



HAMS:

THE FIRST MAKERS

WITH INTRODUCTIONS TO THE MAKERSPACE

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INTRODUCTION

- Frances Bonte, age 16

- St. Francis DeSales High School
- Loves: Learning science & math
- Studies: Classical ballet & choir/drama
- Technician Class License



- Seamus Bonte, age 14

- St. Paul School in Columbus, OH
- Studies: Bagpipes & gaming/computers
- Loves: sports – football, basketball, wrestling, & lacrosse
- General Class License



HAMS: THE FIRST MAKERS

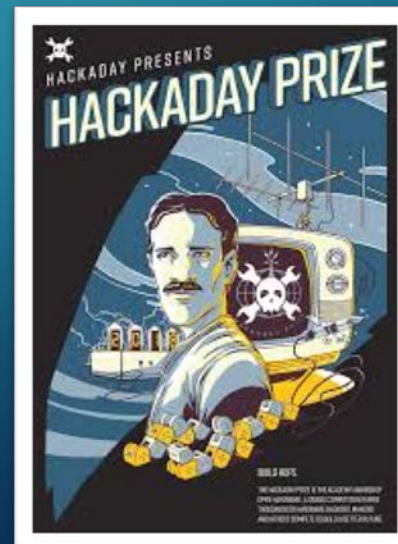
- What is a Maker?

“The maker...[movement] is a contemporary culture representing a technology-based extension of DIY culture that intersects with hacker culture and revels in the creation of new devices as well as tinkering with existing ones. The maker culture in general supports open-source hardware.” (PSU).

- Hams have always been Makers.



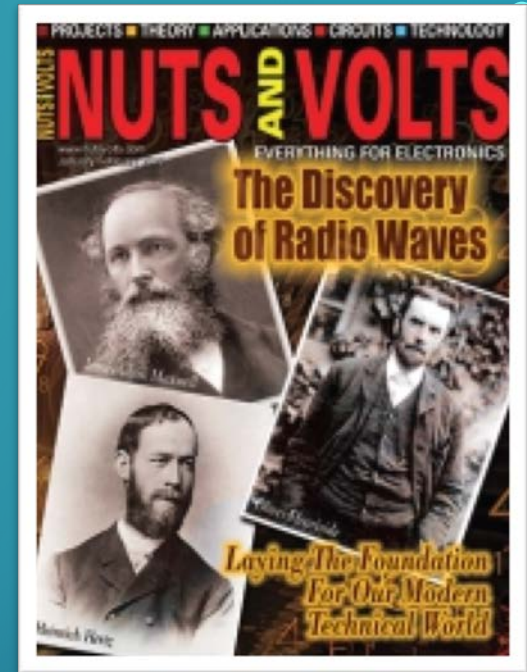
Make: Magazine



Hackaday.com

HAMS: THE FIRST MAKERS

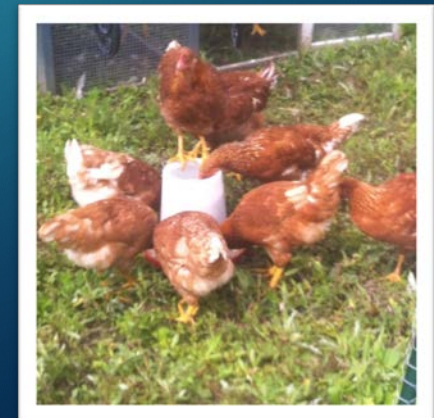
- Post-Marconi, late 1800s, people experimenting with “wireless telegraphy”
- Distance Records Set
- Transatlantic & Global Communication
- Wartime Improvements



Nuts and Volts Magazine



1939 MGM “Radio Hams”



HAMS: THE FIRST MAKERS

- 1950s & 1960s
 - AM & CW
 - Vacuum Tubes
 - Homebrew began in earnest
 - Parts readily available
 - Rise of the kits
- 1970s & 1980s
 - SSB & FM
 - Transistors then ICs
 - Mobile Radio & Repeaters (VHF)
 - Satellite & Space Operation



Heathkit "Lunchbox" Radio



HAMS: THE FIRST MAKERS

- 1990s & 2000s
 - Digital Modes 1.0
 - *Packet Radio*
 - *Bulletin Boards*
 - Microcontroller
 - APRS (GPS)
 - World Wide Web
- 2010 & Beyond
 - Digital modes 2.0
 - *WSPR, JT-65, FT-8*
 - *DMR, D-Star, Fusion*
 - Single Board Computers
 - Software Defined Radio
 - Solar Power/Battery Tech



Balloon Launch



NASA Images



THE MAKERSPACE

- What is a Makerspace?

A Makerspace is a place in which people with shared interests, especially in computing or technology, can gather to work on projects while sharing ideas, equipment, and knowledge.

- Where do you find a Makerspace?

Makerspaces are found in schools, churches, libraries, and universities. Some Makerspaces operate like a business. Chances are that there is a Makerspace near you.

THE MAKERSPACE: WORKSHOPS

- Wood Shop
- Metal Shop
- Electronics Shop
- Graphics Lab
- Textiles Space
- Computer Lab
- Robotics Lab



*A MAKERSPACE IS OFTEN
BROKEN DOWN INTO A
COLLECTION OF WORKSHOPS*

THE MAKERSPACE: 3D PRINTER



- What is a 3D printer?
A 3D printer is a machine that uses melted plastic. Its is like a hot glue gun. A nozzle places or prints on the X, Y, and Z axis.
- How can a ham use a 3D printer?
Hams can create all types of plastic parts, including cases, knobs, rollers, and insulators. I have my call sign printed.

THE MAKERSPACE: LASER CUTTER

- What is a laser cutter?

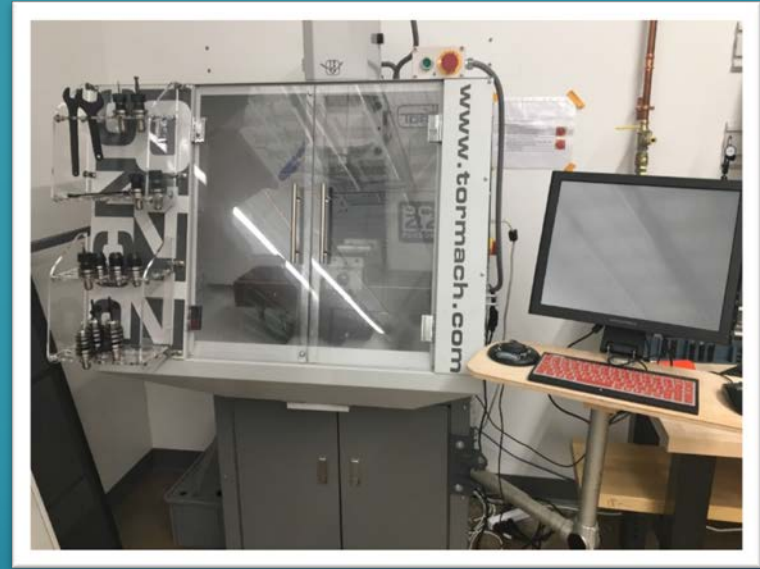
A Laser Cutter uses a high power laser to engrave or cut plastics, wood, or other materials with light and heat.

- How can a Ham use a Laser Cutter?

Hams use them to cut panels, etch labels, and prepare printed circuit boards. Some Hams cut boxes from plywood or clear plastic.



THE MAKERSPACE: CNC MACHINE



- What is a CNC Machine?

CNC Stands for computer numerical control. A CNC Machine manufactures parts by cutting or subtracting material from a block or sheet.

- How can a Ham use a CNC?

There are CNC Machines for wood, metal, and other materials. Hams can use them for everything from printed circuit boards to antenna parts.

THE MAKERSPACE: WORKBENCH



- What is an Electronics Workbench?
An electronics workbench is a mix of electronic tools, test equipment and a soldering station.
- *Digital Multimeter*
- *Bench Supply*
- *Signal Generator*
- *Digital Oscilloscope*
- How can a Ham use a Workbench?
Is there anyone here who can't answer this question?

THE MAKERSPACE: VACUUM FORM

- What is a vacuum form machine?

A vacuum form machine uses heat and vacuum to create molds and packaging from thin plastic sheets.

- How can a Ham use a vacuum form machine?

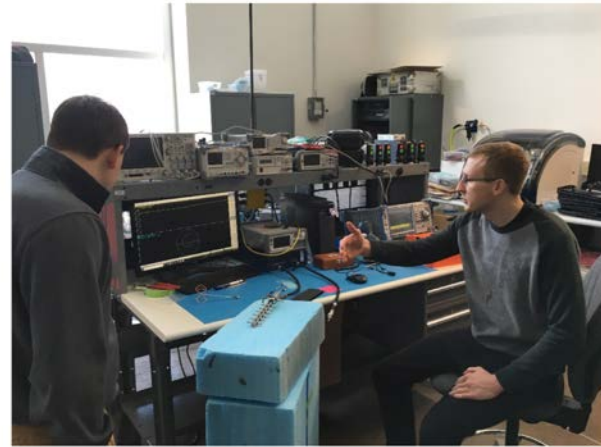
Hams can use them to create panels in a go box as well as weatherproofing for outdoor gear, like an Arduino controlled coax switch.



THE MAKERSPACE: PROJECT

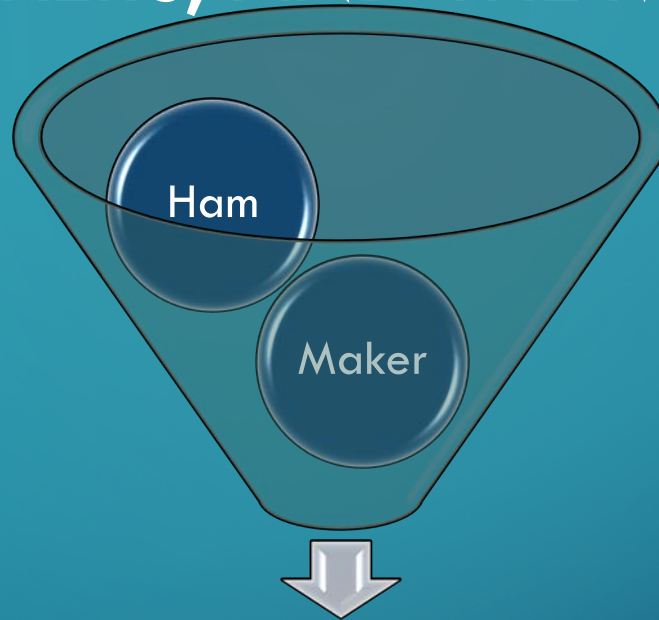
2019 Science Fair Project

The Effect of Antenna Type on Range (2.4 GHz WiFi)



- Construct Test Antennas
- Sweep at Bench
- Test for Signal/Distance
- Report on Results

HAMS, MAKERS, AND THE MAKERSPACE?



MAKERSPACE

Place to Work
Tools and Equipment
Coaching/Knowledge
Experience or Practice



COMMUNITY

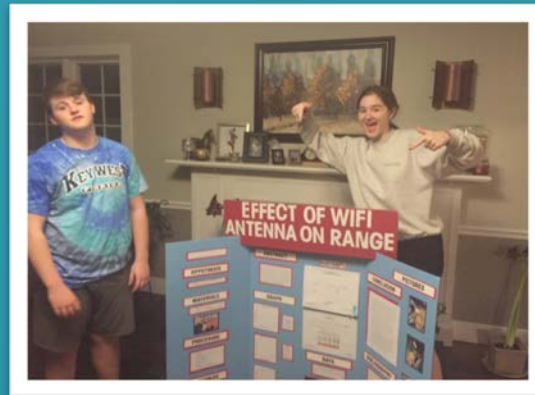
- The most important thing in Ham Radio is Community.
- Makerspaces must have community to succeed.





QUESTIONS?

THANK YOU!



SPECIAL THANKS TO:

HAM RADIO SCIENCE CITIZEN INVESTIGATION (HAMSCI)

UNITED STATES NATIONAL SCIENCE FOUNDATION (NSF)

CASE WESTERN RESERVE UNIVERSITY / SEARS THINK[BOX]

OTTERBEIN UNIVERSITY / THE POINT

CAROLE PERRY, WB2MGP, AND RADIO CLUB OF AMERICA (RCA)