Easy Design™ Guide

What is Easy Design?

1 Select the correct type of speaker for the job *(see chart below)* → **2** Find the number of speakers needed *(see charts on pages 6-8)* → **3** Select the amplifier for the system *(see page 9)*

Armed with just 3 pieces of information, you can quickly create a bill of material for speaker paging jobs. Bogen's Easy Design line of products was created specifically to make the design process easier and less time consuming for the installer.

You supply some basic pieces of information – type of application, dimensions of the area to be covered, ambient noise level, and ceiling height*. Then, a few simple and direct charts will immediately provide you with the best type of speaker to use, the number of speakers needed, and the amplifier size required for the job.

* *Not all dimensions needed for all speaker types. Refer to section 2 for specific dimensions needed for each speaker.*

Each speaker in the Easy Design line is designed with a single power tap and a volume control. Any paging system you create using the Easy Design products will be flexible, robust, and powerful. If noise levels increase in the future, just turn up the volume controls on the speakers – the amplifier will not overload!

You get all the benefits of a 70V central-amplified system – full power capability, high-quality sound and performance, 2-wire installation, long speaker runs, flexibility in amplifier location, no distributed power supplies – and now, super simple system design (we've eliminated the multiple power taps). Easy Design speakers have the high quality and reliability you expect from Bogen.

1 Select Speaker Type

- Determine the **ambient noise level and type of environment** in which the speakers will be installed.
- Then select the **speaker(s) best suited** for the area.

Example:

- The ambient noise level in a machine shop in an industrial area is 90 dB. By referring to the chart, you will find that the HS30EZ horn loudspeaker is best suited for this environment.

For applications with mixed noise levels, such as a location with quiet waiting rooms, medium noise level office areas, and very noisy manufacturing, select an appropriate speaker type for each different area.

Once you have selected the speaker type(s), the next step is to determine how many speakers you will need to cover the area sufficiently.

SPEAKER MODELS →		SM1EZ, CS1EZ, WB1EZ	HS7EZ	HS15EZ, HS30EZ
TYPICAL AMBIENT NOISE LEVEL	TYPICAL ENVIRONMENTS	see chart on pages 6 & 8	see chart on page 7	see chart on page 7
VERY HIGH NOISE **85-95 dB** Speech Almost Impossible To Hear	• Construction Site • Loud Machine Shop • Noisy Manufacturing • Printing Shop			
HIGH NOISE **75-85 dB** Speech Is Difficult To Hear	• Assembly Line • Crowded Transit Waiting Area • Machine/Print Shop • Shipping Warehouse • Supermarket (Peak) • Very Noisy Bar or Restaurant			
MEDIUM NOISE **65-75 dB** Must Raise Voice To Be Heard	• Bank/Public Area • Transit Waiting Area • Department Store • Noisy Office Setting • Supermarket (Normal) • Bar or Restaurant			
LOW NOISE **55-65 dB** Speech Is Easy To Hear	• Conversational Speech • Doctor's Office • Hospital • Hotel Lobby • Quiet Office • Quiet Bar or Restaurant			

*For applications over 100 dB, contact Bogen for assistance.

Easy Design™ Guide (cont.)

2 Determine the Number of Speakers Needed

CS1EZ

SM1EZ

CS1EZ Ceiling Speaker
SM1EZ Surface-Mount Ceiling Speaker

Use this chart to determine the number of CS1EZ Ceiling Speakers and/or SM1EZ Surface-Mount Ceiling Speakers a particular installation will require, based on the dimensions of the area and the ceiling height.

RED for 8' Ceiling
BLUE for 10' Ceiling
GREEN for 12' Ceiling

Look Up **LONGER** Dimension Of Area On This Side

Look Up **SHORTER** Dimension Of Area On This Side

	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
20	1	2	3	4	5	6	6	7	8	9	10	10	11	12	13	13	14	15	16
	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10
	1	1	2	2	2	3	3	3	4	4	4	5	5	5	6	6	6	7	7
30	4	5	6	7	8	10	11	12	13	14	15	17	18	19	20	21	22	24	
	2	3	4	5	5	6	7	8	8	9	10	11	11	12	13	14	14	15	
	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	11	
40	6	8	9	11	13	14	16	17	19	20	22	24	25	27	28	30	31		
	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
	3	4	4	5	6	6	7	8	8	9	10	11	11	12	13	13	14		
50	10	12	14	16	18	20	22	24	26	28	29	32	33	35	37	39			
	6	8	9	10	11	13	14	15	16	18	19	20	21	23	24	25			
	4	5	6	7	8	9	10	11	11	12	13	14	15	16	17	17			
60	14	17	19	21	24	26	28	31	33	35	38	40	42	45	47				
	9	11	12	14	15	17	18	20	21	23	24	26	27	29	30				
	6	7	8	9	11	12	13	14	15	16	17	18	19	20	21				
70	19	22	25	27	30	33	36	39	41	44	47	50	52	55					
	12	14	16	18	19	21	23	25	26	28	30	32	33	35					
	9	10	11	12	13	15	16	17	18	20	21	22	23	24					
80	25	28	31	35	38	41	44	47	50	54	56	60	63						
	16	18	20	22	24	26	28	30	32	34	36	38	40						
	11	13	14	15	17	18	20	21	22	24	25	27	28						
90	32	35	39	42	46	49	53	56	60	64	67	70							
	20	23	25	27	29	32	34	36	38	41	43	45							
	14	16	17	19	20	22	24	25	27	28	30	31							
100	39	43	47	51	55	59	62	67	71	74	78								
	25	28	30	33	35	38	40	43	45	47	50								
	17	19	21	23	24	26	28	30	31	33	35								
110	47	52	56	60	65	69	74	78	82	86									
	30	33	36	39	42	44	47	50	52	55									
	21	23	25	27	29	31	33	35	36	38									
120	56	61	66	70	75	80	85	90	94										
	36	39	42	45	48	51	54	57	60										
	25	27	29	31	33	36	38	40	42										
130	66	72	76	82	87	92	97	103											
	42	46	49	52	56	59	62	66											
	30	32	34	36	38	41	43	45											
140	77	82	88	93	99	105	110												
	49	53	56	60	63	67	70												
	34	37	39	41	44	46	49												
150	88	94	100	106	112	118													
	56	60	64	68	72	76													
	39	42	45	47	50	52													
160	100	107	114	120	125														
	64	68	72	76	80														
	45	47	50	53	56														
170	114	120	127	133															
	72	76	81	85															
	50	53	56	59															
180	128	134	142																
	81	88	90																
	56	60	63																
190	142	150																	
	90	96																	
	63	66																	
200	156																		
	100																		
	70																		

Ceiling Speakers (CS1EZ, SM1EZ)

- Obtain the length, width, and ceiling height of the area.
- Look up where the **length** and **width** of the area meet on the chart.
- You will find three color-coded numbers. Use the **red** number for 8 ft. ceilings, **blue** for 10 ft. ceilings, and **green** for 12 ft. ceilings.

  The color-coded number that corresponds to the area's **ceiling height** is the general number of speakers the installation requires.

The **minimum amplifier power** needed (in watts) is equal to the total number of CS1EZ or SM1EZ speakers required in the area for uniform coverage.

Amplifier Power (min.) = Number of CS1EZ or SM1EZ Speakers

Example:

An office area, using CS1EZ Ceiling Speakers (or SM1EZ Surface-Mount Ceiling Speakers), is 100 feet long by 70 feet wide by 10 feet high. Crisscross the length (100 feet) and width (70 feet) on the chart. You will find three color-coded numbers: 27, 18, and 12. Since blue numbers are used for ceiling heights of 10 feet, 18 is the recommended quantity of CS1EZ speakers needed for this application. This number – 18 – is also the minimum amplifier power needed (in watts) for this area.

27
18

NOW, TURN TO PAGE 9 TO SELECT AMPLIFIER.

Easy Design™ Guide (cont.)

Horn Loudspeakers (HS7EZ, HS15EZ, HS30EZ)

- Obtain the **square footage** of the area to be covered and its ambient noise level.
- Where the area's square footage intersects the area's **ambient noise level**, you will find two numbers.

The number in **blue** is the typical **number of horn loudspeakers** the installation requires. Additional speakers may be needed in areas that have obstructions, like shelving, that block sound dispersion.

The number in **red** is the **minimum amplifier power** needed (in watts) for the installation.

Amplifier Power (min.) = Number in Red

Example:

A factory has 35,000 square feet of open area and an average ambient noise level of 80 dB. Thus, it will require HS15EZ Horn Loudspeakers. Using the chart for the HS15EZ speaker, crisscross the square footage and the ambient noise level. The number of horn loudspeakers needed with an installation is shown in blue and the minimum amplifier power for this number of speakers is shown in red. As you can see, 6 speakers are needed for this application and the minimum amplifier power needed is 90 watts.

HS7EZ Horn Loudspeaker

Use this chart to determine the number of HS7EZ Horn Loudspeakers a particular installation will require, based on the size of the area and the ambient noise level of the environment.

HORN QTY. & MIN. POWER (WATTS) BASED ON AMBIENT NOISE		SIZE OF AREA TO BE COVERED (THOUSANDS OF SQUARE FEET)																			
		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
55–65 dB Low Noise – speech is easy	HORNS	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10
	POWER	8	8	15	15	23	23	30	30	38	38	45	45	53	53	60	60	68	68	75	75
65–75 dB Medium Noise – must raise voice to be heard	HORNS	1	2	3	4	5	5	6	7	8	9	10	10	11	12	13	14	15	15	16	17
	POWER	8	15	23	30	38	38	45	53	60	68	75	75	83	90	98	105	113	113	120	128

The # in **blue** is the # of speakers.

The # in red is the minimum amplifier power required.

NOW, TURN TO PAGE 9 TO SELECT AMPLIFIER.

HS15EZ Horn Loudspeaker

Use this chart to determine the number of HS15EZ Horn Loudspeakers a particular installation will require, based on the size of the area and the ambient noise level of the environment.

HORN QTY. & MIN. POWER (WATTS) BASED ON AMBIENT NOISE		SIZE OF AREA TO BE COVERED (THOUSANDS OF SQUARE FEET)																			
		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
75–85 dB High Noise – speech is difficult	HORNS	1	2	3	4	5	5	6	7	8	9	10	10	11	12	13	14	15	15	16	17
	POWER	15	30	45	60	75	75	90	105	120	135	150	150	165	180	195	210	225	225	240	255
85–95 dB Very High Noise – speech almost impossible	HORNS	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
	POWER	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	480	510	540	570	600

The # in **blue** is the # of speakers.

The # in red is the minimum amplifier power required.

NOW, TURN TO PAGE 9 TO SELECT AMPLIFIER.

HS30EZ Horn Loudspeaker

Use this chart to determine the number of HS30EZ Horn Loudspeakers a particular installation will require, based on the size of the area and the ambient noise level of the environment.

For Applications over 100 dB, Contact Bogen for Assistance.

HORN QTY. & MIN. POWER (WATTS) BASED ON AMBIENT NOISE		SIZE OF AREA TO BE COVERED (THOUSANDS OF SQUARE FEET)																			
		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
85–95 dB Very High Noise – speech almost impossible	HORNS	1	2	3	4	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22
	POWER	30	60	90	120	180	210	240	270	300	330	360	390	420	480	510	540	570	600	630	660

The # in **blue** is the # of speakers.

The # in red is the minimum amplifier power required.

NOW, TURN TO PAGE 9 TO SELECT AMPLIFIER.

Easy Design™ Guide (cont.)

2 Determine the Number of Speakers Needed (cont.)

WB1EZ Wall Baffle Speaker

Use this chart to determine the number of **WB1EZ** speakers a particular installation will require, based on the dimensions of the area.

Look Up SHORTER Dimension Of Area On This Side ↓ / Look Up LONGER Dimension Of Area On This Side →	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
20	1	1	1	2	2	2	3	3	3	4	4	4	5	5	5	6	6	6	6
30	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	
40	3	3	4	5	5	6	7	7	8	9	9	10	11	11	12	13	13		
50	4	5	6	7	8	8	9	10	11	12	12	13	14	15	16	17			
60	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				
70	8	9	11	12	13	14	15	16	18	19	20	21	22	23					
80	11	12	13	15	16	17	19	20	21	23	24	25	27						
90	14	15	16	18	20	21	23	24	26	27	28	30							
100	17	18	20	22	23	25	27	28	30	32	33								
110	20	22	24	26	28	29	31	33	35	37									
120	24	26	28	30	32	34	36	38	40										
130	28	30	33	35	37	39	42	44											
140	33	35	37	40	42	45	47												
150	33	40	43	45	48	50													
160	43	45	48	51	52														
170	48	52	54	56															
180	54	58	60																
190	60	64																	
200	66																		

Wall Baffle Speaker (WB1EZ)

- Obtain the **length** and **width** of the area.
- Where the length and width of the area crisscross on the chart, you will find the typical **number of speakers** the installation requires.

The **minimum amplifier power** needed (in watts) is equal to the total number of WB1EZ speakers required in the area for uniform coverage.

Amplifier Power (min.) = Number of WB1EZ Speakers

Example:

An area's dimensions are 150 ft. long by 110 ft. wide. Crisscross these two dimensions on the chart and you will find that 28 WB1EZ Wall Baffle Speakers are needed for this application. This number – 28 – is also the minimum amplifier power needed (in watts) for this area.

Mixed Speaker Type Applications

For applications with more than one type of speaker:

- Determine the number of speakers and the minimum amplifier power needed for each type of speaker separately.
- Add together the minimum amplifier power needed for each type of speaker to obtain the **minimum amplifier power** needed for the **entire application**.

Example:

An application requires 10 SM1EZ Surface-Mount Ceiling Speakers (minimum amplifier power needed is 10 watts), 5 HS15EZ Horn Loudspeakers (minimum amplifier power needed is 75 watts), and 10 WB1EZ Wall Baffle Speakers (minimum amplifier power needed is 10 watts). Add together the minimum amplifier power needed for each type of speaker: 10 watts + 75 watts + 10 watts. The sum is 95 watts. This is the minimum amplifier power needed (in watts) for the entire application.

NOW, GO TO PAGE 9 TO SELECT AMPLIFIER.

Easy Design™ Guide (cont.)

3 Select an Amplifier

Once you determine the number of speakers and the minimum amplifier power for the installation, you are ready to select the system amplifier. A 70V paging amplifier is very easy to select.

- Locate amplifiers on the chart that have a **wattage equal to or higher** than the minimum amplifier power of your application. (Amplifiers with power capacities greater than this number will not damage the speakers. The extra power available is simply not used.)
- Determine the **amplifier features** needed for the application (see the *Site Survey Check List* on page 72 and the *Amplifier Features Chart* on page 78).
- Using the chart on page 78, **find an amplifier** that offers these features. As long as the wattage of the selected amplifier is equal to or higher than the minimum amplifier power, the amplifier will work well for the application.

If you think the application's system may need to expand in the future (this is often the case with new constructions and relocating companies), you may want to select an amplifier with a greater power capacity now.

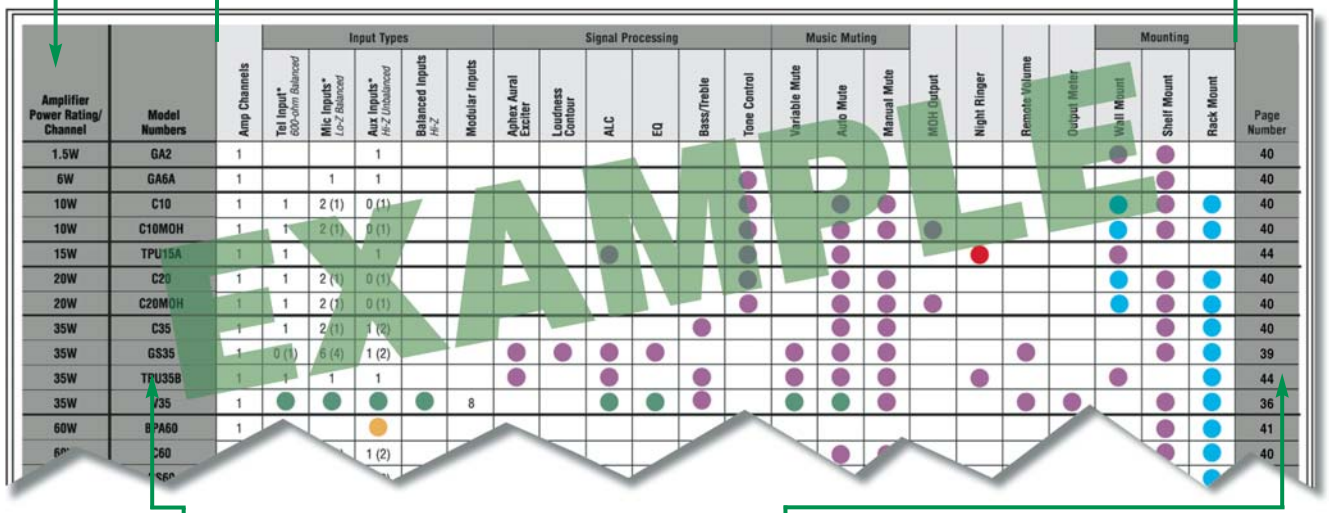
Example:

An application requiring 18 CS1EZ Ceiling Speakers requires a minimum amplifier power of 18 watts, so an amplifier with a power rating of 18 watts minimum is needed. Now, look at the chart on page 78 to determine which amplifiers provide the necessary wattage to drive the speakers as well as provide the amplifier features that are most appropriate for the installation. Since the minimum wattage needed is 18, the amplifier with the lowest power usable for this installation is 20 watts (model C20). However, if the C20 does not have the features required for the application, such as bass and treble controls, you can select any amplifier of greater wattage that offers the specific features. For instance, you might select the TPU35B or C35. Both of these amplifiers have a higher wattage than the application's minimum amplifier power needed and provide the desired features because they have bass and treble controls. Either of these amplifiers will work well for this application. Plus, there is room to expand the system on a 35W or higher amplifier without the need to purchase an additional amplifier in the future.

The Amplifier Features Chart outlines the features and power ratings of Bogen amplifiers that can be used for a variety of application needs. For complete chart, see page 78.

A POWER
Locate a power rating that is higher than the application requires (allowing for future system expansion).

B FEATURES
Find the amplifier features that the application requires.



Amplifier Power Rating/ Channel	Model Numbers	Amp Channels	Input Types: Tel Input* 600-ohm Balanced	Input Types: Mic Inputs* Lo-Z Balanced	Input Types: Aux Inputs* Hi-Z Unbalanced	Input Types: Balanced Inputs Hi-Z	Input Types: Modular Inputs	Signal Processing: Aphex Aural Exciter	Signal Processing: Loudness Contour	Signal Processing: ALC	Signal Processing: EQ	Signal Processing: Bass/Treble	Signal Processing: Tone Control	Music Muting: Variable Mute	Music Muting: Auto Mute	Music Muting: Manual Mute	MOH Output	Night Ringer	Remote Volume	Output Meter	Mounting: Wall Mount	Mounting: Shelf Mount	Mounting: Rack Mount	Page Number
1.5W	GA2	1			1																●	●		40
6W	GA6A	1		1	1								●									●		40
10W	C10	1	1	2 (1)	0 (1)								●		●	●					●	●	●	40
10W	C10MOH	1	1	2 (1)	0 (1)								●		●	●	●				●	●	●	40
15W	TPU15A	1	1		1					●			●		●			●			●			44
20W	C20	1	1	2 (1)	0 (1)								●		●	●					●	●	●	40
20W	C20MOH	1	1	2 (1)	0 (1)								●		●	●	●				●	●	●	40
35W	C35	1	1	2 (1)	1 (2)							●			●	●						●	●	40
35W	GS35	1	0 (1)	6 (4)	1 (2)			●	●	●	●			●	●	●			●			●	●	39
35W	TPU35B	1	1	1	1			●		●		●		●	●	●		●			●		●	44
35W	C35	1	●	●	●	●	8			●	●	●		●	●	●			●	●		●	●	36
60W	[illegible]PA60	1			●																	●	●	41
60[illegible]	C60				1 (2)										●	●						●	●	40
[illegible]	[illegible]																						●	

C MODEL NUMBER
Select the amplifier model(s) best suited for your application.

D REFERENCE PAGE
Turn to the page number indicated for more information about the product you need.

COMPLETE CHART ON PAGE 78

Easy Design™ Is Easy!

That's all it takes to design a robust, high-quality paging system with Bogen's Easy Design line.