use the citizens' band type radios only for those limited applications where conditions will permit.

T. W. Wigton, General Superintendent Communications, Chicago, Burlington & Quincy, Chicago, Ill.

A. We have both American and foreign 100-milliwatt portables on trial. The more expensive American units appear satisfactory for line work and surveying crews where direct contact with trains is not required. Such operations would release standard railroad portables for train and yard operations.

With regard to 5-watt Class D equipment, it is contemplated that non-operating supervisors and special agents might use them for their activities. If convertible equipment becomes available, it is a small jump to move from the CB assignments of 26.965 through 27.255 mc to one of the five Land Transportation assignments of 27.235 mc through 27.275 mc available to railroads on a 30-watt basis. The range of mobile units on these frequencies makes such operation attractive and the equipment cost is a fraction of the standard railroad installation.

F. B. Childs, Radio Engineer, Northern Pacific, St. Paul, Minn.

A. We are not using citizens' band radio for voice communication. We are using frequencies in the citizens' band for radio paging in Grand Central Terminal, Mott Haven Yard and in the Harmon diesel shop area. Performance of the radio paging equipment is very satisfactory and it is likely that it will find additional application in other areas of the railroad.

R. C. Karvwatt, Director of Communications, New York Central, New York, N. Y.

Power Factor Improvement

Q. Do you use capacitors to improve the power factor of signal power transmission lines? Please state your reasons for using or not using them.

A. Capacitors have been in use on signal power transmission lines for about 32 years. Some of the many reasons for using them are as follows: 1. To reduce the power bill where commercial power is used. Some power companies give the customer a bonus for high power factor, and levy a penalty for poor power factor. 2. Where energy is produced by steam-electric generating plants, to reduce the amount of coal used to fire the boiler and to reduce the number of firemen to a minimum. 3. To effect a large saving in I^2R, or line losses, in signal power lines, where in some instances sources of power are as much as 80 miles apart. 4. To reduce the number of substations, from which power is obtained, by increasing the efficiency of the transmission line. 5. To improve the operating characteristics of relays, slot coils, motors, and incandescent lights by boosting the voltage, where low voltage formerly existed. 6. To increase the capacity of the transmission line, without increasing the size of the conductors. Since the line losses vary inversely as the square of the power factor, for example, where the system power factor was 50% and is improved to 100%—the line losses in a transmission would be reduced from, say, 10 kw to 2.5 kw.

H. P. Hancock, P.E., Retired Supervisor of Signals, Roanoke, Va.

Dynamic Indication

Q. What are the possibilities of eliminating the dynamic indication feature in all-electric interlockings, where adequate point detection is also in use?

A. Why should one think of eliminating the desirable features of dynamic indication? Dynamic indication from a switch machine assures the switch has made the full travel to either the normal or reverse position and is locked. The free running of the motor in the switch machine generates the current to produce the dynamic indication. Therefore, this type of switch machine must operate accurately and in sequence: unlock, throw off the switch, lock and indicate. Another advantage in the use of machines of the dynamic indication type is less wear on the switch points. To obtain the most desirable effects of dynamic indication, the operating rod to the switch must not have excessive tension or stress, so common to other electric and pneumatic switches.

It has been my observation that when too much tension or stress is placed on the operating rod of other types of machines, overloading at the completion of the movement causes excessive pull or push on the operating rod, thereby resulting in the switch point becoming twisted at the point. The top of the point is then slightly gapped from the stock rail, which results in chipping or breaking off the top of the point. Unless the stock rail is ground or recessed to protect the point, it is only a short time until the point must be ground, re-ground, and finally changed out long before the full expected life of the point has been used. Switch points, too, cost money. Dynamic indication allows longer wear life for switch points due to proper tension or adjustment of the operating rod.

The primary purpose of point detectors on switch machines, after the switch has been locked and used, is to detect an unsafe condition of the switch (due to being run through or dragging equipment springing the points). Point detector protection is most desirable on any type of switch machine over which trains are operated by signal indication.

Hubert Smith, Retired Foreman Communications and Signals, Richmond, Ind.

A. The dynamic indication feature in all-electric interlockings may be eliminated if certain requirements for protection are met. They are:

1. The point detection must include an over and locked check on the switch machine.
2. The interlocking must be equipped with full mechanical locking or the equivalent.
3. A complete network for restricted speed signals must be provided.

The indication magnet coils should be retained as a snub to stop the switch machine motor, but the indication parts can be removed from the switch lever. Out of correspondence lights are then added for each switch lever to indicate when the lever does not agree with the position of the switch points.

We have put this arrangement in at one of our large interlockings, using non-vital telephone type relays which check correspondence and control the indicator light.

M. H. Work, Office Engineer-System, New York Central, Cleveland, Ohio.

Caboose Power

Q. What kind of power equipment do you use for radios on cabooses? What problems have you encountered and what steps did you take to solve them?

A. We use two types of batteries for radio power in cabooses. Twelve-volt lead acid batteries are used in most installations; however, alkaline batteries have been installed to replace the lead acid type in quite a large number of

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