C.T.C. Puts More Trains Over An Erie Cut-Off

In spite of increased traffic, the train time has been reduced on a single track-freight line 28.6 miles long

The C.T.C. Permits Trains to Keep Moving at Closer Spacing

THE Erie has increased the track capacity of a single-track cut-off, 28.6 miles long, between Leavittsburg, Ohio, and Pymatuning, Pa., by installing centralized traffic control, including power switches and signals for authorizing train movements to replacing manual block, thereby permitting following trains to be spaced more closely with safety, eliminating the necessity for stopping trains when entering or leaving passing tracks, and increasing the average speed through industrial areas where yard limit rules were previously in effect. Practically all through freight trains pass over this cut-off, while the passenger trains as well as certain freight trains are routed over a double-track line, 11 miles longer, that passes through Youngstown.

Previously the cut-off handled about 18 freight trains daily, which has now increased to a total of about 28 trains daily. In spite of this fact, the average train time on the 28.6 miles is now 10 minutes less than prior to the installation of C. T. C. Furthermore, the C. T. C. has so increased the track capacity that two through freight trains that were previously operated via Youngstown are now operated over the cut-off.

Character of the Line

For the most part the cut-off has a rolling grade line with short grades ranging up to approximately 1 per cent. From Latimer, the grade ascends westward for three miles to the center of the siding at Johnsons on a maximum grade of 1.05 per cent for approximately one mile and for the next five miles west it descends, with a maximum of 1 to 1.11 per cent for about two miles. There are only five curves, with a 1-deg. maximum.

At Pymatuning, a mechanical interlocking, "GH," includes the switches, crossovers and signals in the junction layout. At Latimer, a mechanical interlocking, "MR," protects a crossing of the Erie with the New York Central. In the east part of North Warren, a mechanical interlocking, "WN," protects a crossing of the Erie with a double-track line of the Pennsylvania. In Warren, another mechanical interlocking, "BO," protects a crossing with a single-track line of the Baltimore & Ohio.

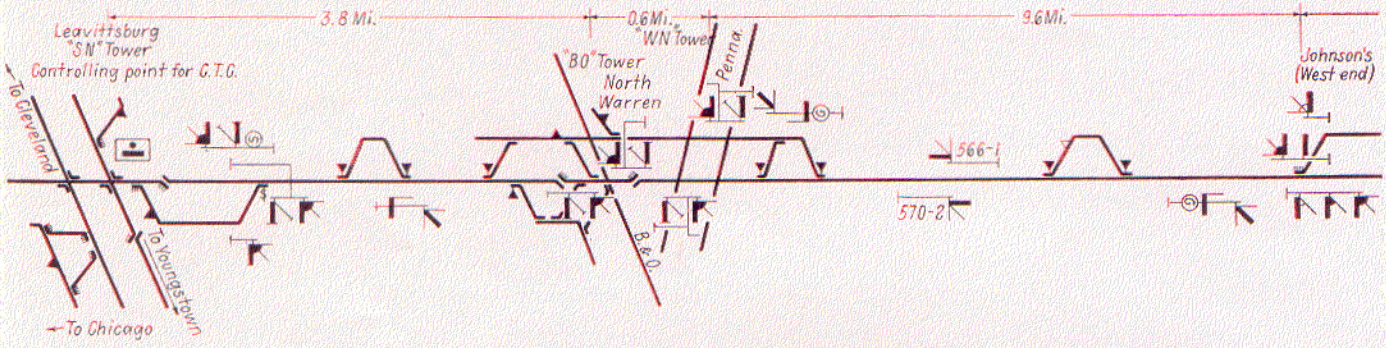
At Leavittsburg, a mechanical interlocking, "SN," includes the signals and track layout at the junction of the two lines eastward to Pymatuning, as well as the main line west to Chicago, and the main line north to Cleveland. The control machine for the centralized traffic control between Leavittsburg and Pymatuning is located in the tower of the "SN" interlocking at Leavittsburg.

Prior to the recent program, no automatic signaling was in service on this territory, and train movements were authorized by manual block with block offices at "SN," "BO," Cortland, east end of Johnsons, Latimer, Burghill, Orangeville, and "GH." Yard limits were in effect through the various towns and switching areas, and through trains were required to operate under yard limit rules, prepared to stop short of switching moves being made on the main line. Means for advising the switching crews of the approach of through trains was limited. This circumstance was an important factor, because, in the industrial area in North Warren, switching crews work 24 hours a day, three crews being on duty the first shift and two on the second and third shifts.

On this territory, only two passing tracks are used in the regular operation of through freight trains. The west switch of the passing track at Leavittsburg is in-

cluded in the "SN" mechanical interlocking, and a spring switch was installed at the east end of this siding, as a part of the C. T. C. project. In the previous arrangement at Johnsons, crossovers were in service between the siding and the main line, at a point about midway of the length of the siding. As a part of the recent program, these crossovers were removed, and the siding was lengthened to 8,200 ft., sufficient to hold two trains of average length. New No. 20 turnouts, with 30-ft. points were installed, and power switch machines were provided.

On this installation all the signals, including semi-automatic, automatic block and interlocking home signals, are of the searchlight type. At each end of the siding at Johnsons, where the power switch machines are used, a complete arrangement of semi-automatic signals is provided to direct trains to enter the siding, depart from the siding or continue on the main line. A track



Track and Signal Plan of the Centralized Traffic

circuit was installed on the passing track, and is used not only for the control of the signals governing movements to this track, but also the track circuit controls an indication on the C. T. C. machine to repeat occupancy of this siding.

Each of the station-entering signals has three "units."

Signals and Power Switch At Johnsons

The top unit governs through movements on the main track. Display of the Medium Approach aspect, red-over-yellow-over-red, Rule 286, indicates that the switch is reversed for a train to enter the siding, and that the siding is unoccupied. In this instance, the "distant" signal displays the yellow-over-green aspect, Rule 282A, which indicates that a train is to approach the next signal at medium speed. This use of signal aspects provides complete information sufficient to enable a train to be brought up to and through the No. 20 turnout at the speed for which it is designed. If only the Approach aspect were given on the "distant" signal, an engineman would, in such instances, be required, according to rule, to reduce to medium speed at the "distant" signal, and approach the station-entering signal prepared to stop.

If an eastbound train, for example, is occupying a part of the siding at Johnsons, the westward signal cannot be controlled to display an aspect to head an opposing train into the siding. On a station-entering signal, an aspect of red-over-yellow, Restricting, Rule 290, indicates that the switch is reversed for a train to enter the siding, but that the train is to proceed prepared to stop short of another train on the siding. In this instance, the "distant" signal displays the Approach aspect, just as it would if the station-entering signal were at Stop.

Take Siding at Spring Switch

The westward station-entering signal at the east end of the siding at Leavittsburg is a two-unit searchlight signal with a "take-siding" indicator attached to the mast below the second unit. This siding indicator is a lamp unit with a 16-in. frosted cover glass which, when illuminated, displays a large letter "S" on a black background. When a westbound train is to enter the siding, the operator codes a westward take-siding control which causes the take-siding indicator to display an illuminated letter "S," and timetable instructions require the train to stop at this signal and throw the switch to the reverse position, after which the take-siding indicator is automatically extinguished and the restricted speed signal is displayed for movement to the siding.

If an eastward train on the Leavittsburg siding is to be directed to depart, the leave-siding dwarf is controlled to display a proceed aspect, either yellow or green, depending on the block occupancy ahead. Then the train trails out through the spring switch, and departs.

In view of the fact that the station-leaving signals are semi-automatic, and normally display the Stop aspect, no two opposing signals can be cleared simultaneously, and intermediate signals were not required to provide head-on protection. The intermediate automatic signals were, therefore, based only on the requirements for spacing

fuel for the movement of one mile of 1,000 tons of freight and equipment. This average has never before been attained. For each pound of fuel used in freight service in 1941, the railroads hauled nine tons of freight and equipment one mile compared with 6⅕ tons in 1921, or an increase of 46.3 per cent."

Fuel Economy Not a Dormant Subject

Fuel economy certainly is not a dormant subject. We are going forward and we can and will continue to make further forward strides. A decrease in fuel consumption of 46.3 per cent in the course of 20 years is a good record. We must continue to perpetuate that good work.

There is frequently a tendency in abnormal times, such as we are now facing, to become possessed with the idea that we are in too much of a hurry to worry about details. In our efforts to handle heavy traffic, keep fast important train schedules on time, and eliminate delays, it is quite possible that, in the opinion of many, fuel economy should be overlooked and regarded as an unimportant detail requiring little consideration. The paramount duty of moving traffic, making of train schedules and avoiding delays must be recognized, but still there is no real need for becoming over-stimulated to the extent that we lose sight of fuel savings which can be accomplished without impairment to the service if proper co-operation is afforded.

The progress in fuel economy referred to was accomplished only to a certain degree by engine crews in charge of the locomotives. It was largely due to improvements in the design of motive power, refinements of equipment on locomotives, elimination of stops enroute, handling of more uniform and practical tonnage per train, and many other factors. A substantial and gratifying reduction has been made in locomotive fuel performance on a ton-mile basis by mechanical improvements and operating methods, to the extent that the ever-present opportunity for economy through education of the employees handling the work of moving the trains and operating the locomotives may have been neglected.

At present, with business on a high level and numerous men being inducted into the armed forces, we will necessarily be faced with inexperienced men in all branches of the railroad service. It cannot be expected that they will reach the state of efficiency that experienced employees have attained and it therefore becomes necessary now, and in the immediate future, to put forth greater efforts in educating employees in the art of fuel economy. The importance of fuel economy must be consistently kept before all employees or there will be an immediate slackening of interest. Therefore, I feel justified in saying that there is a greater opportunity at present and in the immediate future than there has been for some time past to save railroad fuel through educational efforts among the employees.

Possibility of 5 Per Cent Fuel Saving Suggested

The second question will answer itself by means of a few figures. During the year 1941, the cost of fuel used on railroad steam locomotives in the United States amounted to $238,076,588, representing 92,605,622 tons. Reports indicate that during the year 1941, there were 41,438 steam locomotives in operation in the United States, the average cost of coal for each locomotive in service being approximately $5,745. The percentage of this fuel that could be saved by comprehensive educational efforts among operating officers, trainmen, enginemen and maintenance forces in the roundhouses and shops would be difficult to determine. Most of you will agree that if everyone were on the alert and eliminated all preventable waste of locomotive fuel a 5 per cent reduction could be made, which would amount to approximately $11,903,829. Besides the immediate savings by the decreased volume required there would be other important advantages gained, such as release of man power required to mine the coal, and release of cars which would amount to approximately 90,000 carloads.

In connection with the third question, it is understood that railroads are not now operating with the primary objective in view of making an outstanding fuel record, regardless of how it effects the service provided. On the other hand, the economy sought is such as ought to be accomplished in connection with the proper meeting of all train schedules, quick turning of power, elimination of delays, increased engine runs, etc. We know that, under certain conditions, trains could be moved over districts or divisions, making a more favorable showing on the ton-mile basis, if train schedules were slower; this would permit handling of increased tonnage up to the most practical tonnage rating for economy.

Fuel Can Be Saved Without Impairing Service

In some instances, a more favorable fuel record could be made if more power were available and greater selection could be made of power units most suitable to fit each particular run or train to be handled. On the other hand, such cases are not sufficient to outweigh the benefits, in so far as fuel economy is concerned, that may be derived from conditions existing with tonnage at its peak, and usually the most favorable fuel performance is made when there is plenty of tonnage to handle with no surplus of motive power available which necessitates the quick turning of power and the greatest possible utilization of all motive power on hand. These facts prove to us that fuel economy can be practiced without impairment of the service. When there is a surplus of motive power available for the business to be handled, there is a tendency to keep in service more power units than are actually needed, resulting in low mileage per month and per day per serviceable unit, increased standby losses at terminals, and many other factors which make for an unfavorable fuel record.

When the practice of extended locomotive runs was first inaugurated to a greater or less degree, many men voiced opposition to it, believing that locomotive maintenance costs would increase, that locomotive life would be decreased, and that fuel consumption would mount. It was believed by many that the proper method of maintaining steam locomotives was to have the locomotive tied up at an enginehouse after it had made a run over a division or district, taking another locomotive out of the enginehouse which had been given routine servicing and attention. The pioneers in the movement for extended locomotive runs soon proved the fallacy of this theory. The weak points on the locomotives which had previously required attention at each terminal point were eradicated, and long engine runs were made with greater success as time went on, until today, it is common practice to run modern locomotives over several districts or divisions between each time they are tied up at a terminal point for roundhouse attention.

While a "cooling-off period" may be beneficial and save a lot of trouble when applied in connection with labor or other disputes, it is not so with steam locomotives. The less frequent the cooling-off and heating-up periods occur with steam locomotives, the longer the

power will last, with fewer bearing troubles, also fewer firebox and flue leaks. Present-day service requires long extended locomotive runs and this method of operation is favorable to a good fuel record, providing proper maintenance is afforded the locomotive which will permit it to function at maximum capacity throughout the entire run, regardless of its length.

To obtain the highest degree of efficiency from locomotives on extended runs, it is necessary that proper provisions be made for conditioning the boiler water enroute. The continuous automatic blow-off system has been of great assistance in this respect. It is also necessary to have grates so designed that the fire can be kept in good condition throughout the run, and if for any reason it becomes necessary to clean the fires while locomotives are receiving light servicing at intermediate points, which are usually fuel and water stations, grate and ash-pan arrangements should be provided which will permit conditioning the fires quickly, thereby preventing any drastic changes in firebox temperature.

The drafting of locomotives must be studied and arranged to suit the operating conditions. It is not practicable, in the present method of operation, to draft locomotives to suit individual engine crews or any single districts over which the locomotives operate. If the maintenance of locomotives is properly handled and they are efficiently drafted so that good fire conditions can be maintained to the end of a long run, there is a distinct fuel economy in long locomotive runs. There is still a great field for further economies when we analyze performance figures and find that the mileage per locomotive day on Class I railroads in the United States for the month of February, 1942, ranged from a high of 167.5 to a low of 46.2.

While waste of natural resources should not be permitted to occur, if there ever was a reason for strict conservation of resources of any kind, it is now, as suggested by our fourth question. It is our patriotic duty to save every pound of locomotive fuel that can be saved without impairment of the service. It has become necessary for the furtherance of the war efforts to make many curtailments of material, both for industrial and domestic use. We are ready to accept such restrictions in the fullest sense of co-operation, knowing that whatever inconvenience may be caused is, after all, but a small sacrifice towards the great cause which we are willing to, and must, support to the limit of our ability. There was never a time that the challenge of strict, thoughtful and intelligent conservation of railroad locomotive fuel should receive a greater response than at the present.

Need for Employee Education

Next to "Safety First," the second slogan which should be brought to the attention of new and old employees alike and kept constantly flashed on the screen depicting railroad operation is "Save Fuel." The slogan of saving fuel should be kept prominently before the locomotive firemen, enginemen, train dispatchers, train conductors, train brakemen, boilermakers, machinists, inspectors, carmen, in fact, all employees who have anything to do with the movement of the trains and the preparation and care of motive power and rolling stock. The saving of railroad fuel is not a one-man job. The fireman who controls the amount of fuel placed in the firebox may be handling his work as economically and efficiently as conditions permit. The fuel that he has saved, compared with a mediocre method of handling the work, can easily be wasted by the engineman through improper manipulation of the locomotive, such as working it at unwarranted long cut-off, thereby building up excessive back pressure in cylinders and while using an excessive amount of steam, not increasing the speed of the train, but on the contrary, retarding it.

On the other hand, the engineman may handle the locomotive in an efficient and capable manner, moving the train over the division or district with a minimum amount of steam consumption. His good work and the fuel saved by expert handling may be wasted through careless and inefficient work on the part of the fireman, such as improper and wasteful boiler feeding, steam wasted through the safety valves, low degrees of superheat steam temperature by reason of permitting fires to become banked in spots, improper fuel distribution and injudicious use of grates which may result in the fire bed being too thin at certain times and too heavy at other times, thus requiring additional fuel.

Officers and Department Heads Must Set Example

If both engineman and fireman handle their work in an economical manner, the saving that they have made through skillful work can easily be wasted by a hot box in the train or a hot bearing on the locomotive. With a slow order in the track, perhaps at the foot of an ascending grade, the additional fuel burned to regain momentum from the slowdown may more than equal the amount of fuel which could be saved in a trip by the most skillful engine crew.

Undoubtedly all irregularities which prevent the uninterrupted movement of trains are being investigated in one manner or another to develop the cause and if possible place responsibility. However, I do not believe that it is a common practice in connection with such investigations to refer to the amount of coal wasted by reason of the delay or irregularity in train movements. It should be made a part of the report and referred to when handling the case with the employees involved. If the slogan "Saving Fuel" is used intelligently and judiciously, there is reason to believe that we can arouse enthusiastic interest among all railroad employees.

In stimulating the interest of employees, as suggested in the sixth question, it is necessary that the leaders, or in this case the officers and department heads, set an example. It cannot be expected that any worth-while results will be obtained if numerous obstacles to fuel saving which could be eliminated are permitted to stand in the way. There must be some action to indicate that the officers or department heads are concerned about the success of the program.

For instance, if train and engine crews are fully determined to move the trains over their territories in a most economical manner and still are faced with unnecessary train delays, injudicious regulation of tonnage, poor planning of work enroute, excessive terminal delays, etc., they will soon begin to slacken their efforts and figure "What's the use, what we are able to save is wasted many times over in other ways and apparently nobody cares."

Engine crews who may be willing and capable of saving every pound of fuel possible are not likely to show continued keen interest if the locomotives are not properly maintained and prepared for them. If a locomotive is dispatched from an enginehouse steaming hard trip after trip due to leaky or stopped-up flues, leaky superheater units, excessive air leaks in the front end, valve and cylinder packing blows, etc., the crew cannot be expected to maintain keen interest in fuel conservation. In order to arouse and retain a lasting interest in

fuel economy it is necessary for railroad officers to watch the situation closely from all angles and take whatever action is necessary to eliminate carelessness wherever it exists. It is not sufficient to train one class of employees only. All employees must be trained to appreciate their own responsibility in order to obtain results. Briefly, it is necessary for railroad officers to have a thorough knowledge of the factors involved in saving locomotive fuel and then afford such supervision that wasteful or irregular practices are eliminated from all sources that will adversely effect a successful fuel economy program. If certain officers are assigned to specialize on fuel savings and fuel supervision, they must be afforded the wholehearted co-operation of the entire staff of railroad operating and mechanical officers in order to carry on their work successfully. If officers and heads of departments are vitally interested in the subject, employees will invariably follow along and do their part to the best of their ability.

The answer to the seventh question can briefly be summarized as follows: The interest in fuel economy will be most successful and effective if it is carried from the highest ranking officer on the road on down the line. An educational program must be carried on constantly to indicate by facts and figures the extent of fuel cost and the opportunities that are present for saving if fuel is used with strict economy. New employees should be instructed so that they will understand from the outset the importance of the subject. For example, it may look far-fetched to talk to a machinist apprentice or a callboy entering the service about fuel economy, but it is not amiss. If a mechanic performs a poor piece of work it will invariably result in failure, train delays and an excessive amount of fuel burned before normal operation is resumed. If a callboy neglects to call the engine crew on time, it will result in a hurry-up job of preparing the engine; perhaps something will be overlooked; and the trip will be started out wrong, resulting in several tons of additional coal being burned on this particular trip which could have been avoided.

It is generally recognized that the fuel record on a railroad is the barometer by which the efficiency may be judged to a great extent. Therefore, the best way to a good fuel record is through efficient railroad operation, a high standard of equipment maintenance and an effective educational program among employees.

Simplifying Interline Payments

Typing and clerical time are saved in system of forms developed by extensive investigation on Northern Pacific

By H. S. Latham

Assistant to General Auditor, Northern Pacific

A SYSTEM of accounting for interline traffic and car service balances has been perfected by the Northern Pacific, which is effecting large savings in typing and clerical time, when compared to the method heretofore used. The new method was developed deliberately—by an extensive investigation undertaken last fall to that end, and included examination of many alternatives, including the use of machine posting and punch cards.

Part of the savings of the new plan accrue from the use of draft list balance forms and part result from revision of our draft form.

Although the advantages of the forms will be apparent to anyone handling traffic and car service balances, a brief explanation might be helpful. Separate sets of similar forms are used for freight, passenger and switching (a portion of one sheet of the freight form being illustrated here), and a different form is used for car accounting data. The part of the car service forms which is similar to the freight, passenger and switching forms—but with lines closer and columns 3, 4 and 5 omitted—is detached to become the draft list balance form.

This form may be described as follows (column numbers referring to the accompanying illustration):

Column 1—"Code No."—Printed—These are the numbers used on interline forms as prescribed under mandatory freight accounting rules, with the exception of the four digit numbers. The code numbers are typed on drafts drawn.

Column 2—"Foreign Line Name"—Printed—Alphabetical order. A study of current freight, passenger, switching, and car service accounts was required to determine which names should be printed and how much space should be allowed for typing in the names of roads with which we seldom have balances.

Column 3—"Acct."—N.P.-F.L.—Printed—Indicates whether source of figure in Columns 4 or 5 is Northern Pacific or Foreign Line, interline report.

Columns 4 and 5—Filled in from interline reports designated in Column 3.

Column 6—"Balance due N.P."—Net of Columns 4 and 5, if receivable.

Column 7—"Balance due F.L."—Net of Columns 4 and 5, if payable.

Column 8—"Date settled" is filled in with a rubber dating stamp from treasurer's daily cash record of receipts and disbursements.

Column 9—"Remarks" is used to enter a memorandum of date drafts were approved for payment, and information such as "Do not draw," "Remits," "Make drafts 'with exchange,'" etc. Some of the remarks are printed.

Columns 4, 5, 6 and 7 are filled in by the departments which receive and forward interline reports. These departments forward forms with only Columns 6 and 7