PinCo ACS Command Runner Equipment Maintenance Procedures

01/18/2024

Mike Drake

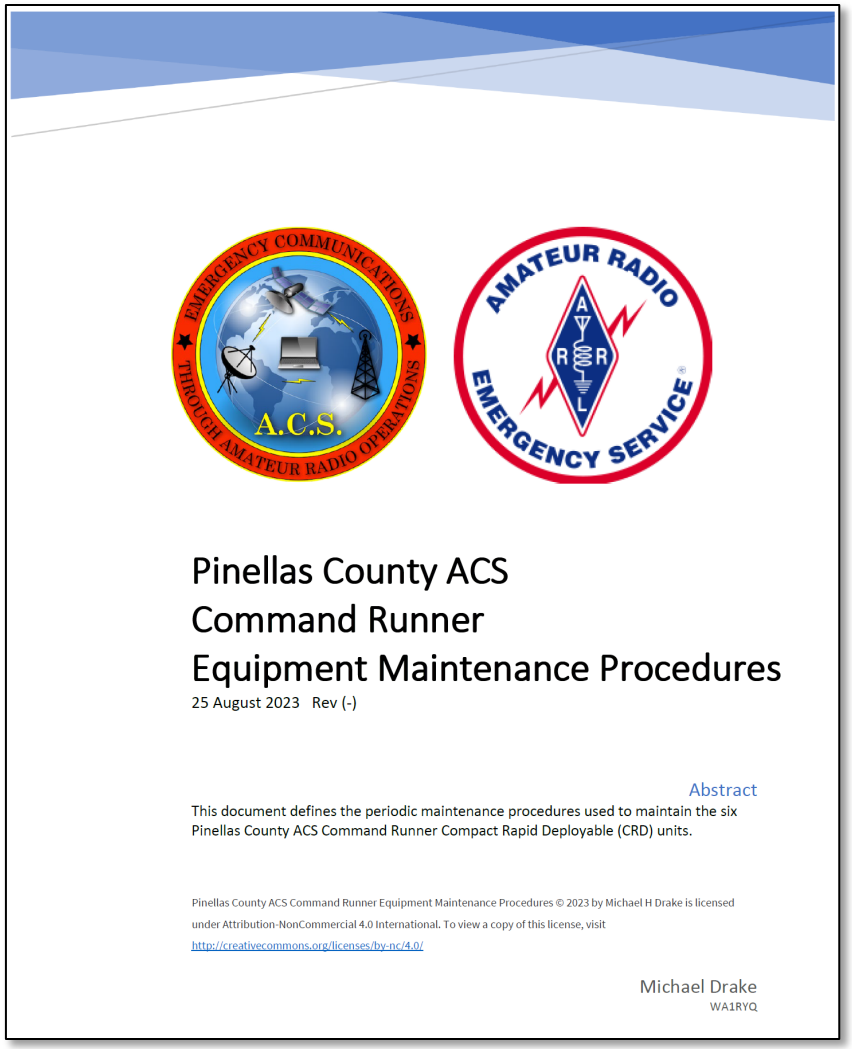
Pinellas County ACS Training Officer

Agenda

- Maintenance Procedure Document Overview
  - Safety
  - Qualifications
  - Procedure Identification
- Detailed Procedures
- Equipment Maintenance Record
- Summary

Command Runner Maintenance Procedures

Document Overview



Pinellas County ACS
Command Runner
Equipment Maintenance Procedures
25 August 2023 Rev (-)

Abstract

This document defines the periodic maintenance procedures used to maintain the six Pinellas County ACS Command Runner Compact Rapid Deployable (CRD) units.

Michael Drake
WA1RYQ

- Periodic maintenance procedures used to maintain PinCo Command Runners
  - Applicable Documents
  - Acronyms and Abbreviations
  - Maintenance Procedure Overview
    - Safety
    - Qualifications
    - Maintenance Procedure Identification
  - Detailed Maintenance Procedures
  - Records and Forms
- Located on PACS Website:
  - ***https://www.pcacs.org/equipment-maintenance/***

Command Runner Maintenance Procedures

Maintenance Procedure Overview – Safety

- Safety Definitions
  - **WARNING:** Death or injury may result if the operating/handling procedures and practices are not correctly followed.
  - **CAUTION:** Damage to equipment may result if the operating procedures and practices are not correctly followed.
  - **NOTE:** Amplifying information or procedural advisory.
- Safety Precautions
  - Master List of all **Warning** and **Caution** statements incorporated into the command Runner Equipment Maintenance Procedures.

Command Runner Maintenance Procedures

Maintenance Procedure Overview – Qualifications

- Minimum set of requirements each maintainer must meet before they are authorized to perform maintenance.
- Rationale
  - Complex set of equipment that could easily be damaged if improperly:
    - Transported
    - Operated
    - Maintained
    - Demobilized and stored
  - Command Runner contains radio equipment that only authorized FCC license holder are permitted to operate.

Command Runner Maintenance Procedures

Maintenance Procedure Overview – Qualifications

- Qualification Requirements
  - The maintainer must have successfully completed the PinCo Command Runner CRD maintenance training program to perform any maintenance action.
  - The maintainer must have a ***Technician, General, Advanced***, or ***Amateur Extra class*** FCC license to perform any task that requires the maintainer to transmit voice or digital information via a VHF or UHF amateur radio.
  - The maintainer must have a ***General, Advanced,*** or ***Amateur Extra class*** FCC license to perform any task that requires the maintainer to transmit voice or digital information via an HF amateur radio.

Command Runner Maintenance Procedures

Maintenance Procedure Overview – Qualifications

- Qualification Requirements - Continued
  - Only a PinCo ACS software system administrator is authorized to perform the following maintenance actions:
    - Update the Cradlepoint router software, ***Victron*** Battery Monitor firmware, or ***Victron*** Bluetooth Interface firmware.
    - Use the ***VictronConnect*** application to evaluate the status of the Command Runner battery.
    - Update the firmware or code plug files installed in Command Runner transceivers.
  - Only a Pinellas County facilities department technician qualified to perform small engine repair is authorized to perform generator maintenance.

Command Runner Maintenance Procedures

Maintenance Procedure Overview – Identification

ID	Description	Maintenance Code	Maintainers	Elapsed Time	Special Qualifications	Related Maint
1	**Power, Computer, and Network Checks**	Q-1	2	2		U-1
	1. Perform power system checks using shore and battery power. 2. Perform computer system and network operability checks.					
2	**Software and Firmware Maintenance**	Q-2	2	2		U-1
	1. Check and update, as required, Windows operating system. 2. Check and update, as required, Winlink Express application and templates. 3. Check and update, as required, virtual TNC applications.					
3	**VHF/UHF System Communication Checks**	Q-3	3	2	Technician	U-1
	1. Perform voice communication tests using the amateur VHF/UHF transceiver. 2. Perform voice communication tests using the VHF and UHF public safety transceivers. 3. Perform voice communication tests using the 800/700 MHz public safety transceiver. 4. Exchange Winlink traffic with EOC using Vara FM and VHF packet protocols.					
4	**HF System Communication Checks**	Q-4	3	2	General	U-1
	1. Perform voice communication tests using the amateur HF transceiver. 2. Exchange Winlink traffic with EOC using amateur radio HF Vara and Pactor protocols. 3. Exchange Winlink traffic with EOC using SHARES.					

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Title

- Title of the maintenance Procedure

Description

- A brief description of each maintenance procedure.

Command Runner Maintenance Procedures

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Maintainers

- Total number of maintainers required to perform the maintenance procedure.

Elapsed Time

- Time (Hrs) from start to finish of the maintenance procedure.

Command Runner Maintenance Procedures

Maintenance Procedure Overview – Identification

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	1. Check and up 2. Check and up 3. Check and up					
3	**VHF/UHF Syste**			2	T	
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	1. Perform voice communication tests using the amateur HF transceiver. 2. Exchange Winlink traffic with EOC using amateur radio HF Vara and Pactor protocols. 3. Exchange Winlink traffic with EOC using SHARES.					

Special Qualifications

- Identifies the special qualifications the maintainer must hold to perform the maintenance action.
  1. **General:** The maintainer must hold a General, Advanced, or Amateur Extra class FCC amateur radio license.
  2. **Technician:** The maintainer must hold a Technician, General, Advanced, or Amateur Extra class FCC amateur radio license.
  3. **Sys Admin:** The maintainer must be a PinCo ACS Software System Administrator.
  4. **PinCo Small Eng:** The maintainer must be a member of the Pinellas County facilities department qualified to perform small engine repair and maintenance.

Related Maint

- Identifies each additional maintenance activity that must be performed in conjunction with the defined maintenance procedure.

Command Runner Maintenance Procedures

Maintenance Procedure Overview – Identification

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	1. Perform voice communi 2. Exchange Winlink traffic 3. Exchange Winlink traffic					

Maintenance Code

- This field consists of two parts. The first part specifies how frequently the maintenance task should be performed. The second part is a sequential number that uniquely identifies each maintenance task that has a common periodicity.

D	- Daily		**S**	- Semiannually
W	- Weekly		**A**	- Annually
M	- Monthly		**R**	- Situation Requirement
Q	- Quarterly		**U**	- Unscheduled

- Unscheduled (U) procedures are used to perform the following activities.
  a. Restore equipment to an operational state when a failure is detected during periodic maintenance or equipment deployment.
  b. Set-up, shutdown, and transport equipment.
- Situation (R) dependent procedures are performed prior to equipment deployment, following equipment deployment, and during long periods of equipment inactivity. A Situation Requirement code (R) will also be used with a calendar periodicity code when, in addition to the calendar, a situation dictates that the procedure must be performed.
  a. S-3R: The procedure is performed semiannually or prior to and after each deployment, whichever comes first.
  b. R-1M: The procedure is scheduled to be performed during a month that does not include a scheduled quarterly test.

Command Runner Maintenance Procedures

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Command Runner Procedures

- 5 Quarterly Procedures
- 3 Semiannual Procedures
- 2 Annual Procedures
- 2 Situational Requirement Procedures
- 3 Unscheduled Procedures

Command Runner Maintenance Procedures

Maintenance Procedure Overview – Scheduling

EQUIPMENT MAINTENANCE SCHEDULE – December 2023					
Equipment Description	**Serial Number**	**December 3rd -9th**	**December 10th – 16th**	**December 17th – 23rd**	**December 24th- 30th**
Command Runner	CR1	Q3, Q4			
Command Runner	CR2	~~Q3, Q4~~			
Command Runner	CR3			R1M	
Command Runner	CR4			R1M	
Command Runner	CR5		S-2R, S-3R	R1M	
Command Runner	CR6		S-2R, S-3R	R1M	
SatRunner	POD1			R1M	
SatRunner	POD2			R1M	
Shelter Radio Cache	N/A				
Radio Room	N/A				

Christmas

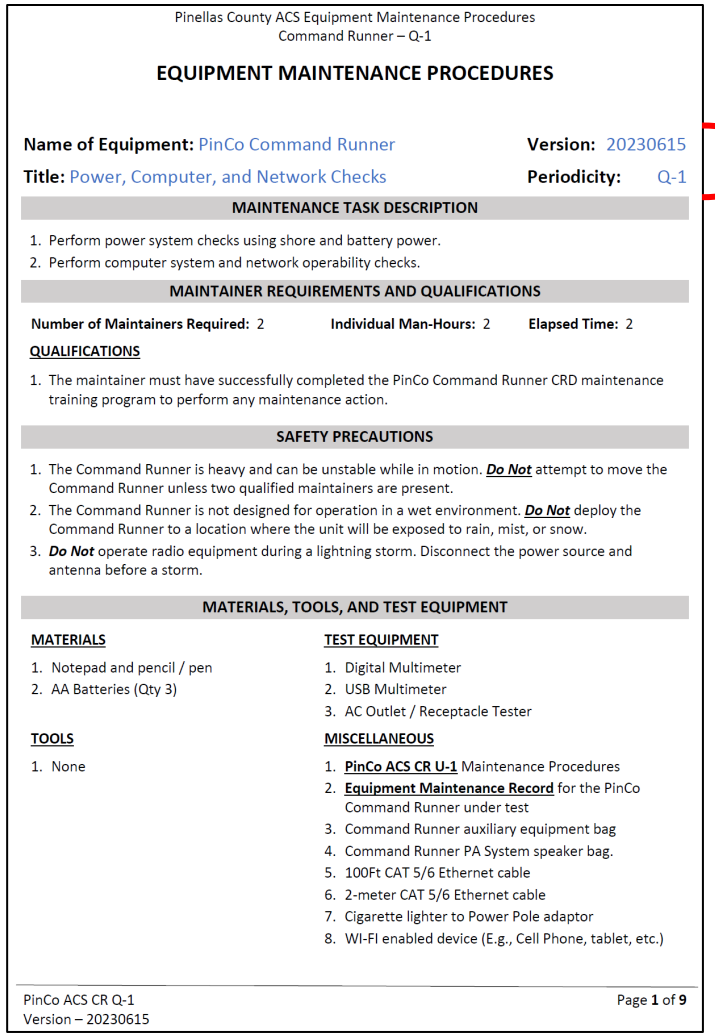
Schedule posted in PinCo EOC Radio Room

Agenda

- Maintenance Procedure Document Overview
  - Safety
  - Qualifications
  - Procedure Identification
- Detailed Procedures
- Equipment Maintenance Record
- Summary

Command Runner Maintenance Procedures

Detailed Maintenance Procedures – Title Page



Pinellas County ACS Equipment Maintenance Procedures
Command Runner – Q-1

EQUIPMENT MAINTENANCE PROCEDURES

Name of Equipment: PinCo Command Runner **Version:** 20230615

Title: Power, Computer, and Network Checks **Periodicity:** Q-1

MAINTENANCE TASK DESCRIPTION

1. Perform power system checks using shore and battery power.
2. Perform computer system and network operability checks.

MAINTAINER REQUIREMENTS AND QUALIFICATIONS

Number of Maintainers Required: 2 **Individual Man-Hours:** 2 **Elapsed Time:** 2

QUALIFICATIONS

1. The maintainer must have successfully completed the PinCo Command Runner CRD maintenance training program to perform any maintenance action.

SAFETY PRECAUTIONS

1. The Command Runner is heavy and can be unstable while in motion. ***Do Not*** attempt to move the Command Runner unless two qualified maintainers are present.
2. The Command Runner is not designed for operation in a wet environment. ***Do Not*** deploy the Command Runner to a location where the unit will be exposed to rain, mist, or snow.
3. ***Do Not*** operate radio equipment during a lightning storm. Disconnect the power source and antenna before a storm.

MATERIALS, TOOLS, AND TEST EQUIPMENT

MATERIALS

1. Notepad and pencil / pen
2. AA Batteries (Qty 3)

TEST EQUIPMENT

1. Digital Multimeter
2. USB Multimeter
3. AC Outlet / Receptacle Tester

TOOLS

1. None

MISCELLANEOUS

1. **PinCo ACS CR U-1** Maintenance Procedures
2. **Equipment Maintenance Record** for the PinCo Command Runner under test
3. Command Runner auxiliary equipment bag
4. Command Runner PA System speaker bag.
5. 100Ft CAT 5/6 Ethernet cable
6. 2-meter CAT 5/6 Ethernet cable
7. Cigarette lighter to Power Pole adaptor
8. WI-FI enabled device (E.g., Cell Phone, tablet, etc.)

PinCo ACS CR Q-1
Version – 20230615

Page **1** of **9**

Name of Equipment: PinCo Command Runner **Version:** 20230615

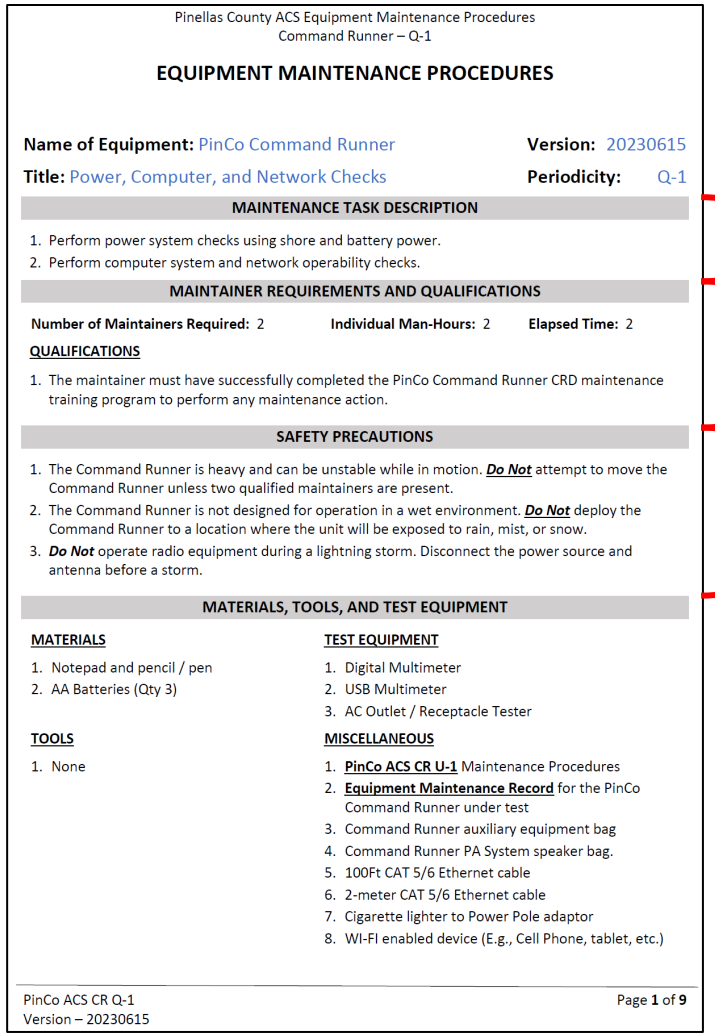
Title: Power, Computer, and Network Checks **Periodicity:** Q-1

Name of Equipment

1. PinCo Command Runner
2. PinCo SatRunner
3. PinCo Starlink Terminal
4. EOC Radio Room
5. PinCo Deployable radio kit

Command Runner Maintenance Procedures

Detailed Maintenance Procedures – Title Page



Pinellas County ACS Equipment Maintenance Procedures
Command Runner – Q-1

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Name of Equipment: PinCo Command Runner **Version:** 20230615

Title: Power, Computer, and Network Checks **Periodicity:** Q-1

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PinCo ACS CR Q-1
Version – 20230615
Page **1** of **9**

MAINTENANCE TASK DESCRIPTION

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2. Perform computer system and network operability checks.

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Number of Maintainers Required: 2 **Individual Man-Hours:** 2 **Elapsed Time:** 2

QUALIFICATIONS

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Command Runner Maintenance Procedures

Detailed Maintenance Procedures – Title Page

EQUIPMENT MAINTENANCE PROCEDURES

Name of Equipment: PinCo Command Runner **Version:** 20230615

Title: Power, Computer, and Network Checks **Periodicity:** Q-1

MAINTENANCE TASK DESCRIPTION

1. Perform power system checks using shore and battery power.
2. Perform computer system and network operability checks.

MAINTAINER REQUIREMENTS AND QUALIFICATIONS

Number of Maintainers Required: 2 **Individual Man-Hours:** 2 **Elapsed Time:** 2

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2. AA Batteries (Qty 3)

TEST EQUIPMENT

1. Digital Multimeter
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3. AC Outlet / Receptacle Tester

TOOLS

1. None

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2. AA Batteries (Qty 3)

TEST EQUIPMENT

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TOOLS

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7. Cigarette lighter to Power Pole adaptor
8. WI-FI enabled device (E.g., Cell Phone, tablet, etc.)

Materials: Administrative supplies, consumable items (batteries, grease, oils, solvents, etc.)

Tools: Common hand tools.

Test Equipment: Portable electric/electronic test equipment.

Miscellaneous: Items not covered under other categories.

Command Runner Maintenance Procedures

Detailed Maintenance Procedures

PROCEDURES

A. Preliminary – Emplace Command Runner

NOTE 1: Use the **Equipment Maintenance Record (EMR)** for the unit under test (UUT) to document the maintenance action performed. For each action performed, enter the date, name, and FCC call sign of the individual completing the action. Document all discrepancies in the **NOTES** section of the EMR.

1. Emplace the Command Runner in accordance with the procedure documented in **Part A** of **PinCo ACS CR U-1**.

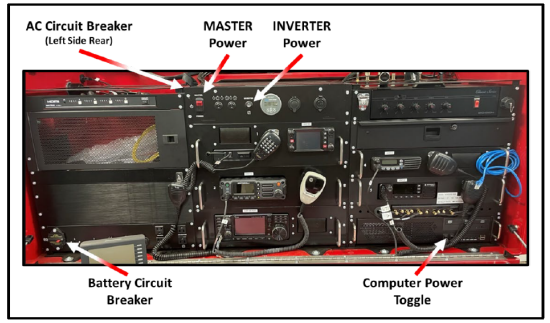

Figure 1. Command Runner Circuit Breakers and Power Switches

B. Power System Maintenance

1. Test system operation using shore power.

a. Set the AC Circuit Breaker to the **ON** position.
b. Set the Battery Circuit breaker to the **OFF** position.
c. Examine the Victron Battery Monitor.
   (1) Use the "**+**" and "**-**" keys on the front of the battery monitor to select and display the following parameters.
      (a) *Voltage on the 12V MAIN bus*. When operating properly, the voltage displayed should be 14.6V ± 10%.
      (b) *Battery Current*: This parameter should read zero.
d. Unlatch and lower the rear panel of the Command Runner.
e. Confirm that the cooling fan located at the top rear of the center console is running.
f. Set the MASTER POWER switch to the **ON** position. The switch should illuminate.

- Detailed step-by-step procedure
- Embedded figures and tables
- Notes and safety precautions

IMPORTANT

Technicians must perform maintenance in accordance with written procedure!

Command Runner Maintenance Procedures

Detailed Maintenance Procedures

Pinellas County ACS Equipment Maintenance Procedures
Command Runner – Q-4

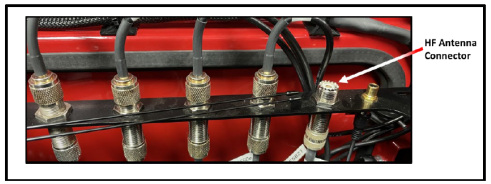

Figure 2. Antenna Distribution Assembly

B. Perform voice communication tests using amateur HF radio (ICOM IC-7300).

NOTE 5: Each of the tasks in Section B require two maintainers; One maintainer to operate the HF transceiver located in the Command Runner and the second maintainer to operate the HF transceiver within the Pinellas County EOC radio room. Both maintainers use the same procedure.

1. Select an HF voice frequency.
   a. Use a 2-Meter HT to coordinate between the EOC and Command Runner.

CAUTION: ***Do Not*** **attempt to transmit unless the antenna system SWR is less than 3:1. Permanent equipment damage can occur when transmitting into an antenna system with high SWR.**

   b. Select an HF frequency that meets the following requirements.
      (1) Frequency is authorized for use by the control operator at each location.
      (2) Frequency is in the voice segment of its respective band.
      (3) Frequency is not in use.
      (4) The antenna system has an SWR of less than 3:1 on the selected frequency.

2. Tune the IC-7300 to the selected frequency.
   a. Use the **touch screen** to select the frequency band.
   b. Use the **Main Dial** to select the operating frequency.

3. Use a 2-Meter HT to notify the EOC Radio Room or Command Runner that the ICOM IC-7300 is configured and ready for test.

WARNING: **Never touch an antenna or antenna connector while transmitting. This action could cause an electrical shock or burns.**

4. Once the radio in the Command Runner and the EOC radio room are both ready for test, exchange voice traffic between the two ICOM IC-7300 radios to confirm that each radio is operating properly.

PinCo ACS CR Q-4
Version – 20230615

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NOTE 5: Each of the tasks in Section B require two maintainers; One maintainer to operate the HF transceiver located in the Command Runner and the second maintainer to operate the HF transceiver within the Pinellas County EOC radio room. Both maintainers use the same procedure.

CAUTION: ***Do Not*** **attempt to transmit unless the antenna system SWR is less than 3:1. Permanent equipment damage can occur when transmitting into an antenna system with high SWR.**

WARNING: **Never touch an antenna or antenna connector while transmitting. This action could cause an electrical shock or burns.**

IMPORTANT

Technicians must comply with all notes and safety precautions!

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Command Runner Maintenance Procedures

Equipment Maintenance Record – Summary Page

EQUIPMENT MAINTENANCE RECORD			
Name of Equipment:	Command Runner	**Serial Number:**	CommandRunner 06

Task Description	**Date Work Performed**			
	10/11/2023	11/15/2023	01/17/2024	Date
	Maintainer Initials	**Maintainer Initials**	**Maintainer Initials**	**Maintainer Initials**
Power, Computer, and Network Checks	MHD/WMS	----------	MHD/WMS	
Software Maintenance	MHD/WMS	----------	MHD/WMS	
VHF/UHF System Communication Checks	----------	WMS/MHD/BK	MHD/WMS	
HF System Communication Checks	----------	WMS/MHD/BK	----------	
Battery Monitor / Cradlepoint Maintenance	MHD/WMS	----------	MHD/WMS	
Generator Maintenance	----------	----------	----------	
Radio Code Plug Maintenance	----------	----------	----------	
Inspect, Clean, and Inventory Equipment	----------	----------	----------	
Radio Firmware Maintenance	----------	----------	----------	
Mechanical System Checks	----------	----------	----------	

Command Runner Maintenance Procedures

Equipment Maintenance Record – Details and Status Page

EQUIPMENT MAINTENANCE RECORD					
Name of Equipment:	Command Runner	**Serial Number:**	CommandRunner 06		
Task Description		**Date Work Performed**			
		10/11/2023	11/15/2023	01/17/2024	Date
		Maintainer Initials	**Maintainer Initials**	**Maintainer Initials**	**Maintainer Initials**
Power, Computer, and Network Checks					
Test system operation using shore power.		MHD/WMS	----------	MHD/WMS	
Test system operation using internal battery.		MHD/WMS	----------	MHD/WMS	
Test operation of USB, Power Pole, and 12Vdc charging ports.		MHD/WMS	----------	MHD/WMS	
Test operation of computer, keyboard, mouse, HDMI switch, and monitors.		MHD/WMS	----------	MHD/WMS	
Test Cradlepoint WAN connectivity to both wired and cellular networks. Confirm auto switchover.		----------	----------	----------	
Test operation of Cradlepoint WI-FI network.		MHD/WMS	----------	MHD/WMS	
Test operation of VOIP phone.		----------	----------	----------	
Test operation of TV Receiver.		----------	----------	----------	
Test operation of Public Address System.		MHD/WMS	----------	MHD/WMS	
Software Maintenance					
Check/Update Windows operating system.		MHD/WMS	----------	MHD/WMS	
Check/Update Winlink Express application and templates.		MHD/WMS	----------	MHD/WMS	
Check/Update virtual TNC Applications.		MHD/WMS	----------	MHD/WMS	
VHF/UHF System Communication Checks					
Perform voice communication tests using amateur VHF/UHF radio.		----------	WMS/MHD/BK	MHD/WMS	
Perform voice communication tests using the VHF and UHF public safety transceivers.		----------	WMS/MHD/BK	MHD/WMS	
Perform voice communication tests using the 800/700 MHz public safety transceiver.		----------	WMS/MHD/BK	MHD/WMS	
Exchange Winlink traffic with EOC using VARA FM and VHF packet protocols. Confirm operation with both amateur and tactical addresses.		----------	WMS/MHD/BK	MHD/WMS	

EQUIPMENT MAINTENANCE RECORD – STATUS					
Name of Equipment:	Command Runner	**Serial Number:**	CommandRunner 06		
Equipment Status		**Date Value Recorded**			
		10/11/2023	11/15/2023	01/17/2024	Date
		Value	**Value**	**Value**	**Value**
Battery Status Monitor Readings					
Consumed Amp-Hours		0	----------	0	
State-of-Charge		100%	----------	100%	
System Software Versions					
Windows operations system version and build		22H2 19045.3324		22H2 19045.3930	
Winlink express version		1.7.10.0		1.7.12.2	
Winlink template version		1.0.243.0		1.0.248.0	
Vara HF version		4.7.7		4.8.1	
Vara FM version		4.2.9		4.3.2	
UZ7HO sound modem version		1.14		1.14	
Victron BMV-712 Battery Monitor version		4.13		4.13	
Victron BMV-712 Bluetooth Interface version		2.46		2.46	
Cradlepoint router version		----------		----------	
Radio Firmware Versions					
Yaesu FTM-400XD amateur VHF/UHF transceiver		----------	----------	----------	
Motorola APX 4500 P25 public safety transceiver		----------	----------	----------	
Motorola XPR 5550e UHF public safety transceiver		----------	----------	----------	
ICOM IC-F5021 VHF public safety transceiver		----------	----------	----------	
ICOM IC-7300 HF Transceiver		----------	----------	----------	
SCS DR-7400 Pactor Modem		----------	----------	----------	
Radio Code Plug Versions					
Yaesu FTM-400XD amateur VHF/UHF transceiver		----------	----------	----------	
Motorola APX 4500 P25 public safety transceiver		----------	----------	----------	
Motorola XPR 5550e UHF public safety transceiver		----------	----------	----------	

Command Runner Maintenance Procedures

Equipment Maintenance Record – Notes and Signature Page

EQUIPMENT MAINTENANCE RECORD – NOTES			
Name of Equipment:	Command Runner	**Serial Number:**	CommandRunner 06

Date	Notes
10/11/2023	Top cover weather seal is loose and sticky. Difficult to open top cover.
10/11/2023	Missing VOIP phone and 100Ft Cat 5 cable prevented testing some cradlepoint capabilities.
11/15/2023	Problem with FTM-400 - Low Audio output. Believe caused by missing stereo to mon adapter.
11/15/2023	Adapter installed.
11/15/2023	Unable to locate EMA channel on the APX 4500 radio. Used EOC-A.
01/17/2024	Missing VOIP Phone. unable to test enet via hardware connection.
01/17/2024	Winlink and VARA registration keys missing. Added keys. Updated settings for Vara FM Wide.
01/17/2024	Unable to easily determine APX 4500 zone number. Need to update procedure.
01/17/2024	Did not test digital TV dongle or cradlepoint software version.
01/17/2024	Noted that EOC DMR reporting as CR2 rather than EOC.

EQUIPMENT MAINTENANCE RECORD – SIGNATURE			
Name of Equipment:	Command Runner	**Serial Number:**	CommandRunner 06

Maint Activity	Date	Name	Initials	Call Sign	Signature
Q1,Q2,Q5	10/11/2023	Mike Drake	MHD	WA1RYQ	
Q1,Q2,Q5	10/11/2023	Will Scott	WMS	W7WMS	
Q3,Q4	11/15/2023	Will Scott	WMS	W7WMS	
Q3,Q4	11/15/2023	Bruce Kreutzer	BK	N4BCK	
Q3,Q4	11/15/2023	Mike Drake	MHD	WA1RYQ	Michael H. Drake 2023.11.16 11:05:57 -05'00' 2023.006.20360
Q1,Q2,Q3,Q5	01/17/2024	Mike Drake	MHD	WA1RYQ	Michael H. Drake 2024.01.17 15:51:06 -05'00' 2023.008.20458
Q1,Q2,Q3,Q5	01/17/2024	Will Scott	WMS	W7WMS	

Command Runner Maintenance Procedures

Equipment Inventory Record

EQUIPMENT INVENTORY RECORD					
Name of Equipment:	Command Runner	Serial Number:		Date:	

Check	Qty	Description	Check	Qty	Description
Command Runner Auxiliary Equipment Bag					
	1	Black Equipment bag			**Mast Guy Kit**
	1	50-Ft Yellow Extension Cord		1	Black Guy Kit Bag
	1	Rubber mallet		3	Individual Guy Bags
	3	Guy Stakes		3	Guy Lines (50 ft)
	1	Cat 5/6 Ethernet Cable (100 ft)		3	Guy Line Tensioners
	2	Cat 5/6 Ethernet Cable (3 ft)		3	Orange Tensioner Strap
				1	Mast Guy Ring
Command Runner Accessary Storage Drawer – Left					
	1	VOIP Phone		1	700/800 MHz Antenna
	1	7/8" Wrench		1	Computer Mouse
	1	15/16" Wrench		1	Computer Keypad
	1	T25 Torx Screwdriver		1 Box	AA Batteries (Qty 4)
	1	Mouse Pad			
Command Runner Accessary Storage Drawer – Right					
	2	Wi-Fi Antennas		1	Key Ring – Command Runner Set
	1	Microphone; Public Address Sys		1	Operating Manuals - Packet
	1	TV Antenna		1 Box	Spare Fuse kit (5, 15, 20, and 25 Amp ATO/ATC)
Command Runner General					
	3	VHF/UHF Antennas		1	Honda EU2200 Generator
	1	15 Foot Mast		1	Hitch Adaptor
	2	Wheel Chocks			
Public Address System – Speaker Bag					
	1	Black Equipment bag		1	Horn Speaker Assembly

Agenda

- Maintenance Procedure Document Overview
  - Safety
  - Qualifications
  - Procedure Identification
- Detailed Procedures
- Equipment Maintenance Record
- Summary

Command Runner Maintenance Procedures
Summary

- Technicians must meet qualification requirements for each task performed.
- Technicians must perform maintenance in accordance with written procedures.
- Technicians must comply with all notes and safety precautions.
- Document maintenance actions on the appropriate *Equipment Maintenance Record* form.

Performing equipment maintenance is a great way to learn how to transport, deploy, and operate equipment

Back-up