E2S: Horn & Beacon Coverage (In Brief)

E2S warning signals

Brief Overview - Horn & Beacon Coverage

Guide to audible signals – reduction in volume over distance

Distance (Feet)	Distance (Metres)	Reduction dB(A)
10	3.05	0
20	6.10	6
40	12.19	12
80	24.38	18
160	48.77	24
320	97.54	30
640	195.07	36
1280	390.14	42
2560	780.29	48
5120	1560.58	54
10240	3121.15	60

- Every time the distance double from a sound source subtract 6dB(A) – Inverse Square Law
- Rule of thumb: alarm sound should be at least 5dB(A) above the ambient
- Double the power = increase of 3dB(A)

e2s warning signals

Brief Overview - Horn & Beacon Coverage

Guide to audible signals – effective distance

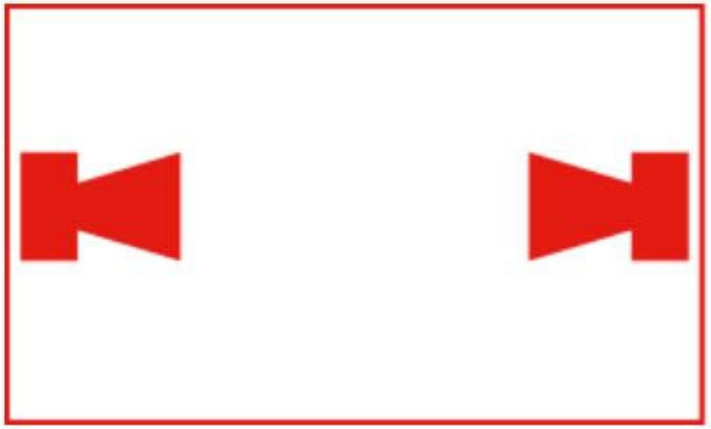
Distance (Feet)	Distance (Metres)	Reduction dB(A)		A121 (112 dBA at 10' @ 1000 Hz)	A100 (92dBA at 10' @ 1000 Hz)	
10	3.05	0		112	90	
20	6.10	6		106	84	
40	12.19	12		100	78	
80	24.38	18		94	72	
160	48.77	24		88	66	
320	97.54	30		82	60	
640	195.07	36		76		
1280	390.14	42		**70**		
2560	780.29	48		64		
5120	1560.58	54				
10240	3121.15	60	A100: 70 db distance = 103'			

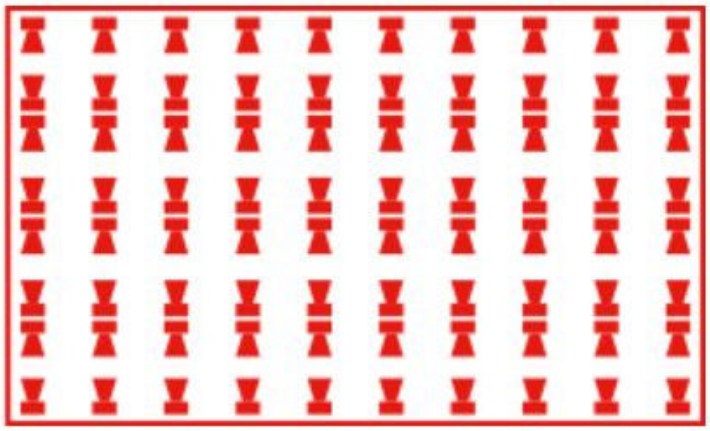
- A121 has approximately 10 times effective distance than A100 & therefore 10 x the radius of coverage
  - A121 – 643,398 square feet
  - A100 – 4166 square feet
- 70dB(A) Effective
- 60dB(A) Audible
- Rule of thumb: alarm sound should be at least 5dB(A) above the ambient

e2s warning signals

Brief Overview - Horn & Beacon Coverage

Guide to audible signals – coverage relative to ambient and horn sound levels





- Area 100’ x 170’
- To achieve 90 dB(A) alarm level
  - Fit 2 x A121 @ 112 dB(A) at 10’ (1000Hz)
    or,
  - Fit 80 x A100 @ 91 dB(A) at 10’ (1000Hz)
- To achieve 70dB(A) level
  - Fit 2 x A100 @ 91 dB(A) at 10’ (1000Hz)

A100

A121

e2S warning signals

Brief Overview - Horn & Beacon Coverage

Visual signals coverage

$$d = \sqrt{\frac{Ieff(av)}{0.4}}$$

- Converts Effective Candela (cd) into effective warning distance. ALERT rather than inform.

  Where *Ieff(av)* = Effective Candela (measured)
  d = Distance (m)

$$d = \sqrt{\frac{Ieff(av)}{(6.37Lb+18.6)10^{-7}}}$$

- Converts effective candela into viewing distance or range

  Where *Ieff(av)* = Effective Candela (measured)
  d = Distance (feet)
  Lb = Foot-Lamberts background illuminance (normal day time conditions, Lb = 2919 ft-L

e2S warning signals

Brief Overview - Horn & Beacon Coverage

Visual signals coverage – effective distance

Effective Candela cd	Warning Distance m	Warning Distance feet		Vewing Distance m	Vewing Distance feet
5	3.54	11.61		16	52
10	5.00	16.40		22	73
25	7.90	25.92		35	116
50	11.18	36.68		50	164
100	15.81	51.87		71	232
200	22.36	73.36		100	328
300	27.39	89.86		122	401
400	31.62	103.74		141	464
500	35.35	115.98		158	518
600	38.72	127.03		173	568
700	41.83	137.24		187	613
800	44.72	146.72		200	656
900	47.43	155.61		212	695
1000	50.00	164.04		223	733
1100	52.44	172.05		234	769

Effective distances, ALERT rather than inform, and viewing distances against measured effective candela (cd) values

Ever diminishing returns!

Ambient light levels increasingly difficult to predict over longer distances.

NEW ENGLAND
ETA PROCESS INSTRUMENTATION
since 1971
www.etapii.com
sales@etapii.com
tel: 978.532.1330

UPSTATE NEW YORK
MARTECH CONTROLS
since 1997
www.martechcontrols.com
sales@martechcontrols.com
tel: 315.876.9120

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