

Rail Signal Aspects and Indications

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ABSTRACT

Wayside rail signaling practice in the U.S. is a nightmarish web of operating rules, signal types, aspects, aspect names, and indications, differing between the different roads and even their individual divisions and locations. Much of the “vocabulary” involved is extremely curious and counter-intuitive, a result of the long historical evolution of this field and of the industry. In this article, after an examination of some of the history of this field, a consistent (if tortured) thread of syntax is identified for the mainstream of current practice, and its principles are discussed at length. Extensive charts illustrate the majority of the vocabulary with explanatory notes under two widely-used “dialects”.

1. INTRODUCTION

Wayside rail signaling¹ practice in the U.S. is a nightmarish web of operating rules, signal types, aspects, aspect names, and indications, differing between the different roads and even their individual divisions and locations. Much of the protocol involved is extremely curious and often counter-intuitive, a result of the long historical evolution of this field and of the industry.

In this article, I illuminate and describe a consistent thread of syntactic principles running through the majority of recent U.S. wayside signaling practice. It may not always apply precisely to every situation. Nevertheless, this description should provide a useful picture for the reader who wonders what on earth could a certain aspect seen on actual signals mean, and why. The presentation gives some information on historical evolution to help explain the concepts used today.

Canadian practice, although for many years generally paralleling U.S. practice, currently follows a somewhat different (and more rational!) practice, which will not be discussed here.

¹ *Wayside signaling* operates through the use of visible signals placed alongside the track which give indications intended for observation by the locomotive engineer. It is distinguished from *cab signaling*, in which the indications appear inside the locomotive cab, and from various forms of *automatic train control*, in which the indications actually govern train operation (either through the engineer or directly).

There are of course numerous subtleties to the various matters I present which are beyond the scope of this paper. And I must emphasize that what I describe for each situation is only one of many possibilities—usually the most common, and hopefully the most illustrative.

Readers having need to further pursue the wide range of possibilities and the various subtleties of the field are referred to the section of the paper entitled “References”, where URLs to Web sites having an almost obscene amount of scope and detail may be found.

Finally, note that, consistent with our practice with respect to telephone signaling, we spell “signaling” that way, with one “L”. The spelling with two L’s is of course quite common and wholly proper.

2. DEFINITIONS

These terms will be widely used in this paper. Words in bold have their own entries.

Signal (wayside)—A **head** or array of heads placed alongside, or over, the track that collectively shows, at any particular time, a single visual **aspect** to the train crew.

Head—A signal element that can exhibit any one of a small number of visual messages. Called “arm” if implemented by a semaphore, and often colloquially called “arm” even if implemented with lights (out of nostalgic respect for the earlier implementation).

Aspect—The visual appearance of a **signal** at a particular time, often described verbally. Example: “Yellow over green over red”.

Aspect name—The formal functional name given to an **aspect**. It is essentially a short form of the aspect’s **indication**. Example, for the aspect above: “Approach Medium”. An aspect may be given different aspect names in the signal practices of different railroads, and in a given practice, there may be multiple alternative aspects that have the same name.

Indication—The operational mandate given by an **aspect**. Example, for the aspect above: “Proceed approaching next signal at *medium* speed”.

Rule—A numbered provision of a recognized set of operating rules that defines a particular **aspect**, aspect name, and the associated

indication. Example (for the aspect/indication above): “NORAC Rule 282”.

3. STANDARDIZATION

3.1 NORAC

Many northeastern U.S. railroads subscribe to a model set of operating rules promulgated by the Northeastern Operating Rules Advisory Committee (NORAC). The NORAC Operating Rules document covers many aspects of railway operation, and defines a set of signal aspects and indications.

The syntactic principles presented in this article are largely those upon which the NORAC signal rules are based.

3.2 GCOR

Many railroads in the western part of the United States adhere today to a set of rules known as the General Code of Operating Rules (GCOR), developed by an industry committee. Like the NORAC rules, it covers many aspects of railway operation. In its initial edition (1985, substantially amended 1986), GCOR defined a set of signal aspects and indications. However, as of the 1989 edition, GCOR no longer defines signal aspects and indications, now leaving that up to the individual railroads.

Many railroads that follow GCOR as their overall operating rules continue to follow signal aspect and indication definitions very similar to those earlier prescribed by GCOR itself. Sometimes these are spoken of as “GCOR aspects and indications”, but in light of the current scope of GCOR, that is not fully apt.

3.3 UCOR and CCOR

At one time, many railroads followed one of three sets of standard operating rules: The NORAC Operating Rules (already mentioned), the Uniform Code of Operating Rules (UCOR), or the Consolidated Code of Operating Rules (CCOR). GCOR in effect superseded both UCOR and CCOR, in an attempt to broaden the uniformity of practices.

Both UCOR and CCOR defined sets of signal aspects/indications. Reference to UCOR and CCOR aspects/indications are still encountered in the literature, but these references are essentially “nostalgic”.

3.4 CROR

In Canada, railroads are governed by the Canadian Rail Operating Rules (CROR). This document is largely based on the UCOR rules.

CROR defines a set of signal aspects and indications.

3.5 Common western U.S. practice

Many western U.S. railroads have sets of aspect/indication definitions drawn from, or evolved from, the definitions once promulgated by GCOR. Each railroad may have a different subset of the entire GCOR repertoire, but when the same aspect appears in the list of two or more railroads, the definitions are usually harmonious (if not identical).

I will refer to the joint collection of such aspect/indication definitions as "Common Western Practice" (CWP).

3.6 Rule numbers

In the various standard sets of operating rules that define sets of signal aspects and indications, the various aspects/indications are each usually identified as a numbered "rule". Thus, it is common, in writing about one or more of these aspects, to refer to them by "rule number", as: "In such an instance, the signal shall display the aspect of Rule xxx", or even, more explicitly, "In such an instance, the signal shall display the aspect of NORAC Rule xxx".

By way of reference, the rule numbers for aspects/indications prescribed by NORAC, UCOR, CCOR, and the first issue of GCOR are all typically in the "upper 200s" and/or "300s".

In the current GCOR, Rule 9.1 states that the aspects and indications are to be found in the Special Instructions, a term used to refer to a railroad-specific "addendum" to the railroad's version of the GCOR.² Accordingly, railroads adhering to the GCOR as their basic set of operating rules will often number their own signal aspects/indications as "Rule 9.1.x".

In the current CROR, the aspects/Indications are denoted as rules 405 through 430.

² Often this information will actually appear in the System Timetable.

4. SIGNAL CATEGORIES

In U.S. practice, most wayside signals may be classified as either *automatic block signals* or *interlocking signals*. Their respective roles are as follows.

4.1 Automatic block signals

Basically, the purpose of automatic block signals is to prevent a train from running into the train ahead. This is done by dividing the track into a series of blocks and controlling the entrance of a train into each. The presence of a train (or even a single errant car) in a block is usually detected by an electrical arrangement called a *track circuit*. When the track circuit determines that a block is occupied, a wayside signal at the beginning of the block gives an indication requiring the engineer to stop the train.

Stop indications given by an automatic block signal are usually *permissive*, that is, after the train has been brought to a stop, it may resume movement at a very low speed (often called the "restricted" speed), assuming that there is adequate visibility of the track ahead. The presumption is that the engineer would be able to see the train (or other obstruction) ahead in ample time to come to a stop before hitting it. Such an indication is sometimes called "Stop and proceed".

4.2 Interlocking signals

An *interlocking* (more completely, *interlocking plant*) is a location in which a train encounters, for example, (a) switches (turnouts), which allow the train to move onto a siding, cross from one track to another, or follow one of several different routes; (b) a crossing at grade over another track, essentially at right angles; (c) a drawbridge or other such potential disruption to the continuity of the track; or (d) a situation where the train could foul another train (such as where two separate tracks are unnaturally close together due to space limitations).

The term *interlocking* itself refers to the fact that the controls operating the signals are mechanically or electrically interlocked among themselves, with the controls for the switches, and with track circuits detecting the presence of a train (or car) in various locations, such that a signal cannot be made to give an indication that would authorize an unsafe or infeasible movement.

An interlocking signal is found at the entrance to an interlocking, but in fact also marks the beginning of, and governs, an entire block, often extending well beyond the far end of the interlocking proper.

Stop indications given by interlocking signals are usually absolute: the train must stop and remain stopped until the signal changes to a more favorable indication. The reason is that the engineer might not be able to see the conflict, such as the rapid approach of another train on a crossing or conflicting track, or an inappropriately set switch. (Such an indication is sometimes called "Stop and stay".)

4.3 Signals for switchyard and siding operation

Simplified versions of the signal doctrine described herein are often used to govern movements within switchyards or onto sidings elsewhere. They often utilize smaller signals, placed near the ground, known as "dwarf" signals. We will not cover this branch of signal doctrine in this paper.

4.4 Distinguishing block and interlocking signals

In many cases, the implications of a particular aspect will depend on whether the signal is in an automatic block or interlocking situation, and it is thus important that the two can be distinguished.

One convention widely followed is that automatic block signals all carry on the mast a plate with the block number; no such plate will appear on interlocking signals.

Another convention sometimes used with multiple-head signals (especially with color light signals, either searchlight or vertical three-lens) is that the heads are staggered on alternating sides of the mast for automatic block signals (typically right, left, right) but are placed on the same side for interlocking signals.)

5. SPEED CATEGORIES

In our discussion of signaling, we will often make reference to various speeds at which the train is permitted to operate. Most present signaling doctrines involve the following speeds, listed from the highest to the lowest:

Normal	Varies with road and location
Limited	Typically 40-45 mph
Medium	Typically 30 mph

Low	Typically 15 mph
Restricted	Speed such that train could stop in “half the visual range”, typically not over 15 mph in any case

6. SIGNALS

In the next sections, I will describe the important physical types of signal, discussing for each the basic historical syntactic principles pertaining to its use. These syntactic principles are largely creatures of the physical implementation, and the overall syntax developed progressively (by accretion) in parallel with the introduction of new signal implementations.

Later (starting in section 10), I will give a systematic summary of the consolidated syntactic principles governing modern signaling protocols.

7. SEMAPHORE SIGNALS

7.1 Basic principle

Many different techniques were utilized during the earliest days of railway signaling. One which came into widespread use was the semaphore, a moving arm mounted on a mast, whose position conveyed information regarding the status of the track ahead.

A common arrangement was to have the semaphore arm hanging down (but not usually quite vertical) when the track ahead was clear, and to raise it to a horizontal position to indicate that the track ahead was not clear (and that therefore the train should stop). It has been suggested that this convention was evocative of a human “signalman” raising his arm to order the train to halt.

Typically the semaphore arm was square at the end, and carried a stripe of a contrasting color across its width near the end, to enhance visibility.

To allow the signal to be read at night, the “hub” of the semaphore arm was fitted with a frame carrying two glass lenses,^{3, 4} behind

³ Formally called, today, *roundels* (pronounced “ron-DELS”), but most frequently still called “lenses” in description of signal types.

⁴ The frame was colloquially called a “spectacle”, a term which is still used, even though today the frame may carry three lenses.

which was placed a lamp (initially an oil lamp, later an electric lamp). The lamp was seen through a different lens for each of the two positions of the semaphore arm. Originally, the lens through which the lamp was seen with the arm down (Proceed) was clear (giving a white light), and the lens through which the lamp was seen with the arm horizontal (Stop) was red.

This convention raised the risk that, were the red lens to crack and fall out of place, with the signal at Stop a white light would be seen, erroneously indicating Clear. To avert this, the standard color of the Clear aspect was eventually changed to green.⁵

If the wire that lifted the arm to the Stop position were to break, or if an accumulation of snow or ice were to weigh down the arm, then when the arm was supposed to be raised (Stop) it might remain in the down position, again giving an erroneous indication of Clear.

To avert this, most railroads eventually converted to "upper-quadrant operation". Here, the Stop aspect was still with the arm horizontal⁶, but the Proceed aspect had the arm raised to an **upward** (truly) vertical position. The original mode, then called "lower-quadrant operation", was retained by some roads (notably Southern Pacific).

7.2 The distant signal

Especially if the track were curved, the engineer might not be able to see a signal in time to bring the train to a halt at a signal that showed Stop. To deal with this, the practice was introduced of having a "distant" signal: another semaphore, following the position of the "main" semaphore but located some distance earlier in the track. The distant signal arm typically had a notched ("fishtail") end, and the stripe across the arm was replaced with a chevron (matching the contour of the arm end), allowing the nature of the signal to be recognized.

With the adoption of the distant signal concept, the "regular" signal at the entrance to the block was given the name *home signal*.

⁵ During the era in which white indicated Clear, three-position semaphores were sometimes used, with green indicating "Caution".

⁶ This choice was intended to make sure that an engineer would always properly recognize the stop aspect during a time of change of schemes.

With the “regular” semaphore arm for a block horizontal (Stop), the associated distant signal also had its arm horizontal, but the indication this conveyed was not Stop but rather, “approach the upcoming signal at reduced speed, prepared to stop” (the modern aspect name being just Approach⁷). The associated lens color on a distant signal (for the arm horizontal) was yellow.⁸

As the blocks controlled by signals became shorter (to provide more efficient operation), it was often practical to have a single mast carry both a home signal for the block beginning there and (beneath it) the distant signal for the next block. The two signals could be distinguished both by their relative positions on the mast and by the difference in the shapes of the arm tips and the stripe/chevron across the arm.

In the initial practice, if the block immediately ahead were occupied (or otherwise unsuited for entry) but the next block were clear, the home signal would show Stop (red) and the distant signal for the next block (on the same mast) would show Proceed (green). There was concern that in this situation the engineer might act upon this inviting apparent Proceed aspect and continue at full speed into the current block (there to collide with its occupant).

To mitigate this concern, it became common to arrange the mechanism such that if the upper (home) arm showed Stop (horizontal, red) the lower (distant) arm would be forced to show Approach (horizontal, yellow) regardless of the position of the downline home signal that it nominally mimicked.⁹ This was called, as a result of the mechanical arrangement used for the purpose, “slotted operation”.

⁷ The aspect name Approach, unqualified, always has that meaning: “Approach the next signal [usually at medium speed], prepared to stop there.” Other aspect names involving the word “approach” mean, “Approach the next signal [at some indicated speed]”, and **do not** imply, “. . . prepared to stop there”.

⁸ During the earlier era in which white was the color for “proceed”, green was often used in the distant signal for “approach” (the arm horizontal aspect).

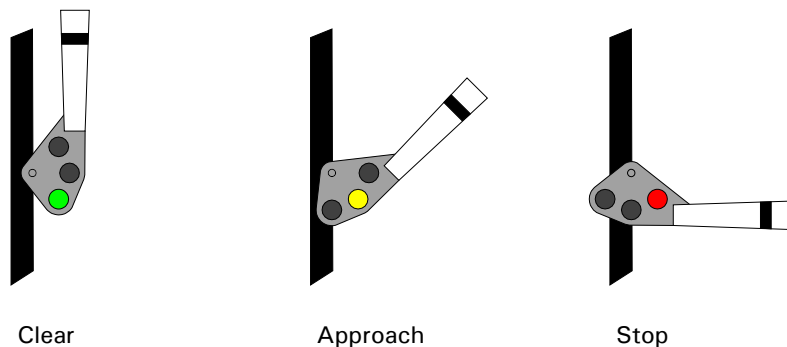
⁹ Evidently, the idea was that if the engineer decided to observe the approach aspect rather than the stop aspect, he would at least be proceeding with caution (still into an occupied block, of course)!

7.3 Three-aspect semaphore signals

With "slotted operation", a set of two semaphore arms (one home, one distant) could only take on three states. The aspects conveyed by the array would be: Clear (vertical over vertical, green over green); Approach (vertical over horizontal, green over yellow); and Stop (horizontal over horizontal, red over yellow). It was realized that a single semaphore arm, with three positions, could convey this same repertoire. The three aspects of such a semaphore, and the associated indications (for "upper quadrant" operation), were:

<u>arm</u> <u>position</u>	<u>light</u> <u>color</u>	<u>aspect</u> <u>name</u>	<u>indication</u>
vertical (up)	green	Clear	Proceed
45° up	yellow	Approach	Proceed at reduced speed, prepared to stop
horizontal	red	Stop	Stop

This figure shows the arrangement:



7.4 Automatic block vs. interlocking semaphores

Sometimes "automatic block" and "interlocking" semaphores are distinguished by having the interlocking semaphore arms have a pointed end, rather than a square end (and a chevron, rather than a stripe, on the arm, oriented the same way as the pointed end.)

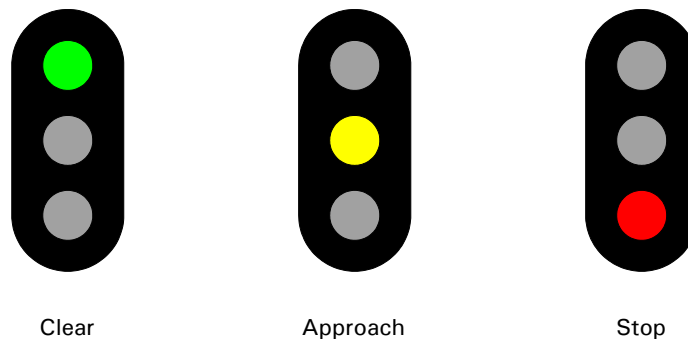
8. LIGHT SIGNALS

8.1 The three-lens color light signal

Semaphores, being overtly mechanical devices, required considerable maintenance, and were subject to problems from ice and snow. Over

time, as electric lighting came into wider use, many railroads moved from the 3-aspect semaphore to a 3-aspect color light signal. In its classical form, this signal has an oval background plate (or “target”) having three lenses, each with a lamp, ordinarily arranged in a vertical column.

The arrangement of the lenses is normally, from top to bottom: green, yellow, red.¹⁰ This matches the sequence of arm positions in the upper-quadrant 3-aspect semaphore. Only one lens is illuminated at a time. The aspects and corresponding indications are the same as for the 3-aspect semaphore. This figure shows the standard arrangement.



When a signal carries multiple “heads” of this type, some or all may not follow the standard sequence of colors (see section 14.5).

8.2 The cluster three-lens color light signal

In this variation of the three-lens theme, the three lenses are arranged in a triangle on a circular or generally-triangular background, usually with green and yellow at the top (and usually in that order, left-to-right) and red centered below.

8.3 The “searchlight” color light signal

A variation of the traditional 3-aspect color light signal, often called a “searchlight” signal, has only one lens and lamp, mounted at the center of a relatively-large circular background. Electromechanical apparatus in the signal head moves colored filters so that the light shown is either red, yellow, or green. An advantage is that it takes up less vertical space than a three-lens signal for a given lens diameter.

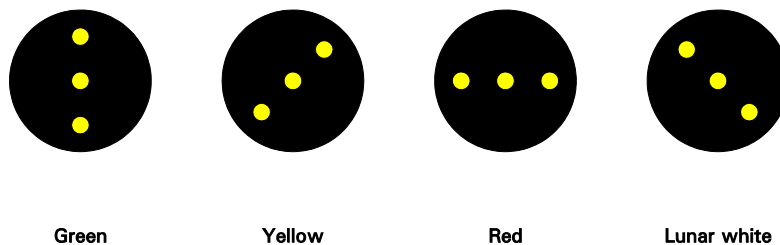
¹⁰ Note that this is the opposite order from that customarily used for road traffic signals. In addition, in road traffic signal work “yellow” is formally called “amber”.

In its basic use, the aspects and indications of this type of signal are the same as for the three-lens color light signal. Some searchlight heads are also equipped to produce a "lunar white" aspect (produced by a diffusing white lens) , typically used to indicate *restricted* speed.

8.4 The position light signal

The position light signal may be thought of as a semaphore without moving parts. It consists of a (usually) round background within which are set several lenses, all of the same color (usually yellow). For the Clear (or Proceed) aspect, three yellow lights in a vertical row are lit. For an Approach aspect, three yellow lights in a diagonal row, upward to the right, are lit. For a Stop aspect, three yellow lights in a horizontal row are lit. Often there is provision for a fourth aspect, used to indicate *restricted* speed: three lights in a diagonal row, downward to the right. A single light serves as the center of all three patterns.

For convenience, when speaking of position light signals, we often call the four visual aspects "green", "yellow", "red", and "lunar white", respectively, even though those colors are not actually involved. This figure shows the arrangement, labeled under that convention.



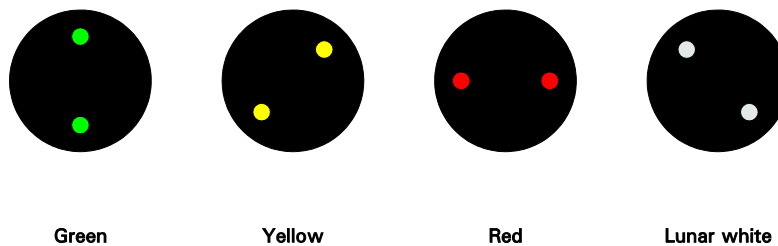
8.5 The color-position signal

The color-position signal is similar to the position light signal, but the lights that are lit for the different aspects have different colors as well as being in different positions, generally the same colors as for the corresponding aspects of the basic three-lens signal. For the Clear (or Proceed) aspect, two green lights in a vertical row are lit (there is no center light¹¹). For an Approach aspect, two yellow lights in a diagonal

¹¹ The reason that there are two, rather than three, lamps lit for each aspect is that no single light could serve as the midpoint of all three patterns, as it would have to have a different color in each.

row, upward to the right, are lit. For a Stop aspect, two red lights in a horizontal row are lit. To indicate *restricted* speed, two yellow lights in a diagonal row, downward to the right, are lit.

For convenience, when speaking of position light signals, we often call these visual aspects simply “green”, “yellow”, “red”, and “lunar white”, respectively. The figure shows the arrangement, labeled under that convention.



9. ADVANCE APPROACH

Many roads have adopted a practice in which there are two types of Approach indication. The first indicates that the signal at the following block is at Stop; the second indicates that the signal at the block after the following block is at Stop. This protocol gives the engineer better information for controlling the train’s deceleration to meet the upcoming Stop signal.

Many sets of signal rules recognize this mode with the “advance Approach” aspect. Its indication is typically to proceed at no more than *limited* speed, prepared to stop at the **second** signal ahead (the one currently known to be at Stop). The basic aspect used is flashing yellow. As an alternative, signals with two heads are used to present this indication. The conventions for that will be discussed in a later section.

10. SPEED LIMITS

10.1 Introduction

There are two basic situations in which it is appropriate to impose an explicit speed limit through a signal.

- At an interlocking, it is often necessary to impose a limit on the speed of the train while passing through the interlocking trackwork proper, especially when a diverging route has been set through a switch (which the train may be unable to negotiate safely at normal

speed). Thus, the signal at the entrance to an interlocking may need to express such a speed limit.

- At a signal (automatic block or interlocking) **just prior to** a signal (of either category) that currently imposes an immediately-applicable speed limit, or is at Stop, it may be appropriate to impose a speed limit applicable to the approach to that following signal.¹²

Both of these types of speed limit may appear on an interlocking signal. Only the second type can appear on an automatic block signal.

The syntactic principles by which these limits are conveyed will be described later.

10.2 “Speed” vs. “route” signaling

Signal doctrines generally follow one of two concepts regarding speed limits:

- Speed signaling—in schemes of this type, speed limits are explicitly conveyed by conventions presented by multiple head signals. Interlocking signals do not explicitly indicate whether the route to be encountered is “diverging” or not—that is, the position of the switch (turnout) is not explicitly revealed, although it may be intimated by the speed limit indicated.
- Route signaling—in schemes of this type, at interlocking signals, whether the route is diverging or not is explicitly indicated. The applicable speed limit through the interlocking, for either the normal or diverging route, is given for the particular interlocking by the employee timetable, and is not part of the signal indication.

In reality, most signaling doctrines do not strictly exemplify either of these concepts, but follow different blends of the two.

The NORAC signaling doctrine is generally of the speed signaling variety. The signaling doctrine formerly specified by GCOR is generally of the route signaling variety. The CROR (Canadian) signaling doctrine is generally of the speed signaling variety.

¹² The “approach” and “advance approach” indications, already discussed, are special cases of this; they carry inherent speed implications.

11. SIGNAL PLACEMENT

In the basic situation of a single track (at least for a given direction of operation), signals are commonly mounted on a mast at the side of the track—typically the right side (corresponding to the engineer's side of the cab).¹³

When there is more than one track for a particular direction of running, rather than place signals for each on their own masts, there may be a column (usually again on the right of the track group) with a platform on the top from which arise separate short masts for each track, carrying the corresponding signals. (This is sometimes called a "bracket post" arrangement, the name coming from an earlier implementation, in which there was not a real "platform" but rather brackets extending to one or both sides of the mast itself to hold the additional signals.)

If there is no signal for one track (perhaps it is a siding), then commonly, to avoid any misunderstanding about which signal goes with which track, there may be in its mast position a small mast with no signal on it (called a "doll arm"¹⁴)—a "mast placeholder".

If there is only one signaled track and one unsignaled, the signal may be placed on a conventional mast, with the short doll arm on a bracket off to its side (the traditional concept of a "bracket post", in fact).

In some cases, especially where there are several active tracks, a gantry (called a "signal bridge") may be built over the whole set of tracks, with signals for each track atop it (usually on short masts). They are not centered over the tracks to which they pertain, but are slightly offset to the right side. A doll arm may be used here, too, if there is an unsignaled track in the group (especially if track curvature can distort the engineer's perception of which signals are "over" which track).

In some cases where there is only one signaled track (at least in a certain direction of travel), there may be a post with a "bridge" extending over the track, so as to allow the signal to be placed over

¹³ This may vary, especially if the railroad uses "left-hand running" (corresponding to U.K. road traffic).

¹⁴ "Doll" is old British slang for a semaphore "head". The term "doll arm" for an empty mast is apparently a curious development from that.

the track (but still offset from its centerline), or to reach across a siding. This is often called a “cantilever bridge” (or just “cantilever”).

12. A MAD METHOD TO THE MADNESS

Although it may be hard to believe, almost all modern rail signal conventions actually form their aspects from a consistent, if tortured, set of underlying syntactic principles. These are summarized in the sections to follow. The indications as stated there are not usually the formal ones, but are paraphrased so as to best illuminate the syntactic principles. Some subtleties of the indication may have been omitted to make it easier to grasp its essence.

Note that there are many departures from these principles in the various specific practices.

13. BASIC ASPECTS AND INDICATIONS

These aspects are given by a single-head signal, or by the top head of a multiple-head signal where the lower heads all display red (placeholder) or are dark. The customary aspect name is given underlined.

13.1 Yellow

Approach—reduce speed to *medium* and approach next signal preparing to stop.

13.2 Green

Clear—proceed at *normal* speed.

13.3 Red

13.3.1 *At an automatic block signal*

Stop—stop, then proceed at *restricted* speed, prepared to stop.

13.3.2 *At an interlocking signal*

Stop—stop (and stay).

13.4 Flashing red

Restricting—Proceed at *restricted* speed.

13.5 Lunar white

Restricting—Proceed at *restricted* speed.

14. COMPOUND ASPECTS AND INDICATIONS

14.1 Introduction

In this section, we explore the syntactic principles governing compound aspects and indications—those generally requiring multiple-head signals (i.e., with multiple semaphore arms or light heads¹⁵) to present their aspects. These generally present operating speed limits, either explicitly or implicitly, and may (in the case of interlocking signals under certain practices) indicate whether the route set is straight through or diverging.

Because aspect names are creatures of the overall indication, resulting from the interaction of two or more principles, names are not given here for the various aspect elements. The general principles governing aspect names for complex indications are discussed below in section 14.9.

14.2 Multiple head signals—Overview

14.2.1 Introduction

Signals providing for speed limit indication (of either variety) typically have two or three heads arranged vertically. Under a speed signaling doctrine, the second and third heads have specific speeds associated with them: *medium* for the second head, and *low* for the third head.

It is perhaps easiest when visualizing this type of signal to think of the heads being of the searchlight color light type, although most of the aspects can be presented equally well on other types (sometimes with some special considerations).

14.2.2 The unique nature of red lights

If all heads on a multi-head signal show red lights, the indication is Stop (Stop and stay or Stop and proceed, as appropriate).

If, however, some but not all heads show red lights, the red lights do not mean Stop, nor do they directly mean anything at all. They are merely placeholders.

A cute phrase used to remind us of this is, “If it isn’t all red, it isn’t red at all”.

¹⁵ They are often called “arms” even if implemented with lights.

14.2.3 *Dark heads*

Under some schemes, lower heads that would only carry a “placeholder” red may instead remain “dark” if that would cause no ambiguity (that is, when considering the possibility that the dark head was just inoperative). Almost always, for a Stop indication, all heads show red. In any case, if some heads are dark but all that are lit are red, the aspect must be interpreted as Stop.

14.3 Speed signaling aspects and indications

The explicit speed limit implications of an aspect in a classical “speed signaling” scheme are given by the yellow and/or green light(s) in the aspect. The syntax is rather subtle.

14.3.1 *Aspect includes a yellow light*

If the signal aspect includes a yellow light, the indication is of the Approach type and governs the train’s approach to the next signal. The position of the yellow light indicates the speed that must be adopted now (in the case of an interlocking signal, “through the interlocking”; in the case of an automatic block signal, “until the next signal”), as follows.

Yellow light:

- Top head—no explicit speed limit now, but *medium* speed may be dictated by the fact that this is an approach signal (see below).
- Second head, flashing—*limited* speed.
- Second head, steady—*medium* speed.
- Third head, flashing—*slow* speed (This is a special construction; ordinarily we would expect this to be conveyed by steady yellow on the third head, but the flashing convention is used to avoid conflict with another unrelated aspect having an arbitrary construction.)

14.3.2 *Accompanying green light*

If the signal aspect includes a yellow light, then the presence or absence of a green light, and its position if present (it will always be below the yellow), indicates the speed at which the next signal is to be approached, as follows:

Green light:

- None—approach the next signal prepared to stop. (With the yellow on the top head, this is just the basic Approach indication, restated here for completeness of syntactic structure.) Speed now: *medium* (implicit).
- Second head, flashing—approach at *limited* speed (not “prepared to stop”).
- Second head, steady—approach at *medium* speed (not “prepared to stop”).
- Third head, flashing—approach at *medium* speed (not “prepared to stop”). This is used when the green cannot go on the second head because the yellow is there.
- Third head, steady—approach at *slow* speed. Speed now: *medium* (implicit).

14.3.3 Aspect includes a green light only

At an interlocking signal, if there is a green light but no yellow, there is no requirement regarding approach to the next signal. In this case, it is the position of the green light which imposes a limit on the speed at which the train must proceed through the interlocking trackwork proper, as given below. In any case, after passing through the interlocking, the train may resume *normal* speed.

Green light:

- Upper head—no speed limit (this just becomes the basic Proceed indication, restated here for completeness of syntactic structure).
- Second head flashing—*limited* speed
- Second head steady—*medium* speed
- Third head, steady—*slow* speed

14.4 Route signaling aspects and indications

In signaling schemes of the “route” type, at an interlocking signal, the color of the top head indicates whether a straight through or diverging route is set, as follows.

14.4.1 *Green or yellow on top*

Straight through route set. When top head shows:

- Green—Proceed
- Yellow, steady (no green below¹⁶)—Proceed, approach next signal prepared to stop.
- Yellow, flashing (no green below)—Proceed, approach next signal at *medium* speed, expecting diverging route there.
- Yellow, with yellow below— Proceed, approach next signal at *medium* speed, expecting diverging route there.

14.4.2 *Red on top, yellow or green below*

Diverging route set. When head below shows:

- Green, steady—Proceed through interlocking at the established speed for that movement.
- Green, flashing—Proceed through interlocking at *limited* speed.
- Yellow—Proceed through interlocking at the established speed, approach next signal prepared to stop.
- Yellow, flashing— Proceed through interlocking at the established speed, approach second following signal prepared to stop.
- Double yellow— Proceed through interlocking at the established speed; second divergence follows.

14.5 Degenerate heads

If the repertoire of aspects to be given does not ever utilize all possible colors on a certain head, that head may have only one or two (sets of) lenses. In such cases, for various styles of light signal, the background has a corresponding shape.

For a semaphore signal, if a head always exhibits one aspect, that arm may not even be equipped with a motor mechanism, and there will be only one lens in the spectacle.

¹⁶ Yellow over green would be an Advance Approach indication (irregular construction).

14.6 Implementation on vertical three-lens heads

In a two- or three-head signal using vertical three-lens color light heads, the position sequence of colors in the second and third heads is not necessarily the same as in the upper head, and the upper head may not follow the normal arrangement. Two arrangements used are:

G	R
Y	Y
R	G
Y	Y
G	G
R	R
R	R
Y	Y
G	G

14.7 Implementation on position light and color-position heads

When position light or color-position heads are used for a multi-head signal, there are sometimes only two heads provided (for economy, or due to space limitations), and thus certain indications cannot be given in the way described above. Instead, special conventions apply.

For an aspect in which the upper head shows red, the lower head is treated as if it were the second (*“medium”*) head. For an aspect in which the upper head shows yellow, the lower head is treated as if it were the third (*“slow”*) head.

If, for the range of situations expected at a particular signal, the lower head will show only either *“green”* or *“yellow”*, a partial head may be implemented, often with a round background with flattened sides. Its width would not accommodate the horizontal (*“red”*) pattern, which is not needed on that head. For aspects in which neither green nor yellow appears on the lower head, that head is just dark.

If, for the range of situations expected at a particular signal, the lower head will show only *“yellow”*, a partial head may be implemented, with a narrow diagonal background.

14.8 B&O augmented color-position light practice

The former B&O Railroad utilized a signal practice involving the use of a single color-position head, augmented by an auxiliary light that could appear in any of six positions, three above the head proper and three below. The syntax is relatively direct.

The arrangement and the syntax are discussed in detail in Appendix B.

14.9 Aspect names

The name for an aspect with speed implications usually revolves around the corresponding basic aspect name, Approach or Clear, depending on whether or not the indication imposes a requirement on approaching the next signal.

For Approach aspects, if the approach requirement is other than "... prepared to stop", the approach speed is stated after the word Approach. Example: Approach Medium

If the indication imposes a speed limit for passing through the interlocking trackwork, that speed is stated before the word Approach or Clear. Examples: Slow Clear, Limited Approach, Medium Approach Medium. (The last example is for an indication imposing both types of limit.)

15. ABSOLUTE AND PERMISSIVE STOP INDICATIONS

As we mentioned at the outset, a Stop indication at an automatic block signal is usually permissive, and a Stop indication at an interlocking signal is usually absolute, although the visual aspects are identical. Thus, an engineer arriving at a signal showing a Stop aspect must be able to determine the category of signal to properly determine the indication. Conventions in this regard, applicable to three-lens and searchlight signals, were described earlier (see section 4.4).

For a position light or color-position signal, a single lunar white light below the basic head (in Amtrak practice; elsewhere, yellow or white above or below) indicates that the Stop indication is permissive. Absence of such an auxiliary light indicates that the Stop indication is absolute.

16. APPENDICES

Appendix A gives two tables showing principal signal aspects in graphic form along with the corresponding aspect name, indication (not in the official form, but paraphrased for clarity) and an explanation of how the aspect is constructed and interpreted. The aspects illustrated are from the NORAC scheme and the schemes (based on the former GCOR definitions) followed by many western U.S. railroads.

Appendix B describes the unique B&O color-position light signaling scheme.

17. CONCLUSION

So, now do you know why there are train wrecks?

18. ACKNOWLEDGEMENTS

The detailed information in this paper comes mostly from a collection of over 300 pages of wondrous, encyclopedic reference documents found on the Web. These documents reflect the great love of railway signaling and its history by the respective authors as well as their extraordinary patience, diligence, and attention to detail. Without in any way slighting the many other contributors to this body of work, I would like to particularly recognize the following:

Mark A. Bej, M.D., of the Department of Neurology, Cleveland Clinic, Cleveland, Ohio (one of the world's finest hospitals, by the way). Mark's special interest is the Pennsylvania Railroad, but his collection of works on signaling overall is wondrous.

Clive D. W. Feather of Thus, PLC in the UK. As you might expect, Clive's *oeuvre* also extends to many fascinating fields. He is the author of many papers and standards in the field of computer science.

James P. G. Sterbenz of GTE Laboratories, Waltham, Massachusetts, author of a large body of (large) Web pages covering signaling practice around the world. Again, as you might expect, his range of interests is quite extensive, and covers many forms of transportation beyond rail.

Special thanks to Dave White, retired locomotive engineer with the Disneyland Railroad, for his insight into "Common Western Practice", and to Dennis Yachechak of the Federal Railway Administration for his help on the evolution of the General Code of Operating Rules.

19. REFERENCES

For those interested in a much larger and deeper look at the extensive landscape of railway signaling (and other railway technical matters as well), I suggest the following Web sites as starting points (the links are all valid as of 2007.03.07):

Railway Technical Web Pages—Home Page and Index
<http://www.railway-technical.com>

Railway Signalling and Operations FAQ (the starting point for access to Mark Bej's monumental work in this field):

<http://broadway.pennsyrr.com/Rail/Signal/index.html>

Railway signaling articles by Clive Feather—Index page

<http://www.davros.org/rail/signalling/articles>

This link takes one to a wonderful interactive graphic signaling simulator (Java) developed by Henry J. Sundermeyer:

<http://raildata.railfan.net/java/DivRte/NORAC.htm>

It is predicated on the NORAC rules, and includes the use of the "Approach limited" aspect to provide the "advance approach" function.

His home page on matters related to New Jersey railroads can be reached at:

<http://raildata.railfan.net>

Click on any railroad logo at the left and you will go to a page listing many items about all these railroads, in many cases including detailed signaling information (often with Java-based interactive displays). The New York Central area has an especially nice graphic table of signal aspects and indications, directly accessible at:

http://raildata.railfan.net/nyc/signals/nyc_signals.html

A very nice resource on U.S. signaling practice is provided by, of all things, a Danish rail signal engineer, Carsten S. Lundsten, accessible here:

http://www.lundsten.dk/us_signaling

Home page of James P. G. Sterbenz' extensive work on railway signaling world-wide.

<http://www.sterbenz.org/transport/rail/signal>

His *oeuvre* includes several gigantic tables of North American rail signal aspects and indications. The illustrations are all drawn with ASCII characters, but are nevertheless quite clear and well thought-out.

From the North East Rails site; includes a nice summary of signal aspects and indications:

http://www.northeast.railfan.net/pro_faq1.html

Finally, for something really different, visit this:

<http://www.pacerfarm.org>

“Pacerfarm” is a site devoted to (1) love of the AMC Pacer (there are links to pages for the Gremlin, too!), (2) cats, and (3) railway matters, especially on the Metropolitan Subdivision of the former B&O Railroad (now part of CSX).

20. RELEASE NOTES

This issue of this article, among other things:

- Adds “Western U.S. Practice” aspects, aspect names, and indications to the table in Appendix A.
- Discusses various signal “standards”.
- Introduces the distinction between “speed signaling” and “route signaling”.
- Improves the structure of the presentation of syntactic principles.
- Adds (in Appendix B) a description of the unique B&O Railroad color-position light signaling scheme.
- Makes more consistent the aspect explanations in the tables.
- Adds illustrations of various basic signal types.
- Deletes references to U.K. signaling practice.

21. SPECIAL THANKS

Special thanks to my bride, Carla C. Kerr, for her insightful copy editing of this daunting manuscript. The Cherokee red pencil never sleeps!

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Appendix A

Selected Aspects and Indications

The tables that follow give illustrative aspects with their name and indication. Two practices are represented:

- That defined by the NORAC Operating Rules. This generally follows the “speed signaling” doctrine.
- What I call “Common Western Practice” (CWP). This is a joint collection of aspect/indication definitions from the sets of several western U.S. railroads, all drawn from, or evolved from, the definitions once included in GCOR. This generally follows the “route signaling” doctrine.

Under any of the standards or railroad practices, a given aspect name/indication may be attached to multiple visual aspects (even for the same type of signal, such as “searchlight”). In general, these are all obvious variants of one another (e.g., **yellow** vs. **yellow over red** vs. **yellow over red over red**). In this table, the visual aspects shown are usually the “most common” searchlight implementation. If the defined alternate visual aspects include ones that are not obvious variations of one another, two or more may be shown as the basis of separate items in the table.

For automatic block signals, I show schematically both a number plate and the convention of “staggered heads”, even though the latter is infrequently found in practice.

A cross across the lens symbol indicates that the light flashes.

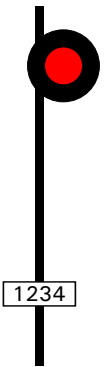
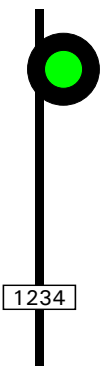
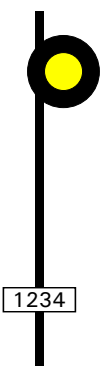
The very light blue color indicates “lunar white”.

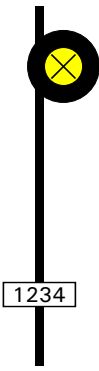
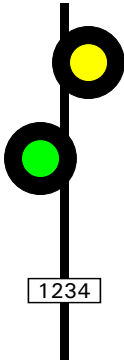
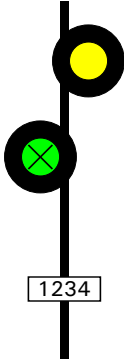
All aspects may appear on a signal with more heads than shown. In such a case, the additional (lower) heads generally show red (placeholder). In certain cases, such lower heads may be dark.

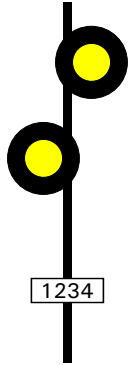
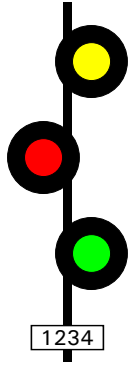
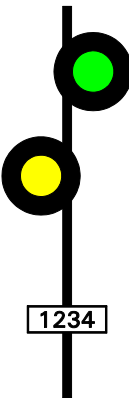
Aspects shown with red on the lower head(s) may appear on signals with fewer heads.

The NORAC indication descriptions are paraphrased (not necessarily verbatim). The CWP indication description is generic, and is only included if substantially different in its implications from the NORAC indication description.

Table A-1 – Automatic block signal aspects

Aspect	<u>NORAC aspect name</u> CWP aspect name NORAC indication CWP indication	Explanation
Basic indications		
	<u>Stop and proceed</u> Stop and proceed Stop; then proceed if appropriate at restricted speed. Stop; then proceed at restricted speed.	The stop is permissive since this is an automatic block signal (number plate present).
	<u>Clear</u> Clear Proceed at normal speed. Proceed.	Basic clear indication.
	<u>Approach</u> Approach Reduce to medium speed and approach next signal at that speed, prepared to stop.	Basic approach indication. It is assumed that the next signal will be at "stop".

Indications with approach speed limits (In aspect name, speed limit stated after "approach")		
	<p><u>Advanced approach</u> Approach medium</p> <p>Reduce to limited speed, and proceed preparing to stop at second following signal. (It is assumed that the next signal will be at "approach".)</p> <p>Proceed not exceeding prescribed speed, prepared to advance on diverging route at next signal at prescribed speed through turnout.</p>	<p>Flashing yellow is an arbitrary "code" for this indication.</p>
	<p><u>Approach medium</u></p> <p>Proceed at normal speed but approach the next signal at medium speed.</p>	<p>Yellow: approach</p> <p>Presence of green implies "but not prepared to stop".</p> <p>Green on second head: approach speed medium.</p>
	<p><u>Approach limited</u> Approach limited</p> <p>Proceed at normal speed, but approach the next signal at limited speed.</p> <p>Proceed prepared to pass next signal not exceeding 60 MPH.</p>	<p>Same as above, but flashing "promotes" the approach speed from medium to limited.</p> <p>This is often used to implement the "advance approach" function.</p>

	<p><u>Approach slow[1]</u> Approach diverging</p> <p>Reduce to medium speed and approach the next signal at low speed.</p> <p>Proceed prepared to advance on diverging route at the next signal at prescribed speed through turnout.</p>	<p>This is an arbitrary "code" to allow this indication to be displayed on a two-head signal. Following the "normal" pattern would require a three-head signal (see next aspect).</p>
	<p><u>Approach slow[2]</u></p> <p>Reduce to medium speed and approach the next signal at low speed.</p>	<p>Here is the orthodox, three-head version.</p> <p>Yellow present: approach</p> <p>Presence of green implies "but not prepared to stop".</p> <p>Green on third head: approach speed slow.</p> <p>The fact that the approach speed is "slow" reduces the proceed speed.</p>
<p>Aspects used in CWP only</p>		
	<p>Advance approach</p> <p>Proceed prepared to pass next signal not exceeding 50 MPH</p>	<p>CWP only</p> <p>Yellow present: approach</p> <p>Assumes next signal will be at "approach".</p> <p>Irregular construction.</p>

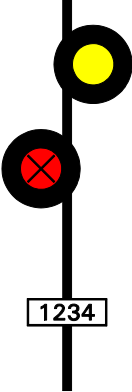
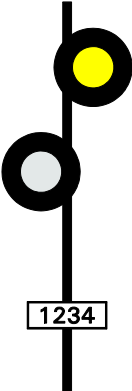
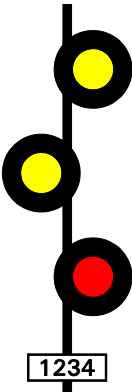






	<p>Approach restricting[1]</p> <p>Proceed prepared to pass next signal at restricted speed.</p>	<p>CWP only.</p> <p>Yellow present: approach</p> <p>Irregular construction.</p> <p>See alternate form below.</p>
	<p>Approach restricting[2]</p> <p>Proceed prepared to pass next signal at restricted speed.</p>	<p>CWP only.</p> <p>Alternate form.</p> <p>Yellow present: approach</p> <p>Lunar white present: restricted speed</p>
	<p>Approach diverging</p> <p>Proceed prepared to advance on diverging route at the next signal at prescribed speed through turnout.</p>	<p>CWP only.</p> <p>Yellow present: approach</p> <p>Irregular construction.</p>




Table A-2—Interlocking signals




Three head signal form shown (unless aspect not defined that way)


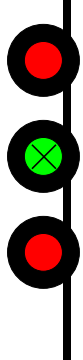

(Aspects with red on the third head may be utilized on two-head signals.)




Aspect	<u>NORAC aspect name</u> CWP aspect name NORAC indication CWP indication	Explanation
	<u>Stop</u> Stop Stop and stay.	Basic stop indication—“It’s red because its all red”. The stop is absolute since this is an automatic block signal (heads in line, no number plate present).
	<u>Clear</u> Clear Proceed at normal speed.	Green only: clear Since the signal is not “all red”, the red lights are only placeholders, and have no meaning.
	<u>Approach</u> Approach Reduce to medium speed and approach next signal at that speed, prepared to stop.	Yellow only: approach (prepared to stop) The reduction to medium speed is inherent in the “approach prepared to stop” indication. The red lights are placeholders.


Indications with speed limits through the interlocking (in name, interlocking speed stated before "approach" or "clear", approach speed stated after "approach").		
	<p><u>Medium approach</u> Diverging approach</p> <p>Reduce to medium speed and approach next signal at that speed, prepared to stop.</p> <p>Proceed on diverging route not exceeding prescribed speed through turnout prepared to stop at next signal.</p>	<p>Yellow present: approach.</p> <p>Yellow on second head: medium speed through interlocking (also).</p> <p>The red lights are placeholders.</p>
	<p><u>Slow approach</u> Diverging approach medium</p> <p>Slow speed through interlocking, then medium speed and approach next signal at that speed, prepared to stop.</p> <p>Proceed on diverging route not exceeding prescribed speed through turnout prepared to stop at second signal unless signal is clear.</p>	<p>Yellow present: approach</p> <p>Yellow on third head: slow speed through interlocking. [Yellow on the third head would indicate "restricted", but is promoted to "slow" by flashing.]</p>
	<p><u>Limited clear</u> Diverging clear limited</p> <p>Limited speed through interlocking, then proceed at normal speed.</p> <p>Proceed on diverging route not exceeding 40 MPH through turnout.</p>	<p>Green present, no yellow: clear</p> <p>Green on second head, flashing: limited speed through interlocking. (Flashing promotes the speed indication from "medium" to "limited".)</p>

	<p><u>Medium clear</u> Diverging clear[1]</p> <p>Medium speed through interlocking, then proceed at normal speed.</p> <p>Proceed on diverging route not exceeding prescribed speed through turnout.</p>	<p>Green present: clear</p> <p>No yellow, green on second head: medium speed through interlocking</p>
	<p><u>Slow clear</u> Diverging clear[2]</p> <p>Slow speed through interlocking, then proceed at normal speed.</p> <p>Proceed on diverging route not exceeding prescribed speed through turnout.</p>	<p>Green present, no yellow: clear</p> <p>Green on third head: slow speed through interlocking</p>
	<p><u>Medium approach medium</u></p> <p>Medium speed through interlocking, then approach next signal at that speed.</p>	<p>Yellow present: approach</p> <p>Yellow on second head: medium speed through interlocking.</p> <p>Green on third head: approach next signal at medium speed. [Special case; green on the lower head should mean "slow"].</p>

	<p><u>Restricting</u> Restricting</p> <p>Proceed at restricted speed until a more favorable signal.</p> <p>(There are several alternative aspects.)</p>	<p>Lunar white: proceed at restricted speed.</p> <p>[Arbitrary: doesn't really fit any pattern.]</p> <p>The red lights are placeholders.</p>
<p>Aspects used in CWP only</p>		
	<p>Approach limited</p> <p>Proceed prepared to pass next signal not exceeding 60 MPH.</p>	<p>CWP only.</p> <p>Yellow present: approach</p> <p>Flashing green on second head: approach next signal at "limited" speed (traditional syntax).</p>
	<p>Advance approach</p> <p>Proceed prepared to pass next signal not exceeding 50 MPH</p>	<p>CWP only.</p> <p>Yellow present: approach</p> <p>Yellow on second head: "medium" speed through interlocking (traditional syntax).</p>

	<p>Approach medium</p> <p>Proceed past next signal not exceeding prescribed speed, prepared to advance on diverging route at next signal at prescribed speed through turnout.</p>	<p>CWP only</p> <p>Yellow present: approach</p> <p>Arbitrary construction.</p>
	<p>Diverging clear limited</p> <p>Proceed on diverging route not exceeding 40 MPH through turnout.</p>	<p>CWP only</p> <p>Green present, no yellow: approach</p> <p>Flashing green on second head: approach next signal at "limited" speed (traditional syntax).</p>
	<p>Approach restricting[2]</p> <p>Proceed prepared to pass next signal at restricted speed.</p>	<p>CWP only</p> <p>Yellow present: approach</p> <p>Lunar white: restricted speed</p> <p>Arbitrary construction.</p>

	<p>Approach diverging</p> <p>Proceed prepared to advance on diverging route at the next signal at prescribed speed through turnout.</p>	<p>CWP only.</p> <p>Yellow present: approach</p> <p>Irregular construction.</p>
	<p>Approach restricting[3]</p> <p>Proceed prepared to pass next signal at restricted speed.</p>	<p>CWP only</p> <p>Yellow present: approach</p> <p>Irregular construction.</p>
	<p>Diverging approach diverging</p> <p>Proceed on diverging route not exceeding prescribed speed through turnouts, prepared to advance on diverging route at next signal.</p>	<p>CWP only</p> <p>Irregular construction.</p>

	<p>Approach thirty</p> <p>Proceed; approach next signal not exceeding 30 MPH, prepared to enter diverging route at prescribed speed.</p>	<p>CWP only</p> <p>Irregular construction.</p>
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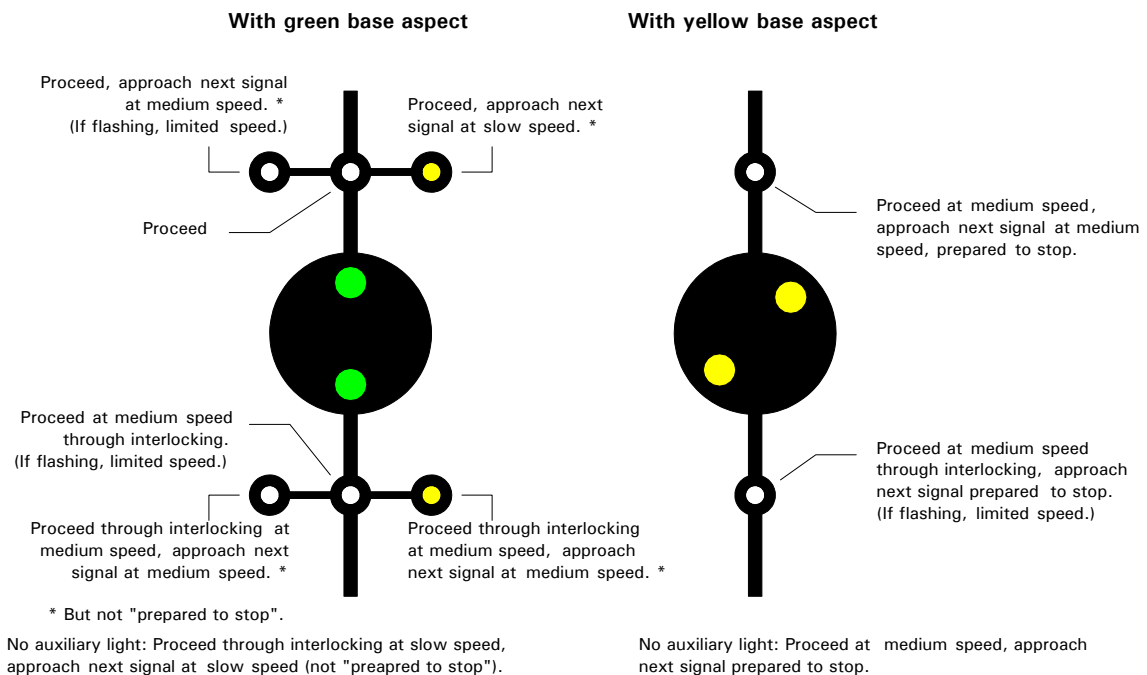
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Appendix B B&O Color-position signal conventions

Introduction

The former B&O railroad widely utilized an interesting convention based on a single color-position head accompanied by auxiliary lights (on individual circular backgrounds) above and/or below the head proper. Although this practice has largely been superseded, it is fascinating, and so I describe it here.

The syntax is quite direct. The signal layout and the basics of the syntax are shown in this chart:



Auxiliary light syntax

There are three auxiliary light positions above the color-position head proper and three below. Only one auxiliary light is illuminated for any aspect (a few involve no auxiliary light).

An auxiliary light above denotes a signal of the automatic block type (or one that is functionally equivalent); one below denotes an interlocking signal.

The center lights in either group essentially denote the "basic" form of the indication given by the aspect of the head proper. The left and

right lights, used mainly in connection with a green base aspect, indicate that the indication is of the speed-limited approach type (that is, not "prepared to stop" at the next signal), and indicate the speed limit for approach.

Green base aspect

With a green base aspect:

An auxiliary light above indicates that this is an automatic block signal, and

- A left light indicates proceed and approach to the next signal be at *medium* speed.
- A flashing left light indicates proceed and approach the next signal at *limited* speed.
- A right light (yellow) indicates proceed and approach the next signal at *slow* speed.
- A center light indicates proceed.

An auxiliary light below indicates that this is an interlocking signal, and

- A left light indicates proceed at *medium* speed and approach the next signal at *medium* speed.
- A right light (yellow) indicates proceed at *medium* speed and approach the next signal at *slow* speed.
- A center light indicates proceed through the interlocking at medium speed and proceed at normal speed.
- A flashing center light indicates proceed through the interlocking at *limited* speed and the proceed at *normal* speed.

Yellow base aspect

With a yellow base aspect:

- A light above at the center indicates that this is an automatic block signal: proceed at *medium* speed and approach the next signal prepared to stop.
- A light below at the center indicates that this is an interlocking signal: proceed through the interlocking at *medium* speed and approach the next signal prepared to stop.

- A light below at the center indicates that this is an interlocking signal: is proceed through the interlocking at *limited* speed and approach the next signal prepared to stop.

Red base aspect

A red base aspect indicates Stop (“and stay), unless one of the following conditions obtains, in which case it indicates Stop and Proceed:

- There is a block number plate on the mast (denoting an automatic block signal)
- The center auxiliary light, above or below, is illuminated.

Lunar white aspect

A lunar white aspect (there will be no auxiliary light) indicates proceed at *restricted* speed.

Alternative to flashing

For any of the aspects that involve a flashing auxiliary light, an alternative is to have the light steady and a triangular yellow plate in the lower right auxiliary light position. (The plate essentially indicates, “limited speed”.)

Flashing green aspect

A flashing green base aspect (there will be no auxiliary light) indicates *slow* speed through the interlocking, then proceed at *normal* speed. (This is an irregular construction.)

No auxiliary light

With no auxiliary light, the indication is highly restrictive (a “fail-safe default” situation). With a green base aspect, the indication calls for slow speed through the interlocking (if applicable) and approach to the next signal at slow speed. With a yellow base aspect, the indication calls for slow speed through the interlocking (if applicable) and approach to the next signal prepared to stop.

As already mentioned, with a red base aspect and no auxiliary light, the Stop indication is absolute (“Stop and Stay”) unless a number plate is present (denoting that the signal is of the automatic block type), in which case the indication is Stop and Proceed.