Use of Derails Varies Greatly on Railroads

Different Standards Exist With Respect to Their Application In and Out of Automatic Signal Territory

Three Types of Derails

THE use of derails at interlocking plants is well standardized throughout the country and the conditions surrounding their installation are familiar to the majority of signalmen, but when these devices are installed, either in automatic signal territory or outside, the employees are familiar only with the general practice as established for their road assuming such methods to be common to those employed on other lines. An investigation of this subject shows that this is not the case and that there is a wide divergency in the use of this simple track device. For instance, some roads like the New York Central, Lines East, make it a practice to install derails on passing tracks, while others like the Long Island are abandoning them for this purpose. The Illinois Central and the Chicago, Rock Island & Pacific make it a practice to install derails on all tracks that lead out of the main line on which cars may stand, while the Chicago, Milwaukee & St. Paul and the Chicago, Burlington & Quincy use them in such tracks only where adverse grade or other conditions warrant. On some lines it is the practice to place derails in turntable leads, while many other roads do not require protection at such points, but may install derails at special locations, such as at the foot of coal chute inclines, on breaker tracks or on tracks running through shop buildings for the protection of the buildings.

It is the general practice on the Lehigh Valley to use pipe-connected derails, while the Long Island prefers the hand-throw type. Some roads use the pipe-connected type in automatic signal territory only, while others use it irrespective of signals. Again, some lines like the Philadelphia & Reading connect up all derails with the signal circuits through switch circuit controllers, whether the derails are pipe connected or hand thrown, while other roads like the Delaware & Hudson use the switch circuit controller on hand throw derails, but not on the pipe-connected type in automatic signal territory.

Again, the tendency towards the more general use of derails varies greatly. The Rock Island, for example, is extending their use, while the Chicago Great Western has recently removed them from passing tracks. Practice again varies regarding the use of the split point or the block type of derail. Some roads use the split point in special cases only, others like the Northern Pacific make the split point type the standard, while the general tendency of many other roads is towards the use of the block derail.

As indicated above, the frequency and the conditions under which derails are used vary greatly. For this reason data has been secured and tabulated covering the practices on 48 representative railroads in all parts of the United States and Canada in order to ascertain the conditions governing their installation at other than interlocking plants. In this investigation the following questions were asked:

(1) Are derails placed on all passing and other tracks connecting with main tracks or on only those with particularly adverse conditions as to grade, vision, etc., or are they omitted from all such tracks? Is any distinction made between passing and industry tracks in this connection?
(2) Are derails commonly installed in tracks leading to turntables or at other special locations apart from the main track?
(3) Is the split point or block derail used?
(4) To what extent is the use of derails modified in automatic signal territory? Are derails in automatic signal territory equipped with switch circuit controllers?
(5) To what extent are the derails pipe connected to the switch stand or hand thrown?
(6) Is the tendency towards the more general use of the derail, and, if so, under what conditions?
(7) Have any recent instances occurred where the use of derails have demonstrated the worth of their application?

The information received was tabulated in the table accompanying this article, but in studying this table it is to be understood that it indicates the general practice of individual roads, numerous exceptions to which will be found in the discussion following.

Sixteen of the 48 roads replying to the circular of inquiry install derails on both passing and industry tracks; 13 install them only on industry tracks, while 19 install them only at locations where particularly adverse conditions as to grade, vision, etc., prevail.

Installation on Both Passing and Industry Tracks

In considering the installation of derails on both passing and industry tracks many different practices again exist. Some roads place derails on both classes of tracks, irrespective of the conditions existing, while others make exceptions to this rule and use derails only where adverse conditions are present. Again derails may be omitted at certain points on lines on which the general practice is to equip all sidings with derails because grade conditions may not warrant their use, while still other roads protect all main line turnouts and omit this protection on branch lines where traffic is light. Derails are omitted on passing tracks by some roads because these tracks are only used for the purpose indicated and it is felt that, with a train in the clear, there is no need of derails, as the cars are under the control of the engineman. However, on other lines the management feels that it is as important to place derails on these tracks as on industry and business tracks, because the derail definitely marks the clearance point and forces obedience in observing it, thus preventing a train stopping at a point of limited clearance.

Many roads make it a practice to install derails on

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both passing and industry tracks, including the Pennsylvania Railroad, the New York Central, Lines East, the Baltimore & Ohio, the New York, New Haven & Hartford, the Delaware, Lackawanna & Western, the Lehigh Valley, the Erie, the Cleveland, Cincinnati, Chicago & St. Louis and the Philadelphia & Reading. Among other roads reporting the installation of derails on part or all of their passing tracks are the Boston & Maine, the Louisville & Nashville, the Chesapeake & Ohio and the Chicago Great Western, while still other lines place them on passing tracks under certain conditions only. Typical of such roads are the Chicago, Rock Island & Pacific, the Illinois Central, the Norfolk & Western, the Nashville, Chattanooga & St. Louis and the Seaboard Air Line.

It is interesting to note some of the variations existing among roads that make it a general practice to install derails on both passing and industry tracks. In this connection the Pennsylvania Railroad installs either a split switch derail or a block derail in combination with the split point on all exterior passing sidings and on all other tracks connected with the main track, where it is possible under any circumstances for the speed of equipment to exceed 12 mi. per hr.; when the speed cannot exceed this rate the block derail is used with the guide rail and if sidings are of infrequent use the hand throw derail is used either independently or with the guide rail. It is not the general practice to equip the interior passing sidings with derails. Apart from this no distinction is made on this line between passing sidings and industrial or other tracks connected directly with the main track. The only exception made to the installation of derails on all tracks by the New York Central, Lines East, is their use on passing sidings located between main tracks, and even these passing sidings are sometimes provided with derails when they are located on a grade which may cause a car to move toward the main track. The upper ends of a few passing sidings located on heavy grades are not protected by derails on the Delaware, Lackawanna & Western, but all other locations on this road are equipped with them. Road G (in the table) located in the central part of the country, makes it a practice to place derails on all sidings connected with the main track. On this road derails derailing in one direction only are used on passing sidings and yard leads, while at stations and industrial sidings those derailing in both directions are installed and it has been found that in some instances that trainmen have pushed cars in over the derails on such sidings with the result that they have become grooved and fail to derail cars running out over them. The only exception in the use of derails made by the Cleveland, Cincinnati, Chicago & St. Louis is on some branch lines, where the traffic is light; in such territories the sidings are not equipped with them.

While the Boston & Maine does not place derails on all passing or other tracks connected with the main track a large proportion of these tracks are so equipped and the number is gradually being increased. At the present time the Chesapeake & Ohio has installed derails on approximately 90 per cent of its passing tracks and it is the practice to equip such tracks with this device.

The practice of the Philadelphia & Reading is to place derails on all tracks leading to the main track except on the end of passing sidings in automatic signal territory that are not interlocked, while the Louisville & Nashville places derails on passing tracks in automatic signal territory only. Road A (in the table), located in the central part of the United States, makes it a practice to place derails on passing sidings in connection with the installation of new automatic signals.

The Rock Island, the Illinois Central, the Norfolk & Western, the Nashville, Chattanooga & St. Louis and the Seaboard Air Line place derails on passing tracks where they are used to set out cars at the station or where adverse conditions may exist. The Lehigh Valley places derails at the fouling points on all passing sidings and industrial tracks where there may be danger of cars dropping and fouling other tracks.

The Long Island no longer requires the use of derails on passing sidings and is abandoning them for this purpose, while the Missouri, Kansas & Texas and the Minneapolis & St. Louis do not make it a practice to install derails on such tracks. The Chicago Great Western has a few derails on passing tracks, but this is not the general practice, and recently a number of derails have been removed from passing tracks because, with only a few such places so equipped, there was a liability of oversight on the part of trainmen, and this condition caused more frequent derailments than if the derails were entirely dispensed with.

The Use of Derails on Industry Tracks

The conditions governing the installation of derails on industry tracks vary considerably on the different roads using them for protection at such points. Some lines make it a practice to place derails on all industrial tracks irrespective of grade or speed conditions, while others omit them at points where the grade of the industry track falls from the main line. Still other lines place derails only on tracks where there is a possibility of cars being blown or pinched out to foul the main track.

Among the roads installing derails on station, industry, business and private tracks are the Delaware, Lackawanna & Western, the Lehigh Valley, the Long Island, the Boston & Maine, the Louisville & Nashville, the Norfolk & Western, the Missouri, Kansas & Texas, the Seaboard Air Line and the Minneapolis & St. Louis. It is the practice of the Lackawanna to install derails on all industrial sidings, while the Atlantic Coast Line occasionally omits their installation where the grade of the industry track falls from the main line. On the Boston & Maine it is now the standard practice to use derails on all new industry tracks and the same practice applies on the Nashville, Chattanooga & St. Louis. While the entire road is not equipped at the present time, this work is being done gradually and the places where derails are needed the worst are being equipped first. Road G, located in the central part of the country, installs a derail, derailing in both directions on station and industrial sidings.

The practice on the Union Pacific is to place derails on all tracks where cars are set out if these tracks are connected with the main line or if they are branch tracks, derails are then placed somewhere between such tracks and the main line for its protection. Other lines make it a practice to place derails at the fouling points on all industrial tracks where grade conditions warrant and on all tracks where cars are left standing if there is the slightest possibility of their being blown out or pinched out where they might foul the main line. Some roads following this practice are the Lehigh Valley, the Rock Island, the Illinois Central and the Mobile & Ohio.

The use of derails on the Central of Georgia is in line with the following maintenance of way rule: "Main track must be protected by approved derail devices so located that derailed cars will clear the main line on all tracks leading therefrom excepting passing sidings. They must be set and locked for derailment at all times except when in use."

The Use of Derails Under Special Conditions

The managements of some roads feel that proper protection is provided, not by the universal application of derails, but by their location at places where grade or

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other adverse conditions warrant. For example, on some roads derails are placed on sidings on which the grade descends toward the main line, while others place them at points where high winds exist which may blow cars out of the sidings. Again, some states have recognized the necessity of derail installations under certain conditions and have passed legislation accordingly. In such cases the practice on the various roads in the states is more or less uniform. In Texas the following requirements are prescribed by law: "It shall be the duty of every railway corporation operating any line of railway in the state of Texas within six months after the passing of this act, to place good and safe derailing switches on all of its sidings connecting with the main line of such railways and upon which sidings cars are left standing; provided, that no derailing switches shall be required where the sidings connect with the main line on an upgrade in the direction of the main line of one-half of one per cent or over; provided, further, that no derailing switches shall be required on inside tracks at terminal points where regular switching crews are employed."

Among the railroads installing derails on tracks where grade or other conditions warrant may be mentioned the Atchison, Topeka & Santa Fe, the Northern Pacific, the Union Pacific, the Delaware & Hudson, the Southern Pacific, the Chicago, Burlington & Quincy, the Chicago, Milwaukee & St. Paul, the Canadian Pacific, the Chicago & Alton, the Chesapeake & Ohio, the Pere Marquette, the Minneapolis, St. Paul & Sault Ste. Marie, the New York, Chicago & St. Louis, the Los Angeles & Salt Lake, the Chicago Great Western, the Denver & Rio Grande and the Colorado & Southern.

The practice on the Atchison, Topeka & Santa Fe, the Southern Pacific, Atlantic System and the Canadian Pacific is to install derails according to the grade conditions; the Santa Fe installs them at the ends of all track excepting passing tracks and wyes where the grade ascending toward the main line is less than 0.5 per cent, while the Southern Pacific Lines install them on all tracks connecting with the main line except yard or other tracks on which switch engines are used, provided such tracks are not on a descending grade of 0.5 per cent or over. The Canadian Pacific protects the main track by derails where a siding may be used for storing cars having a gradient of 0.2 per cent or over towards the main line so located that there is danger of a runaway car getting either directly or through an intervening siding to the main track. These derails are placed on tracks coming off the main track or any other one leading to it.

The Northern Pacific places derails only on those tracks where particularly adverse conditions exist as to grade, vision, etc. Ordinarily derails are not placed on passing tracks unless they are also at times used as storage tracks. They are placed on all industry tracks where the grade toward the main line is such that a car could move when the brakes are off. Through the prairie country, which is subject to very high winds, this road places derails on all tracks where there is danger of cars being blown out on the main line, the entire matter being left to a considerable extent to the judgment of local officers. It is not the practice of the Southern Pacific to place derails on passing tracks and other tracks connected with the main line, but they are installed on such tracks wherever these are on a grade approaching a main line or at points in level territory where unusual conditions, such as high winds, prevail. It is also its practice to put in derails on short spur tracks where cars that are set out for loading ordinarily come close to clearance points to prevent cars moved by the shipper from fouling the main track. The Chicago, Milwaukee

	Derails Used on Tracks Leading to Main Line				How Operated		Used in Special Locations		Type Used		Use in Automatic Signal Territory			
ROAD	Passing	Industry	Both Passing and Industry	Only Where Grade or Other Conditions Warrant.	Pipe Connected	Hand Thrown	Turntable Leads	Other Special Locations	Split Point	Block	Pipe-connected Without Switch Circuit Controllers	Controllers Used on Hand Throw Derails	Is Tendency Towards More General Use	Has Their Value Been Demonstrated
A.T.&S.F.				Yes	Yes	Yes	No	No		Yes	Yes	Yes	Yes	No
A.C.L.		Yes				Yes	No			Yes		Yes(?)	No	Yes
B.&O.			Yes		Yes*	Few	No			Yes	Yes[a]		Yes	Yes
B.&M.	Partly	All New			Yes	Yes		Yes	Yes	Yes*	Yes	Yes	Yes	
C. of Ga.		Yes				Yes	No	No		Yes*		Yes	No	Yes
C.&O.	Yes			Yes	Yes	Yes	No	No	Yes	Yes	Yes[a]	Yes	Yes	Yes
C.&A.				Yes	Yes	Yes	No	No	Yes	Yes			No	No
"			Yes		Yes*	Yes	No	Yes	Yes#	Yes			Yes	Yes
C.B.&Q.				Yes	Yes*	Few	No	Yes		Yes*			Yes	Yes
C.&N.W.	Few			Yes		Yes	No	No	Some	Yes	No	No	No	No
C.M.&St.P.				Yes		Yes	No	No	Yes	Yes*		Yes	Yes	
C.R.I.&P.		Yes			Yes*	Yes	Some	Some	Some	Yes*	Yes	Yes	Yes	Yes
C.C.C.&St.L.			Yes		Yes	Yes	No	No		Yes*	Yes	Yes	No	Yes
C.&S.				Yes		Yes	Few	Few	Some	Yes*			Yes	Yes
D.&H.				Yes	Yes	Yes	No	Few		Yes*	Yes	Yes	Yes	Yes
D.L.&W.			Yes			Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
D.&R.G.				Yes		Yes	No	Few		Yes*			Yes	Yes
Erie			Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes(a)		Yes	Yes
I.C.		Yes			Few	Yes	Yes	Yes	Some	Yes*		Yes	Yes	Yes
"	Few	Yes				Yes	No	Few	Yes*	Few			Yes	Yes
L.V.			Yes		Yes*		Few	Few	Few	Yes*	Yes	Yes		Yes
L.&N.		Yes			Yes	Yes*	No	No	Yes	Yes	Yes(a)	Yes	No	Yes
L.&A.&S.L.				Yes		Yes	No	No	Yes	Yes		No	No	Yes
L.&N.	Yes?	Yes			Yes	Yes	No	No	Yes	Yes	Yes		Yes	Yes
"				Yes		Yes	No	No	Few	Yes*		Yes	No	Yes
"				Yes	Yes*		No	No		Yes*	Yes		Yes	No
M.&St.L.		Yes				Yes	No	Yes	Some	Yes*			Yes	Yes
M.St.P.&S.S.M.				Yes	Yes	Yes*	No	No		Yes*				No
M.K.&T.		Yes				Yes	Yes			Yes*		Yes		Yes
"		Yes				Yes	Some	Few		Yes*		No	Yes	No
M.&O.		Yes				Yes*	No	No		Yes*			Yes	Yes
N.C.&St.L.		Yes				Yes	Seldom	Yes	Yes	Yes*		Yes	Yes	Yes
N.Y.C.(East)			Yes		Yes	Few	No	No	Some	Yes*	Yes	Yes	Yes	Yes
N.Y.C.&St.L.				Yes	Some	Yes	No			Yes		Yes	Yes	No
N.Y.N.H.&H.			Yes		Yes*	Few	No	Few	Few	Yes*	Yes	Yes	No	No
N.&W.		Yes			Yes		No	No	Some	Yes*	Yes(a)		No	Yes
"				Yes		Yes	No	No	Few	Yes*			Yes	No
N.P.				Yes		Yes	No	No	Yes*	Some		No	No	Yes
P.&R.			Yes		Yes	Some	No	No	Yes	Yes	Yes		No	Yes
"			Yes		Yes	Yes#	No	No		Yes*	Yes(a)	Yes	No	No
P.M.				Yes	Yes	Some	No	No		Yes*	Yes	Yes	No	No
P.&S.			Yes		Yes	Yes	No	Few	Yes	Yes	Yes(a)	Yes	No	Yes
"				Yes		Yes	No	No		Yes*		No	Yes	Yes
S.A.L.		Yes			Yes		No	No		Yes*			No	No
S.P.				Yes	Few	Yes	No	No	Yes	Yes		Yes	No	Yes
S.P.(Lines)				Yes		Yes		Yes	Yes	Yes		No	Yes	No
U.P.		Yes			Few	Yes	No	No	Yes	Yes*		Yes	Yes	No
C.P.R.				Yes	Few	Yes	No	Few		Yes*		No	No	Yes

* General Practice. † In Automatic Signal Territory. # In Special Cases. [a] Equipped with Circuit Controllers.

Table Showing the General Practice in the Use of Derails on Some American Railroads

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& St. Paul makes it a point to install derails generally on main line turnouts only and restricts their use to points where grades are such that cars could easily run out on the main line or be blown out by heavy winds.

Installation of Derails at Turntables, Drawbridges and Other Locations

The general tendency of the railroads is not to install derails in turntable leads or at other special locations in yards or points not connected directly with the main line. However, in this respect the practice varies considerably on different roads, some installing derails in turntable leads, others at the foot of tracks leading to coal chutes, at box car loaders around breaker tracks or for the protection of shop buildings.

Among the roads making it a general practice to install derails on tracks leading to turntables and like places involving risks are the Illinois Central, the Erie and the Missouri, Kansas & Texas. Among other roads using them to a limited extent at such locations are the Lehigh Valley, the Chicago, Rock Island & Pacific, the Boston & Maine, the Baltimore & Ohio and the Colorado & Southern. The Lehigh Valley, the Rock Island and the Boston & Maine make it a practice to install derails on tracks leading to turntables and other special locations where the grade is unfavorable, where there is a possibility of engines running out on the main track or at points where accidents have occurred or are liable to happen. The Baltimore & Ohio and the Colorado & Southern have installed derails in a few special locations on tracks leading to turntables and at other points.

The New York, New Haven & Hartford makes it a practice to place derails at drawbridges. At these locations they are placed in tracks both with and against the direction of traffic. It is the practice of the Chicago, Burlington & Quincy to also use derails on tracks approaching drawbridges.

Some roads make it a practice to protect box car loaders, coal chutes and repair tracks. The only special locations apart from the main track on which derails are used on the Delaware & Hudson are at box car loaders around some of the breaker tracks, but this is indirectly a protection to the main track. A road in the central part of the country, road A in the table, installs derails on tracks leading to elevated coal chutes whether these tracks are connected into the main track or otherwise, but it is not the regular practice to treat other special locations in a similar manner. The Minneapolis & St. Louis uses derails to protect shop buildings beyond car repair tracks where these tracks run through the buildings, and a road in the southwest, road B in the table, uses derails on repair tracks.

Among the roads installing derails at special locations apart from the main track, such as industrial tracks or similar spurs which are located on bad grades or at points where cars are liable to foul the running tracks, may be mentioned the New York, New Haven & Hartford, the Delaware, Lackawanna & Western, the Southern Pacific Lines, the Philadelphia & Reading and the Nashville, Chattanooga & St. Louis.

In general, derails are not installed on tracks leading to turntables, but in a number of cases they are used to protect other special locations on the Delaware, Lackawanna & Western, the Southern Pacific, the Delaware & Hudson, the Chicago, Burlington & Quincy and the Canadian Pacific.

The Use of Split Point and Block Derails

Three classes of derails are used by the railroads replying to the circular. These types are the split point, the block and the lifting rail derail. The split point derail is used at places where high speed conditions prevail or on curves of a certain degree and at points where there must be no possibility of a train or car getting by. One objection to the use of this type is that a break is made in the track. The lifting rail derail is another type of high speed derail which can be installed without breaking the track, but it is used mostly within the limits of interlocking plants. The block derail is one that can be applied at almost any location without cutting the track and can be used advantageously in a large number of places where speed or curve conditions are not too severe or when not prohibited by law. Some roads report the split point as standard and others the block type, but practically all use both kinds, depending on conditions, such as their location on a curve, their use on important passing tracks in high speed territory, the speed of equipment and where the type of derail is specified by law. In some cases the type of derail used on a siding is determined by whether it is a permanent or a temporary one.

Some of the roads make it a practice to use the split point type on main line tracks and on all tracks immediately connected with the main line and where high speed movements occur. Among these roads may be mentioned the Santa Fe, the Lackawanna, the New York, New Haven & Hartford, and the Louisville & Nashville. On these lines the block type derails is used for other locations. The Norfolk & Western uses the block derail except at places where it is prohibited by law, in which case the split point type is used, while the Los Angeles & Salt Lake uses a split point derail in locations that are particularly hazardous, while the block derail is used at other places. A road in the southwest, road H in the table, uses a block derail except at the foot of coal chute inclines, when the split point derail is installed.

The Baltimore & Ohio uses a derail of the lifting rail type on main tracks and at the outlet of important passing tracks in high speed territory, but the block derail is used elsewhere. In some cases the Louisville & Nashville uses the lifting rail type derail for locations in high speed territory, while the Burlington uses this type on the main track, but the block derail is being used for all new installations and replacements for side tracks.

The New York Central, Lines East, the Southern Pacific and a road in the central part of the country, road A in the table, make it a practice to use the split point derail on the inside of curves or where grade conditions may warrant. The New York Central, Lines East, use the split point on the inside of curves where they are sharper than one degree, while road A does not specify any certain curvature for its use at such locations. On the Southern Pacific the block derail is used only where grades are less than one per cent; at points where grades are greater the split point type is employed.

The standard derail on the Northern Pacific is the split point, but the block derail is used in special locations. The split point derail was adopted as standard because the conditions are a little peculiar from those existing on roads in other parts of the country, as in the timber regions along the Northern Pacific, a great many temporary tracks are being built and remain in for a year or two. After they have served their purpose they are then removed. This road found difficulty in matching up material recovered from the derails used in the temporary tracks and many times the recovered material went to the scrap pile because of some missing parts. As these tracks are frequently needed in a hurry and many delays were experienced in getting and installing the derails, it was felt to be better practice to use the split point, as this is always available. Under other circumstances the block derail would likely have been favored as a standard. The practice of a road in the

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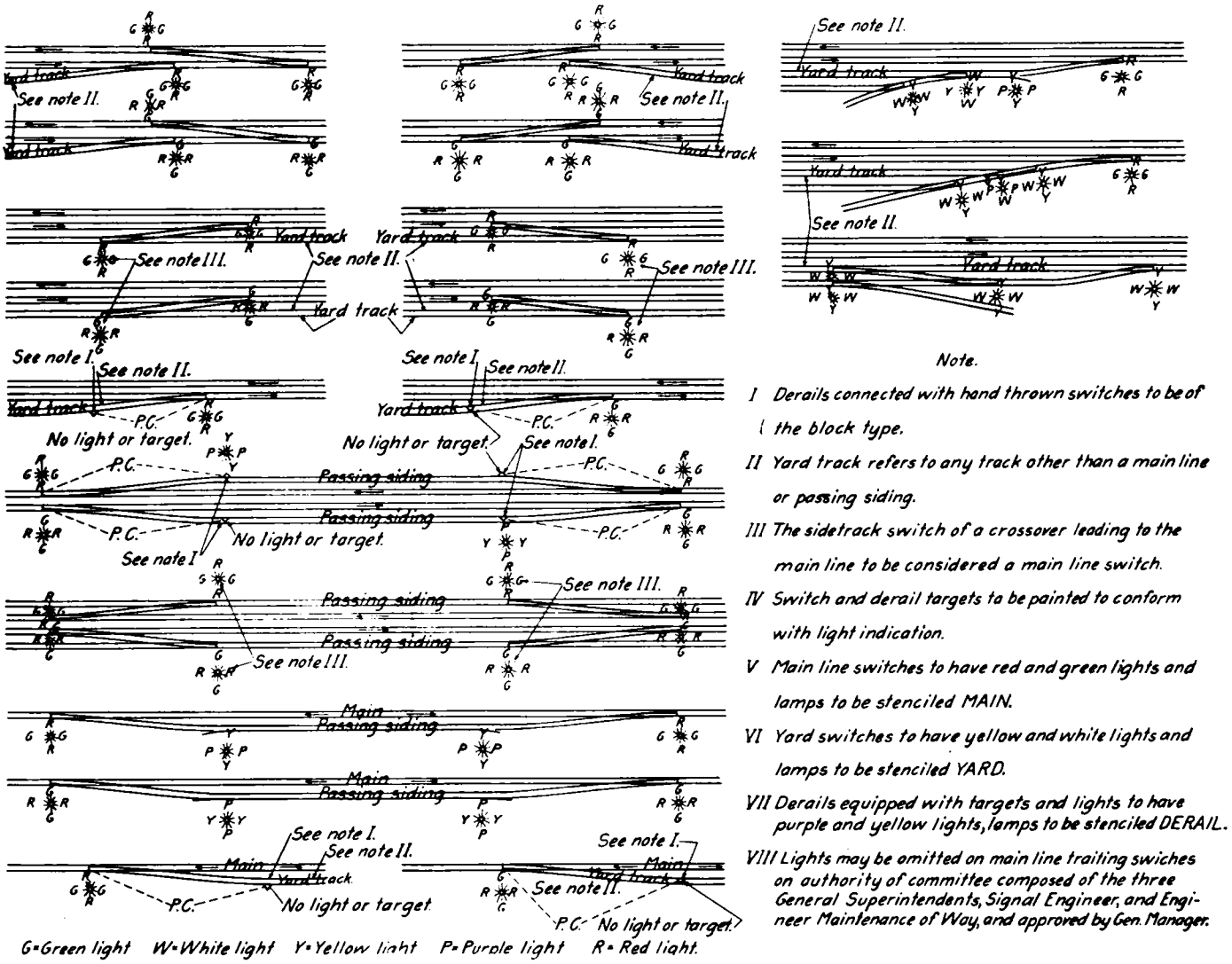
southwest, road B in the table, is to use the split point derail with the low pony switch stand to operate it, similar to the one used for back track switches. The standard practices and the types of derails used by other roads are as listed in the table.

Derails in Automatic Signal Territory

Considerable variation exists in the application of derails to sidings connected to the main line in automatic signal territory. Some roads make it a practice to use switch circuit controllers connected up with the derails whether they are pipe connected or hand throw, other roads use the circuit controller only in connection with hand throw derails, while still others make it a practice to use pipe-connected derails in such territory without connecting them up to the signal system. The reports received indicated that 14 railroads use both pipe connected and hand throw derails in automatic signal territory, 7 roads use pipe-connected derails, and 16 use hand throw, while 11 report no automatic signal territory.

Where a pipe-connected derail is used in automatic signal territory some roads do not make it a practice to use the circuit controller operated by the derail inasmuch as the signal system is controlled through one located at the main line switch which operates the derail. In this connection it is the general practice to install pipe-connected derails without circuit controllers on the Atchison, Topeka & Santa Fe, the Pennsylvania Railroad, the New York, New Haven & Hartford, the Chicago, Rock Island & Pacific, the Delaware & Hudson, the Louisville & Nashville, the Lehigh Valley, the Boston & Maine, the Cleveland, Cincinnati, Chicago & St. Louis, the Pere Marquette and the Nashville, Chattanooga & St. Louis.

As a safety measure and in order to indicate the position of the derail when it is not connected to the main line switch, but is handled separately a number of the roads use switch circuit controllers attached to the derails. Some of the roads following this practice are the New York Central, Lines East, the New York, New Haven & Hartford, the Santa Fe, the Rock Island, the Boston & Maine, the Delaware & Hudson, the Lehigh Valley, the Big Four, the Pere Marquette and the Nashville, Chattanooga & St. Louis.



The Location of Derails and the Color Indications as Used on the New York, New Haven & Hartford

As an additional safeguard circuit controllers are connected to all derails in automatic signal territory, whether these derails are pipe connected or hand thrown on a number of roads, among which are the Baltimore & Ohio, the Delaware, Lackawanna & Western, the Long Island, the Union Pacific, the Southern Pacific, the Philadelphia & Reading, the Chicago, Milwaukee & St. Paul, the Norfolk & Western, the Chesapeake & Ohio, the Erie and the Central of Georgia. While the Nashville, Chattanooga & St. Louis has no derails in automatic signal territory, which is limited, were derails to be installed they would be equipped with circuit controllers.

Those roads not using the circuit controllers on de-

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rails, whether pipe connected or hand thrown, in automatic signal territory include the Chicago & Alton, the Southern Pacific Lines, the Canadian Pacific, the Los Angeles & Salt Lake, and the Chicago Great Western, while the Northern Pacific uses them to a very limited extent. It has not been the practice of the Illinois Central to use circuit controllers on derails in automatic signal territory in the past, but on new signal installations made in the past two years they have been installed and the practice will be continued on future work. The Missouri, Kansas & Texas uses the block derail in automatic signal territory in the majority of cases, but when it is necessary to use the spit point this type is then equipped with the circuit controller.

The Use of Pipe Connected and Hand Throw Derails

The practice of using a pipe connected or a hand thrown derail, like the use of the split point or block type, varies greatly on the different roads as revealed in their answers to the questionnaire. The standard practice on some roads is toward the pipe-connected type, while others incline toward the hand-thrown derail. Again, some roads have about an equal number of both types in service with no preference expressed, while the use of pipe-connected derails on other systems has been discontinued for certain locations. Practically all the roads, however, have both types of derails in service.

Among the roads making it a standard practice to pipe connect all derails where they operate with main line switches are the Lehigh Valley, the Erie, and the Burlington. All derails installed since 1916 on the Chicago, Rock Island & Pacific have pipe connections to the main line switch stands on all tracks connecting with the main line. The general practice on a line in the central part of the country, road G in the table, is to connect derails by pipe lines to the main track switches on passing sidings and yard leads leading to the main track except in the state of Indiana. Derails on station and industry sidings connected with the main track are hand throw. In the state of Indiana the law requires lights on non-interlocked derails on passing sidings and on yard leads connected with the main track and on this road these derails are not pipe connected to the main line switch, but are hand thrown.

The New York, New Haven & Hartford and the Atchison, Topeka & Santa Fe make it a general practice to pipe connect all new installations to the main line switch stands. There are, however, exceptions in special cases and both types are employed.

The Pennsylvania Railroad, the Baltimore & Ohio and the Cleveland, Cincinnati, Chicago & St. Louis make it a standard practice to pipe connect all derails to switch stands where these protect main track movements except on unimportant branch lines or where tracks are infrequently used. At such locations the hand-throw derail is employed.

The New York Central, Lines East, has about 80 per cent of its derails pipe connected to and operated by the switch stands, 14 per cent connected to and operated by a separate lever working a facing point lock, 5 per cent interlocked, while 1 per cent are hand thrown. Approximately 75 per cent of the derails on the Delaware & Hudson and on the Pere Marquette are pipe connected, while on the Delaware & Hudson about 18 per cent are thrown with an ordinary switch stand instead of by hand.

On the Boston & Maine the majority of the derails are thrown by independent switch stands, but these are gradually being replaced by the pipe-connected type. The Louisville & Nashville connects derails in automatic signal territory with pipes to the switch stands, while those outside this territory are hand thrown.

The general practice of the Illinois Central is to use a hand-throw derail and only in a few cases are the derails connected with the switch stands by pipes, while on the Missouri, Kansas & Texas the derails are all hand thrown and a derail sign is also used to indicate their location. A very small percentage of the derails on the Union Pacific and the Southern Pacific are pipe connected; it is not the practice of the Union Pacific to operate them in this manner, while the practice of pipe connecting them on the Southern Pacific has been discontinued. The Long Island has approximately 50 per cent of its derails still pipe connected, but on all new work they are no longer connected in this manner, while the Chicago Great Western has taken out practically all pipe-connected derails and maintains only those that are thrown by hand.

Approximately 95 per cent of the derails on the Northern Pacific are of the hand thrown type, while on the Chesapeake & Ohio and the Minneapolis, St. Paul & Sault Ste. Marie probably 50 per cent of the derails installed are pipe connected, the hest being hand throw. The general practice of the Chicago & Alton is to use the hand-throw split point derail except on side tracks having a heavy grade descending to a passing track or main line, in which case the pipe-connected derail is installed. The practice of the Canadian Pacific is to use a hand-throw derail except in the vicinity of interlocking plants or in other locations where it may be felt desirable to pipe connect them to switch stands.

The Use of Derails and the Value of Their Application

In view of the very general use of derails as expressed above, the general opinion of the railroads is that the derail is a desirable safety device and while many of the roads have had no recent occurrences showing the worth of their application, derails have, however, demonstrated their value in the past. The installation of derails on the roads has prevented cars from moving out of sidings due to wind or grade or because the brakes were not properly set, or at locations where cars were moved by outside parties as at coal mines and like industries. The value received in protecting traffic and preventing damage in the past makes their use fully justified in the opinion of a number of the roads.

Many of the roads report instances having occurred as demonstrating the value of derail installations. The Delaware & Hudson has recently had four instances occur where cars moved out of sidings because the brakes were not properly set and the cars were derailed, preventing more serious damage occurring. Many instances have happened on the Rock Island where the use of derails has demonstrated the wisdom of their application, while other accidents have occurred where the failure to put derails on certain tracks has shown the necessity for such a device. On the Northern Pacific derails have quite often prevented the main track from being fouled by cars, while the Canadian Pacific reports that many instances have occurred where the lack of derails has proven their necessity. Cases have occurred on the Nashville, Chattanooga & St. Louis where cars have been started out of sidings from various causes and were derailed before causing trouble, while the Minneapolis & St. Louis in the last several years has had cars blown out of the side tracks by wind storms which have run for some distance on the main track. Derails are felt to be an effective safeguard in such occurrences.

There is a tendency on some lines to extend or make more general use of derails; among these roads may be mentioned the New York Central, Lines East, the Balti-

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more & Ohio, the Delaware, Lackawanna & Western, the Chicago, Milwaukee & St. Paul, the Chicago, Rock Island & Pacific, the Lehigh Valley, the Illinois Central, the Boston & Maine, the Union Pacific and the Nashville, Chattanooga & St. Louis. It is the intention of the New York Central to install derails on all connections of side tracks and main tracks, while the tendency of the Baltimore & Ohio is toward their general use to prevent the fouling of main tracks, runaways down steep grades, overrunning into open draws and to some extent into pits, such as turntable pits, etc. The Delaware, Lackawanna & Western and the Boston & Maine, in connection with recent construction work, equip all new tracks with derails. The Lackawanna places them on tracks regardless of grade, while the Boston & Maine is equipping existing tracks as rapidly as labor and material conditions will permit. It is the general practice on the Lehigh Valley, the Union Pacific, the Delaware & Hudson and the Illinois Central to install at all danger points or where conditions may require.

The number of derails in service is increasing each year on the Chicago, Milwaukee & St. Paul, but no recent instances have occurred demonstrating the wisdom of their application. This road reports daily derailments having occurred due to the installation of derails which would not happen if the tracks were not protected with them. However, the damage done by such derailments is generally not great and greater damage could result were the derail omitted at such points.

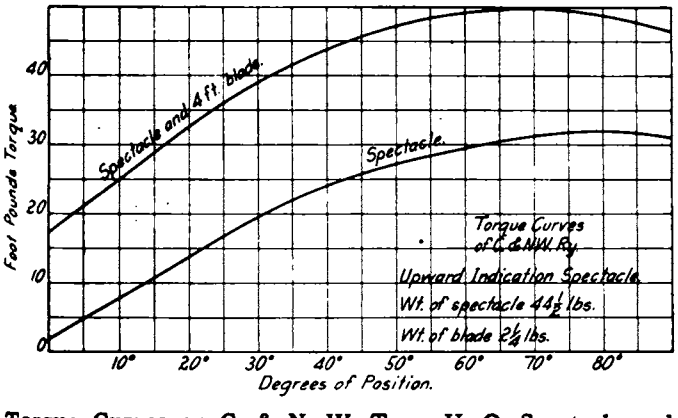
The tendency of the Rock Island is to have all tracks leading to the main line on which cars are placed properly equipped with derails, while the Nashville, Chattanooga & St. Louis is extending their use and feels that their application on industrial tracks to prevent shippers from pushing cars beyond the clearance point alone justifies their use.

TESTING THE TORQUE OF SEMAPHORE SIGNALS*

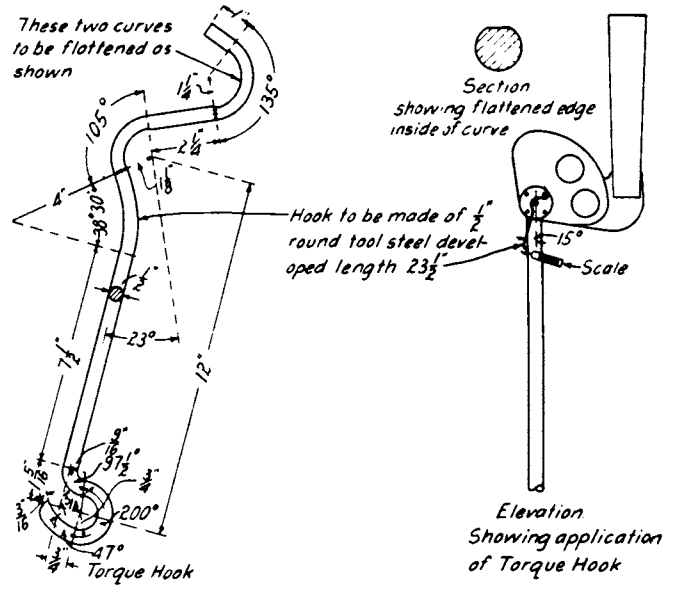
By Caleb Drake

General Signal Inspector, Chicago & Northwestern, Chicago

A NUMBER of years ago the Chicago & North Western found that a standard minimum release of disc signals must be adopted and that some method of checking this release should be worked out. To do this electrically was out of the question at that time, as the maintainers were not provided with meters. To make this test mechanically, a signal instrument was adjusted by means of counterweights, as light as was considered safe under all circumstances, and the signal then balanced by a weight attached to the horizontal arm a fixed distance from the pivot. The weight was then filed until the signal went to the stop position. The weight was weighed



Torque Curves on C. & N. W. Type, U. Q. Spectacle and Blade



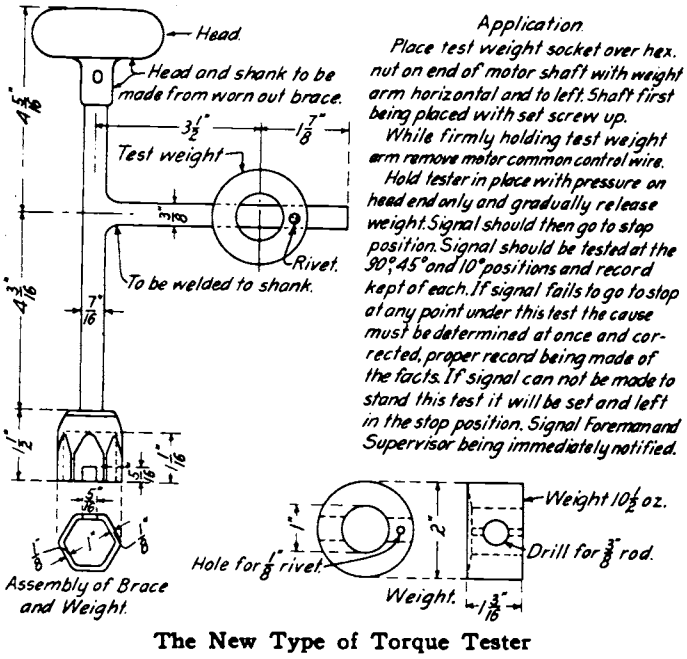
The torque of a signal is the amount of energy required to hold the signal at any given point and is measured in foot pounds, or number of pounds to hold the signal, applied at one foot distance from the shaft. Apply torque hook and scale as shown, bring blade to proper position by current, hold with hook and scale, release current, read scale, record torque at zero degrees, 10 degrees, 45 degrees, 70 degrees and 90 degrees. Hold scale at right angle to the straight part of hook while reading the pointer on scale.

The Torque Hook and Its Application

and found to be 112 grains and was thereafter called a test weight. Each maintainer was supplied with a test weight made in the signal repair shop and instructed how to use it. This was in reality a torque tester, as by its use a signal was known to be above or below the standard minimum torque requirement.

Since torque is the factor depended on to cause a signal to display the least favorable indication, it is obviously just as necessary to test the torque of a signal as to test the dropaway of relays or any other part of a signal installation which is depended on for proper operation.

Until I had made some torque tests of upper quadrant



The New Type of Torque Tester

*Paper read before the Chicago Sectional Committee of the Signal Division, American Railroad Association, May 27.

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