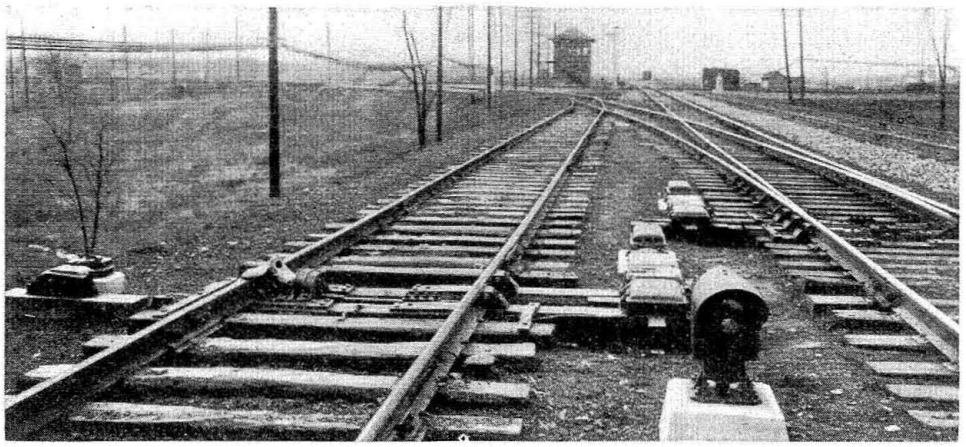
The Application of Derails



An application of the lift-type derail on a passing track at an interlocker

A discussion of circumstances where derails should and should not be used, together with an explanation of the types for different conditions of operation

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WHY should a railroad, whose success and in fact whose very existence is predicated upon keeping rolling equipment on the rails, deliberately provide a device for derailing moving trains, locomotives or cars? It is said that the use of fire is one of the greatest benefactions to the human race, and equally the misuse or loss of control of fire is frequently one of man's great misfortunes.

Derails properly used can be of material assistance to a railroad in its ever present goal of maintaining reliable operation. It should be obvious, however, that they should not be used when the results from their use are likely to be more undesirable than the conditions they are intended to guard against. A derail improperly installed may not only be a "delusion and a snare" but may, under some conditions, be a positive menace to that reliable operation being striven for.

Derails are installed for two general purposes. They may be used as a matter of discipline to enforce observance of the rules and observance of the fixed signal indications; they may be used as a safety provision, as on a siding or at the entrance to the main track, where a derailment would be preferable to fouling the main track. During the earlier years of North American signaling it was the general practice to provide derails in all tracks leading to a grade crossing with another railroad, if trains were to be permitted to pass over the crossing without first making a full stop. The derails in such main tracks were located from 300 to 500 ft. from the crossing, this distance being, in most cases, sufficient to stop a derailed train, at weights and speeds then customary, before the crossing tracks were fouled.

Discipline was not always as strict as it should have been and a derail in advance of a signal was very helpful in enforcing proper respect for and observance of the signal indications. Signal indications are now almost universally observed, and a derail is hardly needed for that purpose. Furthermore, the weight of railroad equipment and the average speed of trains has been so greatly increased, and momentum become so great, that a derailed train may be projected forward the several hundred intervening feet, and pile up on the crossing. This condition is aggravated when the ground is frozen. When an engineman misjudges his stopping distance by a few feet the train may slip by a signal enough to be derailed, even though there would be no danger of his fouling the crossing. These hazards, with improvement in the observance of signals, has made the use of derails, in main tracks outside of switching territory, inadvisable. This conclusion is particularly applicable at locations where automatic train control is in service, as stopping trains by automatic control is greatly to be preferred to derailing them.

The practice of installing derails in high-speed main tracks outside of switching territory has been almost universally discontinued by the railroads of the United States and Canada. The following conclusion was approved by the American Railway Association in 1927 and appears in the Manual of the Signal Section of that association:

"Derails should not be used in main tracks. On heavy grades, where the need of some device to check runaway trains or cars is indicated, properly deflecting tracks may be used."

The Board of Railway Commissioners of Canada, after making extensive investigation of the practices and recommendations of the various railroads and public service commissions of the United States and Europe, issued under date of September 9, 1931, Circular No. 230, the following resolution:

"The Board will approve of interlocking signal protection at steam railway crossings at grade level without derails, except in special cases where it may be deemed that derails are required."

The railroad and public service commissions of many states have generally gone along with the latest approved practice and have authorized grade-crossing signaling without derails in the main tracks. One of the inexplicable inconsistencies in the administration of this question has been that in many cases labor representatives both on and off the commissions have frequently advocated the use of derails in main track, although it would seem that labor's interests were entirely on the

other side of the question, particularly as a locomotive cab is an uncomfortable place to be when a locomotive is derailed and possibly turned over.

Consideration in Switching Areas

General rules for the use of derails have their exceptions as do practically all other rules. A main track in slow-speed and switching territory, although still a main track, should, in some cases, be protected as if it were only a switching track. This conclusion applies particularly in the vicinity of drawbridges near terminals. The speeds at such points are generally sufficiently low to permit the stopping of derailed equipment before reaching the open span, and the chance of the signal being disregarded is greater than is the case where through movements in the normal direction of traffic only are made.

During continuous switching operations the locomotive may be at either end of a group of cars of varying number, and the engineman frequently cannot see the fixed signal or in some cases cannot see the man on the last car of the group that he is moving. The signal indications and switching instructions are frequently relayed to the engineman through the fireman and perhaps through a succession of switchmen. Under these conditions derails may properly be used in the main tracks to protect a drawbridge or even a grade crossing if the crossing signal must, on account of lack of room, be placed close to the crossing.

Influence of Derail Types

The type of derail also has a material bearing on the advisability and method of its use. The split-point derail, either single or double point, was the type first generally used and still remains the most effective type from a derailing point of view. The split-point derail opens a gap in the running rail which should cause the wheels of moving equipment to drop to the ground and be diverted away from the other running rail. This type of derail has the serious objection of opening the running rail, thus requiring careful checking and locking of the derail point. Careful inspection and cleaning is necessary to keep the open point free from pieces of coal or ballast and particularly from snow and ice during the winter.

The lifting or block-type derail is satisfactory for locations on the outside of curves or for straight tracks at speeds below medium speed. The lifting-type derail in most general use consists of a casting two feet or more in length with a diagonal groove for the wheel flange from the inside to the outside of the rail. The derail casting may be slid up on the rail, pushing snow or other obstructions automatically out of the way, or may be hinged and turned over on top of the rail. The lifting-type of derail has definite advantages in lower first cost and maintenance and less hazard to normal traffic, and should be used wherever adapted to the requirements. This type of derail is frequently painted vermillion to attract attention.

The use of derails has its greatest and more definite advantage on sidings and side tracks to avoid inadvertently fouling of the main track by equipment on the siding. A side-track derail is of benefit in marking the clearing point and, if of the lifting type, in the actual stopping of a slow-moving car and in preventing the pushing of a car by means of bars towards the main tracks by men desiring a more favorable location for loading or unloading.

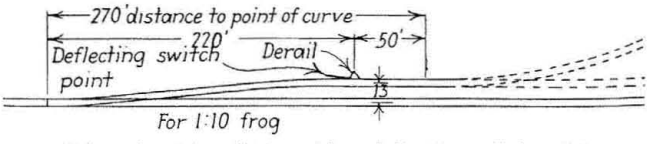
Derails at the ends of sidings in addition to enforcing the clearance point, identify the end of a fouling track circuit. Without this protection, if either the front or rear end of a train should be moved onto the track circuit, the signals on the main track should assume the stop position, possibly in the face of an approaching train. Frequently it is impracticable, for physical reasons, to provide a clearance sign at the end of a track circuit and even where practicable such a sign is not as effective as a derail.

At some locations where sidings and side tracks are infrequently used the rail may become rusty and require special attention to keep the fouling circuit in active operation. A derail is helpful as a safety factor under such conditions. Occasionally a car not properly blocked may be started by a strong wind and if assisted by a grade may, if not stopped, foul the main track when not protected. An unattended locomotive in a yard may start and should be derailed rather than permitted to reach the main track. The location or stopping distance of moving equipment on a siding or side track may be misjudged by a train crew.

Placement of Derails

Siding and side-track derails should be located so that a derailed car or locomotive, even moving at a fair speed, will not foul the track which is to be protected. A lifting-type derail properly located on a straight section of track parallel with the track to be protected or on the outside rail of a curve or on the inside rail of a curve not sharper than one degree, may generally be depended upon. The effectiveness of this type of derail should be insured by placing a switch point outside of the running rail in advance of the derail to deflect a derailed car or locomotive away from the track to be protected; otherwise, derailed equipment, moving on the ties or on frozen ground, may foul the main tracks, thus defeating the purpose for which the derail is intended.

For the inside of a curve sharper than one degree, a split-point derail is desirable. When clearance distance is limited and derailed equipment must be diverted sharply, a complete switch with double points and a No. 7 frog may be required. The theoretically correct location for a siding or side-track derail is at a point where such track is parallel with the track to be protected and with this tangent continuing at least fifty feet to the rear of the derail location. Such a location as shown on accompanying plan should insure that the car or locomotive, at the time of derailment, is not headed toward the track to be protected, and may readily be diverted. It is not always practicable, due to local conditions, to provide an ideal arrangement. In such cases it is desirable to approximate the ideal as closely as practicable, bearing in mind that if a derail is to be provided consistent protection should be afforded thereby.



Siding derail installation with a deflecting switch point

Where there are switches or frogs between the main track switch and the derail location, consideration should be given the possibility of the running rails or frogs permitting derailed equipment to be re-railed. The decision as to the use of derails and their proper type and location is not a haphazard matter but one which in each case should be given proper engineering consideration.