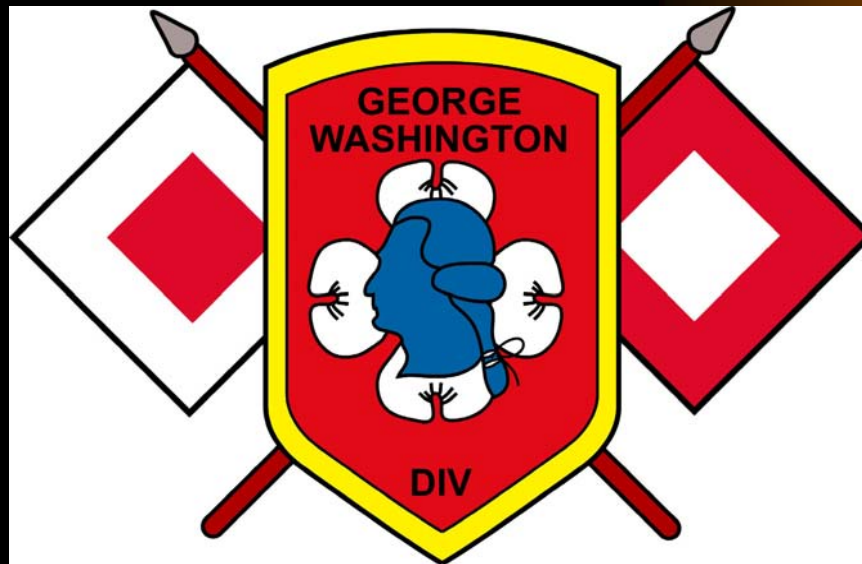


*Introduction*  
*To Very High Frequency Radio*  
*Presented by:*  
*Mr. Bryan Buck WO1*  
*Virginia Defense Force*



# *Introduction*

- TASK: To aid personnel in very high-frequency (VHF) radio systems to achieve successful communications.
- CONDITION: The individual is provided with classroom training, documentation, and equipment.
- STANDARD: Standard is met when personnel can successfully identify the basic components of a VHF system, put the components into operation, and make a communications check.

# Introduction

- RISK ASSESSMENT: Moderate
- SAFETY CONSIDERATIONS: Do not permit antennas to come into contact with high power lines or other sources of electricity. **IT CAN CAUSE INJURY OR DEATH.** DO NOT install antennas or operate equipment during thunderstorms or high winds.

# *Introduction*

- What is a VHF radio system?
- What are the characteristics, frequencies, and capabilities of a VHF system?
- When to utilize VHF communications.
- How to assemble a VHF system.

# *What Is VHF Radio?*

- VHF is an abbreviation for Very High Frequency.
- Very High Frequency is a term used to describe the 30MHz. to 300MHz. portion of the radio spectrum.
- This range of frequencies will provide short-range LOS (line of site) communications.
- The range for VHF communications will typically be 2 to 20 miles depending on equipment used, antenna height, and terrain.

# *Radio Frequency Band Designations*



- 30-300 Hz ....ELF (extremely low frequency)  
300-3000 Hz .....(voice / hearing range)  
3-30 kHz .....VLF (very low frequency)  
30-300 kHz .....LF (low frequency)  
300-3000 kHz ....MF (medium frequency)  
3-30 MHz .....HF (high frequency)  
30-300 MHz .....VHF (very high frequency)  
300-3000 MHz ..UHF (ultra high frequency)  
3-30 GHz .....SHF (super high frequency)  
30-300 GHz EHF(extremely high frequency)

# *Characteristics*



- Unlike HF frequencies, the ionosphere does not usually reflect VHF signals.
- Signals are restricted to the local AO (area of operation).
- VHF signals are less effected by atmospheric noise and interference from electrical equipment than HF signals.

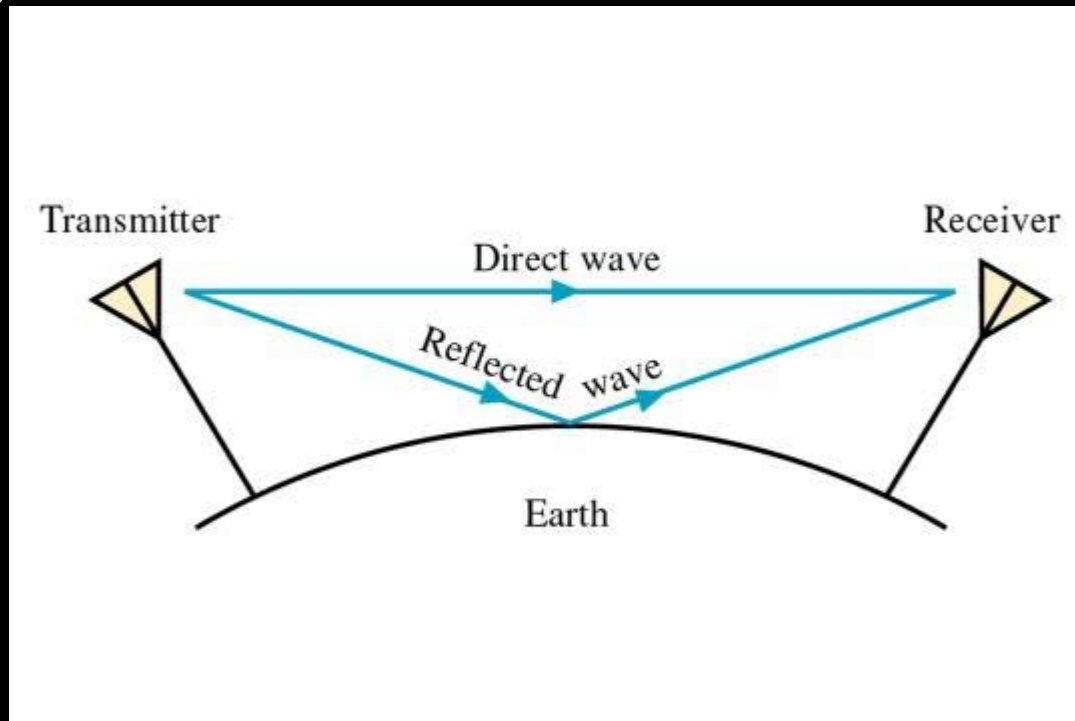
# *Propagation*

- VHF is very limited by terrain (foliage, buildings, mountains).
- To use VHF it is necessary to be able to visualize a direct line of site between the two stations.
- There are two unusual conditions that can cause VHF signals to propagate farther than normal, tropospheric ducting and Sporadic-E.
- While both of these conditions are possible neither is reliable and are hard to predict.



# Propagation

- VHF signals travel fairly direct from one station to another.



# *Available Frequencies*

- The VaDF is authorized 2 VHF frequencies by the VaARNG, listed in the SOI (signal operating instructions).
- 150.450MHz.
- 150.700MHZ.
- The VaDF upon request from the G6 can be issued frequencies in the 30-88MHz. range for training and operations.

# *Modes of Operation*



- The VaDF will only utilize one mode of operation on VHF frequencies, FM (frequency modulation).
- FM is the same mode used by broadcast stations.
- Output power should be restricted to 35 Watts or less for all equipment that is not narrowband compliant.

# *When to Utilize VHF*

- VHF is the best choice to use when communications are needed to tie all personnel together in a localized area.
- Examples:
  - In the immediate area where a mobile CP is set up.
  - Traffic control operations.
  - Guard duty in an armory.

# *Range*

- For handheld type radios the communications range can be from several hundred feet to several miles.
- With mobile and base VHF radios, which generally have higher output power, this range can be extended out to a much greater distance.
- The type of antenna and the terrain are the two biggest factors that will influence VHF communications.

# *Range*

- The use of a simple ground plane antenna can dramatically improve communications.
- When possible, locate your CP or your antenna on the highest ground.
- If not possible mount the antenna up as high as is safely possible or practical.
- Remember Line of Site, the higher up the antenna, the more it can “see”.

# *Dependable*

- VHF radio will work day in and day out with little concern for weather, time of day, and time of year.
- This is one reason that VHF has been the preferred system to use by the military, police, rescue, and fire departments for years.

# *VHF Radio In Action*





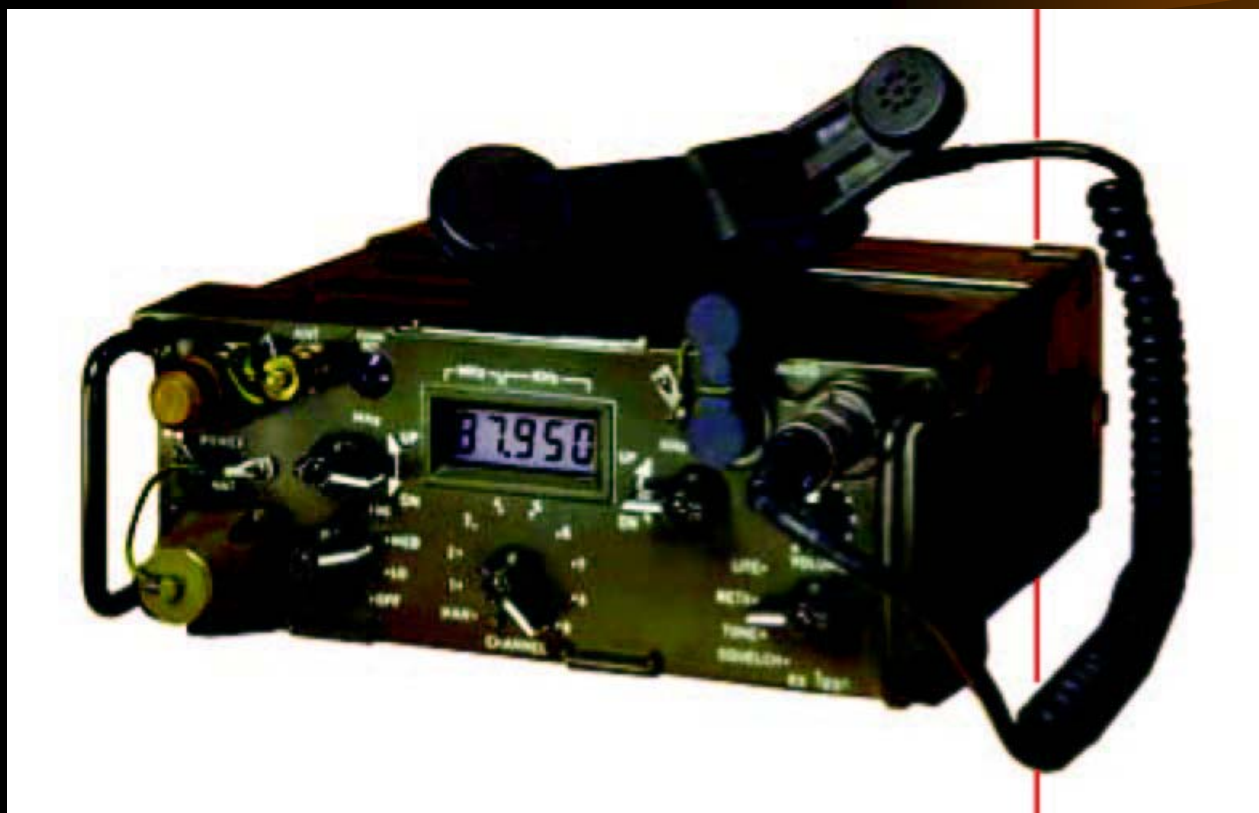
# *VHF Radio In Action*



# *Putting the VHF Station Together*

- There are four basic things needed to assemble a VHF station:
- VHF transceiver
- Power source
- Cabling
- Antenna

*PRC1077 VHF transceiver, one of the VHF types of radios used by the VaDF*



# *PRC1077 VHF Transceiver*

- The PRC1077 is a VHF, manpack transceiver, used for short range, two-way communications.
- The PRC1077 is capable of providing FM voice communications.
- The PRC1077s frequency range is 30 to 88MHz.
- The PRC1099 can operate from an internal rechargeable battery or an external 12VDC power source.
- Depending on the antenna used and terrain features, the PRC1077 can provide communications from 2 to 20 miles.\
- The PRC1077 can work as a base or mobile radio.

# *Power Sources*

- Most modern day VHF transceivers can operate from 12VDC.
- This is very convenient when operating in an emergency operation where commercial power or fuel for a generator might be in short supply.
- When commercial power or generator is available, a 12VDC power supply can be used.
- To conserve battery power, use only the output power necessary to carry out the communications, i.e. if you are running high power, and you can reliably carry out the communications with low power, switch to the low power position..

# *Internal Battery PRC1077*



# *External Type Power Supply*



# *Motorola HT750 VHF Handheld Transceiver*



- The Motorola HT750 handheld transceiver is one type of handheld radio that will be used in the VaDF.
- The Motorola HT750 covers a frequency range of 35-50MHz., externally programmable.
- The HT750 is used primarily as a handheld squad level radio.
- The HT750 can be used to communicate with the PRC1077 radios.



# *Motorola HT750 Handheld Transceiver*



# Antennas



- There are many types of VHF antennas.
- VHF antennas are small and lightweight compared to HF antenna systems.
- For VHF communications that the VaDF will be tasked with, a simple  $\frac{1}{4}$  wave vertical ground plane antenna mounted at least 20' up works very well.
- A  $\frac{5}{8}$  wave mag mount antenna mounted on a vehicle roof can also prove to be very effective.
- The use of vertical antennas will assure that all stations have the same polarization.

# *VHF Ground Plane Antenna*

**VHF 1/4 wave  
Ground Plane  
Base Antenna**

**144-156 Mhz**

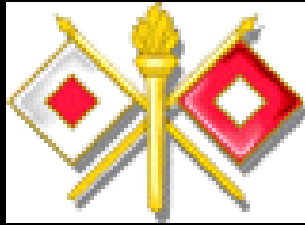
[www.CenterfireAntenna.com](http://www.CenterfireAntenna.com)

Typical  $\frac{1}{4}$  wave ground plane antenna.

# *VHF Mag Mount Antenna*



Typical 5/8 wave mag mount antenna.



# • Questions???



- *TAKE A 15 MINUTE BREAK*



- *TAKE A 15 MINUTE BREAK*

