

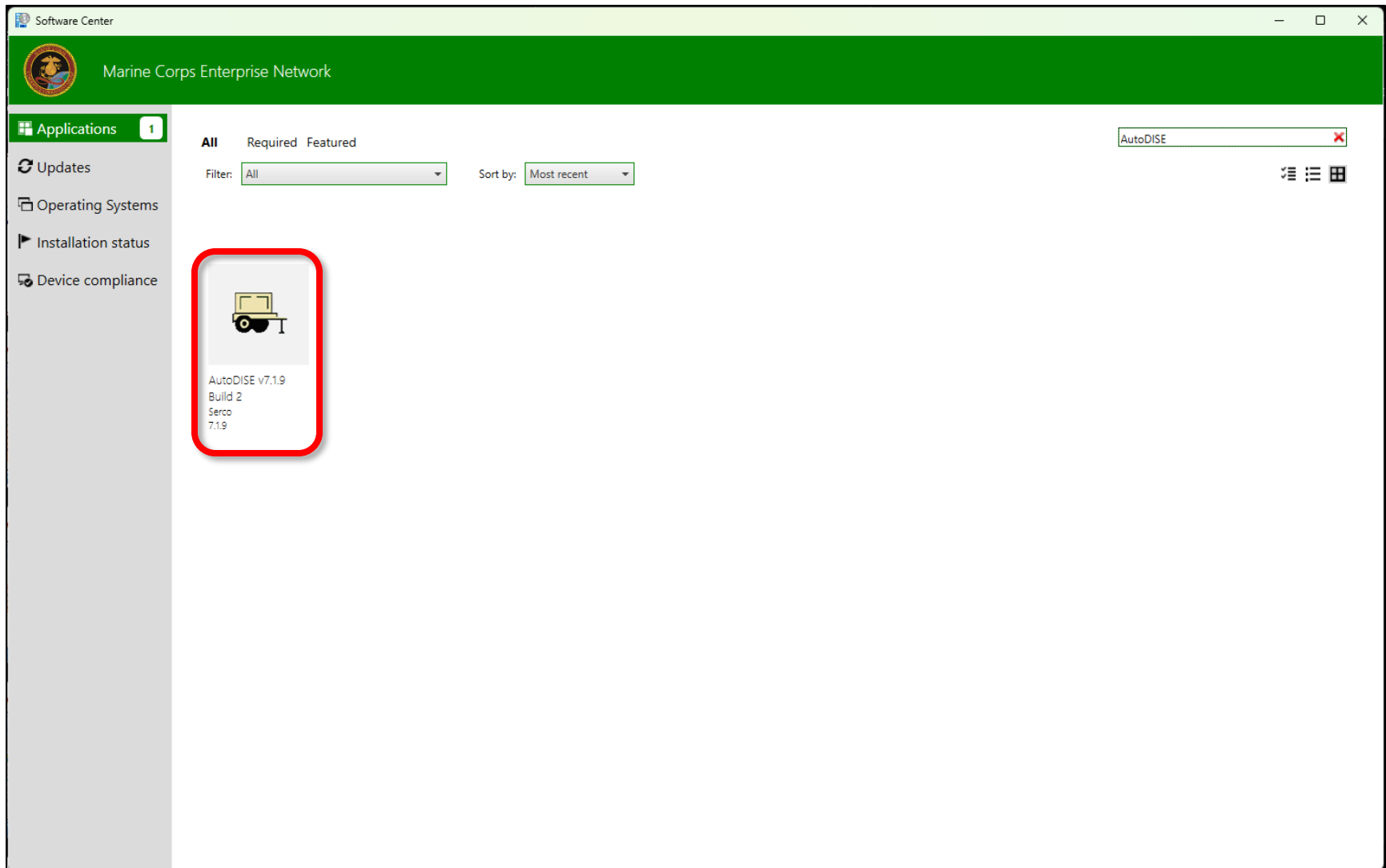


ECU Optimization Tool User Guide





Step 0: Install AutoDISE



If you haven't already, download AutoDISE from the MCEN Software Center.



Step 1: Build Your Layout in AutoDISE



The screenshot displays the AutoDISE 7.1.9 software interface. The main workspace shows a grid-based layout of various shelters and their associated ECU (Energy Control Unit) connections. A pop-up window titled 'Base-X 305 60K' provides a detailed view of the internal ECU configuration for a specific shelter, showing connections to various devices like MAGTAB, HP Laptop, ANPRC, and a Server. The interface includes a menu bar (File, Home, Electrical, IT, Water, Wastewater, Shelters/Staking, Toolbox, Import/Export, Window, Help and Tutorials), a toolbar with icons for editing, zooming, and layer visibility, and a status bar at the bottom indicating zoom level (106%) and coordinates (X = 106, Y = 59).

- Build as many shelter configurations as you wish.
- Ensure all consumers and ECUs are properly connected.
- Name your shelters something distinct that you can remember. The tool uses these names.

The ECU you use here does not matter. The tool will test all different combinations of ECUs.



Step 2: Set Your Environment

Click here to set up the environment

The screenshot shows the AutoDISE 7.1.9 software interface. The 'HVAC Requirements Calculator' tool is active, displaying various input fields and results. A red box highlights the 'HVAC Calculator' icon in the toolbar. Another red box highlights the 'Shelter Internal Conditions' section, which includes a graph of 'Number of Personnel' over time, 'Personnel Activity Level: Moderate Work', 'Max Temp in Shelter: 85 °F', 'Min Temp in Shelter: 50 °F', 'Desired Humidity Inside: 80 %', 'Ventilation / Infiltration: 300 CFM', and 'Electrical Load: 18486 BTU/hr (all loads)'. The 'Environmental Conditions' section includes graphs for 'Ambient Air Temp (°F)', 'Ground Temp (°F)', and 'Solar Load (BTU/sqft-hr)', along with 'Relative Humidity: 22.8 %', 'Wind Speed: 11.2 mph', 'Ground Type: Sand', and 'Location / Time Zone / Month' (Latitude: 34°, Longitude: -116°, Month: July, Time Zone: (UTC-08:00) Pacific Time (US & Canada)). The 'Roof Configuration' section shows a diagram of a dome and inputs for 'Width at Base: 21ft - 10in', 'Length at Base: 32ft - 11in', 'Height: 10ft - 11.5in', 'Eave Height: 8 ft', and 'Angle of Wall Side to Horizontal: 80 °'. The 'Shelter Material Properties' section includes 'Shelter Material U-Factor: 0.4 BTU/°F-sqft-hr' and 'Solar Absorption: 0.7'. The 'Results' section shows 'Steady State Temp inside Shelter: 85 °F' and a breakdown of heat loads: 'Elect. Equipment: 18486 BTU/hr', 'Ventilation: 6254 BTU/hr', 'Personnel: 11000 BTU/hr', 'Structure: 21575 BTU/hr', and 'Total Heat Load: 57315 BTU/hr'. The 'Structure Summary' section shows a breakdown of the total structure heat load: 'Vertical Walls: 4241 BTU/hr', 'Angled Walls: 7437 BTU/hr', 'Roof: 8561 BTU/hr', 'Floor: 1335 BTU/hr', and 'Total Structure Heat Load: 21575 BTU/hr'.

The more realistic you make your environment and shelters, the better the analysis will be.

Optional: While AutoDISE comes preloaded with climate data, it can be inaccurate in some cases. Average climate data can be accessed [here](#) if you wish to manually input real data.



1. Go here

2. Select all shelters to export

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Click this to download





Step 4b (Optional): Convert To CSV File

Excel | M365 Copilot

HVAC24HourProfile_Palms_Custom 1

File Home Insert Share Page Layout Formulas Data Review View Help Draw

Autosaved online to Documents

Open

Share

Create a Copy

Export

Print

Rename

Move File

Info

Options

Download as PDF

Download as CSV UTF-8

Download as CSV

Download as ODS

Temporarily converted this file to a format that Excel can read. [Learn more](#)

Click this once you open the file in browser

24 Profile for Shelter: AirBeam 2032 36K

Shelter HVAC Heat Load / ECU Supply Summary (BTU/hr)

	2400-0100	0100-0200	0200-0300	0300-0400	0400-0500	0500-0600	0600-0700	0700-0800	0800-0900	0900-1000	1000-1100	1100-1200	1200-1300	1300-1400	1400-1500	1500-1600	1600-1700	1700-1800	1800-1900	1900-2000	2000-2100	2100-2200	2200-2300	2300-2400
Shelter HVAC Heat Load	19067	17828	15687	13544	12240	10937	18946	26730	35013	41903	48137	52603	56226	58143	58365	57315	53690	49512	44127	37260	28724	25988	24057	
Electrical	18486	18486	18486	18486	18486	18486	18486	18486	18486	18486	18486	18486	18486	18486	18486	18486	18486	18486	18486	18486	18486	18486	18486	18486
Personnel	5500	5500	5500	5500	5500	5500	11000	11000	11000	11000	11000	11000	11000	11000	11000	11000	11000	11000	11000	11000	5500	5500	5500	5500
Structure	-4261	-5171	-6653	-8138	-9113	-10087	-7906	-1439	5197	10771	15688	19167	21802	23061	22953	21575	18279	14429	9703	4153	2104	356	-917	
Ventilation	-658	-988	-1646	-2304	-2633	-2963	-2633	-1317	329	1646	2963	3950	4938	5596	5925	6254	5925	5596	4938	3621	2633	1646	988	
Shelter HVAC Heat Load	19067	17828	15687	13544	12240	10937	18946	26730	35013	41903	48137	52603	56226	58143	58365	57315	53690	49512	44127	37260	28724	25988	24057	
Ambient Temperature	83	82	80	78	77	76	77	81	86	90	94	97	100	102	103	104	103	100	96	93	89	85	81	
Shelter Internal Temperature	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85

24 Profile for Shelter: AirBeam 2032 36K

Shelter HVAC Heat Load / ECU Supply Summary (BTU/hr)

	2400-0100	0100-0200	0200-0300	0300-0400	0400-0500	0500-0600	0600-0700	0700-0800	0800-0900	0900-1000	1000-1100	1100-1200	1200-1300	1300-1400	1400-1500	1500-1600	1600-1700	1700-1800	1800-1900	1900-2000	2000-2100	2100-2200	2200-2300	2300-2400
HVAC Supply from 36K ECU	19067	17828	15687	13544	12240	10937	18946	26730	35013	41903	42514	41569	40624	39994	39994	39994	39994	39994	39994	39994	39994	39994	39994	39994

Workbook Statistics

Give Feedback to Microsoft

100%

MCEN computers can't open XLS files using the desktop app. If you wish to open the file, you can view and convert it to a CSV file using Excel Online ([link](#)).



Step 5: Input ECU Data

Unit (ECU)	Cooling Capacity (BTU/hr)	Cooling Load (kVA)	Cost	Weight (lbs)	Size (ft3)	Window Mount
60K	60000	12.9	20251	560	48.4	FALSE
36K	36000	7.7	15092	472	43.3	FALSE
18K	18000	5.1	10020.66	230	9.7	TRUE
HDT	72000	21.1	22000	540	30.18	FALSE

If you haven't already, input all ECU data into the ECU specifications spreadsheet. This data will come from the Technical Manual or manufacturer.



Step 6: Open The Tool

ECU Selection Optimizer - Streamlit

<https://ecuoptimizationtool.streamlit.app>

Type or paste link

ECU Selection Optimizer

Upload your HVAC CSV (output from AutoDISE) and your ECU catalog (spreadsheet with all the available ECUs). Then choose weights and press **Optimize**.

Upload **AutoDISE Output** (HVAC24Profile...csv):

Drag and drop file here
Limit 200MB per file • CSV

Browse files

Upload **ECU Specifications File**:

Drag and drop file here
Limit 200MB per file • CSV

Browse files

Download Example AutoDISE Output

Download Example ECU Specifications

Run Example Scenario

Upload both an HVAC file from AutoDISE and ECU Specifications file to continue.

> ? Help

> i Information

> 🌱 About The Developer

This will work in any browser.

Open your browser and go to the link:

<https://ecuoptimizationtool.streamlit.app/>



Step 7: Upload Files

ECU Selection Optimizer - Streamlit

https://ecuoptymizationtool.streamlit.app

Set Weights

Click Optimize after changing weights.

Cost

Power

Weight

Size

BTU Penalty

Getting Started

ECU Selection Optimizer

Upload your HVAC CSV (output from AutoDISE) and your ECU catalog (spreadsheet with all the available ECUs). Then, choose weights and press Optimize.

Upload AutoDISE Output (HVAC24Profile...csv):

Drag and drop file here

Limit 200MB per file • CSV

Browse files

HVAC24HourProfile_Palms_Custom.csv

31.5KB

Upload ECU Specifications File:

Drag and drop file here

Limit 200MB per file • CSV

Browse files

ECUSpecs.csv

412.0B

Files uploaded.

Target BTU and Window Compatibility

Action: Select whether each shelter is compatible with window ECU units.

ShelterName	TargetBTU	Window Unit Compatibility
AirBeam 2032	58365	<input checked="" type="checkbox"/>
AirBeam 3236	77883	<input checked="" type="checkbox"/>
Base-X 203	48526	<input checked="" type="checkbox"/>

ECU Catalog

All ECUs loaded from ECU Specifications file uploaded above.

Model	CapacityBTU	PowerKW	CostUSD	Weight	Size	Window Mount	\$/BTU	KW/BTU	ft3/BTU
60K	60000	12.9	20251	560	48.4	<input type="checkbox"/>	0.3375	0.0002	0.0008
36K	36000	7.7	15092	472	43.3	<input type="checkbox"/>	0.4192	0.0002	0.0012
18K	18000	5.1	10020.66	230	9.7	<input checked="" type="checkbox"/>	0.5567	0.0003	0.0006

Drag and drop each file into its respective place or click "Browse Files"

Upload your AutoDISE output (CSV, XLS, or XLSX) and ECU specifications file (CSV or XLSX)

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Step 8: Window Compatibility Check

Set Weights

Click Optimize after changing weights.

Cost

Power

Weight

Size

BTU Penalty

Getting Started

Target BTU and Window Compatibility ⓘ

Action: Select whether each shelter is compatible with window ECU units.

ShelterName	TargetBTU	Window Unit Compatibility
AirBeam 2032	58365	<input checked="" type="checkbox"/>
AirBeam 3236	77883	<input type="checkbox"/>
Base-X 203	48526	<input checked="" type="checkbox"/>
Base-X 305	59336	<input checked="" type="checkbox"/>

Generator Catalog ⓘ

These generators are loaded from a background file. The 'XX% Load' columns indicate the number of gallons per hour each generat

Generator Name	Model	TAMCN	Max Power (kW)	Fuel Capacity (gal)	25% Load	50% Load	75% Load	100% Load	Full Data
15kW AMMPS Generator Set	MEP-1050/MEP-1050A	B00437B	15	8.61	0.46	0.65	0.9	1.06	<input checked="" type="checkbox"/>
			5	3.8	0.26	0.31	0.38	0.43	<input checked="" type="checkbox"/>
			3	4	None	None	None	0.5	<input type="checkbox"/>
			10	6.3	0.34	0.48	0.61	0.75	<input checked="" type="checkbox"/>
			10	9	None	None	None	1.07	<input type="checkbox"/>
2kW LTWT, Man-Portable Generator Set	MEP-531A	B09807B	30	16.7	0.9	1.23	1.8	2.46	<input checked="" type="checkbox"/>
			2	1.6	None	None	None	0.3	<input type="checkbox"/>
			60	34.7	1.59	2.47	3.51	4.47	<input checked="" type="checkbox"/>
60kW AMMPS Generator Set	MEP-1070/MEP-1070A	B10217B							<input checked="" type="checkbox"/>

ECU Catalog

All ECUs loaded from ECU Specifications file uploaded above.

Model	CapacityBTU	PowerKW	CostUSD	Weight	Size	Window Mount	\$/BTU	KW/BTU	ft3/BTU
60K	60000	12.9	20251	560	48.4	<input type="checkbox"/>	0.3375	0.0002	0.0008
36K	36000	7.7	15092	472	43.3	<input type="checkbox"/>	0.4192	0.0002	0.0012
18K	18000	5.1	10020.66	230	9.7	<input checked="" type="checkbox"/>	0.5567	0.0003	0.0005
HDT	7								

Optional: Change shelter name if needed.

Toggle window-unit compatibility on/off

Optimize

If any of the shelters in your data can't accept a window-mounted ECU, toggle the check off.



Step 9: Select Weights

ECU Selection Optimizer - Streamlit

https://ecuooptimizationtool.streamlit.app

Set Weights

Click Optimize after changing weights.

Cost: 1

Power: 1

Weight: 1

Size: 1

BTU Penalty: 1

> Getting Started

Target BTU and Window Compatibility ⓘ

Action: Select whether each shelter is compatible with window ECU units.

ShelterName	TargetBTU	Window Unit Compatibility
AirBeam 2032	58365	<input checked="" type="checkbox"/>
AirBeam 3236	77883	<input type="checkbox"/>

ECU Catalog

All ECUs loaded from ECU Specifications file uploaded above.

Model	CapacityBTU	PowerKW	CostUSD	Weight	Size	Window Mount	\$/BTU	KW/BTU	ft3/BTU
60K	60000	12.9	20251	560	48.4	<input type="checkbox"/>	0.3375	0.0002	0.0008
36K	36000	7.7	15092	472	43.3	<input type="checkbox"/>	0.4192	0.0002	0.0012
	18000	5.1	10020.66	230	9.7	<input checked="" type="checkbox"/>	0.5567	0.0003	0.0005
	72000	21.1	22000	540	30.18	<input type="checkbox"/>	0.3056	0.0003	0.0004

These generators are loaded from a background file. The 'XX% Load' columns indicate the number of gallons per hour each generator burns at the percentage of electrical load.

Generator Name	Model	TAMCN	Max Power (kW)	Fuel Capacity (gal)	25% Load	50% Load	75% Load	100% Load	Full Data
15kW AMMPS Generator Set	MEP-1050/MEP-1050A	B00437B	15	8.61	0.46	0.65	0.9	1.06	<input checked="" type="checkbox"/>
5kW AMMPS Generator Set	MEP-1030/MEP-1030A	B00777B	5	3.8	0.26	0.31	0.38	0.43	<input checked="" type="checkbox"/>
3kW Generator Set	MEP-831A	B07307B	3	4	None	None	None	0.5	<input type="checkbox"/>
10kW AMMPS Generator Set	MEP-1040/MEP-1040A	B08917B	10	6.3	0.34	0.48	0.61	0.75	<input checked="" type="checkbox"/>
10kW Tactical Quiet Generator (TQG)	MEP813A	B09217B	10	9	None	None	None	1.07	<input type="checkbox"/>
30kW AMMPS Generator Set	MEP-1060/MEP-1060A	B09537B	30	16.7	0.9	1.23	1.8	2.46	<input checked="" type="checkbox"/>
2kW LTWT, Man-Portable Generator Set	MEP-531A	B09807B	2	1.6	None	None	None	0.3	<input type="checkbox"/>
60kW AMMPS Generator Set	MEP-1070/MEP-1070A	B10217B	60	34.7	1.59	2.47	3.51	4.47	<input checked="" type="checkbox"/>

Optimize

Set weights to prioritize the optimization of different parameters.

These weights are used to score the mixes of ECUs that the algorithm tries. The solution for each shelter becomes the mixture that scores the best (lowest) for each shelter.



Step 10: Solve

Set Weights

Click Optimize after changing weights.

Cost

Power

Weight

Size

BTU Penalty

> Getting Started

Optimize

Solution success.

Solution Overview

The ECU_Mix column shows the type and number of ECUs that are optimal based on the user-input weights.

Shelter	TargetBTU	AchievedBTU	ExcessBTU	TotalKW	TotalCost	TotalWeight	TotalSize	ObjectiveValue	ECU_Mix
AirBeam 2032	58365	60000	1635	12.9	20251	560	48.4	3.5599	{"60K":1}
AirBeam 3236	77883	96000	18117	20.6	35343	1032	91.7	6.5529	{"36K":1,"60K":1}
Base-X 203	48526	60000	11474	12.9	20251	560	48.4	3.7683	{"60K":1}
Base-X 305	59336	60000	664	12.9	20251	560	48.4	3.5431	{"60K":1}

Fuel Consumption Metrics ⓘ

Only generators that were capable of handling the electrical load of the ECUs are shown.

Generator Name	AirBeam 2032 - Fuel Consumption (gal/hr)	AirBeam 2032 - Runtime (hr)	AirBeam 3236 - Fuel Consumption (gal/hr)	AirBeam 3236 - Runtime (hr)	Base-X 203 - Fuel Consumption (gal/hr)	Base-X 203 - Runtime (hr)	Base-X 305 - Fuel Consumption (gal/hr)	Base-X 305 - Runtime (hr)
30kW AMMPS Generator Set	1.32	12.69	2.09	8.01	1.32	12.69		
60kW AMMPS Generator Set	1.66	20.95	2.22	15.63	1.66	20.95		

Plots

If the solution is successful, the solution metrics and multiple graphs will be shown.



Optional Additional Steps

Change weights and re-run as needed. Must click "Optimize" again after changing any of the weights.

Set Weights

Click Optimize after changing weights.

Cost: 5

Power: 2

Weight: 4

Size: 3

BTU Penalty: 2

Getting Started

Download Tables and Plots (zip)

Help

Information

About The Developer

Observed vs. Achieved Heat Load per Shelter

Shelter Name	Observed Head Load (BTU/hr)	Achieved Heat Load (BTU/hr)
Airbeam 2032	58365	60000
Airbeam 3236	77883	96000
Base-X 203	48526	60000
Base-X 305	59336	60000

Number of ECUs by Type Per Shelter

Shelter	60K	36K
Airbeam 2032	1	0
Airbeam 3236	1	1
Base-X 203	1	0
Base-X 305	1	0

Click to view any of the graphs in full screen

Download all outputs to your computer in a single zip folder

View additional help and information

Feel free to run the optimization as many times as you wish.