DAYTON AUDIO – PA460-8 18” Pro Woofer

Product Specifications

- Nominal Diameter 18"
- Power Handling (RMS) 500 Watts
- Power Handling (max) 1000 Watts
- Impedance 8 ohms
- Frequency Response 26 to 2,000 Hz
- Sensitivity 97.8 dB 2.83V/1m
- Voice Coil Diameter 3"
- Magnet Weight 80 oz.

Thiele-Small Parameters

- Resonant Frequency (Fs) 28.3 Hz
- DC Resistance (Re) 5.6 ohms
- Voice Coil Inductance (Le) 3.9 mH
- Mechanical Q (Qms) 11.2
- Electromagnetic Q (Qes) 0.34
- Total Q (Qts) 0.33
- Compliance Equivalent Volume (Vas) 14.19 ft.^{3}
- Mechanical Compliance of Suspension (Cms) 0.19 mm/N
- BL Product (BL) 22.3 Tm
- Diaphragm Mass Inc. Air-load (Mms) 171g
- Maximum Linear Excursion (Xmax) 6 mm
- **Surface Area of Cone (Sd)** **1241.1 cm² (1.336 sq. ft.)** (192.384 sq. in. [divide by width])
- PORT(“TUBE”) MEASUREMENTS 9.618” X 20” = **192.36 sq. in.**
- Speaker Diameter = 15.685”
- Radius= 7.825”

Materials of Construction

- Cone Material Carbon Fiber Impregnated Paper
- Surround Material Cloth
- Voice Coil Wire Material Copper
- Voice Coil Former Kapton® / Polyimide
- Basket / Frame Material Steel
- Magnet Material Ferrite

Mounting Information

- Overall Outside Diameter 18.11"
- Baffle Cutout Diameter 16.73"
- Depth 7.8"
- # Mounting Holes 8

Optimum Cabinet Size (determined using BassBox 6 Pro High-Fidelity suggestion)

- Sealed Volume 2.73 ft.^{3}
- Sealed F3 72 Hz
- Vented Volume 5.68 ft.^{3}
- Vented F3 47 Hz

Dayton Audio PA460-8 18" Pro Woofer

- Brand Dayton Audio
- Model PA460-8
- Part Number 295-036
- UPC 844632084256
- Product Category Pro Woofers, Subwoofers & Midrange Speakers
- Unit of Measure EA
- Weight 24.5 lbs.

LINE LENGTH 9.89399' 7.933'

CONE DIAMETER = 15.610"

CONE RADIUS = 7.805"

LINE AREA = 1.336 sq. ft. *(smallest area of any part of "tube")(L X W)

FULL WAVE = 39.576'

¼ WAVE = 9.894'

y = 2.545

22.25" x 20" x 57.135" (INSIDE MEASUREMENTS)

24.25" x 22" x 59.135" (OUTSIDE MEASUREMENTS)

SPEED OF SOUND = 1120

$12^3 = 1728$

32,406.4^3 inches (volume of entire box)

CLASSIC T-LINE DESIGN

1. The line area should equal or exceed slightly the cone area of the driver used.

   1.336 sq.ft. (Line Area)

2. The line length should be 1/4 wavelength tuned to the resonant frequency of the chosen speaker **IN THE BOX VOLUME CREATED BY THE TOTAL T-LINE CROSS SECTIONAL AREA TIMES LENGTH**, and as if the box were a closed box.

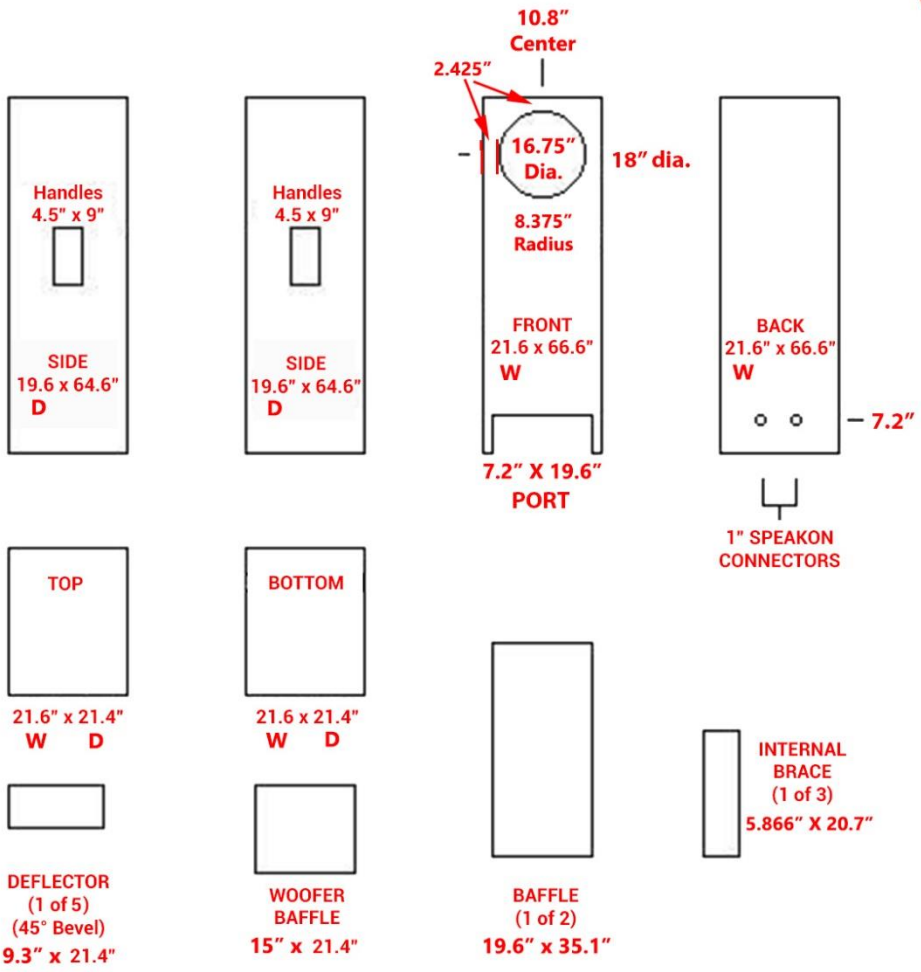
22" X 29.392" X 66.6" ***BOX OUTSIDE DIMENSIONS***

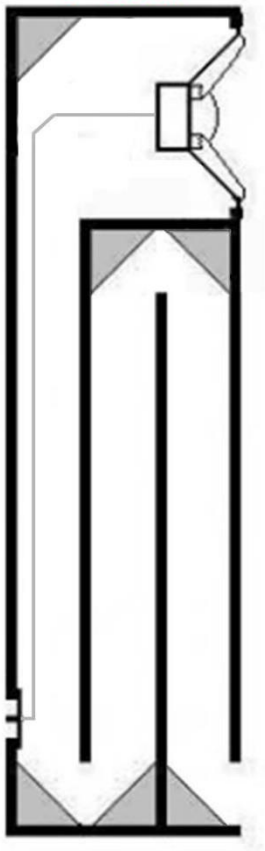
20" X 27.392" X 64.6" = **35,390.464^2 inches** *or* **20.48^3 feet** (TOTAL BOX VOLUME)

VLR-17PRO

Multiplied by 1.2

1" MDF





VLR-17PRO 18"

- system response: 16 Hz – 2,000 Hz
- power handling: 500 watts RMS
- maximum output: 97.8 dB @ 1 meter
- Woofer: 18", 8 ohm
- Vas 14.19 cu. ft.
- Qts 0.33
- Fs 28.3 Hz
- dB/W/meter 97.8 2.83V/1m
- enclosure tuning: 22 Hz
- enclosure dimensions: 21.6" W x 23.4" D x 66.6" H
- port dimensions: 7.8" x 16.73"
- line length: 10.8 ft.
- Cone Diameter 15.6"

Line Length 9.894' (1/4 wave Length)

191.134sq. in. - Full Wave - Minimum Tube Volume

71.766" Line Length (5.98')

Surface Area of Cone (Sd): 1.38k cm2 ???

PARAMETERS	
Impedance	8 ohms
Re	5.6 ohms
Le	3.9 mH
Fs	28.3 Hz
Qms	11.2
Qes	0.34
Qts	0.33
Mms	171g
Cms	0.19 mm/N
Sd	1,241.1 cm²
Vd	746.5 cm³
BL	22.3 Tm
Vas	402 liters
Xmax	6.0 mm
VC Diameter	76 mm
SPL	97.8 dB @ 2.83V/1m
RMS Power Handling	500 watts
Usable Frequency Range (Hz)	26 - 2,000 Hz

1

$$y = \frac{280}{\frac{x}{12}}$$

(Frequency)

Box of given amount of inches (turned into sq. ft.) (x = line length of your box in inches)

Y represents what a ¼ Wave of a given amount of frequency

2

$$y = \frac{283\sqrt{1 + \left(\frac{14.19 \cdot 1728}{\frac{19113\,x}{100} + (400)}\right)}}{10}$$

Formula that defines a speaker's free air resonance inside a sealed box of a given volume.

1: (1728=12X12x12)(cu/ft.)

2: $y=Fs((Vas/Vol)+1)^2$

Y= speaker's free air resonance inside a sealed box of a given volume

Fs= Free Air Resonance = 28.3 Hz

Vas= Compliance Equivalent Volume (T/S Parameters) = 14.19 cu ft

Vol= Volume of your box = ? + 400 inches to allow room for speaker in top of box. (???)

DRIVER RADIATING AREA: S_d (in^2) 56.265

THIELE-SMALL PARAMETERS

Voice Coil DC Resistance:	R_{EVC} (ohms)	1.80
Voice Coil Inductance @ 1kHz:	L_{EVC} (mH)	1.07
Driver Radiating Area:	S_D (in^2)	56.265
	S_D (m^2)	363.00
Motor Force Factor:	Bl (Tm)	10.80
Compliance Volume:	V_{AS} (ft^3)	1.19
	V_{AS} (liters)	33.68
Suspension Compliance:	C_{MS} (µm/N)	179.00
Moving Mass, Air Load:	M_{MS} (grams)	153.00
Moving Mass, Diaphragm:	M_{MD} (grams)	149.00
Free-Air Resonance:	F_S (Hz)	30.40
Mechanical Q:	Q_{MS}	7.98
Electrical Q:	Q_{ES}	0.45
Total Q:	Q_{TS}	0.43
Magnetic-Gap Height:	H_{AG} (in)	.0.314
	H_{AG} (mm)	8.00
Voice Coil Height:	H_{VC} (in)	1.34
	H_{VC} (mm)	34
Maximum Excursion:	X_{MAX} (in)	0.512
	X_{MAX} (mm)	13.00

VLR Pro Systems

VLR-10PRO 15" 2-way high output system

system response: ~ 20 Hz - 20 kHz

power handling: 400 watts RMS

crossover: 1200 Hz, 18 dB/octave

woofer: 15" pro woofer, 8 ohm

Vas ~ 16 cu. ft.

Qts ~ .3

Fs ~ 28 Hz

dB/W/meter ~ 98

tweeter: 6.5" x 9.5" CD horn, 8 ohm

DB/W/meter 106 (requires 8 dB pad for matching woofer

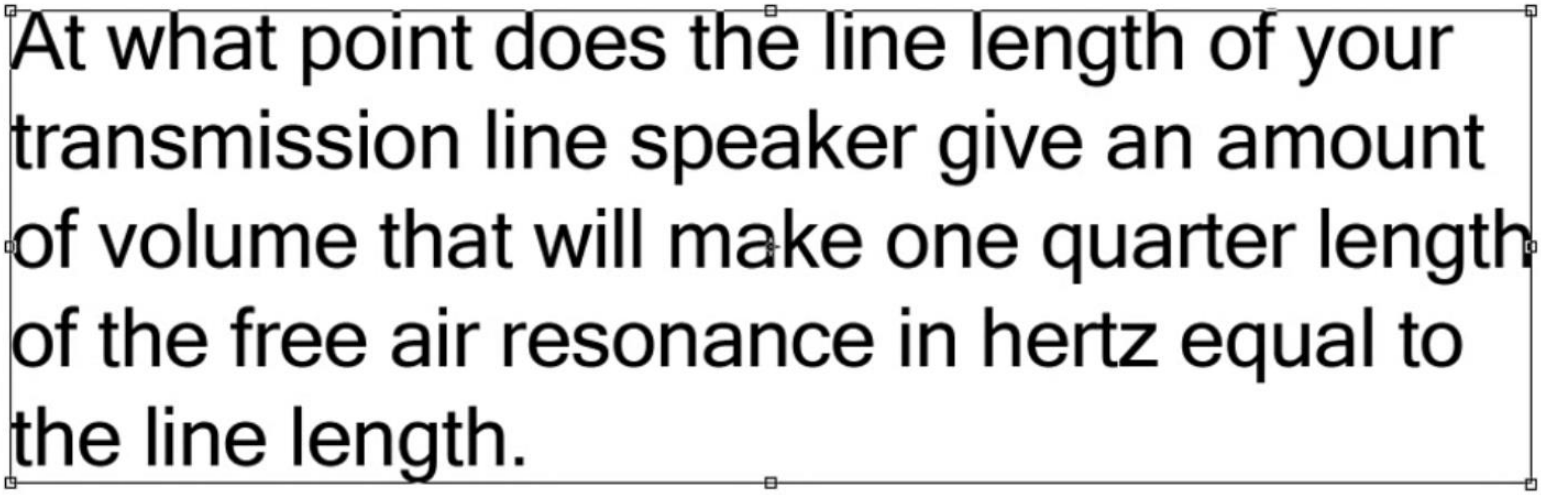
Sensitivity and increased power handling)

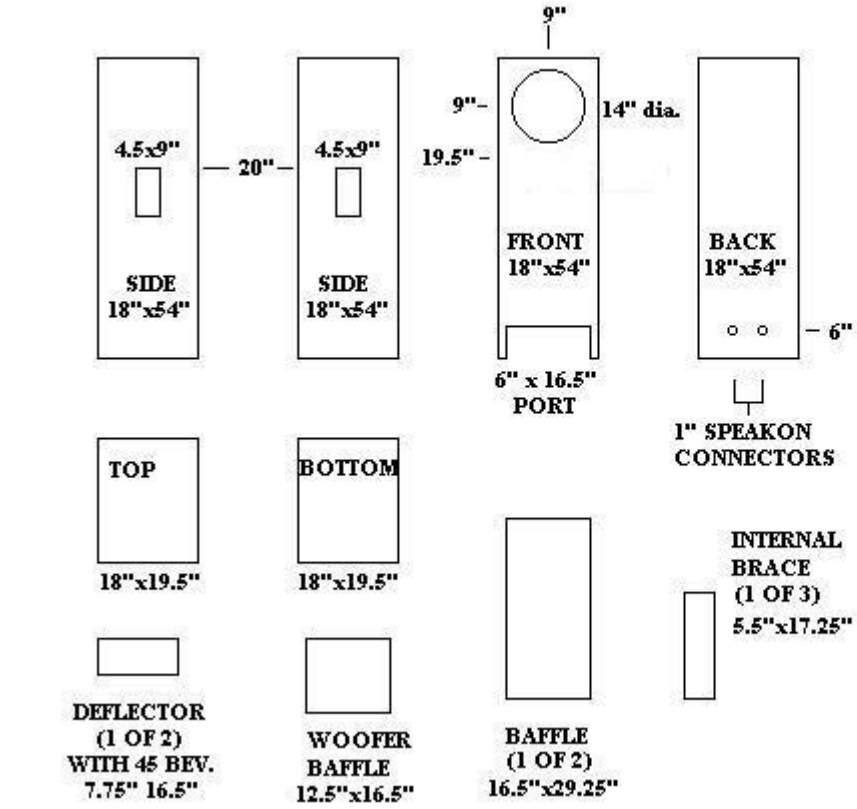
enclosure tuning: ~ 22 Hz

enclosure dimensions: 18" W x 19.5" D x 55.5" H

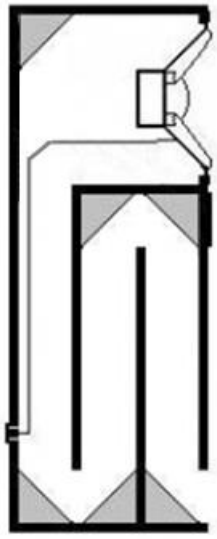
port dimensions: 6" x 16.5"

line length: 9 ft.





VLR-10PRO Parts



TL design for deepest bass at high efficiency, high output pro audio (98 dB/W/m). A 15" woofer version using a 9 ft. line length has an Fb of 22 Hz!

There is a chamber behind the woofer which I stuff with polyester fiberfill. This chamber also contains the crossover network.

For proper line damping all that is required is to place 20 oz. of Polyfill in the chamber behind the woofer. Stuffing the line will lower the efficiency and reduce LF output.

This high output VLR-10PRO TL uses a 15" pro woofer and horn tweeter and produces bass to 20 Hz. That's a full octave below low E on a 4-string bass guitar! They use a line length of 9 feet.

Richard Weisenberger. Owen Jones wanted a high output subwoofer to fully produce the Low C pedal of a 32' foundational organ stop. My recommended 15" pro woofer can fully handle the Low E so his modification called for an 18" woofer with a higher Vas of around 17 cubic feet and lower Fs of around 25 Hz. The Qts would still be about the same. To get the dimensions of the cabinet right you will multiply the dimensions of the VLR-10Pro or VLR-13.5 ProS, whichever you choose, by a factor of 18/15 or 1.2. The cabinet volume will be increased by the cube of 1.2 or 1.728. The 18" version of the VLR-10 Pro would be transformed to a VLR-17Pro and the VLR-13.5ProS to a VLR-23ProS. The line length would be increased from 9 feet to 10.8 feet, lowering the enclosure tuning from 22 Hz to 18 Hz giving the enclosure an F3 of 16 Hz. You can ask Owen how his modified cabinet performs.

Richard Weisenberger Steven Scott The enclosure you drew will work fine. I didn't use the complicated math that you are showing to design it. I went totally by what I learned from my research in Flue Pipe Acoustics and applied it to TL design. I simply made the line's cross-sectional area and port area approximately 80% of the cone area. As far as stuffing goes I put all of it in the chamber behind the woofer as stuffing the line reduces efficiency. I use readily available polyfill and stuff that relatively small space with approximately 1 pound of polyfill per cubic foot of that small space before mounting the woofer. In your case 5 pounds of polyfill should do. That prevents higher frequencies from entering the line, which in the case of a subwoofer will be negligible. I figure my line length in the line past the woofer chamber. The woofer chamber itself is not included in my line length. I simply add the distances between the parallel surfaces of the line, which does not include the deflectors.

Owen Jones

He is using Sketchup, great CAD software, I have been using for years; designing consoles and speaker boxes. I discussed this with Richard and I draw up the plans for one of his TLs and I rescaled it to take the 18" sub. As I said before I was limited by budget issues, so I couldn't go on a spending spree. My efforts were well worth it, and Richard said it would do the job and it does. I have the levels down a bit; those low frequencies if to loud can damage one's hearing. As a friend said to me once one can go down many dry creeks in this hobby and don't I know it. I have the Microsoft Mathematics software; I watched the video and got a migraine, hahaha

The Mellow Monsters I built back in 1965, are folded horns and I fitted them with high power 8" woofers and the bass for normal music was astounding. I am not using them ATM, they are having a rest. They were used for dance parties and in a disco in Sydney many years ago.

1540

In the future, **H x W x D /1728**, that´s the displacement of the bracing...

.458 + .458 + .191

THIELE-SMALL PARAMETERS

VOICE COIL DC RESISTANCE:	R_{EVC} (OHMS) 1.80
VOICE COIL INDUCTANCE @ 1KHZ:	L_{EVC} (MH) 1.07
DRIVER RADIATING AREA:	S_D (IN^2) 56.265

CONE SURFACE AREA

MOTOR FORCE FACTOR:	BL (TM) 10.80
COMPLIANCE VOLUME:	V_{AS} (FT^3) 1.19
	V_{AS} (LITERS) 33.68
SUSPENSION COMPLIANCE:	C_{MS} (µM/N) 179.00
MOVING MASS, AIR LOAD:	M_{MS} (GRAMS) 153.00
MOVING MASS, DIAPHRAGM:	M_{MD} (GRAMS) . . . 149.00
FREE-AIR RESONANCE:	F_S (HZ) 30.40
MECHANICAL Q:	Q_{MS} 7.98
ELECTRICAL Q:	Q_{ES} 0.45
TOTAL Q:	Q_{TS} 0.43
MAGNETIC-GAP HEIGHT:	H_{AG} (IN) 0.314
	H_{AG} (MM) 8.00
VOICE COIL HEIGHT:	H_{VC} (IN) 1.34
	H_{VC} (MM) 34
MAXIMUM EXCURSION:	X_{MAX} (IN) 0.512
	X_{MAX} (MM) 13.00