



Recognize these symbols? They're the railroad's shorthand, stated as Operating Rule 14L, for use of the locomotive whistle at highway crossings. The Penn Central rule book states that engineers will comply with Rule 14L - two longs, one short, one long - whenever:

(1) Approaching public crossings at grade, to be prolonged or repeated until crossing is reached unless otherwise provided;

(2) Approaching locations where men may be at work on tracks, bridges, other points.

Rule 14L is an American railroad tradition. It is a signature of the railroad as familiar to your father and grandfather as it is to you, and as it will become to your children someday.

Whistles that the railroads have used to sound 14L and all of the other Rule 14 signals appear to have had quite a profound effect upon public opinion over the years; as much effect as those bright paint schemes or anything else in railroading for that matter. The lonesome sound of a "whistle-in-the-night" has found its way into songs, folklore, record libraries, memories, and legend. The variety of sounds has been endless, and though the plaintive steam chime whistles are gone, a goodly variety of chime air horns has come along to take their place. More than 30 types (plus one air whistle) are in use today, at one locale or another, across the North American Continent. Some of these are musical to say the least, while others are, well, functional anyway, but all are very necessary components of today's locomotive.

As an informed rail enthusiast, you can learn to recognize an air horn just by its sound if you wish. Interested? If you would like to know more about the voices of those locomotives running near your home, or those on a favorite rail line, then the "O" Guide is a place to begin. In this guide you will find just about all that's known of today's air horns; how they're supposed to sound, who used what, and where to find a specific type. With a little study, patience, and practice, you should easily unlock the secrets to the sight and sound of our modern "whistles-in-the-night". It's a fascinating chapter of railroads.

"-o-" Guide

Part 1 - Nathan; Airchime Limited

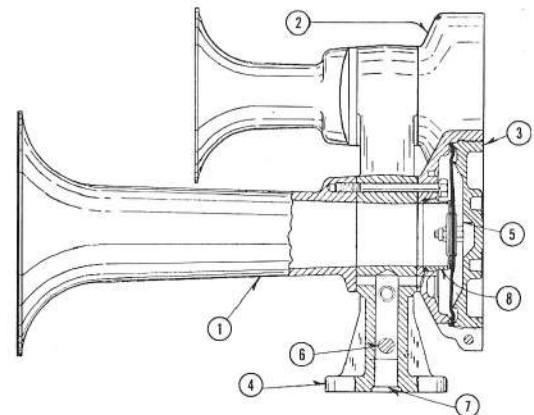
While some might argue this statement on a point of technicality, the origin of the multiple-chime air horn, for all practical purposes, was in 1949. Up until that time, multi-toned horns were not single entities, but instead, were combinations of existing single-note "honkers", placed on a rather makeshift bracket. These were rarely used on locomotives. In his workshop in Vancouver, B.C., Robert E. Swanson, P.E., had developed a 5-chime horn formula which he brought to the U.S. for a demonstration at Alexandria, Va., in 1949. Assisting various railway officials in evaluating this and several other horns and whistles was Captain Charles Bantor, successor to John Philip Sousa as conductor of the U.S. Marine Corps band. Enthralled with the sound of Swanson's horn, Bantor asked if the #4 bell could be changed to Bb, and the chord from C# Dim. to an A 7th Maj. Swanson made the change right there in the railroad yards, and Bantor called its voice "music". The Nathan Manufacturing Co., of Long Island City, obtained a license to sell the horn and its derivatives, and gave it Swanson's designation of "M5".

To successfully apply the Guide for making identifications through sound, some extra pointers may be helpful. For example, a horn and a whistle may be tuned to sound the same basic note--the same fundamental--yet they sound it differently. Consider a trumpet or trombone versus a flute, and how the tones of one differ from the other. This tonal difference--timbre--is largely a result of the presence or absence of harmonic overtones modifying the fundamental. The vibrating diaphragm in an air horn generates few of the rich, melodious tonal modifiers characteristic of steam and air whistles, and the horn is more pure and strident in sound. The fundamentals, the base note to which each trumpet (called "bell" for some strange reason) is tuned for locomotive air horns typically fall within the range of 250-600Hz (middle C on the piano is 262 Hz).

The fundamental notes and intervals--chords--are shown in the Guide for each horn. So are the notes as your ear may register them as heard at trackside. The trackside chords may differ from the design chord partly because some railroads reverse one or more bells on the same mounting bracket causing them to sound either sharp or flat relative to bells pointed forward, and partly because of flaws in the castings of the bells right from the factory.

Parts of a Typical Chime Horn

- (1) Bell (Correct name for entire trumpet assembly)
- (2) Diaphragm Head
- (3) End Cap
- (4) Mounting Bracket
- (5) Diaphragm
- (6) Restricting Orifice
- (7) Air Supply Line
- (8) Diaphragm Seat



RESEARCH SOURCE
AND PHOTOGRAPHER:
Stephen J. Hoskins

With more input from Swanson, Nathan developed the "P"-series of horns in the early 1950's, compromising on the beautiful timbre of the M5, but favoring lower air consumption, reduced in-shop time for repairs, and lower initial cost. The fundamentals and chord intervals of the "P" horns are identical to the sister "M"-series, but the timbre of "P" horns is far more brassy and strident, and there is no mistaking one for the other. Both series carry the registered "Airchime" trademark cast or stamped in each bell along with the number of the bell, and both horn types can be modulated in loudness by varying the pressure of supplied air.

R. E. Swanson developed a third horn formula for use in Canada in compliance with the Board of Transport Ministers' regulations stipulating both the loudness and exact fundamentals for horns used in Canada. Thus it is that the "K" horns of Airchime Limited, now marketing this series, bear a striking resemblance to the Nathan horns, yet sound much different chords. These horns are used almost to the exclusion of all other types in Canada, and, logically, are rarely found in the U.S.

The letters and numbers used in the model designations are explained under the headings of the various manufacturers, as each has his own method of designation. The musical notations are shown in the key of C natural, in the treble clef. Chord or "chime" horns are properly restricted to those having three or more notes, and only a limited number of the most popular one- and two-note horns are included in this listing. Part 1 of the Guide includes the "M" and "P" horns of the Nathan Manufacturing Co., and the "K" horns of Airchime Limited. Part 2 of the Guide, to be carried in the next issue, will include the "S" horns of the Leslie Co., the "E" horns of the Westinghouse Air Brake Co., and, as this Guide is intended to recount modern chime whistles, the "4700" series air whistles of the Hancock Manufacturing Co.

Some horns you will hear just simply won't fit the Guide in description even though the manufacturer designed them to sound the notes as shown in the Guide. Both horns and whistles have a pair of dire enemies--deferred maintenance and contaminated air supply--which will cause them to have silent or overblowing bells, or to sound sadly out-of-tune and voicing. To be able to identify these by sound alone is a real challenge. By the same token, your pursuit of the perfect-sounding horn just might lead you to one that is very, very rare. Who knows? (see also Pursuing the 5-Chime, part I X2270/21p27 and part II X2270/23p25, by Donald K. Tead)

Bell sizes are numbered #0-5, with 5 the smallest and therefore the highest pitch. Hz = hertz (cycles per second)



Nathan MS1 using single base and #1 bell, common on many switchers and early Geeps.

Nathan Manufacturing Division
Wegner Machinery Corporation
35-41 11th Street
Long Island City, NY 11106

Nathan "Airchime" M-series

1. Least streamlined appearance among all horn types.
2. Bells are stubby and well flared at ends.
3. Diaphragm heads are of different diameters for each bell.
4. Ends of diaphragm heads appear to be perfectly flat and in the same vertical plane when viewed from the side.**
5. End caps are indented with raised insert, drilled to accept spanner wrench.
6. Mounting bracket is solid for 3-chime; open-tubular for 5-chime.
7. Bells for 5-chime appear to be piled up and clustered about the mounting bracket, giving the impression of symmetry about the central axis when viewed either fore or aft.

**The prototype line of M5's, 1949-50, did not have heads in the same vertical plane, and small steel tubes supplied air from the mounting bracket to the diaphragm chamber. Few of these horns will be found at this late date, but WM, among others, has a few still in service. They are otherwise identical to the M5.

Nathan "Airchime" P-series

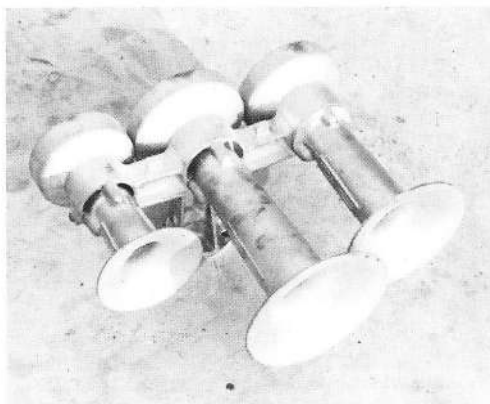
1. Although of rugged construction, horns appear to be fragile and delicate compared to other types.
2. Bells are of moderate length, and are of slim, tubular construction, moderately flared at ends.
3. Diaphragm heads are in the same vertical plane when viewed from the side; end caps are flat.**
4. Diaphragm heads are the same in diameter, and are cast integral with each bell.
5. Caps are attached with machine screws around the periphery of each cap.
6. Mounting brackets are solid and compact for all configurations.
7. Bells of the 5-chime appear to be piled up and clustered about the mounting brackets when viewed fore and aft, giving the impression of perfect symmetry about the longitudinal centerline.

**The Nathan experimental, low-profile "P" horns do not have the diaphragm heads in the same vertical plane, and the overall height of the horn has been significantly reduced, giving the horn a squatty appearance. At this time, these models are used only by Amtrak.

Airchime Limited
Vancouver 1, B.C.

Airchime "Airchime" K-series

For visual spotting features, see Nathan M-series 1, 2, 4, 5, 6 & 7. Key difference is that the diameter of all diaphragm heads of K-series horns is the same.



Nathan M3 (all forward) uses bells #1, 2, 4.

Nathan "M"

M5	A 7th Maj. C#, E, G, A, C#	A 7th Major	A 6th Major	C# Dim.	F# 7th Major	F# Min. 6th	Note 1.
Bells: 1, 2, 3, 4, 5							
M5 Dim.	C# Dim. C#, E, G, A#, C#				Also, other M5 variations.		Note 2.
M5R-- (a)	Same as M5	See variations listed for Nathan M5.					Note 3.
M3	A Maj. C#, E, A	A Major	Bell No. 2 Flat	Bell No. 3 Flat			Note 4.
Bells: 1, 2, 4							
M3R-	Same as M3	See variations listed for Nathan M3.					Note 5.
M3RT1	Same as M3	See variations listed for Nathan M3.					Note 6.
M3H & M3HR	D# Min. D#, F#, A#	D# Minor	Bell No. 3 Flat	Bell No. 2 Flat			Note 7.

(a) Hyphens indicate that any numbered bells may be reversed on the mounting bracket.

M3-12; M3-1R2	Not a Chord	Bells 1 & 2	Note 8.
Bells: 1, 2			

Nathan "P"

P12345	A 7th Maj. C#, E, G, A, C#	A 7th Major	See A Maj. 6th and other variations listed for Nathan M5.	Note 9.
Bells: 1, 2, 3, 4, 5				
P135R24 or P--R---	Same as P12345	See variations listed for Nathan P12345.		
P01235	A 7th Maj. A, C#, E, G, C#	A 7th Major		Note 11.
Bells: 0, 1, 2, 3, 5				
P1234a5	C# Dim. C#, E, G, A#, C#	C# Diminished		Note 12.
Bells: 1, 2, 3, 4a, 5				
P124	A Maj. C#, E, A	See variations listed for Nathan M3.		
Bells: 1, 2, 4				
P24R1 or P-R--	Same as P124	See variations listed for Nathan M3.		
P24; P12	Not a Chord	Bells 2 & 4	Bells 1 & 2	Note 15.
Bells: 2a4, E, A 1a2, C#, E				

Airchime "K"

K5H	D# Min. 6th D#, F#, A#, C, D#	D# Minor 6th	Variations not documented.	Note 16.
Bells: 1, 2, 3, 4, 5				
K5HR (b)	Same as K5H	See variations listed for Airchime K5H.		
K3H & K3HR	D# Min. D#, F#, A#	D# Minor	Variations not documented.	Note 18.
Bells: 1, 2, 3				

(b) Reversed bells not indicated in Airchime model designations.

Note 1 Swanson's M5 formula was the final product of an evolution beginning with a 6-tone prototype on the C Diminished chord called the Hexatone-6. To reduce the size of that horn, one bell was removed, and the others were shortened, altering the Hexatone to a 5-tone, C# Diminished, later called an M5 to eliminate the "hex" connotation. Following the test at Alexandria, the M5 was tuned to an A 7th Major, and aluminum, rather than cast iron, was used to manufacture the bells. The specified fundamentals are: 277.18, 329.60, 391.90, 440.00, 554.30 Hz. Bell forward M5 horns are relatively rare to find; some first generation cab units and road switchers. Major users: WM, SR, SP, CS(CO), SL-SF, Katy, Southeastern Shortlines.

Note 2 This was the original M5 formula of 1949. A few diminished versions have been produced since and have been used both in Canada and the U.S. As Nathan also has the castings for a #4 bell tuned to 466.20 Hz for the M3H horn, it is possible that this bell gets used on M5's occasionally, and the diminished model may be encountered among locomotives of the railroads using M5's. The chord is distinctive and quite pleasant.

Note 3 M5R24 (bells number 2 & 4 Reversed) listed in the Nathan catalog, but any number of bells may be reversed on the mounting bracket. Reversed-bell M5's are very popular. Major users: WP, WM, SR, SP, RI, Family Lines, SL-SF, Katy, CS(BO), Amtrak, Southeastern Shortlines.

Note 4 The 3-tone derivative of the M5. Mostly first generation cab units, road switchers, some yard units. Major Users: Single, most notable application was to passenger units of the former PRR.

Note 5 The reversed-bell M3 is one of the most widely used horns in the U.S. and Mexico; second only to the Leslie S3LR in popularity. The M3R1 is listed in the Nathan catalog, but any number of bells may be reversed on the mounting bracket. As with other reversed-bell horns, reversing caused the M3 to sound somewhat out-of-tune in most cases as heard at trackside. Major users: D&RGW, CS(BO), B&M, DT&I, LV, LI, CNJ, NdeM, SP, SP&S, and numerous shortlines.

Note 6 Similar to the M3R1 except that the #1 bell is tilted 10° vertically from the cab roof, and the end of the bell is elliptically flared to maintain vertical height limits. Usually heard sounding well out-of-tune even though the device has been properly voiced. Major users: Nearly exclusive to the D&H and L&HR.

Note 7 Nathan model for use in Canada in compliance with Board of Transport Ministers' regulations stipulating the fundamentals of D#, F#, A#. Seldom used in the U.S. or Canada, but scattered applications among units of B&M, CV, GT.

Note 8 Two-bell M-horns using the M3 mounting bracket with one port blanked. Mostly found among yard switchers of roads using M3's.

Note 9 Same bell fundamentals as the M5. The bell-forward P12345 is relatively rare to find, perhaps among units of SP, RI, Family Lines, BN, and Amtrak. Both the Nathan M and P horns were listed as standard applications by Alco when not otherwise specified, and users of Alco power may have scattered applications of P12345's.

Note 10 The P135R24 is listed in the Nathan catalog, but any number of bells may be reversed on the mounting bracket. Major users: DM&IR, B&LE, N&W, SP, BN, ICG, RI, Family Lines, among others.

Note 11 Special low-profile model with #0 bell (220.00 Hz, A Nat.) replacing the standard #4 bell. Suggested to Amtrak by D. K. Tead, Lincoln, Mass., and adopted for use with the E60CP electric units. The deep-throated #0 bell gives this horn a "steamboat" sound that is quite distinctive.

Note 12 Special low-profile model with its #4 bell shortened 7/16" to sound a 466.20 Hz (A#) fundamental, and altering the chord to a C# Diminished. Specified by Amtrak for use with the P30CH diesel-electric locomotives, and second order of ANF TurboTrains. Much improved timbre compared with the P12345.

Note 13 Not as widely used as its reversed-bell counterpart. The intense, strident timbre of P124 easily distinguishes it from its sister M3. Recently applied as forward and rearward sets to units of SR, and sounded together from the same horn valve. Major users: SP, Family Lines, SR.

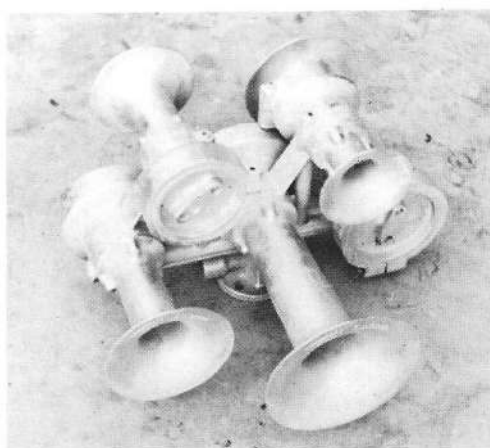
Note 14 The P24R1 is listed in the Nathan catalog, but any number of bells may be reversed. Major Users: SP and affiliates, Family Lines, RDG, BN, among others.

Note 15 Rarely applied to locomotives, but widely used on Budd RDC equipment of the B&M and RDG.

Note 16 Not as widely used as its reversed-bell counterpart. Both the K5H and K5HR are essentially K3H's, complying with Canadian regulations, to which the fundamentals of C and D# were added to satisfy a market for a 5-chime horn. Found mostly among Canadian shortline roads.

Note 17 The model designation for reversed-Bell Airchime Ltd. horns does not indicate which bells are reversed, but any number of bells may be reversed on the mounting bracket. Major users: PGE, Canadian shortlines.

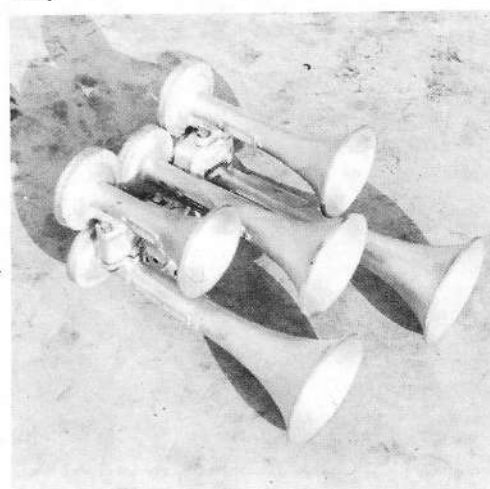
Note 18 The K3HR is the most widely used horn in Canada; practically a standard application among CN and CP units. Scattered applications may be found among units of CV, GT, B&M, P&W, and U.S. locomotives returning from lease by a Canadian road.



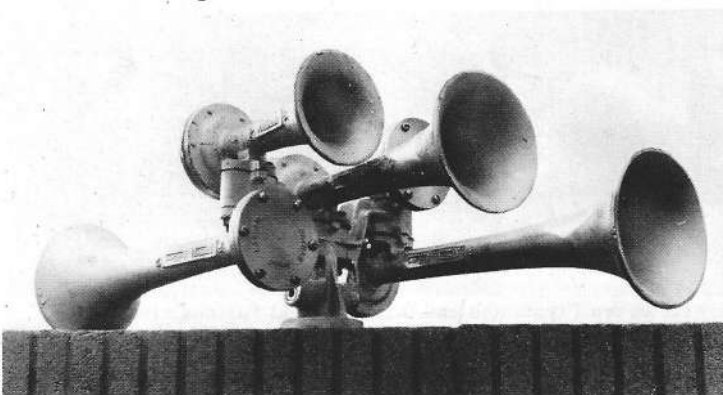
Nathan M5R24 - common on road units.



Nathan P3 - all forward P3 used mainly by SR, also on some SP units.



Nathan P5 - all forward P5 not used much.



Nathan P5R24



Nathan P3R2's: (left) IC, SR, SP SW1500's (note holes--missing blanking caps); (right) SP road power, NP.