

# {TESS+} VHF Training

## Module 4: Installation best practice & maintenance

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Read more about {TESS+}: [www.wfp.org/telecommunications-security-standards](http://www.wfp.org/telecommunications-security-standards)

Email: [TESS@wfp.org](mailto:TESS@wfp.org)

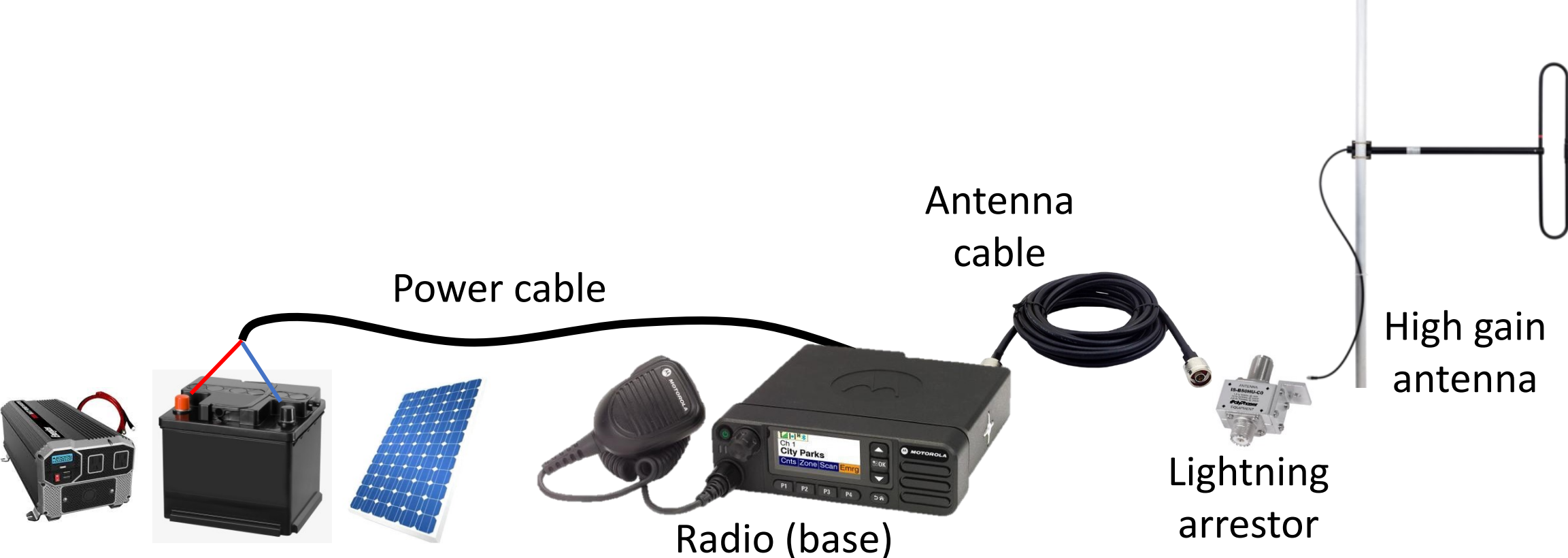


# Session objectives

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- Overview of installation best practice
- Discuss the technical maintenance and compliance checklists (*see handout*)

# Basic components of a base radio station



DC battery  
Solar panel  
Inverter / DC charger

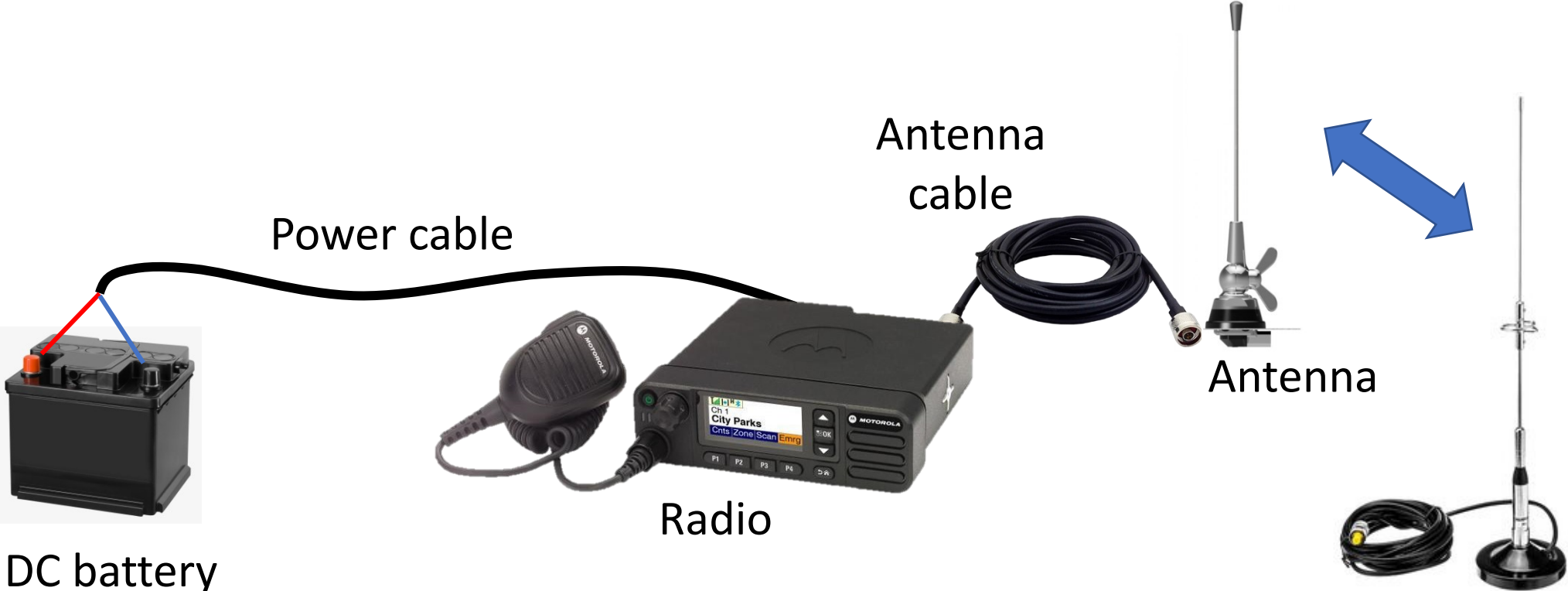
# Base radio station (installation instructions)

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- Type of antenna for the base (folded dipole, omni-directional etc.)
- Respect 5m distance between base antennas
- Satellite antennas should not be in direct view of other radio antennas
- Use the space in the compound well
- Ensure the lightning arrestor is close to ground
- Ensure the mast is grounded



# Basic components of a mobile radio station



DC battery

Power cable

Radio

Antenna cable

Antenna

Antenna with magnetic mount



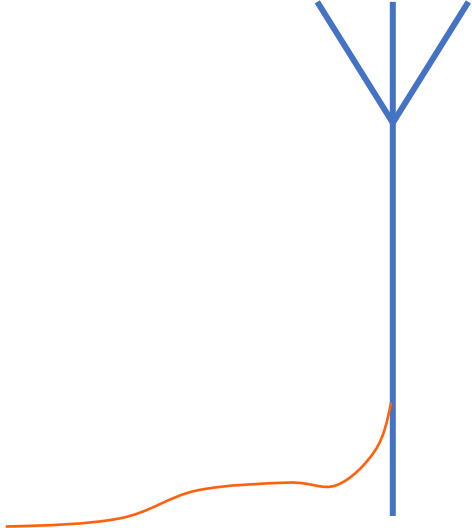
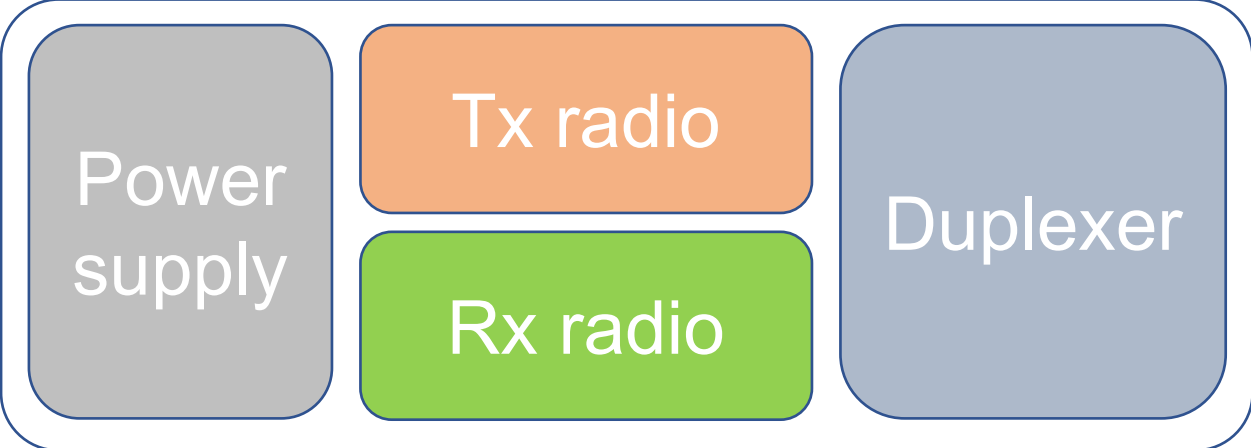
# Mobile radio station (installation instructions)

- Flexible route for passing the cables – *helpful for troubleshooting later*
- Install antenna at the highest point possible and ensure it is vertical
- Use a mounting bracket if the vehicle has no additional space for installation
- Secure the radio when all connectors are properly in place.



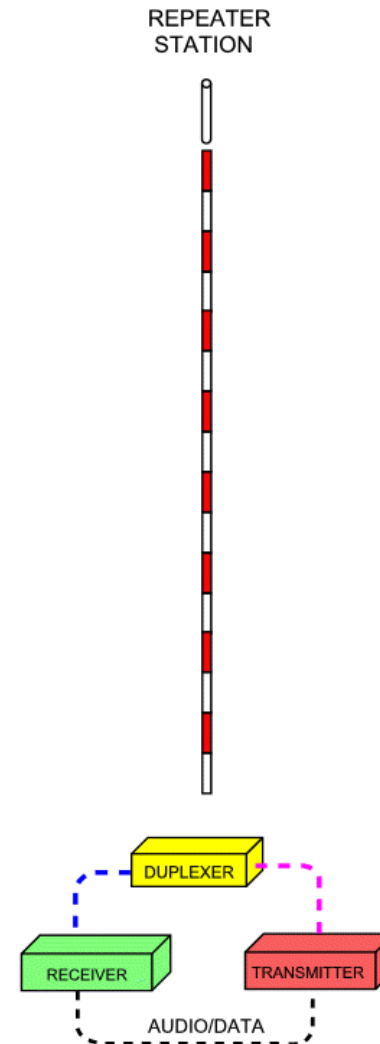
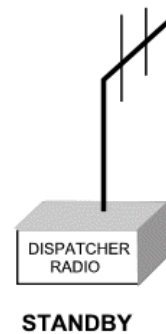
# Basic components of a repeater

## Repeater

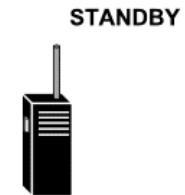


# Basic components of a repeater station

Device	Max. transmit power
Handheld radio	5 W
Mobile / base radio	25 W
Repeater	50 W



SYSTEM STATUS:  
IDLE



DUPLEX FREQUENCY EXAMPLES:  
UHF F1 = 450 MHz. F2 = 453 MHz  
800 F1 = 806 MHz. F2 = 851 MHz



# Repeater installation - best practice

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- Install on a tall building or mountain-top – improves radio coverage
- Requires 24/7 power supply – consider solar power or separate generator
- Repeater antenna – good quality, high gain, install on a tower/mast
- Repeater antenna cable – a short and good quality cable will reduce loss
- Lightning arrestor/lightning protection in-line with the antenna cable
- Power supply should be secured whilst also ensuring easy accessible for servicing.









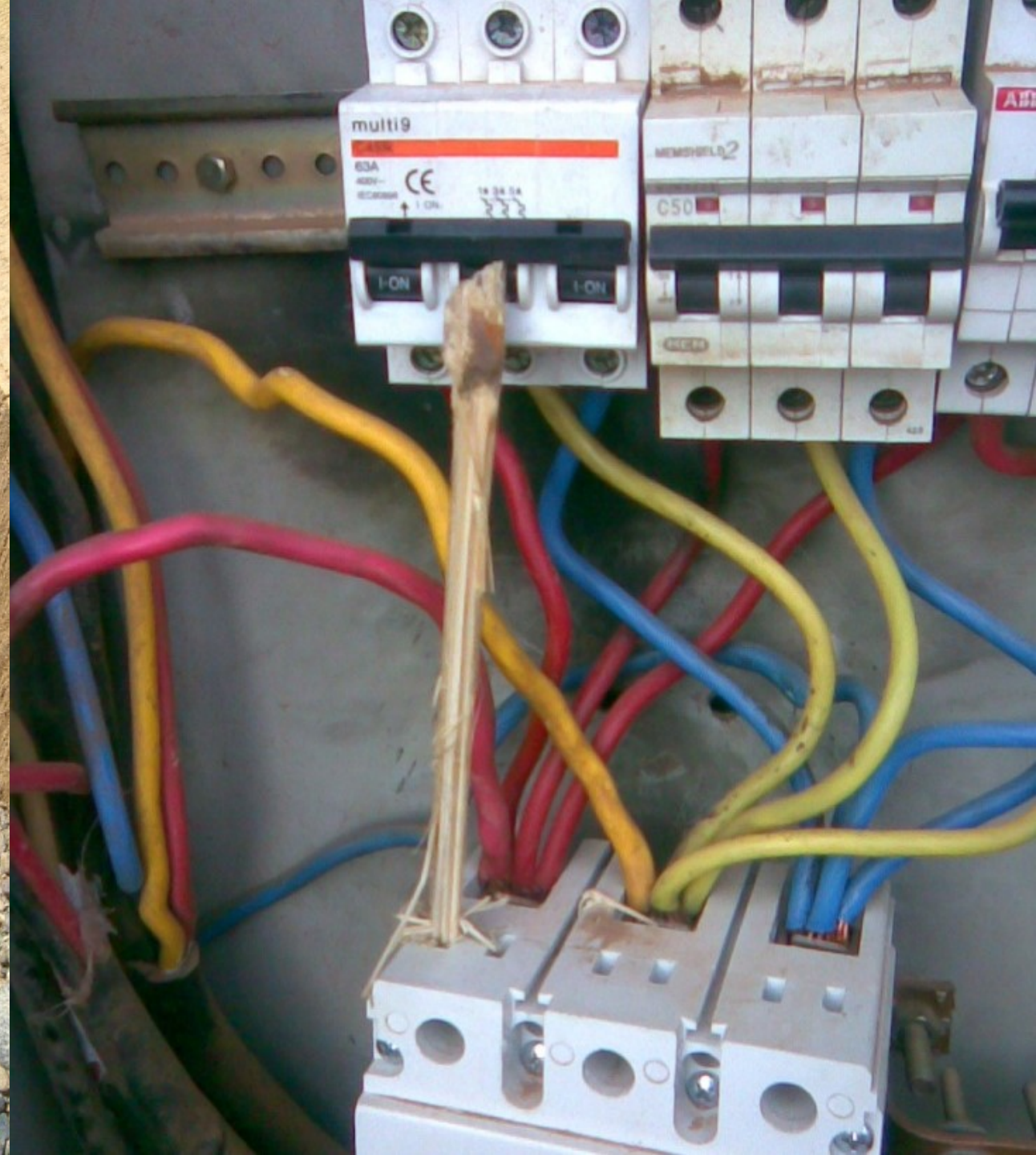


N150  
12V 150Ah







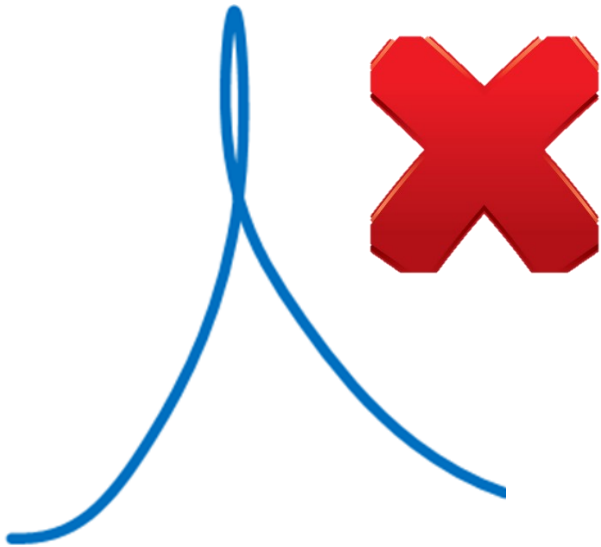




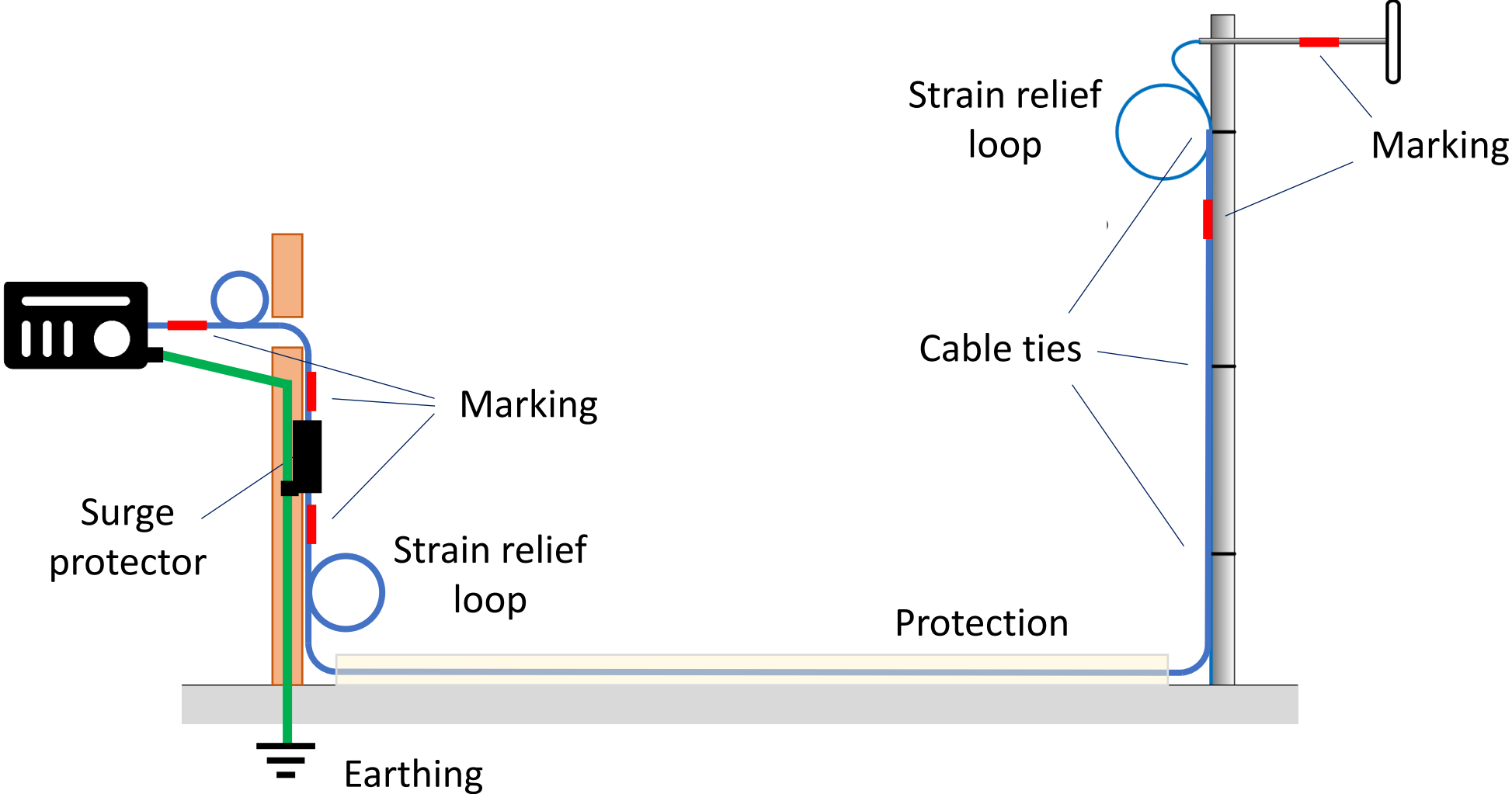


# Handling coax cable

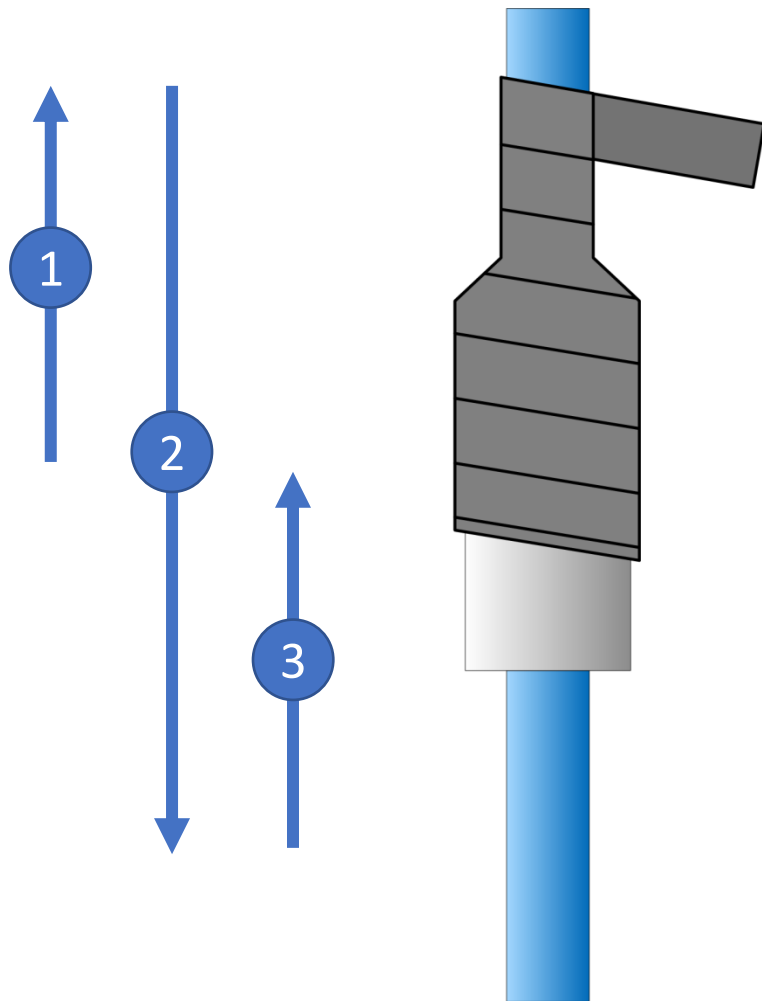
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# Installation best practice



# Taping - best practice



- First layer: Self-amalgamating tape
- Second layer: Electrical tape

# Earthing/grounding installation - best practice

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- Inadequate earthing causes issues with radio systems (e.g. lightning damage, hazardous shock, interference, atmospheric noise etc.)
- Provide adequate earthing for both **indoor** and **outdoor** equipment.





# Marking cables - Installations best practice

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- Marking cables is important because people working on the cables in the future need to know what they are doing. It makes maintenance easier.
- Mark antennas with **large** markings
- Mark cables on **both** ends of the cable
- For outdoors - coloured markings can be easier than text.



# Remember:

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- Spending a bit more time during installation to get it right will save time and money in the future

# Live demonstration – crimping RF connectors

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- Your trainer will now demonstrate how to crimp a connector

Time needed:  
**appx 30mins**



# Live demonstration – measuring SWR

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- Your trainer will now demonstrate how to measure SWR with an SWR meter

Time needed:  
**appx 30mins**



# Maintenance - considerations

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- Keep cables clean and tidy (label, use cable ties & ducts)
- Avoid twists, tangles, sharp bends, and strain on connectors
- Keep documents/manuals updated and accessible
- Update inventories e.g. in use, in stock, broken
- Keep tools and instruments in good working order
- Clean solar panels, satellite dishes, terminals, batteries
- Conduct regular checks and inspections – use **checklists!**

# Checklists - discussion

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- We will now discuss the {TESS+} technical maintenance and compliance checklists in the class

Time needed:  
**appx 20mins**



Please  
take the  
handouts



# Student resources

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- Technical compliance checklist
- Technical maintenance checklist



# Questions and remarks

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