talents being confined to territories where full advantage of their talents could not be utilized and developed. Such an arrangement handicaps the signal department and does not help the man.

(3) Adequate forces are available for maintenance. The work schedule is not interrupted by track maintenance, relaying rail, installing

switches, etc., that take maintenance time. When track work is to be done the foreman can assign men to work with the track forces, while the rest of the gang does signal maintenance.

If one man needs help on a job, the foreman can assign one or several men to help him. A maintainer who sometimes has to wait several days for a maintainer in an adjacent section to be free to help him. With a gang system, adequate forces are available for major repairs, pole line work, small construction jobs, etc. without calling in outside assistance.

(4) Supervision, issuing of instructions and training of men is improved and simplified. One reason, of course, is that the foreman can readily bring his men together at gang headquarters. An assistant supervisor, signals and communications, is located at Potomac yard and another at Fredericksburg.

Generally, the maintainers work

uable and in far too short supply squander. The signal maintenance is a very conservative workman. He makes few mistakes, and when he does make one it is generally on the safe side. Any changes to upset his established routine had best be **incited** rather than **imposed**. We often become so accustomed to doing things a certain way at a certain time, we no longer question the basic purpose of our actions. Blind conformists are abundant in signaling the same as in all walks of life. Experience indicates that the signal suppliers are much too modest in their recommended maintenance interval to **routine** check their equipment. We are required by law to follow a certain routine of inspections and tests of signal devices, but it is one routine that is outside the scope of this talk.

Training for Assistant Signalmen

We have a four-year training program for assistant signalmen. An understanding with the Brotherhood of Railroad Signalmen of America permits us to move the men around the railroad so they may obtain varied

experience in signal work.

The men are given on-the-job training with instruction by myself and the assistant supervisors. We also give them a copy of "Railway Signaling and Railway Operations" as well as Signal Section chapters on "Railway Signaling Principles and Practices" which pertain to the work they are doing in a particular six months' period. At the end of each six months, the men are given a written and oral examination covering the work done in this period. The men must pass each of the eight examinations during the four-year training program.

The written examination consists of multiple choice, true and false, and matching questions (match definition with symbol or indication with aspect). Passing is 70. A man can ask for a re-examination within three months. After two failures he is dismissed as not being able to qualify as a signalman.

I prepare and correct the written examinations. I also give the oral exams. If meter readings, switch adjustments or similar equipment testing or maintenance procedures are

involved, I go out in the field with the man and watch him at work. It's real on-the-job training and testing.

Learn About RF&P First

The training, of course, starts with basic information pertinent to our road, and progressively becomes more difficult. For example, the first six-months' exam covers the operating time table, rule book, safety rules and graphic symbols. The second exam will cover meter reading, circuit symbols, switch operating sequence, and various types of relay hook-ups. The third exam is more technical, covering the basics of car retarders, CTC or highway crossing protection, depending upon the work performed by the man. As we have one gang working at Potomac yard, we can put an assistant signalman in for six months to give him some retarder experience. We usually finish the training program on carrier equipment. Toward the end, we always bring the men into the drafting room for experience doing circuit work. This program has been very successful, both from the standpoint of the men and our management.

me, and the supervisors had to go out along the line to see them. This took a great deal of the supervisor's time, especially if he spent some time instructing the maintainer.

(5) Men benefit from the knowledge obtained by construction. Installations of various types of new signal equipment using new circuits permit in better qualified men to maintain this equipment.

(6) A minimum number of power tools, meters, special instruments, test equipment and other supplies is required. Fewer tools are needed with gang maintenance than were required with maintainers on sections. For example, only two track motor cars are now used (for the signalmen and track inspectors who patrol the railroad in pairs). Formerly each maintainer had a track motor car.

(7) Relief is not required for men on vacation or absent from work on account of sickness.

(8) More men are available for correcting signal faults without territory time claims. In case of trouble, the best man available is called. A signalman is sent out, and he may take an assistant, but an assistant signalman is never sent out alone. When trouble occurs, the dispatcher or others in the operating department call the assistant supervisor. If he is not available, the foreman is called. He makes the decision as to which men go out and repair the trouble.

(9) A major personal benefit of the gang maintenance system is that members are able to live at home in or near the headquarters. Because our gang headquarters are in fairly large communities, homes, shops, schools, churches and recreation facilities are readily accessible. Generally, the men are home every night. This eliminates the need for camp cars and their attendant sanitary and

cooking facilities, as well as a cook.

(10) A competitive spirit and urge to learn is apparent in the gangs. As the men usually work in pairs, and often in groups of three or four, they can learn from each other. It is especially beneficial to the younger men as it gives them the opportunity to work with experienced men. A man takes pride in his workmanship because he knows his work will be seen, and he will receive recognition for good work. An esprit de corps or team spirit is created, especially as each gang wants to be the best gang.

(11) Work is planned by the foreman with a minimum of routine. In most cases a report is turned in one day, and the work is done the next day—unless it's trouble, which is handled immediately. A big advantage is that no time is wasted. The foreman instructs the man or men on the job to be done, including what is expected.