Net Control Type III

Homework for Part B

Santa Clara County ARES®/RACES

Last Updated: 31-Mar-2024

0

The co-pilot of the net

WORKING WITH A SCRIBE

What is a “Scribe?”

- A second set of ears (no mic) for the NCO
- Primarily used on heavy traffic nets
- Can keep outgoing message queue in priority order
- Can offload some record keeping so NCO can operate faster
- Can allow for more detailed status tracking
- Can watch the clock and prompt the NCO to make announcements, health and welfare checks, FCC ID, etc.
- Can handle questions and messages from others
- Can serve as “runner” when needed

A good NCO/scribe team functions as a single, integrated unit

Recommended NCO/Scribe Division of Duties

- Assumptions
  - NCO has microphone; scribe does not
  - NCO and scribe both hear the same thing
    - headphone splitter on same radio is ideal; HT listening to repeater is o.k.
    - Scribe's ability to hear NCO speak is critical; may be difficult in noisy location
- Resource Net
  - NCO: manages net; maintains ICS 309 Communications Log
  - Scribe: manage T-cards or tracking forms; prompts when H&W checks due
- Message Net
  - NCO: manages net; sends and receives messages, possibly ICS 309
  - Scribe: Probably ICS 309, prioritizes outgoing messages; manage T-cards
- Packet Net
  - Packet Operator: sends and receives messages
  - Scribe: prioritizes outgoing messages; manages printer; manage T-cards

Local Hand-off / Relief with a Scribe

- Trade jobs to reduce stress
  - Time frame depends on traffic and stress level
- Take a break
  - When one needs to take a break, net can continue (perhaps slower)
- Recommended relief rotation
  - Arrive and Plan in advance
    - Replacement (be available) up 5-15 minutes in advance; reviews procedures, equipment, surroundings
    - Scribe briefs replacement while NCO continues to operate net
    - Use final few minutes before handoff to make sure scribe is up to speed
  - Scribe becomes net control; replacement becomes scribe
    - Replacement → Scribe → Net Control → Break/Replacement → Scribe …
  - Done correctly, handoff can be completed in < 30 seconds

STATUS TRACKING

Heads Up Net Control
Can You Easily Answer the 5Ws?

- Who:
  - Who is checked into your net?
  - Reminder: resource net level 1 damage reports are not check-ins
- What:
  - EOCs, ICPs, etc.: partially/fully activated, …
  - Credential qualifications, contact info, location, assignment, …
- When:
  - When you haven't heard from them in a while (Message, Command nets)
  - Regular health & welfare check (Field/tactical nets, resource net, …)
- Where:
  - Street address, odometer for traveling resources
- Why:
  - DSW requirements, situational awareness, …

FIELD RESOURCE TRACKING

Distracted Driving Law

- Observe “distracted driving” laws
  - Documents: https://www.scc-ares-races.org/operations.shtml#mobile
- As the Resource Net NCO we are not going to ask drivers to break the law to respond to a H&W check while driving.
- Will require some flexibility as some operators will feel comfortable using their “installed” mobile radio while driving and others will not and will need time to find a safe place to pull off the hiway and respond.
  - During assignment, try to find out their preference and note it.
  - Adjust H&W messages accordingly.
- Example every 30 min +/- 5 min:
  - “<call sign> health and welfare check”, or
  - “<call sign> health and welfare check-in reminder, respond when safe”
- For the purposes of this course the exercises remain the same as before; e.g. for NCO/scribe exercise for listening and logging, operators immediately reply.

ICS-309 Logging Exercise

- Activation # XND-23-1TC, Op Period 12:00 – 15:00 03/04/23
- You take over as NC at 12:45. Log the following message traffic
- Herman Munster W6XRL4 is your scribe.
- You are at the EOC, your next Message # is XND-206

Time	Other Station	Their Msg #	Action
12.55	Shelter 1	S1-113	They send you a Shelter Status with bed counts
13:10	KJ6HAM		They check in and you assign them as Shelter 2
13:20	KB6HAM		They check in and you assign them as Shelter 3
13:50	Shelter 3	S3-2004	Your send them an Inventory check list
14:05	Shelter 2	S2-121	They send you a Supply Status
14:30			You send an all stations message saying the exercise is complete. Confirmation Msg #s: Shelter 1 – S1-122; Shelter 2 – S2-114; Shelter 3 – S3-2005
14:33			You made a net closed announcement and thanked the owners and operators of the repeater

Field Resource Tracking

- DSW supervision requirement handled over the air
  - This is important, even for drills and public service events!
- Resource assignment approved by an authorized person
  - DEC/CRO, RACES Unit Lead, ADEC/DCRO, or other delegatee
- The NCO is responsible for tracking field resources
  - NCO must always know who is on the net and where they are
- Always be aware of safety, help field ops to focus on safety
  - In stressful situations, people often overlook safety and/or get a "hero" mentality
  - Listen for and recognize this behavior in yourself and field resources

National Weather Service always advises for flood watch and warnings:
"Turn Around, Don't Drown"

Logging vs. Status Tracking

- Each contact/message recorded on ICS 309 Comm. Log
  - Example: Resource Net Level 3
    - Typically tracking volunteers (MACs) from home to event/incident and back
    - Key items logged: time, call sign, last three digits of odometer, and street location
    - En route health and welfare checks every 20-30 min +/-
  - Example: Message Net
    - Cities may join or leave the message net at different times
- But ICS 309 is not ideal for STATUS tracking
  - It's hard to quickly tell who's currently on the net and who's not
  - It's hard to quickly tell overall status/progress of each station/person

Example Resource Net ICS 309 Comm Log

COMM Log ICS 309-SCCo ARES/RACES	1. Incident Name and Activation Number *Santa Clara County Drill* *XSC-24-02C*	2. Operational Period (Date/Time) From: *4/6/24 06:00* To: *4/6/24 12:00*
3. Radio Net Name (for NCOs) or Position/Tactical Call *Resource Net*		4. Radio Operator (Name, Call Sign) *Herman Munster, W6XRL4*

5. COMMUNICATIONS LOG

Time (24:00)	FROM Call Sign/ID	FROM Msg #	TO Call Sign/ID	TO Msg #	Message
0645	*W6HAMM*				*check-in / depart First St. odo 112*
0650	*W6DRAC*				*check-in / not ready*
0700			*W6HAMM*		*odo 123 Second St.*
0700	*W6DRAC*				*depart Mercury st. odo 101*
0715			*W6HAMM*		*odo 134 Third St.*
0715	*W6DRAC*				*odo 201 Venus St.*
0730	*W6WOOF*				*check-in / not ready*
0730	*W6HAMM*				*Fourth st. odo 145*
0730			*W6DRAC*		*Mars St. odo 301*
0735	*W6HAMM*				*arrived / checkout*

Possible, but difficult to determine current status

Keeping Track of Status

- Need to be able to quickly answer status-related questions
  - Who is en route? Who has arrived? Who needs a H&W check?
  - This is hard to do by scanning the 309, especially multiple pages
- It is usually helpful to track status separately
  - Especially with a larger number of travelers
- Lots of options
  - Index cards, t-cards, white board, computer, forms, plain paper, …
  - Resource Net Tracking Form
  - Choose whatever method works for you
  - Must be accurate and efficient
- Remember, this is a DSW supervision responsibility
  - Get it right!

RESOURCE NET TRACKING FORM

Resource Net Travel Tracking Tool Form

Resource Net Travel Tracking Tool	1. Incident Name and Activation Number:	2. Operational Period (Date / Time): From: To:

3. Call Sign	4. Traveler Status (00:00 24-hour –or– ✓)								5. Notes
	Check-In	Depart	H&W-1	H&W-2	H&W-3	H&W-4	Arrive	Check-Out	

6. Prepared by (Name, Call Sign)	7. Date & Time Prepared	8. Page __ of __

15

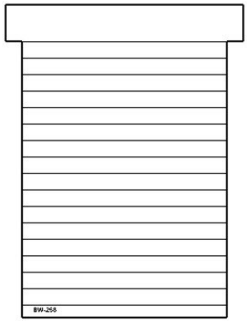
Resource Net Travel Tracking Form

- Not a substitute for the ICS-309 Communications Log
  - ICS-309 logs time, call sign, odometer, street location
  - Form only used to record time (or just a check mark) of last status
- Convenient for drills and public service events
  - Everyone traveling to one location
  - Use a clipboard, minimal table space required
- Not as useful as T-cards for real incidents
  - Individuals traveling to different destinations
  - Individuals with different skill sets
- Instructions on back of form
- Not a required form, but most people find it helpful

T-CARD SYSTEMS

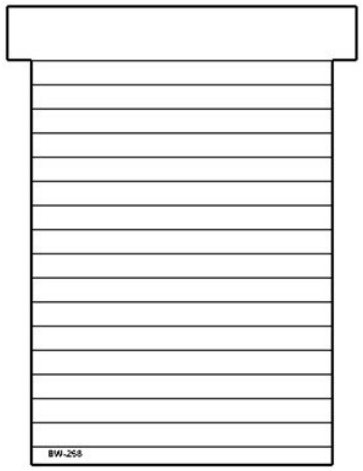
T-Card Systems

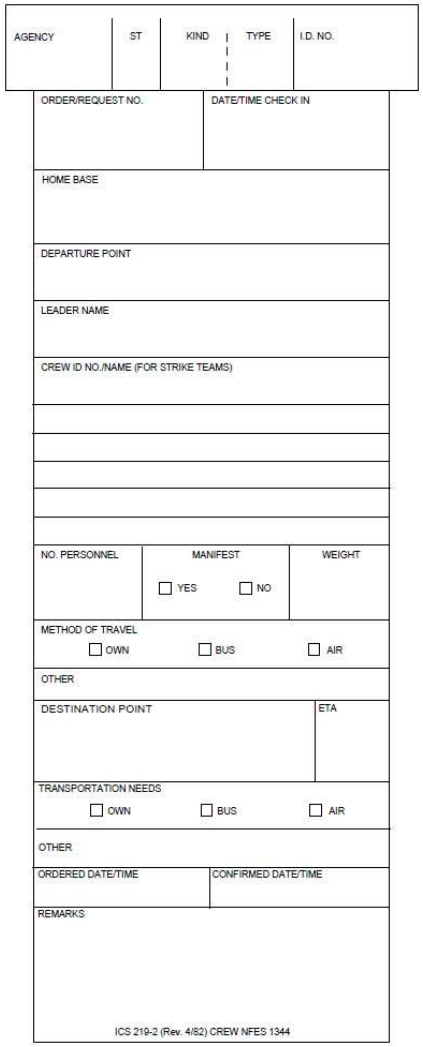
- A simple indexing system which uses cards shaped like a T
- Very useful when tracking larger number of resources
- Racks available in various configurations
- Extra Credit: why shaped like a T?



T-Card Formats

- ICS-219 used by Fire and Search & Rescue
  - Standard formats preprinted for crew, helicopter, aircraft, individual personnel, dozer, …
- Colors indicate type of resource
- Smaller cards typically used in ARES®/RACES
- Index cards are good substitute



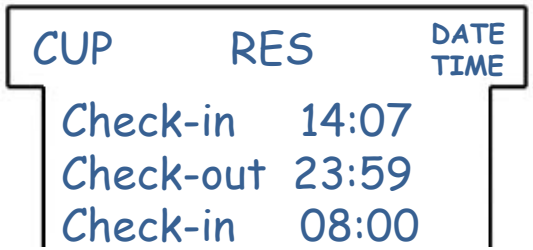


Tracking Cities/Agencies/Shelters/Locations

- Rack is organized in columns for nets; rows for cities/agencies
- Presence of card indicates that entity has checked-in on that net
  - Cards placed in "Inactive" slot when city is checked-out of that net

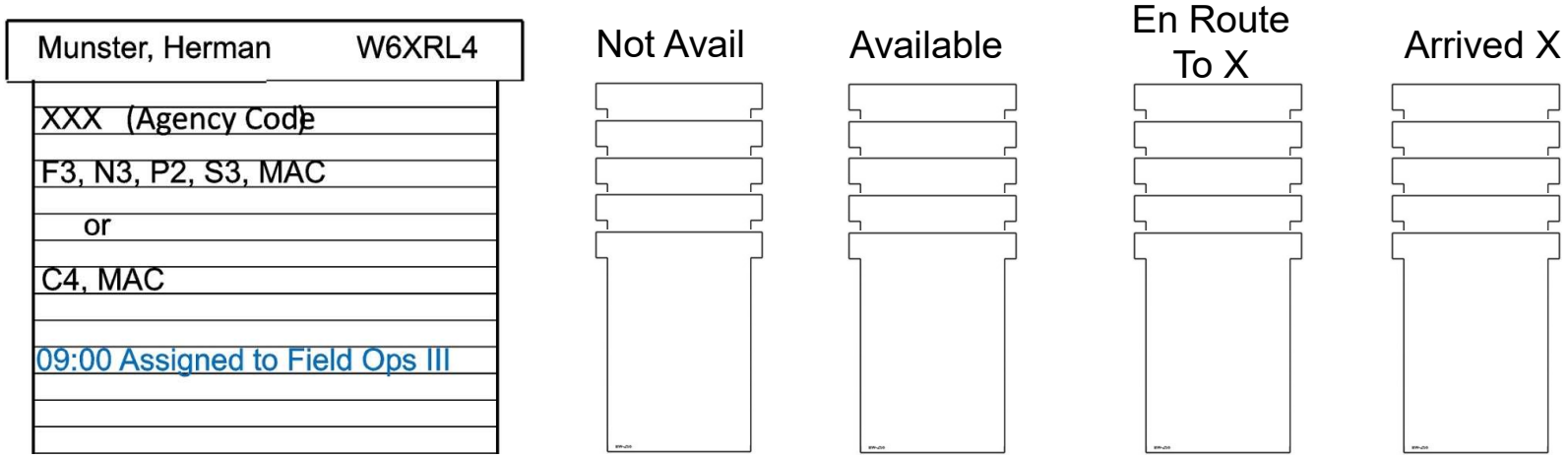
City	Resource	Message	Command	Packet	EOC	Inactive
Campbell						CBL RES DATE TIME
Cupertino	CUP RES DATE TIME	CUP MSG DATE TIME				CUP MSG DATE TIME
. . .						

- Details on card show Agency, Net type, check-in/out time, …

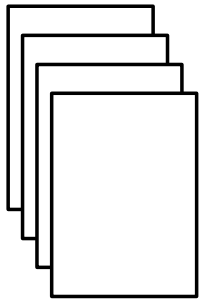


Tracking Individuals with T-Cards

- Individual NCO may simply write call signs on the t-card
- Scribe can maintain more info as needed for situation
  - Call sign, Credentials, home city/agency, time of last H&W check, assignment, status, cell phone, …
  - Specific details dependent on traffic level and particular situation
- Flexibility is key – no two situations are exactly alike



Index Cards as Substitute for T-cards



- No T-cards? Index cards can be just as effective
- One card per person
  - Amount of info on card can be simple or detailed
  - Start with call sign and MAC qualifications
  - A scribe can help with more detail
- Instead of columns in a rack, make piles for each status
  - Available, en route to X, en route to Y, arrived @ X, arrived @ Y, …
  - Stagger cards so top line is visible
- New or updated card inserted at bottom of pile
  - Next H&W check is usually the person on top
- Similar process for transfers or return home

EQUIPMENT FOR NET CONTROL

Required Equipment

- Typical situation
  - Most nets are managed from an EOC radio room (county, city, agency)
  - Most EOCs are fully equipped, but some are not or are not tested
    - You may prefer your own headphones/headset or sanitary covers, hand sanitizers, alcohol wipes, face masks, etc.

- Be prepared with your own equipment anyway
  - 2 hour carry kit & 12 hour go kit
  - Go Kit checklists: https://www.scc-ares-races.org/operations.shtml#equip
  - Itemized as: required, recommended, optional
  - Minimum required means you can't do the job without it
    - May not be the most efficient or comfortable way to operate
  - Recommendation: consider the "recommended" items, too; go with what works for you.

Net Control Ops Still Need Complete Go Kit

- Even if you're going to a fully equipped net control station, you still need your go kit. Some example uses:
  - HT and coax adapters
    - Monitor tactical frequency, monitor for doubles, backup radio
  - County frequency List
    - Direct resource net check-ins to proper city tactical frequency
  - Emergency contact numbers
    - Direct dial police, fire
    - ADEC list for repeater linking; EC list to direct check-ins to local resources
  - Maps (printed or electronic offline – *device must work in airplane mode*)
    - Minimum = Santa Clara County for resource net
    - Surrounding counties, event specific or incident maps
    - Smartphone map apps: use offline download of intended area
  - Clock or watch
    - Set to 24-hour time is most convenient for logging, message traffic

Headsets for Net Control

- Use a headset whenever possible
  - Reduces noise and distractions
  - Keeps microphone positioned consistently
  - Frees hand from holding microphone
  - Use a headset even with an HT!
- Be aware
  - Most HTs and many mobile radios have mono headphone outputs
  - Most dual-ear headsets are stereo
    - (Note: dual-sided Heil Traveler is mono)
  - Many headsets have different adapter cables per radio type
- Recommendations
  - Use stereo headphones with proper stereo/mono adapters
    - Stereo can be used to monitor a different VFO in each ear
  - Use over-the-ear / full ear cup – except when driving!

Headset Connections for Scribes

- Simplest option – Splitter
  - Available from most electronics locations
  - Add single or dual volume control

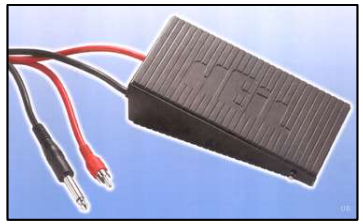
- Better option - Headphone amp (12v DC)
  - Set sound level for each pair of headphones
  - Pictured: ART HeadAmp4 – about $~~50.00~~ 79.99 (new)

- Even better options?
  - Add intercom functionality between NCO and scribe
  - Issues: microphone levels, PTT should override VOX, stereo (for two radios or VFOs), …
  - Custom home-brew solutions?

PTT Options for Headsets

- Headset needs hand- or foot-switch for PTT
- Hand switch
  - One hand still occupied
    - But can now be repositioned; can hold down papers
  - Still hard to type and use a computer
  - Doesn't sit on the ground - good in dirt or rain, vehicle

- Foot switch
  - Frees BOTH hands for typing, computer logging
  - Beware of hinged, gas-pedal style
    - Ankle fatigue; chasing it around under the desk
  - Round, heavy is preferred by many
    - Stays put, allows different foot positioning, prevents fatigue
    - Local contesting favorite: Linemaster Gem V2 (shown here)
  - Not ideal outdoors (in dirt or rain)



Protection From the Elements

- Protect yourself and your equipment from the elements
  - Heat, sun, wind, rain, cold
- Consider a pop-up shelter for outdoor sites
  - Side panels important for rain, shade, cold, night (bugs)
  - Tent stakes or ballast important for wind
- Consider airflow
  - Personal clip-on fan (12 VDC)
    - Available from marine & aviation distributors
  - Computer equipment fan (12 VDC, ¼ A)
    - Recommend 25 dB or less and 50 CFM or more
- Consider lighting
  - Logging, reading maps, reports, manuals
  - Consider an LED light stick (100-120mA) or wind-up lantern

Power Requirements for Net Control

- Question:
  - What size battery do we need for an X hour shift as Net Control?
  - Different from a field operator!

- Read the application note: AGM vs LPF Battery Testing
  - https://www.scc-ares-races.org/operations/docs/AGM_vs_LFP_Battery_Test_App_Note_v190208.pdf

SLA vs $LiFePO_4$

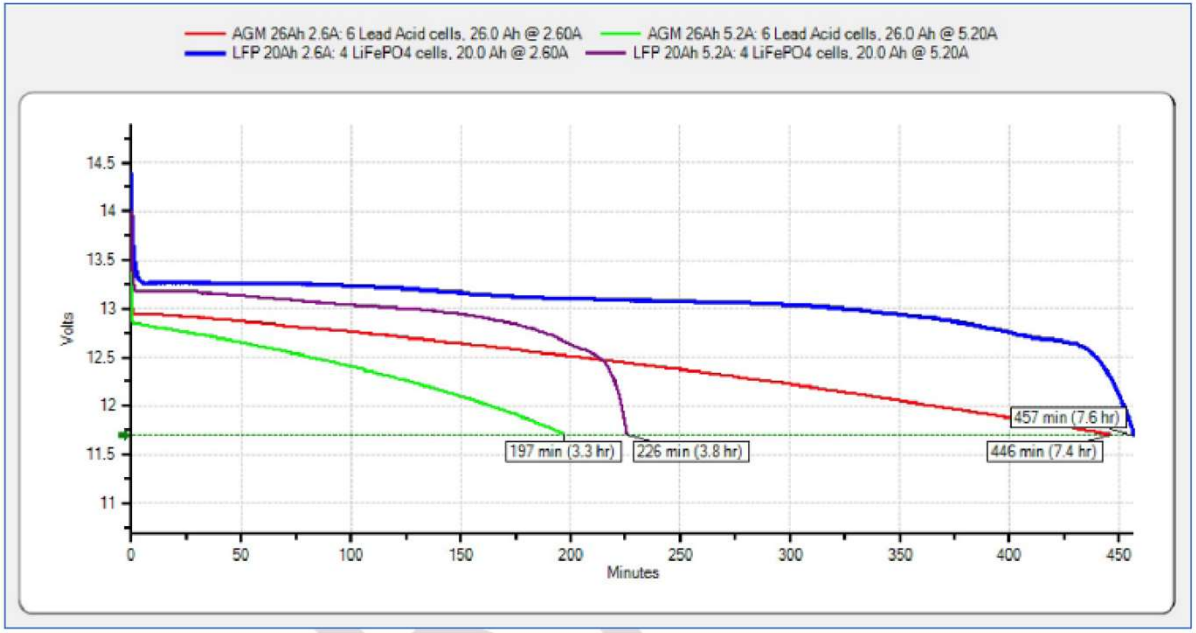
- PowerSonic PS-12260, 12V 26Ah AGM, approx. 2 years old
- Bioenno BLF-1220A, 12V 20Ah $LiFePO_4$ battery, new
- Cut-off voltage 11.7 VDC.
  - This corresponds to the lowest operating voltage for commonly used mobile VHF/UHF amateur radios.
- Example radio: Kenwood TM-V71

Radio Operating State		Current (per User Manual)	Current @ 11.73 V	Current @ 13.8 V	Current @15.87V
Idle					
Squelched, no signal		Not specified	0.5 A	0.5 A	0.5 A
Receive					
@ 2W audio output		"Less than 1.2A"	0.6 A	0.6 A	0.7 A
Transmit					
VHF	Hi (50W)	"Less than 13.0 A"	7.7 A	8.2 A	8.6 A
	Med (10W)	"Less than 5.5 A"	4.6 A	4.6 A	4.7 A
	Low (5W)	"Less than 4.0 A"	3.2 A	3.2 A	3.3 A
UHF	Hi (50W)	"Less than 13.0 A"	8.6 A	9.2 A	9.7 A
	Med (10W)	"Less than 6.5 A"	4.5 A	4.6 A	4.7 A
	Low (5W)	"Less than 5.0 A"	3.1 A	3.2 A	3.3 A

Table 1: Kenwood TM-V71 Current Values

Our Constant Current Discharge Test Results

- A constant current test was run on both the 26Ah AGM battery and the 20Ah LFP battery. Two current values were used with each battery: 2.6A and 5.2A, corresponding to two of the curves present in the 26Ah battery datasheet.
- Note: When comparing the the curves below with the curves from the AGM battery datasheet, note that the time axis in the datasheet is logarithmic, while it is linear in the graph below.



- These results can be summarized and compared to the expected values for the 26Ah AGM battery as interpolated from the datasheet.

	2.6A Discharge to 11.7V	5.2A Discharge to 11.7V
26Ah AGM Datasheet	402 min (6.7 hr)	174 min (2.9 hr)
26Ah AGM Battery	446 min (7.5 hr)	197 min (3.3 hr)
20Ah LFP Battery	457 min (7.6 hr)	226 min (3.8 hr)

Net Control Operator Duty Cycle Test

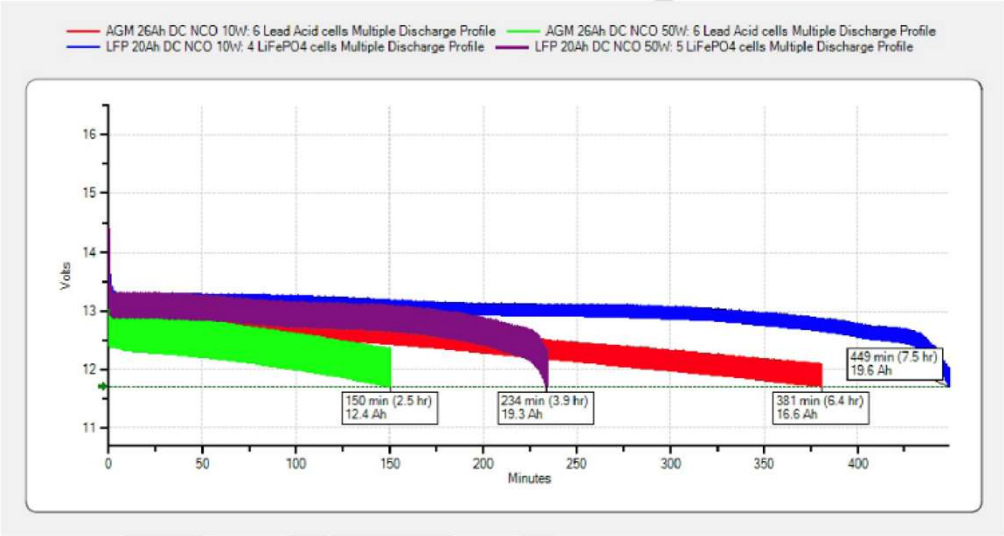
For purposes of a battery test, the following is assumed to be representative of a very busy net control operator's communications over a one-hour period.

- **Total Idle time (no signal received) = 3 minutes (5%)**
  - Even the busiest of nets have some idle time between transmissions, which adds up over the course of an hour
- **Total Transmit time = 32 minutes (53%)**
  - Send one formal all stations message per hour (ICS-213, ICS-213RR or other form)
    - Clock time = 8 minutes
    - TX time = Approximately 6 minutes
  - Send four formal messages per hour (ICS-213 or other form)
    - Clock time = 5 minutes each; 20 minutes total
    - TX time = Approximately 4 minutes each; 16 minutes total
  - Receive four formal messages per hour
    - Clock time = 5 minutes each; 20 minutes total
    - TX time = Approximately 1 minute each; 4 minutes total
  - Send/receive informal traffic (conduct two health and welfare checks, net announcements, respond to check-ins/outs, etc.)
    - Clock time = 9 minutes
    - TX time = Approximately 6 minutes
- **Total Receive time = 25 minutes (42%)**
  - (60 minutes) – (3 minutes idle time) – (32 minutes TX time) = 25 minute

Net Control Duty Cycle Test Configuration

- 10 W (M) and 50 (H) transmit power was simulated. The “Multiple Discharge” test was used to simulate a repeating cycle of idle, transmit and receive until the battery reached 11.7 V. (seconds are substituted for minutes).
- Test Device: West Mountain Radio Computerized Battery Analyzer IV Pro (CBA IV Pro) plus one CBA Amplifier, which is required in order to draw more than 100 Watts.

State	Duration/Cycle	Medium (10 W)	High (50 W)
Idle	3 sec	0.5 A	0.5 A
Transmit	32 sec	4.6 A	9.2 A
Receive	25 sec	0.6 A	0.6 A



	10 W Transmit	50 W Transmit
26 Ah AGM Battery	381 min (6.4 hr); 16.6 Ah	150 min (2.5hr); 12.4 Ah
20 Ah LFP Battery	449 min (7.5 hr); 19.6 Ah	234 min (3.9 hr); 19.3 Ah

Predicting Battery Capacity

- Weighted Average Discharge Current
  - Calculating an equivalent constant current value from a duty cycle can be done by using the weighted average of the different currents values that make up the duty cycle. The weighted average current can be calculated as follows:
    - (idle %)(idle current) + (TX %)(TX current) + (RX %)(RX current)
- For example, the 50 Watt Field Operator Duty Cycle for one hour can be summarized as follows**:**
  - Idle = 3 minutes (5%) at 0.5 Amps
  - Transmit = 12 minutes (20%) at 9.2 Amps
  - Receive = 45 minutes (75%) at 0.6 Amps
- We can calculate the weighted average current of the 50 Watt Field Operator Duty Cycle to be:
  - (0.05)(0.5 A) + (0.20)(9.2 A) + (0.75)(0.6 A) = 2.3 A

Review: Rules of Thumb for Battery Capacity

LFP Battery:

- The rule of thumb for calculating expected runtime for an LFP battery can be expressed as:
  - [LFP 20 hr Rating] / [Weighted Avg Current (A)] = Expected Runtime (hr)
- Using this rule of thumb, the expected runtime for the 50 Watt Field Operator Duty Cycle is:
  - [20 Ah] / [2.3 A] = 8.7 hours

AGM Battery:

- The rule of thumb for calculating expected runtime for an AGM battery is similar, but discounts the battery's 20-hour rating by 50%. It can be expressed as:
  - [50% of AGM 20 hr Rating] / [Weighted Avg Current (A)] = Expected Runtime (hr)
- Using this rule of thumb, the expected runtime for the 50 Watt Field Operator Duty Cycle is:
  - [(0.50)(26 Ah)] / [2.3 A] = [13 Ah] / [2.3 A] = 5.7 hours

Further refinement: Calculating Battery Capacity with Peukert's Law

- Read the report: AGM_vs_LFP_Battery_Test_App_Note
  https://www.scc-ares-races.org/operations/docs/AGM_vs_LFP_Battery_Test_App_Note_v190208.pdf

Pre-flight through “flying” the radio checklists!

PILOTING THE NET CONTROL STATION

N3: Expectations for Station Operation
Prepare your checklist

- As a Net Control Type III you are:
  - A fully independent operator
  - Capable of basic net control assignments without assistance or coaching.
- This means being able to use someone else's station equipment; e.g., a different city's equipment, equipment at a field exercise or actual deployment.
- "But, but it is just ham radio equipment, anyone can figure it out"
  - You need to be efficient about walking up to a previously unknown station and have it ready-to-go for your operational period
- This suggests a methodical approach to being consistent
- Aircraft pilots do this all the time using a checklist
- Try developing a checklist for any Net Control radio station

Items to consider

Things to consider doing before arriving at your assignment

Checked	Item
☐	Update County Voice frequency list, if needed
☐	See if you can find out what radio make and model you will be using, if you can download the user's manual and study up on basics: VFO, memories, band selection, power setting, offset, PTT selection (if dual band), etc.
☐	Make sure your go-kit forms are up to date and bring extras with you
☐	Verify your own prepared scripts are up to date. Note that your served agency might have their own, but good to check yours.
☐	Bring your own headphones?
☐	Anything else?
☐	

Sizing up the equipment

Things to consider doing before your operational period starts.

Checked	Item
☐	Verify your assignment, obtain the ICS-205
☐	Verify proper equipment power up. Also, methods of supplying power. Only on battery: verify you have enough Ah available for the operational period.
☐	Verify memory/VFO programming for your intended net: frequency, shift, offset, and PL tone set.
☐	If a mobile radio with two “sides”: which side will you be using and verify PTT selected for the side of the radio you’ll be using
☐	Verify PTT method: microphone, handswitch, or footswitch. Verify VoX is turned off if the radio has that capability (never enable Vox!!!)
☐	Verify transmit power is set correctly
☐	Verify squelch is set correctly
☐	Listen on frequency of intended use. If free, verify PTT operation with successful voice transmission (and repeater squelch tail has been heard).
☐	Document any issues from expected behavior. Inform both Supervisor and next staff that arrives of each of the issues. Get approval to remedy any issues if are able.
☐	Anything else?

Homework Preparation Checklist

Done?	Homework Item
☐	Reviewed self-paced training video for ICS-214
☐	Started ICS-214 for the class
☐	Reviewed both parts of self-paced training video for ICS-309
☐	Create a Preflight checklist for yourself. Prepare to share and be interactive in class.
☐	Complete Homework ICS-309 logging exercise

Done?	Other Items
☐	If needed, print your credential wallet card. Cards expire(d) on 31 Jan 2024
☐	If needed, check SCCo go-kit forms for any updates and update personal go-kit
☐	If needed, review your scc-ares-races.org ”My Profile” -> “My Contact Info” • Updated any information • Check the box following “I have reviewed the information on this page” • Pressed “Save Changes” Note: please try to do this at the beginning of every year and when there are changes to your contact information

Thank You!

Some of the homework and the assignment will be reviewed during the class.

The rest you will have to retain in your knowledge.