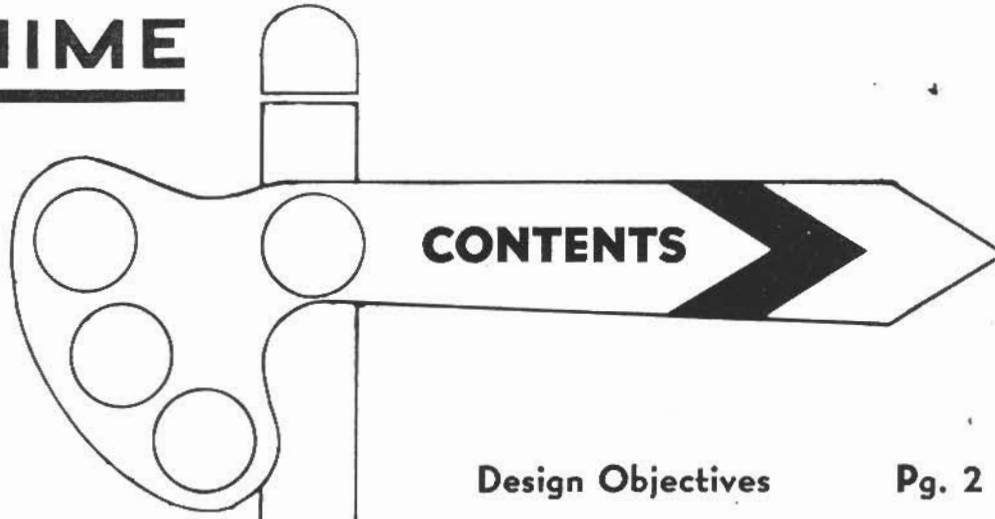


# NATHAN

## AIR CHIME



Design Objectives Pg. 2

Design and Construction  
Features " 2


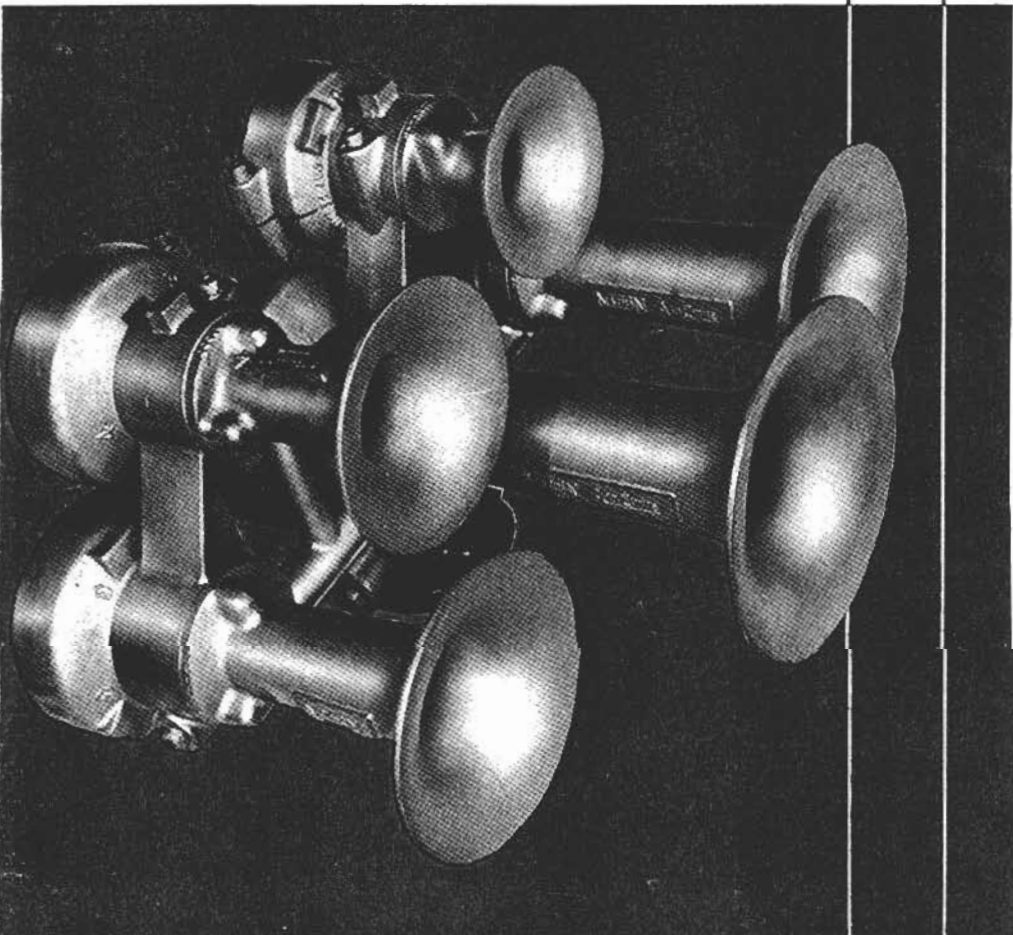
Application Data " 4

Operation " 9

Installation " 10

NATHAN MANUFACTURING CO.

416 East 106th Street,  
New York 29, N. Y.



M 5



## Design Objectives

Development of the Nathan Airchime has paralleled, and to a great extent been caused by, the ever-increasing swing of the railroads to Diesel-powered locomotives.

Because of the absence of steam, the familiar steam locomotive whistle is no longer suitable as a signalling device for the increasingly popular Diesels. In designing a steam-whistle replacement it was essential that its sound be similar to the time-proved and public-accepted "voice of the locomotive", the steam whistle. The tone had to be pleasant yet penetrating in all directions, signal response instant, air consumption low, and construction sturdy enough to withstand the severe demands of railroad service.

Meeting these requirements the Nathan Airchime incorporates many other basically important features to make it the most acceptable signalling device, both to the public and to all aspects of Diesel locomotive operation. Due to safety considerations in railroad operations, use of the Nathan Airchime is reserved by the company for the railroad industry exclusively.

## Design and Construction Features

The Airchime's outstanding tone quality is characteristic of the several single-tone whistles of the Nathan line, which in the five-tone combination faithfully duplicate the sound of the long-familiar steam whistles. Two- and three-tone combinations are also distinctive and effective warning signals.

TONE is produced by a multi-layered, thin-ply metallic diaphragm and heavy-duty clapper disc. The thin plies permit maximum flexibility and leave the pounding, air-valving job to the clapper disc, which, properly supported, eliminates metallic buzz in the note.



PITCH is controlled by the bell length, the interior shape of the bell holding the note true to the design tonal character.

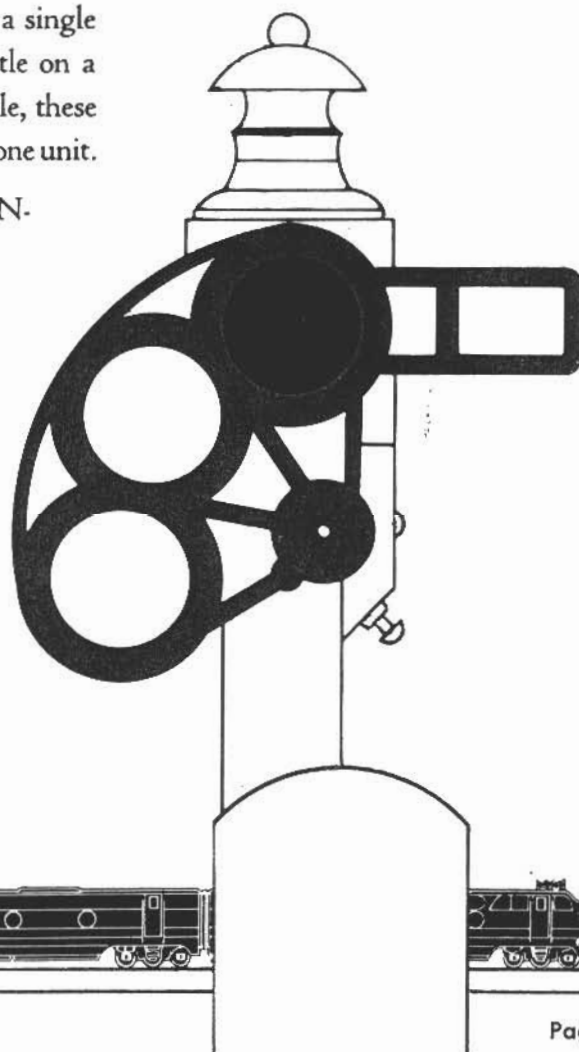
LOUDNESS-MODULATION range is flexible as all model Airchimes can be blown at pressures of 20 to over 100 psi. For maximum loudness the whistles are built to handle more than the maximum available air pressure, producing a tone which penetrates for miles. For terminal and urban use, operation at low pressure reduces volume to that of an automobile horn, yet holds a true tone. The bell shape permits blanketing the area with sound for warning in all directions.

CHIME EFFECT is desirable because of the fact that a very loud note at a distance is inaudible if the same note is sounded softly close by. For example, a warning note in the same low sound range as a truck engine will never be heard by a truck driver. For better warning, the multi-tones of an Airchime contrast distinctly with the growl, whine, or hum of a truck or car.

VERSATILE AND STANDARDIZED ASSEMBLIES permit combinations best suited to railroad operations. All the bells of a combination can be directed forward for grade-crossing warning, or some bells may be pointed to the rear for equal loudness in both directions. One Nathan Airchime does the work of two ordinary units—warning and signalling—and is operated by a single control. All whistle parts are standardized, a two-tone whistle on a three-tone base having the same parts as the three-tone whistle, these bells and diaphragm heads again being duplicated in the five-tone unit.

SMALL SIZE, LIGHT WEIGHT, RUGGED CONSTRUCTION mean longer service life. Almost all parts are aluminum for light weight and are simple in shape for maximum strength. They need not be braced or supported and can hold their own in the roughest service!

SIMPLE MAINTENANCE is possible because *both* wearing parts (there are *only* two) can be quickly and easily replaced with simple tools. Testing requires only an air valve and a pressure gauge.

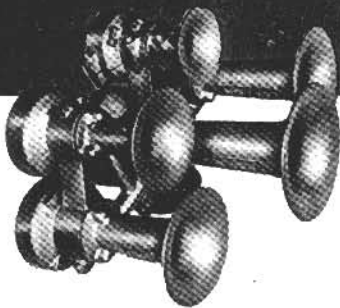
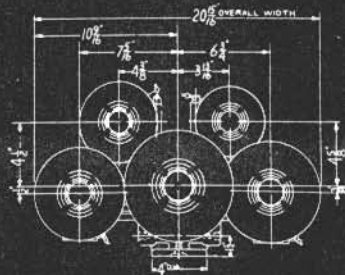
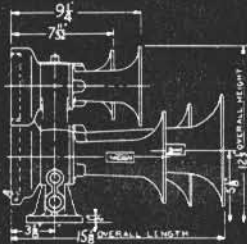


# Application Data

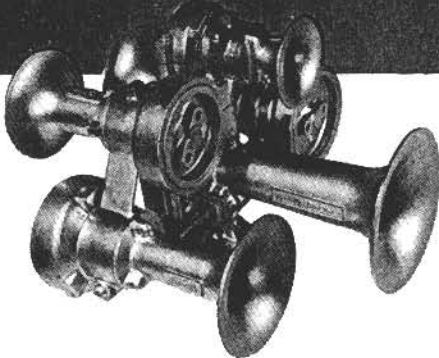
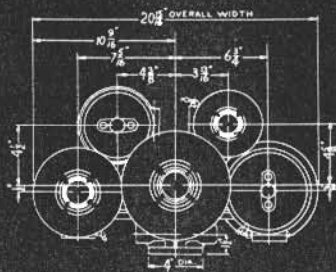
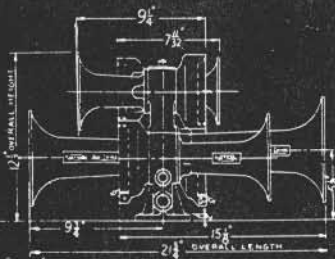
There is a Nathan Airchime for every need. The greatest degree of flexibility has been achieved through the use of three bases: a five-chime, a three-chime, and a single-chime base. On the five- and three-chime bases, fewer than the full complement of bells may be used by installation of blanking covers over those whistle mounts not used. This exclusive design feature allows selection of an Airchime providing minimum requirements for a particular type of service, to which additional bells may be later added as dictated by changed service needs.

Variation in road needs and the requirements of different geographical areas make impractical the setting up of rigid model recommendations. The following, however, are types of locomotive service in which the Airchime models listed have been successfully applied:

PASSENGER	FREIGHT	ROAD SWITCH	YARD SWITCH
M5	M5-124	M3	M3-1R2
M5R24	M5-24R1	M3R1	M3-1
	M3	M3-12	MS1
	M3R1	M3-1R2	

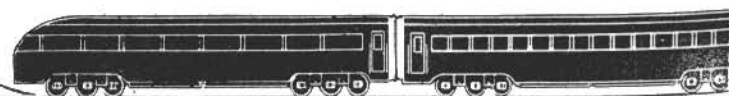


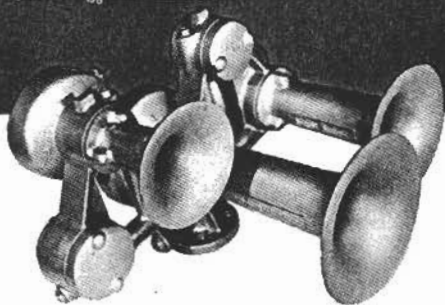
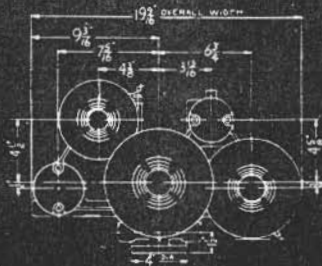
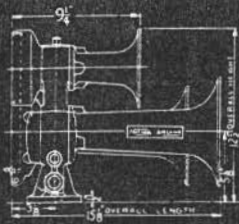
**M5** A perfectly tuned combination of five separate tones acoustically balanced to sound a penetrating musical (A-major, 7th chord) warning signal which provides maximum road safety, is entirely pleasant and truly distinctive. Excellent sound dispersion in all directions with volume capable of modulation for terminal and urban use. The M5 operates at pressures of 20 to over 100 psi (as do all Nathan Airchimes) and weighs 35 pounds.



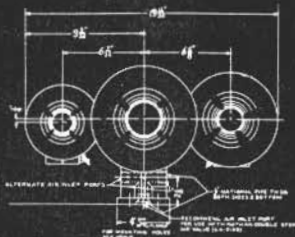
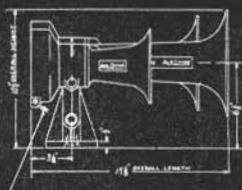
**M5R24** This is the same grouping of five Airchimes as in Model M5, except that bells 2 and 4 have been reversed on the base for greater warning coverage to the rear. The tone combinations used achieve a pleasing and highly effective signal of great penetration in both directions. Weighs 35 pounds.

BELL NUMBER	PITCH	FREQUENCY
1	C#	277.18
2	E	329.6
3	G	391.9
4	A	440.0
5	C#	554.3

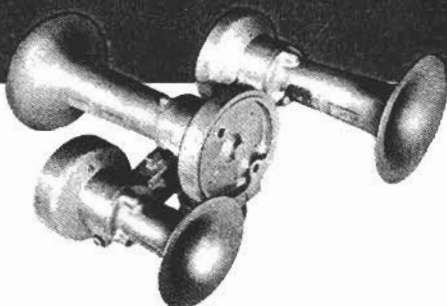
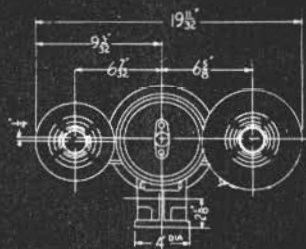
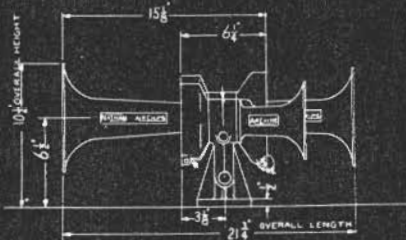




**M5-124** The 5-chime base used in the Model M5-124 Nathan Airchime comes fitted with three powerful bell units (1, 2, and 4) base openings 3 and 5 being sealed off with blanking covers. Bells 3 and 5 may be easily added at any time service requirements warrant by removing the covers and replacing with the proper bells. The M5-124 ensures ample warning for standard passenger and fast-freight road use, though volume and fullness of tone do not equal that of the 5-chime complement. Weight 28 pounds.



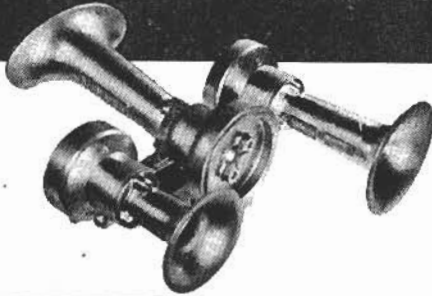
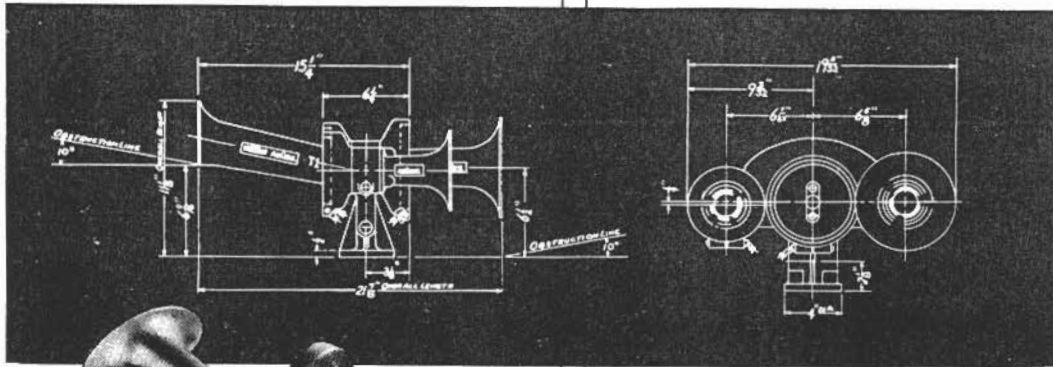
**M3** A smaller unit than the M5, but a fully efficient warning signal which produces a balanced tone of the three combined bells, of sufficient range and volume for general freight or switcher service. Somewhat less euphonious in sound than the M5, but more than adequate for its purposes. No more than the original three bells may be mounted on this base. Weighs 28 pounds. Uses bells 1, 2, and 4.



**M3R1** This is the same assembly as the M3, but with bell 1 reversed for more signal range to the rear. General tone and range are entirely satisfactory for the type of service for which the unit is intended, and will ensure an extra safety factor for freight and switcher operations. Weight is 28 pounds. Uses bells 1, 2, and 4.

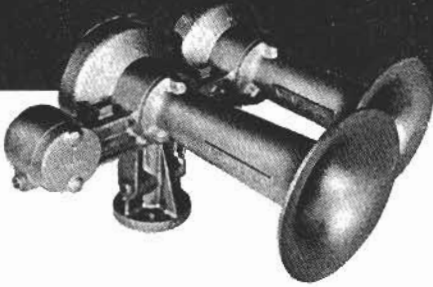
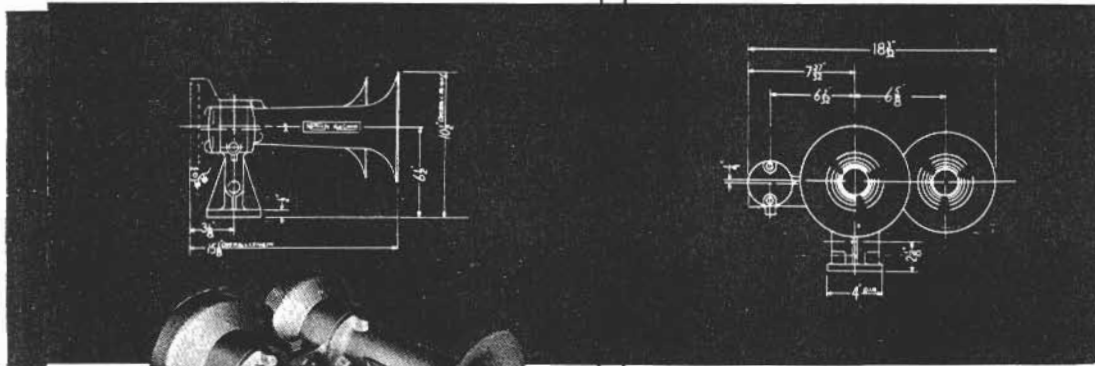




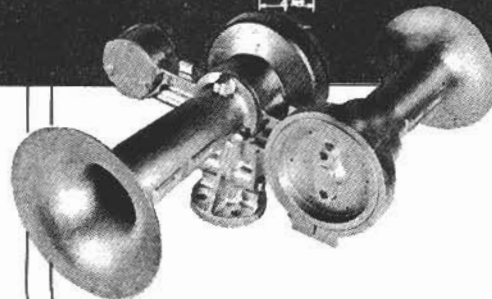
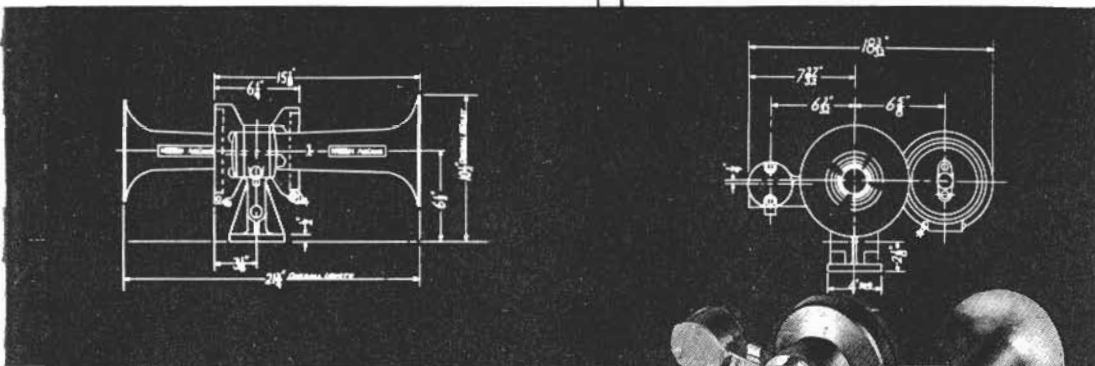


### M3RT1

A three chime whistle, with two bell forward and the number one bell reversed and tilted slightly upward to clear any locomotive obstruction. This whistle is equivalent to the M3R1 in all respects of tone and sound intensity.

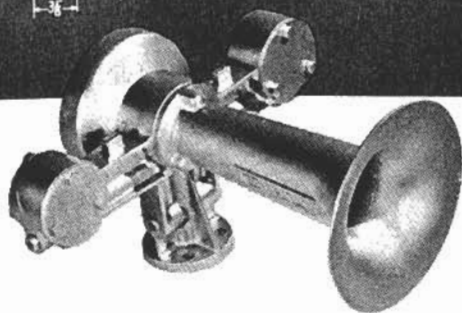
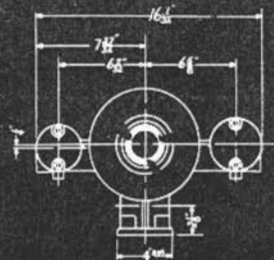
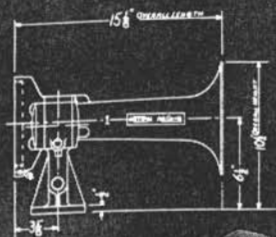


**M3-12** Bells 1 and 2 are mounted on a 3-chime base for maximum performance in limited service with a minimum initial investment. The tone value of the unit may be improved whenever desired by the addition of the 4 bell to replace the blanking cover furnished. Weighs 22 pounds.

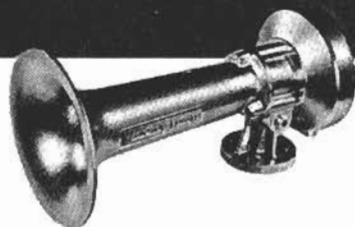
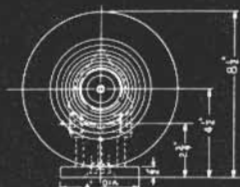
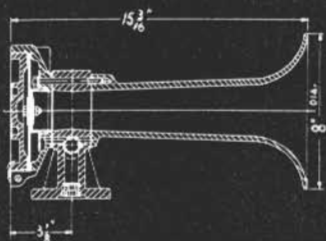


**M3-1R2** Reversal of the 2 bell in this model gives a greater sound range to the rear while still retaining adequate warning in the forward direction for general switcher usage. Bell 4 can be added whenever future needs require. Weight 22 pounds.

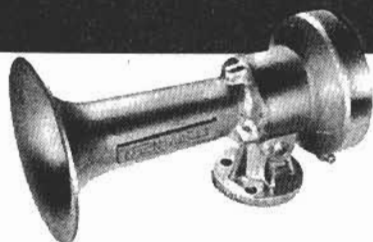
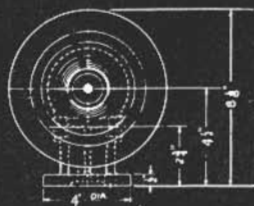
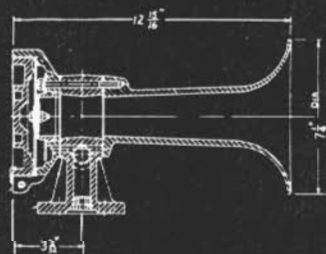




**M3-1** This Airchime furnishes adequate warning signal for general switcher service, while offering maximum adaptability in its 3-bell base, to which desired bells may be added as needed. Weight 16 pounds.

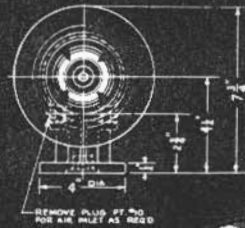
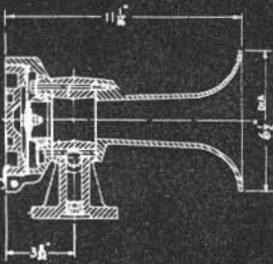


**MS1** The single-bell model which provides a clear and penetrating tone of adequate volume for switch service. Weight is 11 pounds.



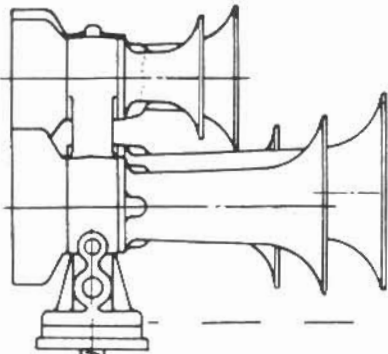
**MS2** A single tone model, with a bell slightly smaller than the MS1 and with a higher pitch. Provides a strong, penetrating signal; especially suitable for yard switcher application.



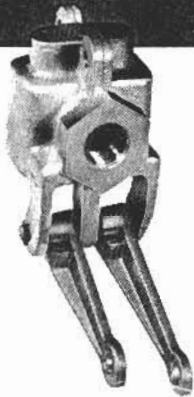
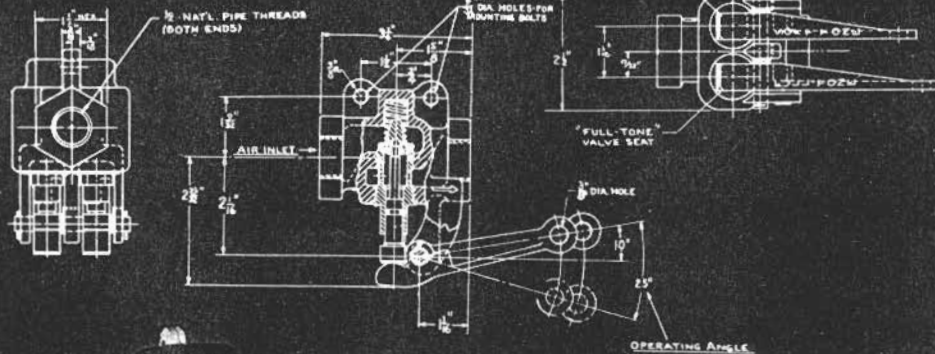


### MS3

Also a single tone model, with a bell smaller again than the MS1 and MS2 and of higher pitch than either one. Designed for yard switcher service.



**DOUBLE STEM AIR VALVE**



**FULL TONE**

**SOFT TONE**

### THE DOUBLE STEM AIR VALVE

A combination air valve in which the full tone lever provides a signal of maximum loudness for rural use, and a soft tone lever for modulating the signal for terminal and urban communities.





# Operation

The tones of all Nathan Airchimes are produced in the same manner and from parts which are identical except for variation in size necessary to create tone differential. Parts of the structure are identified in the diagram below.

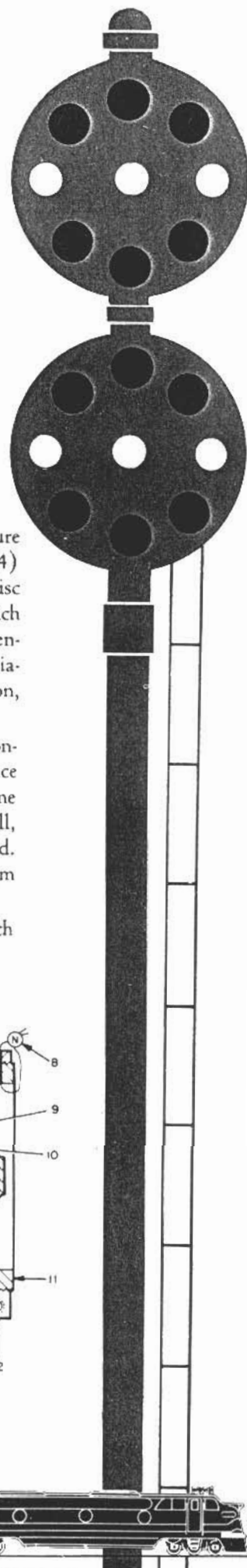
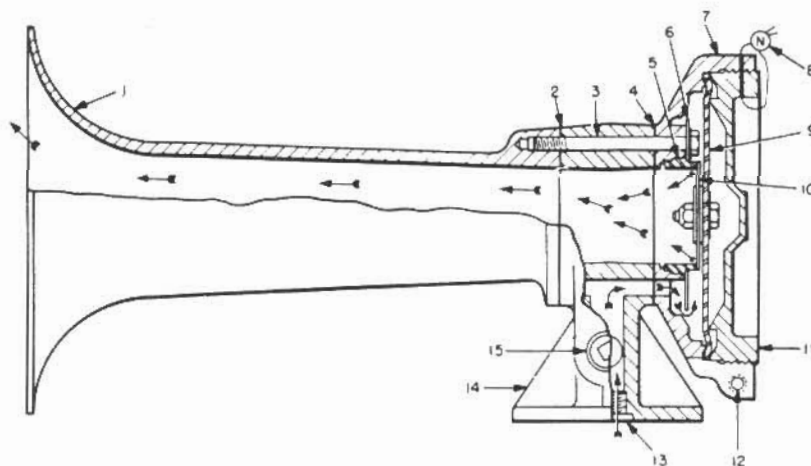
Major parts of the assembly are the bell (1), base (14), diaphragm head unit, and the diaphragm assembly (9). The base, a manifold for bell and diaphragm head assemblies, also provides a mounting flange for the unit.

Opposite faces of the base hold the bell and diaphragm head assembly by three bolts (3) which also secure the diffuser ring, this in turn securing the circular seat recessed in the diaphragm head. Gaskets (2) (4) prevent air leakage. The diaphragm head assembly (phosphor bronze diaphragm discs (9), clapper disc (10), and spacers, bolted together as a unit) is held in the diaphragm by the adjusting cap (11), which screws into the diaphragm head, tightening the diaphragm against a circular land in the head and tensioning the discs sufficiently to bring the clapper disc down against the clapper seat (5). After proper diaphragm tension has been obtained, the clamp screw (12) is tightened to lock the adjusting cap in position, drilling and lockwiring preventing change in adjustment.

The air inlet port in the bottom of the base (13), or either of the alternate ports (15) provide air connections. Opening of the valve in the air supply line admits air to the forward chamber between the face of the base and the diaphragm assembly (see arrows). Pressure builds up here until sufficient to overcome diaphragm tension and push clapper disc (10) away from seat (5), allowing air to escape through the bell, and lowering chamber pressure until the clapper disc closes against the seat, at which time the cycle is repeated. Design of the diaphragm causes this cycle to occur at the natural vibration frequency of the diaphragm and bell producing a tone of the desired pitch.

In this manner the Nathan Airchime, when used in multiple mountings, produces a musical chord which acoustically simulates the sound of the steam chime whistle.

- 1—Bell
- 2—Gasket
- 3—Bolt
- 4—Gasket
- 5—Clapper Seat
- 6—Diffuser Ring
- 7—Diaphragm Head
- 8—Seal
- 9—Diaphragm
- 10—Clapper Disc
- 11—Adjusting Cap
- 12—Clamp Screw
- 13—Air Inlet Port
- 14—Base
- 15—Alternate Air Inlet Port





## Installation

**WHISTLE MOUNTING** The Nathan Airchime is easily installed on existing mounting pads, a thick, oil-resistant rubber gasket first being inserted between whistle and pad. For maximum volume, the air supply line should be  $1/2''$  I.P. minimum, and free from restricting elbows and fittings.

**AIR SUPPLY CHOKES** An air-choke (socket-head plug, center-drilled to restrict air flow) is supplied threaded into the bottom air inlet of each whistle base. Louder tone may be produced by removing the choke or by drilling hole larger; softer tone by replacing choke furnished with a plug with a smaller aperture.

**MODULATION** The Nathan double-stem whistle valve provides in one unit the means for modulating whistle tone at will. Operation of the "soft tone" valve lever checks the air supplied to the Airchime, while the "loud tone" lever allows full signal intensity by admitting air direct from the line without valving restriction. Convenience of access to air line determines valve location.

We have tried to foresee and answer your questions regarding the Nathan Airchime in this brochure, by providing basic specifications and general information.

Your inquiry regarding specific applications or any further questions are cordially invited.

**NATHAN MANUFACTURING COMPANY**  
416 East 106th Street, New York 29, N. Y.

