

Ham Engineering

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Introduction

Ham Engineering is a vast, fully-offline toolbox for amateur radio operators of every level — from curious SWLs to seasoned builders. It gathers the calculators, design labs, references, comparisons and gear guides you reach for at the bench and in the field into one app. It does not teach or test; it is a tool and a guide. Every feature works offline, and all illustrations are drawn as scalable vector art, so nothing has to be downloaded.

Layout

Seven tabs along the bottom: Antennas, Feedlines & RF, Circuits, Reference, Extra, Settings and About. Each content tab has its own row of sub-tabs. Tap the (i) on any panel for an explanation of what it computes and the formula it uses. Any pop-up dialog is dismissed by tapping outside it. Most panels carry a header row of small icons: an (i) explains the panel, a circular arrow resets it to defaults, and a share icon exports the panel or diagram as a theme-aware image.

Getting Started

Open Settings and enter your callsign, Maidenhead grid locator and email. These are stored only on your device. Your grid feeds the Grid Compass and the beam-heading tools; your email pre-fills the Support form. Everything auto-saves as you type.

Units & themes

Most calculators show both metric and imperial where it helps. Switch between light and dark themes and adjust the font size in Settings; both apply instantly across the app.

Antennas

Calc

Length calculators for half-wave dipole (with velocity/k factor), quarter-wave and 5/8-wave verticals, ground-plane radials, full-wave loop, Yagi, end-fed half-wave and random/long wire.

Match

L-network, Pi-network, quarter-wave transformer, balun/unun ratio and stub matching.

Lab

An interactive radiation-pattern visualizer. Choose an antenna, set frequency, height, feedpoint SWR, feedline and (for Yagis) element count, then view the azimuth pattern, the elevation pattern, or a 3D lobe over a labeled ground plane. Readouts include directivity, realized gain, takeoff angle, beamwidth, front-to-back, reflective (mismatch) loss, feedline loss and system gain — each with its own explanation.

Compass

A live Grid Compass that rotates with your phone. Enter your QTH grid (pre-filled from Settings) and a target grid to get a beam bearing and distance; the orange arrow shows where to point a directional antenna.

Gallery

An illustrated reference of antenna types — tap any tile for its description, typical use and a practical note.

Feedlines & RF

Coax

Coax loss by cable, frequency and length (with power reaching the antenna), plus velocity-factor electrical length.

SWR

SWR from forward/reflected power, SWR to return and mismatch loss, an antenna A/B comparison, a receiver noise-floor estimator, and guides to using a NanoVNA and a tinySA.

Power

dBm/watts conversion and ERP/EIRP.

Prop

Free-space path loss, radio horizon and Fresnel-zone clearance.

Gallery

Coax and connector reference illustrations.

Circuits

Basics

Ohm's law solver, series/parallel resistance, voltage divider and RC/RL time constants.

Reactance

Inductive and capacitive reactance, LC resonance, Q and bandwidth, and stored energy.

Filters

RC and LC cutoff frequencies, a constant-k Pi/T LC filter designer, a Bandpass/Notch calculator (geometric center frequency, bandwidth and loaded Q), and a Butterworth LC low-pass ladder designer (2–7 poles).

Codes

Resistor, capacitor and inductor color/number codes, an AWG wire table, and a 555 astable timer calculator.

Lab

A live series-RLC resonance tool driven by L, C and R sliders.

Parts

An illustrated component reference.

Reference

Bands

A band plan for ITU regions 1, 2 and 3. Tap a color key to filter by mode; tap a segment for its exact frequency range.

Convert

Wavelength/frequency, power (watts/dBm/microvolts) and temperature converters.

Compare

Side-by-side comparison tables for coax, connectors, antennas and battery chemistries.

Tools

An illustrated reference of bench tools and test gear.

Rig

An illustrated reference of radio front-panel controls and buttons, with cross-manufacturer naming notes.

Grid

Maidenhead grid / latitude-longitude conversion and great-circle beam-heading with a compass.

Extra

Links

Curated external resources, including major retailers and brands. Links open in your browser.

Tips

Hundreds of searchable, categorized engineering tips.

Formulas

A formula cheat-sheet across antennas, feedlines, circuits and propagation.

Glossary

A searchable glossary of ham-engineering terms.

Constants

Physical and RF reference constants.

Settings

Enter callsign, grid and email (all auto-saved, stored only on your device; identifier fields auto-capitalize, grid uses Maidenhead formatting). Toggle dark mode, adjust font size, and turn the weekly tips on or off.

About & Support

About

Shows the version, a feature summary, and links to this manual, the support form and the version history.

Support

Sends a pre-filled message (with your callsign, email and app version) to the developer via your email app.

Privacy

Ham Engineering works offline and stores your callsign, grid and email only on your device. It does not collect or transmit personal data.