The Star Dwarf Signals at UP (ex-C&NW) Chicago Passenger Terminal

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Introduction

The dwarf signals at the Chicago & North Western Railroad's downtown Chicago station have long aroused the curiosity of signal enthusiasts. There are two unique features of this station's signaling. The first is the starting lights – the two-star marker units depicted above, and the second is the back lights (made up of a single star) facing the opposite direction of a trains' movement.

The present-day station and related terminal facilities like the Lake Street interlocking tower were placed in service on June 5, 1911. The terminal was known to railroaders as Chicago Passenger Terminal or simply CPT, and that designation will be used here. Though the C&NW's public timetables listed the station as Madison Street Station, the station was more well known to Chicagoans as North Western Station.

In an unfortunate act of destruction, the beautiful 1911 headhouse was demolished in 1984, giving way to a modern glass and steel skyscraper. Once the new complex was completed, the terminal was renamed to Ogilvie Transportation Center (OTC). The Chicago & North Western disappeared into the vast Union Pacific system in 1995. Today's commuter service is funded by the public agency Metra (formally the Northeast Illinois Regional Commuter Railroad Corporation) but the physical plant is maintained and operated by UP.

Subsequent renovations have modernized the train shed area, but despite all the changes over a century's time, the layout of the station tracks and interlocking plant have remained remarkably identical to the original 1911 layout.

The central subject of this article is the dwarf signals protecting the train traffic entering and leaving the terminal. This complex is technically known as Lake Street interlocking. Although a considerable amount of modernization to the signaling facilities has taken place over the years – some of which will be covered in this article – the plant is still fundamentally the same as was placed in service over a century ago.

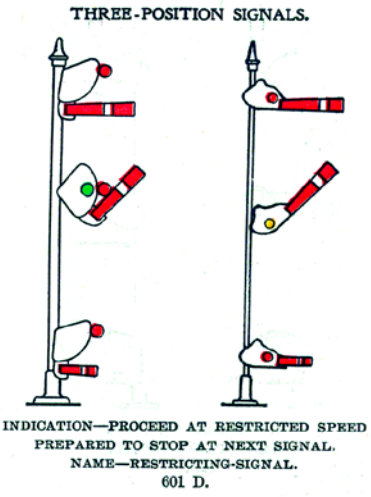
The North Western's 1911-era terminal facilities resulted in the construction of five interlocking towers to control the traffic of revenue passenger trains, empty coach and engine moves, as well as switching of the industries along the C&NW in the downtown area. Each of these interlocking plants was designed and equipped by the General Railway Signal Company of Rochester, NY. The C&NW was loyal to GRS, and purchased nearly all of their signal equipment from this manuacturer.

The centerpiece of the signaling facilities associated with the new Chicago Passenger Terminal in 1911 is Lake Street Tower, which controls the station tracks, ladders, and leads using the vintage 212-lever GRS Model 2 unit lever interlocking machine installed in 1911. Where else can one find a century-old interlocking machine serving a major downtown passenger terminal?

The complexity of the Lake Street plant is astonishing: 67 signals, 29 conventional switches, and 46 double slip switches.

At Lake Street, with the exception of the outermost inbound signal on each of the six leads, the remaining signals were of the dwarf type, due to the space constraints and low speeds within the Lake Street plant. These dwarf signals were GRS Model 2A semaphores configured as a disc instead of the more conventional blade.

One of the more noteworthy features of C&NW signaling of the era was that the Caution (Approach) indication was displayed using a green and red lamp side by side on the railroad's Hall disc signals and semaphore. Accordingly, the Model 2A discs at Lake Street and the other interlocking plants placed in service as part of the terminal project contained only green and red lamps in concert with the customary diagonal blade position associated with that indication.



The C&NW's 1919 operating rule book depicted two variants for the night indication of a diagonal semaphore blade – the C&NW's traditional green/red combination, and the new standard of yellow.

Note also that the term "restricted speed" had a different meaning in 1919 than it does today. The name of this signal today would be **Diverging Approach**.

C&NW's 1919 operating rule book didn't depict the disc signals used at Lake Street interlocking and elsewhere.

A star is born

Having grown up along the Chicago & North Western, this writer's assumption was that the star markers were part of the legendary original 1911 installation that coincided with the grand terminal's opening. However, further research produced no mention in the contemporary literature of the special indications given by the star markers. However, the recent discovery of a C&NW signal department diagram of the station and interlocking facilities reveals certain previously-unknown details about the star markers.

A revision note on this diagram places the date the starting lights were installed as August 8, 1944. The facts leading up to this addition are probably lost to history, but one can envision a scenario involving passenger trains whose length was swelled by the heavy passenger loadings of wartime.

Could the back lights have been the C&NW's answer to delays caused by trains extending beyond their departure signal where the engineer was unable to view his departing signal? Perhaps the starting lights were placed to benefit the despairing engineer faced with this complex web of tracks, wondering whether the favorable signal ahead of his locomotive's boiler was, in fact, intended for his train and not for another train weaving its way through the ladder tracks ahead.

The diagram showing the 1944 additions lists each of the signals by the number of its control lever. The totals are as follows:

Back starting lights (one star)	14
Front starting lights (two stars)	2
Both front and back starting lights	19
No starting lights	32
TOTAL	**67**

How they work

Two C&NW divisions served the terminal in 1911: the Wisconsin Division and Galena Division (which never actually went to Galena). Traffic to and from Chicago ran on three subdivisions. Today, the entire region is under Union Pacific's Chicago Area, but the same three subdivisions – Kenosha, Harvard, and Geneva – still serve the Chicago Passenger Terminal today.

Oddly, CPT does not seem to have formally belonged to any one railroad division or subdivision in C&NW days. Each subdivision's operating timetable showed scheduled service to and from Chicago without a notation that they were on a different subdivision. The special instructions applying to Lake Street interlocking and to the station tracks were listed in both divisions' timetables, and the station was probably also considered for the train and engine crews working trips to and from CPT as part of home territory rather than being an incursion into a foreign operating division.

This anomaly persists today; the station lists and track diagrams for each of the three UP subdivisions include the station itself along with its approaches.

Special instructions from 1960

To see how the star markers at Chicago Passenger Terminal function, we'll turn first to the special instructions for Chicago Passenger Terminal.

Though the particular example chosen for this study originates in C&NW's Wisconsin Division timetable No. 3 dated April 24, 1960, the same or similar verbiage has been in effect for a substantial portion of the terminal's long lifetime. Only the instructions pertinent to the station starting signals are shown.

Chicago Passenger Terminal

Dwarf signals governing westward movements displaying a marker consisting of TWO white stars located directly above the signal light are located as follows on Lake Street Interlocking, Chicago Passenger Terminal:

The first dwarf signal governing westward movements from each of the sixteen train shed tracks.

The second dwarf signal governing westward movements from Track No. 16.

The dwarf signal governing westward movements from each of the two pockets on lead tracks 1 and 6.

The dwarf signals governing westward movements over Lake Street interlocking are now equipped with a rear view lunar white marker light displaying ONE star located on top of the signal case. This marker is illuminated only by action of the leverman when the signal is cleared.

The initial westward movement of any train or engine from the train shed tracks must not be started without a proceed indication on the dwarf signal marked with TWO stars, except that a train or engine with the west end west of one or more dwarf signals must not be started without a proceed indication on the first signal east of its west end on the track it occupies.

The initial westward movement of any train or engine from the pockets on lead tracks one and six must not be started without a proceed indication on the dwarf signal marked with TWO stars.

When enginemen or trainmen can not observe starting signal indication because of engine or train being too far in advance of the starting signal, enginemen or trainmen may be governed by the rear view ONE lunar white star marker light.

When this ONE star marker is illuminated, it indicates that the signal to which it is attached is cleared and that the Operator at Lake Street Interlocking has a route lined up and enginemen or trainmen may proceed on this indication to the next signal.

On empty coach trains in charge of backup men with the west end west of the starting signal the backup man must look to the trainman who remains at rear of the train until the backup movements starts, for the indication of the starting signal.

This classic view from 1967 was taken from alongside the station throat looking toward the train shed. Signals 14 and 94 are both cleared for what appears to be a deadhead equipment move into track 4. Perhaps this is the equipment move from the California Avenue coach yards for the outbound Kate Shelley "400" to Clinton, Iowa.

Observe from the signal aspects that the terminal's signals do not indicate block occupancy; they only indicate whether they may be passed and whether the next signal is at **Stop**.

View from the platform between station tracks 5 and 6. At left foreground is signal 132, which governs outbound moves from track 5. At right foreground is signal 133, with an early color position light dwarf replacement on inbound signal 141.

Another view from the platform between station tracks 5 and 6, showing a multitude of 2A disc signals (and one color position light interloper) in the station throat. At dead center is signal 132, and immediately to signal 132's rear is inbound signal 97, which governs moves through the puzzle switch at right.

The inbound push-pull commuter train's routing from 4 Lead suggests that this is probably a Harvard Subdivision (Northwest Line) train.

A close-up view of dwarf signal 132 governing outbound moves from station track 5, along with the rear of inbound signal 97.

Transition

Beginning around 1990, the C&NW began a sporadic replacement of the Model 2A dwarf discs, which where at the time beginning to push 80 years of age, and replacement parts had long since been dropped from the GRS equipment catalog.

Conventional wisdom would have led to these signals being replaced by a garden-variety color light dwarf. Unexpectedly, the replacement hardware model C&NW selected was the color position light dwarf – manufactured, surprisingly, by Union Switch & Signal instead of C&NW's longtime signal supplier, GRS. Lacking any factual details, one can but speculate that the choice of signal type was made to provide indications through color + position just as with the disc semaphores. By using the dual lamp arrangement inherent to this signal type, C&NW exploited the color position light's inherent redundancy – if one lamp were burnt out, the indication was still visible, and a lamp failure wouldn't affect the station's throughput during rush hour.

Color position light dwarf replacements for the 1911-era disc signals began to appear in Chicago Passenger Terminal around 1990. The starting signal star indicators were carried forward to this new signal type.

This view from 1993 shows signal 131, which governs outbound moves from station track 3.

The final 1911-era disc signals in Lake Street interlocking survived until 2008 – logging a remarkable 97 years of service. The color position light signals at Chicago Passenger Terminal didn't survive as long as their illustrious Model 2A disc predecessors, and began to be replaced around the same time as part of a general modernization of the terminal. Union Pacific embarked on a multi-phase project to modernize the track infrastructure in and around the terminal, along with renewal of the signaling and electrical apparatus making up the Lake Street plant. Around the same time, the old 1911 train shed was replaced, and new platforms and other passenger facilities were updated, forever changing the long-static appearance of the station at track level.

With the advances in light-emitting diode (LED) technology, UP chose a compact signal unit manufactured by L&W Industries as the replacement for both the 1911-era disc semaphore dwarfs and the 1990-era color position light dwarfs. This type of signal consists of a single lamp unit capable of displaying different colors, much in the same way as a searchlight signal. Instead of the searchlight's

pivoting vane, the new L&W dwarf signals do their work without mechanical parts by means of an array of LED units displaying the three discrete colors needed.

Both the front and back starting light stars remain, although the star light units consist of lunar white LED arrays. Though the starting lights have changed in form, their behavior hasn't changed. The following excerpt from Union Pacific's System Special Instructions dated April 7, 2010 is remarkably familiar to the C&NW special instruction issued 50 years prior.

The portion of the special instructions not pertaining to Lake Street interlocking have been snipped from this excerpt.

ITEM 10-J: Commuter Train Operations
Geneva, Kenosha, Harvard and McHenry Subdivisions.

I. **Commuter Operations Documents and Requirements**

2. Lake Street Interlocking:

a. Engineer on scheduled passenger train will contact Lake Street operator via radio when the coach doors have been closed, door light is displayed in the operating control compartment, and the train is ready to depart. In the event of a door light failure, the engineer must communicate with the conductor to ascertain that all doors are closed before contacting Lake Street.

b. The first signal governing movements from each of the train shed tracks is identified by two white stars located directly above the signal light. In addition, these signals are equipped with a single white star which is in view when looking back at the signal (train or engine beyond the signal). When the indication displayed by the first signal cannot be observed due to train or engine extending beyond this signal, engineer or trainman will be governed by the single white star. When the single white star is illuminated:

(1) The signal displays a proceed indication.

(2) The route is lined to the next signal.

c. Movement from the mail or fuel pockets must not be made without a proceed indication and permission from Lake Street control operator.

The same UP system special instruction booklet lists three specific signal rules that apply at Lake Street interlocking only.

ITEM 19: Block and Interlocking Signals

Rule	Name	Aspect	ACS	Indication
9.2.17	Clear Restricting		–	Proceed at restricted speed, not exceeding 10 MPH.
9.2.18	Approach Restricting		–	Proceed at restricted speed, prepared to stop.
9.2.19	Stop		–	Stop before any part of train or engine passes the signal.

The name of the two proceed indications and the "proceed at restricted speed" requirement exist because the signals in Lake Street interlocking do not display block occupancy. As noted previously, the signals at Lake Street indicate only whether they may be passed, and whether the next signal is at Stop.

Here's a modern-day view of signal 131, facing north toward the station throat. Signal 131 governs outbound moves from station track 3.

Side view of signal 131. The stenciled numbers are used to help identify each individual signal; after all, there are a total of 67 dwarf signals in the Lake Street interlocking plant!

A close-up view of the lamp unit containing the two star indications on the front face of signal 131. These stars are permanently illuminated, and simply identify the corresponding signal as the first signal governing movements from each of the train shed tracks and therefore subject to the special instructions.

Observe that the stars, like the main aspect of these signals, are illuminated using an array of light-emitting diodes (LEDs) that produce lunar white light.

Rear view of signal 131 showing the back light referred to in the special instructions. This light illuminates only when the corresponding signal displays an indication more favorable than **Stop**.

The main signal unit is manufactured by L&W Industries.

