

RAILWAY SIGNALLING

by Calvin Henry-Cotnam

There have been many articles and books written over the years that provided an explanation of railway signalling systems. Often a detailed explanation of block signalling is covered in order to provide the reader a full understanding of the meaning of the basic signal indications. Many texts continue on to provide some information regarding more complex signal indications that are used at interlocking sites or controlled locations in Central Traffic Control (CTC) installations. However, often is the case where the explanation of such complex signal indications falls short of the detail they deserve. It is the purpose of this article to provide this detail to enable the user to understand and recognize their installation and use, under the Canadian Rail Operating Rules, or CROR.

ASPECTS AND INDICATIONS

The terms *aspect* and *indication* are sometimes used interchangeably, but they have slightly different meanings. A signal's indication is the meaning or message it conveys, such as "Clear". The aspect is how it is displayed, such as "green-over-red" for a colour light signal, or "vertical-over-horizontal" for a semaphore, both conveying the Clear indication.

Before we get into signal indications and their aspects, let's start with a background of some of the basics of just why signalling exists in the first place.

TIMETABLE SCHEDULES, TRAIN ORDERS, MANUAL BLOCK SYSTEMS

If a railway line operates with only one train, then no signalling is needed at all. Once a second train is introduced, something must be done to prevent one train from either running into the rear of the other when travelling in the same direction, or from running head-on into the other when travelling in opposite directions. The simplest method of traffic control is to use timetable schedules. The timetable defines when a train is to run. This includes details such as where a train is to meet another train travelling in the other direction as well as what trains have superiority over other trains. When an extra train must be placed on the line, it must then operate under the authority of train orders that effectively insert them into the schedule such that there is a proper spacing of time between it and timetable scheduled trains.

On a heavily travelled line, a train having to slow down or stop can greatly throw off such a system. Safety is then placed on the shoulders of the flagman to provide protection from collision as a subsequent train can only know the time since the last train at a manned station. Between manned stations, a train crew is literally, on their own.

To increase safety, a manual block signalling system may be implemented. When a train passes a manned station, the operator at the station sets a signal on the line to a stop indication to inform a following train not to proceed. Only after receipt of a confirmation that the first train has reached the next station will the station operator clear the signal. The major obstacle with this system is that the entire section of line between two stations is now reserved for a single train, thus reducing the capacity of the line. A second concern is that trains must approach each station prepared to stop.

This second problem can be solved by placing a distant signal in advance of the station (this means on the line before reaching the station) by the necessary braking distance. When the station's signal displays a stop indication, the distant signal displays an approach, or caution, indication informing a train crew that a stop is upcoming.

AUTOMATIC BLOCK SYSTEMS

To increase capacity, an automatic block signalling system may be implemented. Blocks may be reduced in length to that of braking distance. Signals are controlled by track circuits where an electrical power source, often DC, is applied to the rails at one end of a block and a relay is powered from the rails at the other end of the block. The energized relay indicates a vacant block. A train in the block shunts the circuit and de-energizes the relay, which is interpreted as an occupied block. In addition to this, a break in the rail, or failure of another part of the circuit will cause the relay to drop and indicate the block is occupied. This provides for fail-safe operation.

When the train clears the block, its signal clears. A three-indication system provides an approach indication that informs a train crew of the need to stop at the next signal. One downfall to using a three-indication system is that on a high-speed heavy traffic line, traffic can bunch up and delays can result as trains must start and stop. Added to this, a train could come across one approach indication after another with the expectation that the train ahead continues to move at the same speed. This becomes a problem when the train ahead must unexpectedly stop and the following train then comes across the need to stop when it was expected a signal would be more permissive upon reaching it.

For higher speed lines, a four-indication system is often used to provide an additional indication that is in advance of the approach indication to inform a train crew that they must reduce to medium speed before reaching the next signal. This additional indication ensures that trains do not "ride the yellows" (yellow aspect typically conveys approach) at too high a speed, plus the reduced speed can possibly reduce the need to come to operate in a stop-and-start mode from signal to signal. A second signal head is needed to provide the fourth indication, as the aspect for this is yellow-over-green. The lower head displays red as a placeholder for the red, yellow, and green aspects that convey stop, approach, and clear indications. In some circumstances, the fourth indication needs only a single head to convey an indication of "advanced approach" with a flashing yellow aspect.

CENTRALIZED TRAFFIC CONTROL

Simply put, CTC is a system where movements over a line are controlled from a central control centre. The line is divided up into blocks, and places where a junction occurs with another line, where a siding starts or ends, or where a cross-over occurs between main tracks are designated as controlled locations. *Controlled location* is the term used in the CROR. Many American texts refer to controlled locations as *control points* or *O/S sections* - O/S meaning *on the sheet*, a term held over from earlier days when local agents would mark a train on their sheet when it reached their location. The term interlocking is also used, as the track switches (points) and signals are interlocked to prevent clearing conflicting routes, or throwing points on a cleared route, or throwing points while a train passes. Movement through a controlled location is under the control of a Rail Traffic Controller, or RTC, at the control centre. For the most part, all signals at a controlled location remain red until a route has been cleared, then the appropriate signal displays the appropriate aspect for movement through the controlled location. Once a train has passed, the signal will return to red as with block signals, but will remain so until another route is cleared. However, some installations allow for automatic clearing to be enabled should a particular route be required for following trains. When a signal at a controlled location is set to automatically clear for a following train, it is said to be *fleeted*, as it allows a fleet of trains to follow the same route.

Signals at a controlled location are interlocked. This means two things: first signals will not display an indication such that two opposing movements may be cleared at the same time; secondly, the signal aspect at a controlled location will convey speed limit information for the movement. In other words, the speed limitation that the signal displays is interlocked to the route selected in order to convey a speed limit that matches the most restrictive speed limit of the route selected. For example, a medium speed limitation would be conveyed where a route travels through the diverging route of a limited speed turnout followed by the diverging route of a medium speed turnout. This is because medium speed is the most restrictive limit of the selected route.

Generally, where CTC is in effect, traffic on the line may move in either direction on any track of a multi-track line. In Canada, no current of traffic exists. That is, there is no rule of right-hand or left-hand running, although a railway may tend to favour running on one side over the other when possible. Prior to 2008, CROR rule 51(c) explicitly stated there was no current of traffic. With the 2008 update of the CROR, no references to current of traffic remain.

All signals on the line between controlled locations operate as automatic block signals; however, the last signal before approaching a controlled location will have to be able to display indications concerning advance notice of speed limitations. For this reason, this last signal before a controlled location is called an *approach* or *distant* signal and will have two heads instead of one. The two heads will not be vertically aligned, and this indicates that it is not a home, or absolute signal. When the aspect is red-over-red, it conveys a "Stop and Proceed at Restricted Speed" indication.

The intermediate block signals between controlled locations will cycle back from being red automatically after a train has passed. In some installations, when a route is selected through a controlled location, the automatic block signals in rear of (beyond) the controlled location will be cleared as favourably as possible, while the signals in the opposite direction on the same track will all turn red, known as "tumbling to red". Once a train has passed, the signals that were previously cleared will cycle from red to a more favourable aspect once again, though the controlled location signals will remain at red until a new route has been selected by the RTC. All signals facing the other direction will continue to remain at red until such time when a route is cleared in the other direction. An example of this can be seen on CN's Kingston Subdivision between Cherry Street (Mile 332.6) and Pickering Junction (Mile 311.4).

Some other installations differ slightly in that the automatic block signals will clear in both directions after a train has passed but before another route has been cleared. This may seem like opposing routes are cleared, but remember these are automatic block signals between controlled locations. The home signals at the controlled locations remain at red. When no actual route is cleared, there is no traffic in either direction and what the signals display is irrelevant. An example of this can be seen on CP's Belleville Subdivision between Kennedy (Mile 199.5) and Don Mills (Mile 204.2).

Another type of signal operation, not specific to CTC, is "approach lighting". In this installation, signals remain dark until they become needed. With automatic block signals, they will light when an approaching train enters the block in advance of the signal or the block that the signal protects. Controlled location signals tend to be illuminated when the RTC clears a route and remain so until a train has passed, but will also be lit by an approaching train should there be no route cleared. Some controlled location signals may also go dark a short while after a route is cleared if nothing is approaching at that time. An example of this can be seen on CP's Belleville Subdivision between Staines (Mile 195.2) and Cherrywood (Mile 189.5). Approach lighting may be used to conserve power needed to light the signals, or it may be used to reduce vandalism - stories exist of bored hunters in the woods aiming at a red light in the distance for something to do.

CROR INDICATIONS

As we have seen so far, automatic block signals only require a single head to show an aspect of either red, green, or yellow. Where higher speeds and traffic densities are required, a second head may be necessary to provide a fourth aspect of yellow-over-green to provide advanced warning of the need to stop without increasing block lengths. This is a far cry from having three heads, each of which could display one of three colours, either solid or flashing.

Mathematically, this provides 216 different possible indications, and this doesn't count the other possibilities generated by the use of letter plates to modify the colour indication given or the vertical alignment of the signal heads!

Naturally, many of these possibilities are not used, as the CROR rules covering signal indications are from 405 to 439. Rule 438 defines an indication specified in special instructions, so this leaves only 34 unique indications. There is actually a pattern, sort of a method to the madness, in what may be displayed, and it is this that eliminates many of the possibilities. By learning the indications one at a time, it is possible to understand the "pattern" many of them follow. That said, there are a few exceptions to the pattern. To aid in learning signal indications and their aspects, some "rules of thumb" will be pointed out throughout this text and summarized at the end.

Before getting into the signals themselves, a word about speed restrictions is necessary.

A given subdivision, or part of a subdivision, of track is going to have a speed limit defined in the timetable, and this may differ for freight and passenger trains. A clear signal aspect, as we will cover shortly, indicates that the block the signal protects may be passed at this speed limit. However, the diverging route to turnouts dictate another speed limit that could be one of the following:

LIMITED: 45 miles per hour
MEDIUM: 30 miles per hour
DIVERGING 25 miles per hour
SLOW: 15 miles per hour

Two other speeds are defined. REDUCED speed is a speed that will permit stopping within one-half the range of vision. RESTRICTED is a speed that will permit stopping within one-half the range of vision of equipment, BUT also prepared to stop short of a switch not properly lined AND in no case exceeding SLOW speed.

As mentioned previously, the approach signal to a controlled location must provide information about upcoming speed restrictions. Under the CROR, signal names follow a "this block" to "next block" speed restriction nomenclature. For example, a signal protecting entry to a controlled location with conditions dictating medium speed is immediately followed by another controlled location dictating slow speed, where there is not an upcoming stop signal, a signal indication of "Medium to Slow" would be displayed. This will be explained one indication at a time, starting with signals showing a clear indication, then "something to clear" or "something to stop" indications as these follow a simple pattern and are easy to understand. This will be followed by indications of the "clear to something" type as they tend to follow another pattern. Then indications of the "something to something" will be covered and finally, the various Stop indications will be covered.

With a signal mast with three heads, each head is capable of displaying an aspect similar to an automatic block signal, except that the top head corresponds to high speed indications, the middle signal is for medium and limited speed indications and the lower signal is for restricting and slow speeds. Though there are a few exceptions, generally medium involves solid indications while limited involves flashing indications on the middle head. Similarly with the lower head, solid tends to be for restricting and flashing for slow, and again there are exceptions. This is not difficult to remember as in both situations, flashing represents the faster of the two possibilities: limited is faster than medium, and slow may be faster than restricting for some circumstances.

Now think of this: three signals indicating high, medium, and low speeds -- and their positions on the mast or bridge are high, medium, and low. Relatively easy to remember! Another thing to remember is that when any of the heads show red while at least one does not, the red ones can be thought of as place holders. Such a place holder shows that the head is functioning, as well as the relative position of the non-red head or heads within the three.

Before we continue, here is where signal types other than triple head masts fit in:

Single head masts have only the high signal
Double head masts have a high and a medium signal
Double head dwarfs have a medium and a low signal
Single head dwarfs have only a low signal

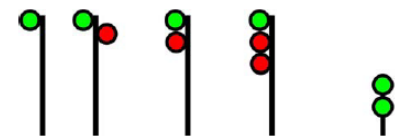
Please note that where this text refers to a "mast" type signal, it is referring to not only signals alone on a mast, but also those on signal bridges, cantilevers, and brackets. Also note that there are a few signal indications for double head masts and dwarfs that differ in pattern from their triple head counterpart using the above definition, but these exceptions will be noted.

Another description that will be used for double head masts is skewed or non-skewed. This differentiates between double head masts where the signal heads line up vertically (non-skewed) or where they are offset from each other, with the lower head usually cantered farther from the track than the upper head (skewed). Non-skewed signals are used at a controlled location, while a skewed signal is used for an automatic block signal, including approach signals. Where either adjective is not mentioned, the description will apply to both types. Unlike practices in the USA, all Canadian railway signals have a number plate, and the presence or absence of a number plate is not used to distinguish between permissive and absolute signals.

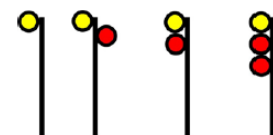
There are occasionally some other installations that are covered by special instructions in employee timetables. For example, Toronto Terminal Railways, the division of the Toronto Harbour Commission responsible for the operation and maintenance of the track in and surrounding Toronto Union Station, has two signal types that differ from the usual. One is a triple head dwarf, and it is treated exactly the same as triple head mast signals. The other is high-mounted single head signals that exist within the station itself. These are treated exactly like single head dwarf signals.

SIGNAL INDICATIONS AND THEIR ASPECTS

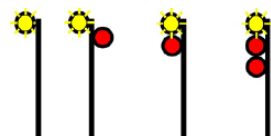
Starting with basic three-indication block signalling with no speed restrictions, the high head may be either green, yellow, or red while the medium and low heads are red or not present in the case of single and double head signals. The green aspect conveys rule 405, the Clear Signal. The Clear Signal may also be displayed on a double head dwarf as green-over-green. This means that this block is clear and so will the next one, both with no speed restrictions. When the high signal is yellow with the others at red, this is the aspect for rule 411, Clear to Stop. This means that this block is clear, but a stop is required at the next signal. Naturally, when all heads are red, it is a Stop indication. We will cover this later as there are some variations on Stop.



405. Clear Signal - Proceed.



411. Clear to Stop - Proceed, preparing to stop at next signal.



415. Advance Clear to Stop - Proceed, next signal is displaying Clear to Stop, be prepared to stop at second signal.

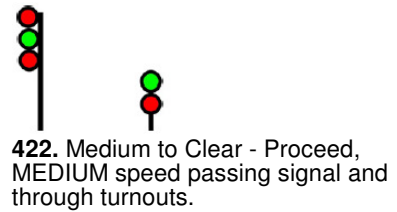
So far, so good. We have Clear, Clear to Stop, and Stop. Generally speaking, the high head does not flash, but there are four examples that have the word "Advance" in their names. For the moment, we will only look at rule 415, Advance Clear to Stop.

It is displayed with a flashing yellow on the high head. This gives advanced notice of an upcoming Clear to Stop signal. As mentioned previously, a four-indication system will often use Clear to Medium as the indication to warn of an upcoming Clear to Stop signal. Rather than require a train to reduce speed to medium, but

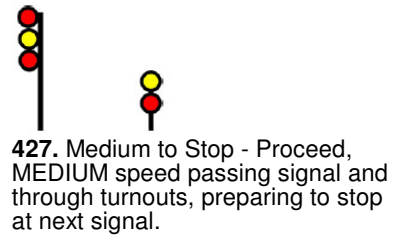
still warn of an upcoming Clear to Stop, rule 415 is used.

One example of this is used northbound on CN's Bala Subdivision at mile 8.9. From this point to the next signal at mile 11.1 the speed limit on the line increases. To warn a train of an upcoming Clear to Stop signal, and thus not have the train unnecessarily accelerate at the speed limit change, an Advanced Clear to Stop signal is displayed when the signal at mile 11.1 shows Clear to Stop. In recent years, the Advance Clear to Stop signal has been introduced in more locations as re-signalling projects have created shorter blocks, sometimes to improve the operation of commuter rail operations and sometimes to add a new controlled location where one did not previously exist. To provide adequate notification of an upcoming Stop signal, Advance Clear to Stop indications are used.

Now let's take the aspects for rules 405 and 411, and move them down to the medium head. That is, keep the high and low heads red while we look at green and yellow in the middle. With the medium head at green, we see rule 422, Medium to Clear, that only applies to triple head masts and double head dwarfs which display it as green-over-red. This means the block is clear with a medium speed restriction, while the next block is clear and may be entered at the normal speed limit. This is the same as the Clear Signal, except that moving the green down one head indicates the speed restriction. Can you guess what the indication is when the medium head is yellow while the others are red? This is rule 427, Medium to Stop, and again it only applies to triple head masts and double head dwarfs. To apply a general rule, any "Medium to ..." signal indication can only be displayed on triple head masts or double head dwarfs, though there is one that may only be displayed on triple head masts.

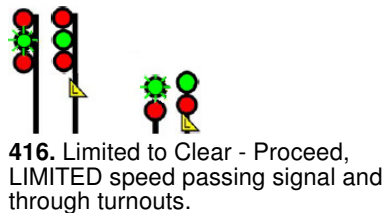


422. Medium to Clear - Proceed, MEDIUM speed passing signal and through turnouts.

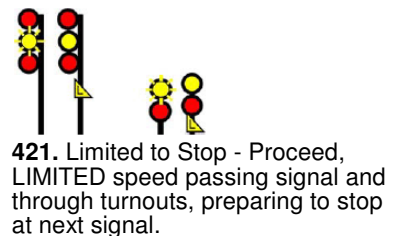


427. Medium to Stop - Proceed, MEDIUM speed passing signal and through turnouts, preparing to stop at next signal.

Taking the aspects of rules 422 and 427, we can modify them to indicate a limited speed restriction by either making the medium head flash, or by placing a yellow triangular plate with the letter "L" on it just below the signal. When this is done, we have rules 416, Limited to Clear, and rule 421, Limited to Stop. If the triangular plate were to fall off the mast, then the indication would reflect the more restrictive medium speed.

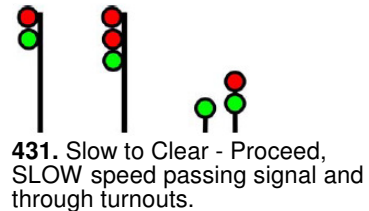


416. Limited to Clear - Proceed, LIMITED speed passing signal and through turnouts.



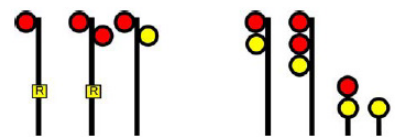
421. Limited to Stop - Proceed, LIMITED speed passing signal and through turnouts, preparing to stop at next signal.

We now move the indications to the low head, leaving the high and medium heads at red. Green on the low head gives us rule 431, Slow to Clear. This applies to triple head masts as well as double and single dwarfs. However, the Slow to Clear signal is also displayed on double head mast signals as red-over-green, which should not be confused with rule 422 because the medium head is green.



431. Slow to Clear - Proceed, SLOW speed passing signal and through turnouts.

Earlier, it was mentioned that the low head is for restricting speeds unless it is flashing. Rule 431 is one exception to this practice, as the green is not flashing.



436. Restricting Signal - Proceed at RESTRICTED speed.

A solid yellow on the low signal is rule 436, Restricting Signal. Double head signals have a variation on the rule of thumb that display a yellow on the medium head.

A restricting signal indication can also be displayed on single head and skewed double head signals displaying all red if a yellow "R" plate is on the mast.

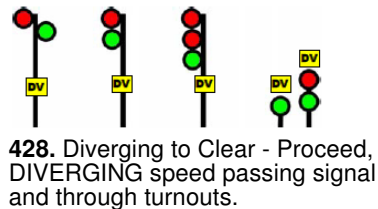
For Slow to Stop, we have rule 435, displayed by having the low head flashing yellow. Double head signals have a variation on the rule of thumb that display a flashing yellow on the medium head.



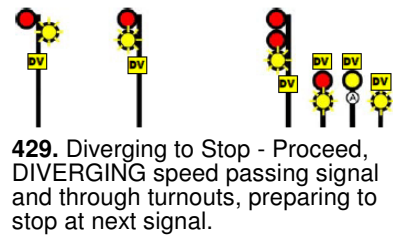
435. Slow to Stop - Proceed, SLOW speed passing signal and through turnouts, preparing to stop at next signal.

To further complicate things, a single head dwarf signal displaying a solid yellow, but with a letter plate displaying the letter "A" on it is treated as a Slow to Stop instead of a Restricting Signal.

A newer speed limit called Diverging allows 25 mph instead of the 15 mph restriction defined by Slow speed. Where turnouts have been upgraded to this higher restriction, a "DV" plate is added to the signal mast to indicate that a signal otherwise defined as a Slow to Clear or Slow to Stop may be passed at Diverging speed. Diverging to Clear is rule 428 and Diverging to Stop is rule 429 and both have versions for skewed double head signals that are not defined in rules 431 and 435.

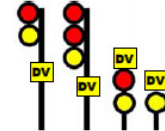


428. Diverging to Clear - Proceed, DIVERGING speed passing signal and through turnouts.



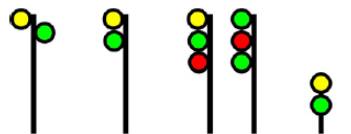
429. Diverging to Stop - Proceed, DIVERGING speed passing signal and through turnouts, preparing to stop at next signal.

There is one other indication related to Diverging speed, rule 430: Diverging. This signal only defines the speed limit past the signal and through turnouts and does not indicate what speed limit will exist with the next signal.



430. Diverging - Proceed at REDUCED speed, not exceeding DIVERGING speed passing signal and through turnouts

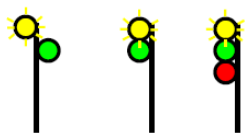
So far, we have covered signal indications having speed restrictions that refer to the block the signal is protecting, with either a clear or stop indication for the next block down the line. Now let us look at signals displaying a clear indication for its block along with advance warning of a speed restriction at the next signal, the "Clear to something" type of signal. To help in remembering, we introduce another rule of thumb: any signal that displays a yellow for the high head, is displaying a "Clear to something" type of indication.



407. Clear to Medium - Proceed, approaching next signal at MEDIUM speed.

If we take a signal displaying yellow-over-green (with a low red for triple head signals), we have rule 407, Clear to Medium. Double head dwarf signals also display rule 407 as yellow-over-green.

There is also an alternative method of displaying Clear to Medium with triple head signals: green-over-red-over-green. Think of it as being the opposite of Medium to Clear, which is red-over-green-over-red.

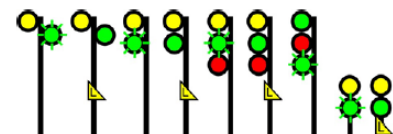


413. Advance Clear to Medium - Proceed, approaching second signal at MEDIUM speed.

As mentioned earlier, there are four indications where the high aspect flashes. One of them is Advance Clear to Medium, rule 413. This gives advanced notice of an upcoming Clear to Medium.

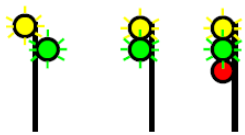
We can modify the signals of rule 407 by either making the green head (medium for double head and triple head masts, low for double head dwarfs) flash or by adding a yellow triangular plate

with an "L" on it to obtain rule 406, Clear to Limited.



406. Clear to Limited - Proceed, approaching next signal at LIMITED speed.

As with rule 407, rule 406 has an alternative method of displaying Clear to Limited: on a triple head mast as green-over-red-over-flashing green.

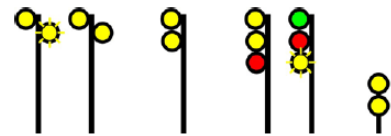


412. Advance Clear to Limited - Proceed, approaching second signal at LIMITED speed.

Once again, there is an Advance Clear to Limited indication, which is rule 412. This gives advanced notice of an upcoming Clear to Limited.

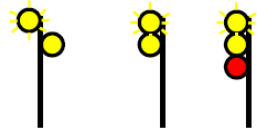
If we take the pattern we have developed so far, then it would be fair to assume Clear to Slow would be displayed as yellow-over-red-over-green. Unfortunately, this is not the case, and patterns begin to break down. Fortunately though, yellow-over-red-over-green is a pattern that is not used at all.

To indicate Clear to Slow, we have rule 409. Rule 409 displays Clear to Slow as yellow-over-yellow on double head mast and dwarf signals, and yellow-over-yellow-over-red on triple head signals.



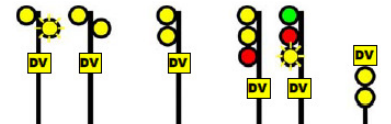
409. Clear to Slow - Proceed, approaching next signal at SLOW speed.

Similar to rules 406 and 407, rule 409 has an alternative method of displaying Clear to Slow: on a triple head mast as green-over-red-over-flashing yellow. It also has an alternate aspect of yellow-over-flashing yellow on a skewed double head mast.

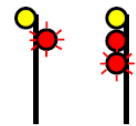


414. Advance Clear to Slow - Proceed, approaching second signal at SLOW speed.

Where turnouts have been upgraded to a diverging speed restriction, a "DV" plate is added to the signal mast to indicate that a signal otherwise defined as a Clear to Slow may be passed at diverging speed. Clear to Diverging is rule 408.



408. Clear to Diverging - Proceed, approaching next signal at DIVERGING speed.



410. Clear to Restricting - Proceed, next signal is displaying restricting signal.

Prior to 2008, there was no specific indication for Clear to Restricting. It was common practice to display a Clear to Stop indication. Now, rule 410 is defined to display Clear to Restricting by having the lowest head flash red.

Now on to signals that display a speed restriction for its block plus information about an upcoming speed restriction. There is a fairly simple pattern for these signals. First, all of them will have the high head red. Even though the high head is red, only some of them are displayable on double head dwarfs. This is mainly because the rule book simply doesn't define them for double head dwarfs, but there is one case, Medium to Medium, where the double head dwarf version, green-over-green, is actually used for Clear, as we have already covered.

To continue with describing the pattern for these signals, all of them will have the middle head flashing green when the current block has a limited speed restriction, just like rule 416, Limited to Clear. All of them will have the middle head solid green when the current block has a medium speed restriction, just like rule 422, Medium to Clear, and all will have the middle head will be flashing yellow when the current block has a slow speed restriction.

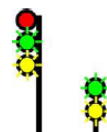
The other half of the pattern is that the low head will always be flashing green when the next block has a limited speed restriction, solid green when the next block has a medium speed restriction, and flashing yellow when the next block has a low speed restriction. With the exception of indications Limited to Restricting and Limited to Stop, there are no "L" plate modifiers for signals indicating a speed restriction for the current and the next block.



417. Limited to Limited - Proceed LIMITED speed passing signal and through turnouts, approaching next signal at LIMITED speed.

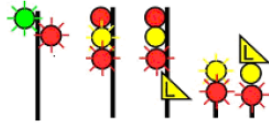


418. Limited to Medium - Proceed LIMITED speed passing signal and through turnouts, approaching next signal at MEDIUM speed.



419. Limited to Slow - Proceed LIMITED speed passing signal and through turnouts, approaching next signal at SLOW speed.

To go through these specifically, Limited to Limited is rule 417, displayed as red-over-flashing-green-over-flashing-green. Limited to Medium, rule 418 is displayed as red-over-flashing-green-over-green, while rule 419, Limited to Slow, is displayed as red-over-flashing-green-over-flashing-yellow. Only Limited to Slow is displayable on a double head dwarf as flashing green-over-flashing-yellow.

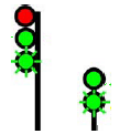


420. Limited to Restricting - Proceed, LIMITED speed passing signal and through turnouts, next signal is displaying restricting signal.

Rule 420 is the Limited to Restricting indication. The three head and two head dwarf aspects for this indication are similar to the Limited to Stop indications (rule 421) with the low head displaying a flashing red instead of a solid red. There is an additional aspect defined for skewed double head signals that is out of the pattern.

Medium to Limited is rule

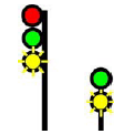
423, displayed as red-over-green-over-flashing-green. It is displayable on a double head dwarf as green-over-flashing-green. Medium to Medium, rule 424, is displayed as red-over-green-over-green, and it cannot be displayed as green-over-green on a double head dwarf as this is how such a signal displays rule 405, Clear. Rule 425, Medium to Slow, is displayed as red-over-green-over-flashing-yellow, and it is displayed on a double head dwarf as green-over-flashing yellow.



423. Medium to Limited - Proceed MEDIUM speed passing signal and through turnouts, approaching next signal at LIMITED speed.

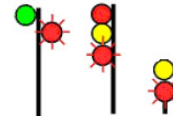


424. Medium to Medium - Proceed MEDIUM speed passing signal and through turnouts, approaching next signal at MEDIUM speed.



425. Medium to Slow - Proceed MEDIUM speed passing signal and through turnouts, approaching next signal at SLOW speed.

Rule 426 is the Medium to Restricting indication. The three head and two head dwarf aspects for this indication are similar to the Medium to Stop indications (rule 427) with the low head displaying a flashing red instead of a solid red.



426. Medium to Restricting - Proceed, MEDIUM speed passing signal and through turnouts, next signal is displaying restricting signal.

Slow to Limited is rule 432 and is displayed as red-over-flashing-yellow-over-flashing-green. It does not have a double head dwarf counterpart. Slow to Medium, rule 433, is displayed as red-over-flashing-yellow-over-green, and it too is not displayed on a double head dwarf. Rule 434, Slow to Slow, is displayed as red-over-flashing-yellow-over-flashing-yellow, and has no double head dwarf version.



432. Slow to Limited - Proceed SLOW speed passing signal and through turnouts, approaching next signal at LIMITED speed.

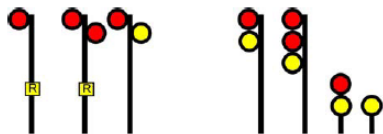


433. Slow to Medium - Proceed SLOW speed passing signal and through turnouts, approaching next signal at MEDIUM speed.



434. Slow to Slow - Proceed SLOW speed passing signal and through turnouts, approaching next signal at SLOW speed.

Finally, we get to the various Stop indications. That is, signal aspects that are all solid red.



436. Restricting Signal - Proceed at RESTRICTED speed.

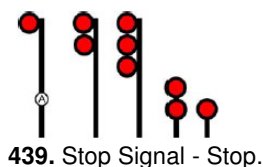
To start with, we have already mentioned rule 436, Restricting Signal. In addition to some non-red aspects, it may be a single head signal that is red or a skewed double head that is red-over-red, both with a yellow letter plate with an "R" on it. This signal allows a train to pass it at restricting speed without making a full stop. Recall that Restricting speed is a speed that will permit stopping within one-half the range of vision of equipment, also prepared to stop

short of a switch not properly lined and in no case exceeding Slow speed (15 mph).

Rule 437, Stop and Proceed, is also either a single head at red or a skewed double head that displays red-over-red, but with no additional letter plate to modify its meaning. This requires the train to make a full stop before continuing past the red signal at Restricted speed.



437. Stop and Proceed Signal - Stop, then proceed at RESTRICTED speed.



Finally, the Stop signal, rule 439, means simply that, STOP. This signal cannot be passed except by special instruction. It may be displayed as a single head red signal that has a letter plate with an "A" on it, as a non-skewed double head signal that displays red-over-red, a triple head signal showing red-over-red-over-red, a double head dwarf signal that is red-over-red, or a single head dwarf signal displaying red.

Hopefully, this text has provided you with the background information necessary to understand the indications given by railway signals in Canada along with why some indications are used instead of others. To summarize, the "rules of thumb" that have been developed here are as follows:

- 1) The only flashing high head aspects are the Advanced something to Stop.
- 2) Any signal that displays a yellow for the high head, is displaying a "Clear to something" type of aspect.
- 3) Any signal displaying a red-over-flashing-green-over-something is displaying a "Limited to something" aspect.
- 4) Signals displaying a red-over-green-over-something generally display a "Medium to something" aspect. The exceptions to this are in rule 416, where there is an "L" plate to modify the meaning of this signal to Limited to Clear, and rule 431 where a red-over-green on double head signals means Slow to Clear.
- 5) Any signal displaying a red-over-flashing-yellow-over-something is displaying a "Slow to something" aspect.
- 6) Any signal displaying a red-over-something-over-flashing-green is displaying a "something to Limited" aspect.
- 7) Signals displaying a red-over-something-over-green generally display a "something to Medium" aspect. The exception to this is rule 431 where a red-over-red-over-green means Slow to Clear.
- 8) Signals displaying a something-over-something-over-flashing-yellow generally display a "something to Slow" aspect. The exception to this is rule 425 where red-over-red-over-flashing-yellow means Slow to Stop.
- 9) All-red indications on triple head, non-skewed double head, single head with and "A" plate, and all dwarf signals display an absolute Stop aspect, meaning that trains must stop and stay unless given special instructions to pass the signal.
- 10) All-red indications on single head (without an "A" plate) and skewed double head signals display a Stop and Proceed aspect.
- 11) All-red indications on single head and skewed double head signals, with an "R" plate, display a Restricting Signal, meaning that a train may pass at restricting speed without first making a complete stop.