




Net Control

For Disaster Communications

Level 2



Santa Clara County ARES®/RACES

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What if you were faced with:

- Virtually non-stop radio communication for your entire shift
- Each transmission contains multiple critical pieces of info
- Personal safety of many at stake


Some folks do that every day

Our challenge:

- Need professional performance
- We rarely need to implement
- So, we conduct regular practice drills and training classes

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Learning Objectives



By the end of this class, you should be able to:

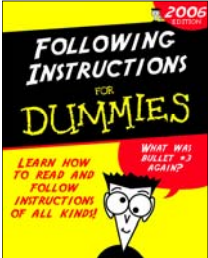
- Understand the role of an advanced net control operator (N2)
- Understand the concepts, techniques, equipment and procedures required to operate:
 - County Resource Net Level 2
 - County Resource Net Level 3
 - County Message Net
 - Other critical and/or high-traffic nets
 - Two nets simultaneously
- Understand the basics of net planning

Classroom understanding is only the first step
It takes experience to become an advanced operator.

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Housekeeping

- Refreshments
- Pen/pencil & paper
- Corrected handouts
- Cell phones & pagers
- Side conversations
- Questions
- Breaks
- Restrooms
- In case of emergency



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Agenda

- The Advanced Net Control qualification (N2)
- Dealing with net control challenges
- Working with a Scribe
- Equipment for Advanced Net Control
- T-cards and Resource Tracking
- Resource Net Operations: Levels 2 – 3
- Message Net Operations
- Organizational models for net control
- Planning Net Control Operations

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Capabilities, Services and Typical Assignments

NET CONTROL OPERATOR LEVELS

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Review of Net Control 1 N1

- Previous class reviewed typical N1 capabilities and services
 - Fully independent operator
 - Capable of basic net control assignments without assistance or coaching
 - Low to medium traffic nets
 - Scribe for low to medium traffic nets
- Typical N1 Assignments
 - Initial Resource Net Level 1 NCO immediately after incident
 - Resource/travel net for public service events
 - Small to medium city and tactical nets
 - County Command Net NCO
 - Small staging area net control
 - Drills and public service events

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Net Control 2 Capabilities, Assignments N2

- All Net Control 1 capabilities and services, plus:
 - Advanced level operator
 - Net Control for medium-to-high traffic net
 - Scribe for medium-to-high traffic net
 - Simultaneous participation in two nets (one active; one light duty)
 - Plans, designs, operates nets for smaller events; assist with larger events
- Typical Assignments
 - Net control or scribe high traffic for county nets
 - County Resource Net level 2 and level 3
 - County Message Net
 - Net control or scribe for large city net
 - Net control for large staging area or large tactical net
 - Liaison operator between two nets

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Net Control 3 Capabilities, Assignments N3

- All Net Control 2 capabilities and services, plus:
 - Specialist level operator
 - The most complicated, highest traffic, most critical assignments
 - Planning, designing, and operating complex multi-radio, multi-net configurations for larger events or incidents
 - Equipped for and capable of out-of-county and extended deployments
- One additional course covers level 3 for all qualification areas
- This course focuses on Net Control 2

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DEALING WITH CHALLENGES

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Loss of Repeater

- Situation
 - Loss of repeater
- How to recognize
 - No courtesy tone (and there used to be one)
 - No squelch tail
 - Not receiving responses
 - Pick one or more stations and call them specifically
 - You can hear people on the input but not the output

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Loss of Repeater

- Action
 - Switch to simplex on repeater output
 - Switch to high power; include tone, in case others are using tone squelch
 - Program into your radio memory for fast recovery
 - If linked repeaters, you may be able to get by with the remaining ones
 - Inform the net of the situation; have them switch to simplex
 - Advise them to NOT use tone squelch
 - Some people will not hear you (repeater range > yours)
 - Accept the fact that you will lose people (especially if they are untrained)
 - Trained operators will be switching to repeater output, too
 - Listen on repeater INPUT for anyone having problems
 - Ask for relays
 - Contact supervisor; request he/she contact repeater control operator
 - Switch to alternate repeater (if available) – you will lose a few more

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Loss of power

- Situation
 - You are working net control when the lights go out and the radio goes dead
- Action
 - Use your HT to inform net of the situation
 - Hook HT up to station antenna if you need better range
 - Keep those coaxial adapters handy!
 - Seek help in restoring power while you work the net
 - It could just be a popped breaker or fuse!
 - You may also need your flashlight!
 - Pass net control duties to another operator
 - Prevent the problem with 12 hours of battery backup in station design
 - Minimum: 3000 mA for HTs, 20-26 AH for mobile stations
 - Net control stations will need MUCH more than the minimum

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Field Operator with Poor Skills

- Situation
 - Field operator with poor skills disrupting or slowing down the net
- Action
 - Polite reminder to all stations of proper protocol
 - Better than singling out an individual
 - They may simply be unaware
 - Specific corrective action request to specific operator
 - See if he's distracted by monitoring another frequency; if so, he should stop
 - Switch to "requester" role instead of "receiver" role
 - Your message number? Your date and time? Your Severity? ...
 - Move him to another frequency with less traffic, if possible
 - Ask supervisor to request replacement
 - Use phone (if possible) or command net to contact responsible EC

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Open MIC Condition

- Situation
 - Someone unknowingly has an open mic on the net frequency
- Action
 - Everyone
 - Listen for and check their own radio if heard; watch radio xmit light; clicking in earphone/headphones (loose connection); no traffic heard for a while
 - Deploy field communicators in pairs; have teams check each other
 - Repeater
 - Increase your power to try to capture the repeater
 - Switch to simplex on repeater output and increase power to capture local receivers
 - Simplex
 - Increase power to capture local receivers
 - Roll call check to determine who can receive; dispatch to check others
 - Designate secondary freq. to monitor for open mic announcements

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Well-meaning But Disruptive Operator

- Situation
 - Field operator trying to be helpful, taking and acknowledging check-ins as a relay, not going through net control
- Action
 - We don't want to discourage people who want to help
 - Remind all stations that this is a directed net and that all traffic must go through net control
 - Announce that you are not taking relays right now but will be soon
 - Ask for relays by call signs only
 - "Are there any relays? I'll take call signs only at this time."

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High Volume Check-ins/Reports

- Situation
 - You are net control taking check-ins or Mike-Mike reports. Reports are coming in faster than you can record them.
- Action
 - Request 5 call signs at a time
 - Request by severity (and first 5 call signs)
 - Request by city (and first 5 call signs)
 - Ask for a scribe
 - Periodically: "Is there any emergency or priority traffic?"
 - Periodically: "Are there any stations that have not been able to reach net control?"


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Emergency Message

- Situation
 - You are taking messages on a low-to-medium traffic net with no scribe and no runner. An EMERGENCY (life threatening) message comes to you from the field and must go to Incident Command immediately
- Action
 - Prioritize Emergency traffic over all other
 - Ask if there is any other Emergency traffic
 - Put the net on hold: "All stations stand by for about 2 minutes while I delivery this emergency message, this is KE6AGJ, net control"
 - Ask for an alternate net control to fill-in while you're gone
 - Deliver it to your supervisor or appropriate authority

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High Temperature

- Situation
 - You are net control in the middle of the summer in an area with very high temperatures which could affect equipment performance.
- Action
 - Use a pop-up or other means to create shade for yourself and radio
 - Use lower power
 - Switch radios
 - Switch off net control duty for a while – give the radio time to cool
 - Position radio for sufficient air flow
 - Sufficient space around cooling fins
 - “Radio in a box” is not the best approach in a hot environment unless it includes forced air (fan) ventilation
 - Consider sealed “blue” ice packs
 - Use a 12v DC fan (consider CFM > 50 and dB < 25) 

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Exhaustion


- Situation
 - You have been net control for 6 hours of your 8 hour shift and, because of exhaustion, you cannot complete your assignment
- Action
 - Drink fluids with electrolytes – may temporarily restore balance
 - Notify supervisor and request replacement
 - Give sufficient notice to allow time for supervisor to locate a replacement
 - Request a replacement on-air
 - If you need to stop, then stop

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Intentional Interference

- Situation
 - Your net is being disrupted by intentional harmful interference
- Action
 - Ignore them
 - Often they will go away if they don't get a reaction from you
 - Explain purpose of net; ask politely if they will switch frequencies
 - Sometimes interference is caused by people who think you are monopolizing “their” frequency and interfering with *them*
 - Once they understand the legitimate nature of the net, they may go away
 - Switch to alternate frequency
 - Should be planned in advance
 - Know what it is so the frequency doesn't need to be announced
 - Shift supervisor can report to Official Observer
 - If possible, record event for use later by the official observer

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The co-pilot of the net

WORKING WITH A SCRIBE

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What is a “Scribe?”

- A second set of ears (no mic) for the NCO
- Primarily used on heavy traffic nets
- Can offload some record keeping so NCO can operate faster
- Can keep outgoing message queue in priority order
- Can allow for more detailed status tracking
- Can watch the clock and prompt the NCO to make announcements, health and welfare checks, 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

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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
 - Scribe: manage T-cards or tracking forms; notifies NCO when H&W checks are due
- Message Net
 - NCO: manages net; sends and receives messages, possibly ICS 309
 - Scribe: Probably ICS 309, prioritizes outgoing messages
- Packet Net
 - Packet Operator: sends and receives messages
 - Scribe: ICS 309, prioritizes outgoing messages

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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
 - Plan in advance
 - Replacement shows up 5-15 minutes in advance; reviews procedures, equipment, surroundings
 - Scribe briefs replacement while NCO continues to operate
 - Use final few minutes before handoff to make sure scribe is up to speed
 - Replacement becomes scribe; scribe becomes net control
 - Replacement → Scribe → Net Control → Break/Replacement → Scribe ...

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ADVANCED TECHNIQUES FOR NET CONTROL

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Keep Information Accessible

- Be as informed as possible; be prepared with information
 - Backlog created the first time you can't answer a question right away
 - Clearing the backlog takes time away from all other activity
 - Examples: lost traveler, missing frequency info, missing contact info
- Anticipate check-in verification requirements
 - Have city list or county DSW list ready to verify check-ins
- Anticipate questions, have answers ready
 - ... or line up a way to get answers quickly
 - Resource net: maps, travel advisories/hazards, DSW status
 - Staging or other sites: site status, facilities, parking, resource status
 - Command net: phone numbers, frequencies, reporting structure

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Avoid the Need to Repeat Yourself

- You can't talk fast enough to make up for the time to repeat
 - And the other person can't copy that fast anyway!
- Speak clearly, concisely, and enunciate words carefully
- Use phonetics, numbers, prowords properly
- Pace your speed on written info by "shadow" writing
- Headset and mic position
 - Maintain consistent mic position - even if you turn your head
- Proper mic gain
 - For FM, usually low/med/high; for USB/LSB, gain & compression
- Know repeater delays
 - Pause after keying up; pause after courtesy tone
- Monitor for doubles
 - Use HT or scanner – earbud under headphones

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Multiple Actions with One Command

- Do things five (or more) at a time
- Check-ins
 - Take 5 call signs at a time
 - Tell them what info you need; how to respond
 - Then call each one
- Resource net activations
 - Collect 5 call signs, issue instructions; get 5 acknowledgements
- Health and welfare
 - Announce H&W roll-call, the run through them all at once
- Ask for multiple pieces of information with one check-in
 - "When I call you, respond with your city, your MAC qualifications and your callsign"


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Provide Direction for Responses

- Inform (remind) the field communicators of reply format
 - Some people may be new/inexperienced; others excited, tired
- Examples:
 - "I will now check-ins from MACs who have been released from their cities. If you have not been released by your city, you should return to your city net or contact your EC for release. I'll take the first five call signs."
 - ... then: "When I call you, indicate if you are a MAC, list any MAC qualifications you have phonetically, such as 'foxtrot 1,' and your call sign ..."
 - "I will now call for Health and Welfare checks. When you hear your call sign, respond with the last three whole numbers on your odometer, your street, and your call sign ..."

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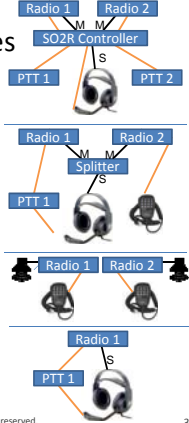
Working Two Frequencies



- Why two (or more) frequencies?
 - First person on site at EOC – multiple nets already operational
 - Resource net repeater link not working – two separated resource nets
 - Some nets are low traffic – will never have a dedicated operator
- Operating role depends on net requirements, operator skill
 - Liaison operator on both nets
 - Full time net control on one net; liaison operator on second net
 - Full time net control on both nets
- Equipment depends on net requirements, availability
 - If available equipment doesn't meet the needs of the role, adjust the role to handle what you can with what you have
 - Example: single radio will severely hamper dual net control role

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Equipment for Two Frequencies




- Full Single Operator /2 Radio Config
 - Stereo headset (one radio per ear)
 - Separate PTT for each radio (footswitch)
 - Allows reception while transmitting
 - Common for contesting, not EmComm
- Two radios, headphones, two mics
 - Stereo headphones (one radio per ear)
 - Two mics (or main radio mic in headset)
 - Allows reception while transmitting
 - Alt: HT w/earbud for second freq. may work
- Two radios, two speakers
 - Distance between speakers helps distinguish radio
 - Very noisy
- One radio, two VFOs
 - Stereo headphones (VFO per ear)
 - No reception on 2nd VFO while transmitting

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Consider Radio Contesting for Practice

- Similar goals in contesting as for net control:
 - Accurate copy (penalties and DQ for errors), speed, caller mgmt
- Similar success factors:
 - Clarity of speaking voice, economy of words, knowledge of phonetics, quality of hearing, endurance, station quality and preparation, radio operations, ...
- Example:
 - Dean Straw, N6BV, Editor ARRL Antenna Book
 - ARRL Sweepstakes 2001: 1289 QSOs; 24/30 hours
 - Exchange: message number, precedence, call sign, check, section
 - Economy of words maximizes score
 - Low error rate maximizes score – Dean's is typically << 1%



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Practice Logging the Exchange

Dean's exchange:


| Number | Precedence | Call Sign | Check | Section |
|--------|------------|-----------|-------|---------|
| ### | B | N6BV | 59 | EB |

See how many others you can copy in 2m 40s ... 🐣

| | | | | |
|----|---|--------|----|-----|
| 71 | A | K5IID | 56 | WV |
| 12 | M | NN2T | 59 | NNJ |
| 95 | B | K2PLF | 55 | MDC |
| 80 | B | K3MD | 63 | EPA |
| 14 | A | N5LYG | 86 | STX |
| 38 | A | N1WR | 61 | MDC |
| 35 | A | NN2L | 64 | NNY |
| 33 | A | VE3FWA | 85 | ON |

How did you do? How about 24 hours? 1000s of QSO's

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Work faster, work longer, work smarter

EQUIPMENT FOR ADVANCED NET CONTROL

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Headsets


- Use a headset instead of headphones
 - Headset keeps microphone positioned consistently
 - Frees hand from holding microphone
 - Use a headset even with an HT
- Use stereo instead of mono for two freqs (except if driving!)
 - Allows radio or VFO per ear (if radio provides it)
 - Most HTs do not provide stereo/separate VFO per ear
 - Note: Even dual-sided Heil Traveler is mono
- Adapter cables
 - Adapt from headset connector to radio connector
- Headphone amp (12v DC)
 - Set sound level for each pair of headphones
 - A simple splitter works in a pinch

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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
 - Not ideal outdoors (in dirt or rain)



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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 (12v DC)
 - Available from marine distributors
 - Equipment fan (12v DC)
 - 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



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Power Requirements for Net Control

- Worst case
 - 100% net utilization (someone is talking all of the time)
 - 50% net control (every message is between net control and someone)
- Example radio: Kenwood TM-D710
 - Receive Current: "Less than 1.2A (at 2W audio output)"
 - VHF Transmit Current: "Less than 13A/5.5A/4A" (for 50/10/5 W)
 - UHF Transmit Current: "Less than 13A/6.5A/5A" (for 50/10/5 W)
- Example calculation for 12 hours at 50W Xmit power:
 - Rec: (1.2A) * (6 hours) = 7.2 Ahr
 - Xmit: (13A high power) * (6 hours) = 78 Ahr
 - Total = Rec + Xmit = 7.2 Ahr + 78 Ahr = **85.2 Ahr**
- Same calculation for 12 hrs at 10W on VHF:
 - Total = Rec + Xmit = 7.2 Ahr + 33 Ahr = **40.2 Ahr**

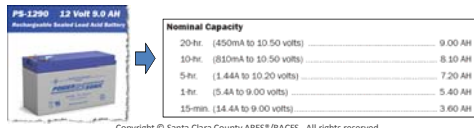


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Understanding Battery Numbers

- Sealed lead acid batteries come in lots of sizes
 - AH = Amp Hours; 1 Ah = 1000 mAh
- Understand the current used for the rating
 - AH rating is usually for 20 hour test → AH rating / 20 hr = theoretical Amps for 20 hrs
 - NOT a linear relationship: twice the current yields less than half the time
- Understand the voltage cut-off used for the rating
 - Cut-off voltage used in rating test is usually MUCH lower than your radio will like
 - Most radios specify 13.8V +/- 15% (low of 11.7V); usually stay above 11.5V
- Rating decreases with age, heat, cold, discharge history, storage conditions
- **Rule of thumb:** Discount rating by 1/3 for rated current; up to ½ if current >> rating


| Nominal Capacity | |
|------------------------------|---------|
| 20-hr (450mA to 10.50 volts) | 9.00 AH |
| 10-hr (810mA to 10.50 volts) | 8.10 AH |
| 5-hr (1.44A to 10.20 volts) | 7.20 AH |
| 1-hr (5.4A to 9.00 volts) | 5.40 AH |
| 15-min (14.4A to 9.00 volts) | 3.60 AH |



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Alternative Power Sources


- Example: Net control average wattage (½ speak, ½ listen)
 - $W_{avg} = V * A_{avg} = 13.8 \text{ Volts} * [(Rcv \text{ current} + Xmit \text{ current}) / 2] \text{ Amps}$
 - For Kenwood TM-D710 at 10W: $13.8V * (1.2 + 5.5)/2A = 46.23W$
- Also consider other power requirements
 - Lights, fan, charger for HT, etc.
- Solar
 - Foldable/portable available up to 62W
 - Higher wattage available with panels
 - Don't forget charge controller
- Generator
 - Inverter style best for sensitive electronics
 - Examples: Honda EU2000i, Yamaha, Honeywell, others
 - Consider: weight, noise, run time (tank capacity, efficiency)




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Power Distribution

- Power requirements
 - Radio(s), fan, lighting, HT charger, cell phone charger (USB?)
 - Scribe's equipment, others
- Powerpoles are county standard
 - "Red, right, roof, rear"
- DC Power Supply
 - Consider one with multiple output connectors
- Battery charger
 - Power radio and charge battery while **A/C is on**
 - Switch to battery power if **A/C fails**
- Fused distribution
 - Don't forget the spare fuses!
- An in-line V/A/W meter can be useful



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TRACKING RESOURCES

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T-Card Systems

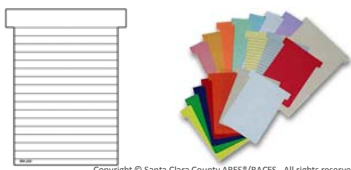

- A simple indexing system which uses cards shaped like a T
- Very useful when tracking larger number of resources
- Racks available in various configurations



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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


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Tracking Cities/Agencies with T-Cards

- Rack is organized in columns for nets; rows for cities/agencies
- Presence of card indicates that city is 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 Resource |
| Cupertino | CUP Resource | CUP Message | | | | CUP Command |
| ... | | | | | | |

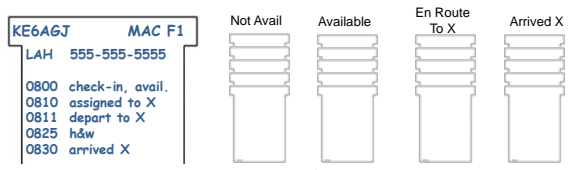
- Details on card show net type, check-in/out time, other info



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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, qualifications, home city, 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



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Index Cards as Substitute 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 times; a scribe can help with more detail
- Instead of columns in a rack, make piles for each status
 - Available, en route, arrived, ...
 - 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

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Other Tracking Methods

- Pre-printed Forms
 - Convenient to carry
 - Can only organize info one way; may not work best for all situations
- Computer
 - Good for high traffic volumes
 - Easy to transfer to a remote operator by e-mail (if e-mail is available)
 - Requires power, hard to move in a hurry
 - Remember to print out often, in case of power loss or other emergency
 - Pick a simple, common format; need to hand off data at shift change
- Form 1 - a plain writing tablet is better than nothing
- Whatever approach you take, remember:
 - You must be able to hand-off to the next net control operator
 - Turn it in at end of shift (someone else needs to understand it!)

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RESOURCE NET OPERATIONS LEVEL 2

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Resource Net Level 1 Operations (Review) 1

- Come up on the Resource Net
 - If possible, use AA6BT (primary)
 - If possible, cover W6ASH (North) and N6NAC (South) with liaisons
- Listen for active stations
- If no net currently exists, announce that you are organizing a net to collect damage information
- Inform that you have no ability to dispatch help
- Take gross reports of damage until relieved
 - Use the Modified Mercalli (“MIKE-MIKE”) Scale (1-8) for earthquakes
- Be prepared to ...
 - Move to Level 2 operations if situation severity increases, or
 - Pass summary information to a more experienced NCO

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Resource Net Level 1 Challenges (Review) 1

- When/whether to start the net
 - No harm in starting a net
 - Knowing (for certain) that the event was small is important info!
- Fear of taking responsibility as net control
 - Be professional, follow your training, do your best
 - Consult “Performance Standards and Best Practices”
- Repeaters initially unlinked
 - Primary vs. North vs. South county – info in 3 different places
 - Use liaison operators while unlinked to consolidate info
 - Ask a control operator or DEC/ADEC to initiate the link, if warranted
- Inexperienced operators
 - Give guidance where needed
 - Announce how you want responses formatted
 - “When I call you, give your city, Mike-Mike number, and call sign”

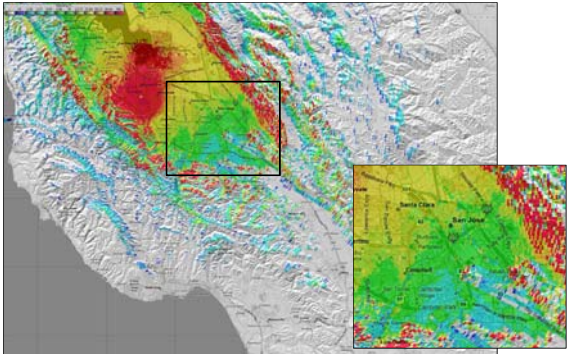
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Resource Net Repeaters

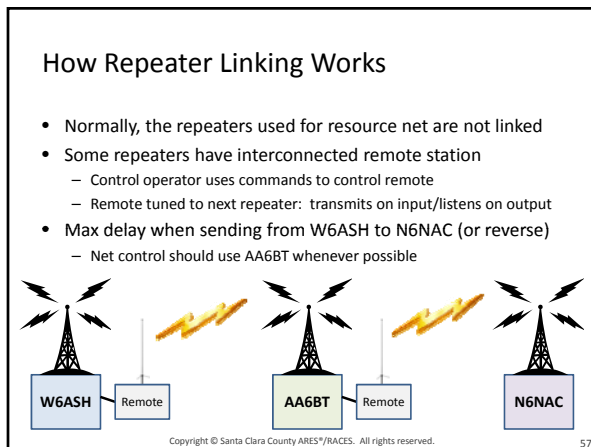
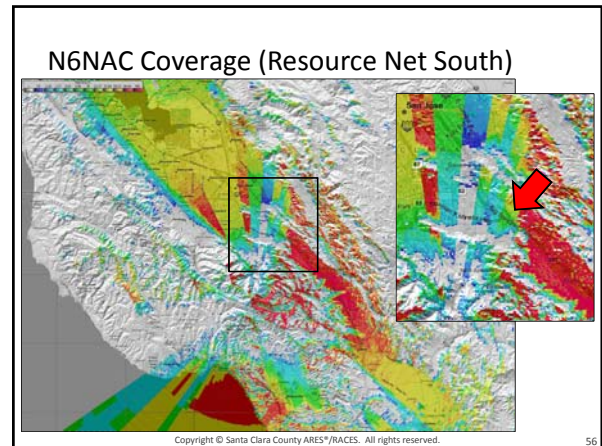
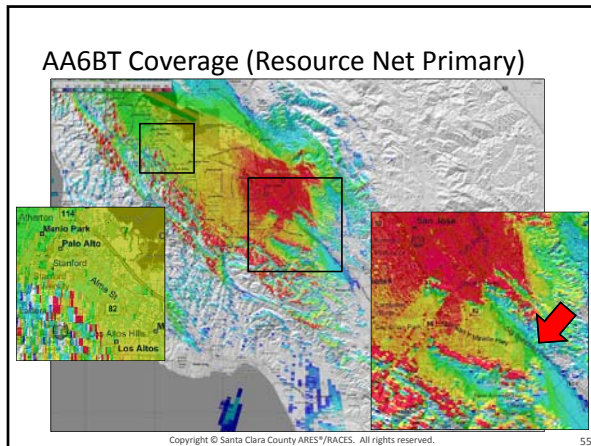
- Primary = AA6BT
 - 146.115 (+) 100.0
 - East San Jose, 1000+ feet above sea level
- North = W6ASH
 - 145.270 (-) 100.0
 - El Camino Hospital, Mountain View, 235 feet above sea level
- South = N6NAC
 - 444.625 (+) 110.9
 - Crystal Peak, 3500 feet above sea level
 - Best for South of 85 & 101 intersection in S. San Jose
- Advanced resource net control operators should understand repeater coverage areas

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W6ASH Coverage (Resource Net North)



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- ### Resource Net Repeater Linking
- Repeater linking capabilities
 - W6ASH can link to AA6BT
 - AA6BT can link to N6NAC
 - No linking can be originated from N6NAC
 - Requesting a link – two methods
 - Come up on repeater to be linked and ask for a control operator
 - On W6ASH, ask for a control operator to link to AA6BT
 - On AA6BT, ask for a control operator to link to N6NAC
 - Contact the DEC or any of the ADECs
 - <http://www.scc-ares-races.org/staff.htm> (keep a copy in your go kit!)
 - Don't forget to ask for link to be removed when done
 - Let the control operator know how long you need the link
 - Contact the control operator or DEC/ADEC when finished with event
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- ### Resource Net Level 2 Operations 2
- Assume Resource Net Level 1 operations underway
 - At some point, if local situation warrants, city/agency EOCs will activate
 - City EOC: "Los Altos EOC has been activated and is taking check-ins on our local tactical frequency of 146.595 simplex"
 - NCO: "Los Altos EOC, Roger. What other county nets do you have up?"
 - NCO: "Roger. Continue to monitor this net in case I need to reach you. Also, let me know when you activate other nets."
 - NCO: "All stations, all stations, if you are from Los Altos, please switch to the Los Altos frequency of 146.595 simplex and check in with your city."
 - Resource Net is now at Level 2 operation
 - If repeaters aren't already linked, request linking now
 - Make regular announcements of which tactical nets are up
 - Be prepared with frequency info if asked
 - Continue to take damage reports from other cities/agencies
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- ### Challenges for Resource Net Level 2 2
- Mixed traffic during transition between level 1 and level 2
 - Start tracking city status (plain paper, t-cards, index cards, ...)
 - Inexperienced operators – don't know about city nets
 - Maintain a copy of the county frequency list
 - Least practiced aspect of the resource net
 - No one is particularly experienced at doing this
 - Understand the process, do your best, be professional
 - Hand-off from previous operator or to next operator
 - Resource net is typically handled remotely during level 1
 - At some point it will likely transition to someone at county EOC
 - Be prepared to hand off damage reports and city/agency EOC/net status
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Exercise – Resource Net Level 2

- Situation
 - An earthquake recently occurred
 - You activated the resource net and you're taking Mike-Mike reports
 - Some reports from some cities indicate significant damage (MM-5+)
 - A city EOC checks-in on the resource net and reports they are taking check-ins on their local tactical frequency
- Task (you have 30 seconds)
 - Write down what you say next
 - Write down what you do next
 - Write down what you say 10 minutes from now
 - Share it with the class

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RESOURCE NET OPERATIONS LEVEL 3

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Resource Net Level 3 Operations 3

- Assume Resource Net Level 2 operations underway
- At some point:
 - Cities may begin requesting resources (typically on Message Net)
 - MACs may begin checking in after being released by their city
 - Resource net NCO may be asked to request MACs from cities
- Resource net shifts to level 3 operation
 - Request, assign, mobilize, track, demobilize mutual aid resources
- Regular announcement
 - Taking check-ins from MACs already released by their city/agency
 - Taking resource requests from city/agency EOCs
- Seek help from shift supervisor when making assignments
 - DEC and ADECs are authorized to make resource assignments
 - Assignments done per DSW rules – according to training

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MAC Check-Ins 3

- “This is ..., net control for the Santa Clara County resource net, standing by for check-ins from MACs who have been released by their cities”
- Record minimum info
 - Call sign, MAC status/qualifications, home city
 - If available but can't monitor continuously, record phone number
- Place in “available” status
- If not available until later – have them check out
 - Record time when they will be available; place in other status area

KE6AGJ MAC F1
 LAH 555-555-5555
 0800 check-in
 Avail after 17:00
 check-out

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Resource Requests 3

- Served agencies may or may not know about MAC levels
 - Some know exactly what they need
 - Some will ask for the highest, even if they don't need it
 - Some don't know MAC levels; only know what skills they need
- Advanced NCO must learn and understand the MAC levels
 - Key services/capabilities; typical assignments
 - It's all in the MAC handbook: <http://www.scc-ares-races.org/mac/>
- Help the requester to ask for the correct resource
 - Translate verbal descriptions into qualification levels
 - “high traffic field assignment”, “25W rig and antenna with mast” → F2
 - Translate common assignments to qualification levels
 - Example: Typical Red Cross shelter needs F1+P1
 - Direct them to make their request formally, usually on the Message net

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Exercise – Resource Net Level 3

- Situation
 - Resource Net has been operating at level 2
 - One of the following happens (pick one):
 1. A MAC checks in after being released by his/her city, or
 2. A city makes a resource request (usually on the Message Net)
- Task (you have 30 seconds)
 - Write down what you say next
 - Write down what you do next
 - Write down what you say 10 minutes from now
 - Share it with the class

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Resource Assignment/Utilization

- Per DSW rules, assignments must be made by proper authority
 - DEC/ADEC or designated alternate
- Resource net NCO needs to be aware of assignment process
 - Example request for resource: MAC with F2 qualification
 - Work with DEC/ADEC for assignments
 - Ideal Assignment – MAC with requested qualification (MAC F2)
 - Fallback 1 – MAC with req'd plus other qualifications (ex. MAC F2 N1)
 - Fallback 2 – MAC with lower qualification of same type (ask if o.k.)
 - Fallback 3 – MAC with unknown or no add'l qualifications (ask if o.k.)
 - Fallback 4 – MAC in Training (MAC Candidate) (ask if o.k.)
 - Fallback 5 – Non-MAC with county DSW (ask if o.k.)
- IMPORTANT:** no one can be assigned without county DSW!

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Resource Mobilization

- Provide assignment to resource
- Resource may accept or reject the assignment
 - We're volunteers! They should refuse if they feel unqualified, unsafe
- Record accepted assignment on T-card (or other tracking tool)
- Provide activation number
 - Typical numbers are XSC-YY-NN, where:
 - "XSC" = Santa Clara County Operational Area
 - "YY" = Year (i.e. "10" for 2010)
 - "NN" = event number (i.e. "01" for first event, "02" for second event, ...)
 - For training exercises, a "T" will be appended to the end (e.g. XSC-10-01T)
- Provide address, map grid, travel advisories, etc.
- Record starting odometer, street, city
- Begin tracking resource en route to assignment

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Mobilization Template

- Lots of details to cover
- No two situations are the same
- No one script can cover all
- Use template to prepare script
 - Assignment
 - Location, address, coordinates, contact, start-time, etc.
 - Activation
 - In-transit
 - Frequencies, procedures
 - Restrictions, hazards, advisories
 - Arrival

Santa Clara County Resource Net - Dispatch Template

[Detailed template content including assignment details, activation instructions, and contact information]

<http://www.scc-ares-races.org/operations.html>

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3

Challenges for Resource Net Level 3

- Resource allocation
 - Availability
 - Who is available? Where are they? (home, staging, some other county)
 - What skills do they have? What constraints?
 - Requests
 - What type of resources have been requested? When are they needed?
 - What flexibility do we have (level, time, quantity)? Are there any specific requirements, such as: climbing stairs, lifting heavy weight, etc.?
 - Assignments
 - Who should be assigned? What alternatives do we have?
- MAC qualifications define skills unambiguously; learn them!
- A scribe is essential
- T-cards (or substitute) are essential

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Challenges for Resource Net Level 3

- Status tracking
 - Questions from requesting city/agency
 - How many people en route? What skill sets? When can I expect them to arrive? How long can they stay? What about replacements?
 - Questions from home city ECs
 - How many of my people are deployed? Where are they? When will they be back? Do you need more help? When?
 - Questions from county staff
 - How many people deployed? Where? Who? What resource gaps do we have? Where/when can we fill them?
- Other challenges
 - Coordinating with other counties
 - Demobilization – people are exhausted, need more guidance than usual


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Challenges for Resource Net in General

- Spontaneous volunteers – don't know any of our procedures
 - "Hey, are you guys running a net or something?"
 - "What's going on? ... Did something happen?"
 - "I'm in <city> and ... and ... and ... how can I help?"
- Inexperienced operators – weak or rusty on our procedures
 - Don't know/remember where to go, when
 - Need release from city before available for assignment

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MESSAGE NET OPERATIONS

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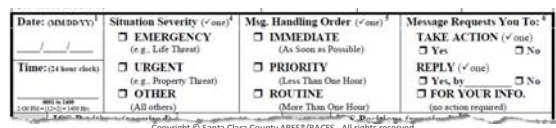
Message Net

- County message net can be non-stop action
- Scribe is essential part of the team
- Message net team needs to be the best of the best
 - Other operators will pattern themselves after net control
 - Clearly state the quantity and nature of the traffic
 - “I have one priority message for you.”
 - Crisp, clear, concise – even for informal messages
 - Say what’s needed, nothing more
 - Proper phonetics, numerals and prowords are critical on this net
 - Pass or copy messages exactly as written
 - Use ICS 213-SCCo for formal messages

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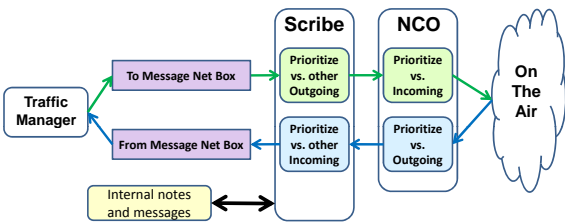
Message Prioritization

- Prioritize according to handling order, severity, and time
 - Handling order: Immediate, Priority, Routine
 - ARRL Precedence: Emergency, Priority, Welfare, Routine
 - Red Cross DWI (Disaster Welfare Inquiry) has Welfare precedence
 - Use Severity to prioritize between same handling order
 - Handle “Priority/Urgent” before “Priority/Other”
 - Use Time to prioritize between same handling order & severity
 - Ultimately, the served agency decides the order
 - All county forms being updated with the same heading info



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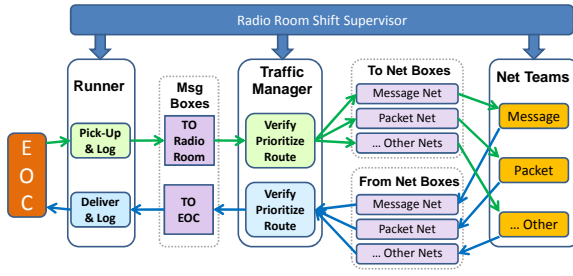
Prioritizing Traffic Within a Net



- NCO prioritizes message on the air
 - Holds incoming for high priority outgoing and vice versa
- Scribe prioritizes & logs message into & out from the team
 - Maintains prioritized incoming and outgoing message bins

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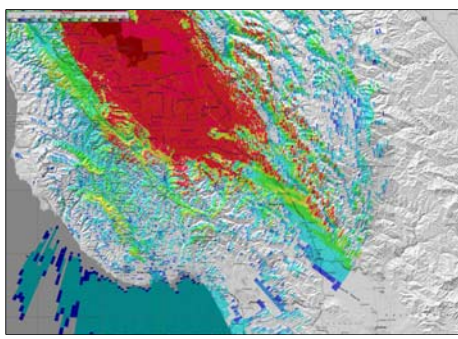
Radio Room Traffic Routing/Prioritization



- For small, low traffic events, radio room supervisor may also perform the traffic manager role

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Message Net Repeater Coverage (W6TI)



Be aware: Morgan Hill and Gilroy have weaker coverage; listen for them!

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Message Net Challenges

- Numerical messages: "13 45 26 ..."
 - "Figures one three, figures four five, figures two six, ..."
- Heterographs: to/too/two, for/four/fore, ate/eight, ...
 - "I spell"
- Traffic volume – can be non-stop
- Prioritizing traffic
 - Individual message prioritization (handling order, severity)
 - Incoming vs. outgoing messages
- Inexperienced operators
 - Don't identify number and priority of messages
 - "I have one priority message for you"
 - Improper prioritization of messages
 - Poor sending/receiving skills (5 words/min., phonetics, etc.)

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Message Net Exercise

- You are net control for the county message net
- The following messages are waiting to be sent:

| Msg Number | Time | Severity | Handling Order |
|------------|------|-----------|----------------|
| XSC327 | 0915 | Other | Routine |
| XSC349 | 0921 | Other | Priority |
| XSC207 | 0925 | Urgent | Priority |
| XSC401 | 0930 | Emergency | Immediate |

- You also have the following incoming messages waiting:
 - At 0920 Los Altos announced that they have one priority message
 - At 0930 San Jose announced that they have one emergency message
- List these six messages in the proper send/receive order

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Message Net Exercise

- Send XSC401 outbound Immediate/Emergency message } *
- Receive San Jose Emergency message } *
- Receive Los Altos Priority message } **
- Send XSC207 outbound Priority/Urgent } **
- Send XSC349 outbound Priority/Other } **
- Send XSC327 outbound Routine/Other } **

** Not likely to appear at exactly the same time. Normally, you'd already be sending/receiving one of them. If occurred at same time, some judgment could be applied: county's Emergency message may affect more than one city, or not. We don't know extent of San Jose's message.

** Los Altos' message was first in line, but what is its Severity?

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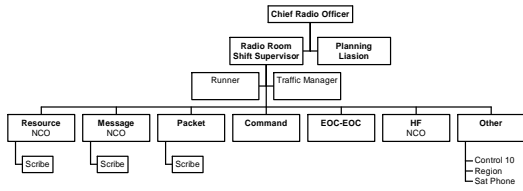


ORGANIZATIONAL MODELS FOR NET CONTROL

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County Radio Room Structure

- Specific staffing dependent upon situation
- Some NCO positions may be combined, if traffic levels permit




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Net Control Models

- Be aware that more than one model for net control exists
 - Net control with scribe
 - NCO/scribe team direct traffic AND handle EOC messages
 - NCO and scribe divide work load for maximum efficiency
 - Appropriate when most traffic is destined for EOC
 - Santa Clara County nets operate with net control and scribe
 - Net control separate from EOC Operator
 - NCO responsible for directing traffic
 - EOC operator sends/receives messages from/to EOC
 - EOC operator goes through net control, just like other field stations
 - Used by some cities
 - Others ...
- Be sure you understand which model is being used before you take over net control duties

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It's not rocket science, but it does take some effort

INTRODUCTION TO PLANNING FOR NET CONTROL

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Planning a Net



- Smaller events typically use only one or two nets
- Advanced net control operator (N2) should be able to
 - Plan a net for a smaller event
 - Assist with net control planning for a larger event
- Small event net plan
 - Frequency selection
 - Power level selection
 - Antenna placement
 - Personnel requirements/assignments
 - Net control script
 - Net control briefing

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Frequency and Power Level Selection



- Frequency Selection
 - Use 2m and 70cm where dependent on field volunteers
 - Just about any HT works on 2m; MACs have dual-band HTs
 - Use 1.25m, other bands for auxiliary comms when possible
 - EOCs often have 220 radios – typically used for packet
 - Simplex: Try for 100 kHz to 1 MHz separation when possible
 - Definitely not adjacent channels (only 15-20 kHz separation)
 - Stagger separation: e.g. 50 kHz between A & B; 75 kHz between B & C
 - Repeaters for wide coverage; simplex for local area
 - Repeaters not good for local area – xmit de-senses nearby receive
 - Use different bands when close proximity required
 - Pick backup frequency and define conditions for switching
- Power Selection
 - Use absolute minimum power required
 - 25-50 watts will de-sense anything near by

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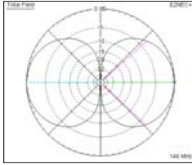
ICS 205 – Communications Plan

| ICS 205 RACES COMMUNICATIONS PLAN | | 1. INCIDENT NAME | | 2. DATE/TIME PREPARED | | 3. OPERATIONAL PERIOD | |
|---|-------------------|-------------------------------|--|--|--|-----------------------|--|
| | | XSC-10-01T | | 11-Mar-2010 | | 13-Mar-2010 | |
| | | Advanced Communications Drill | | 19:21 | | 06:00 - 14:00 | |
| 4. COMMUNICATIONS RESOURCE UTILIZATION | | 5. FUNCTION | | 6. ASSIGNMENT | | 7. REMARKS | |
| TYPE USED (check) | FREQUENCY/PL | | | | | | |
| <input checked="" type="checkbox"/> AMATEUR RADIO | 146.115 (+) 100.0 | Resource Net | Track travelers to/from drill | Link repeaters by 06:30 | | | |
| <input type="checkbox"/> ATV | 145.270 (-) 100.0 | | | | | | |
| <input type="checkbox"/> PACKET | 444.625 (+) 110.9 | | | | | | |
| <input type="checkbox"/> OTHER | | | | | | | |
| <input checked="" type="checkbox"/> AMATEUR RADIO | 146.595 no PL | Staging Net | Track resources when not on assignment | Locate staging NCO in staging area for access to T-cards | | | |
| <input type="checkbox"/> ATV | | | | | | | |
| <input type="checkbox"/> PACKET | | | | | | | |
| <input type="checkbox"/> OTHER | | | | | | | |
| <input type="checkbox"/> AMATEUR RADIO | | | | | | | |
| <input type="checkbox"/> ATV | | | | | | | |

- Type Used – usually “Amateur Radio” for voice
- Frequency/PL – if linked, list all
- Function – primary function
- Assignment – brief description of how used
- Remarks – important comments for implementation

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Antenna Placement



- Typical vertical antenna pattern
 - Most energy is directed horizontally
 - Very little energy is directed vertically
- Vertical separation is best for confined areas
 - i.e. collinear, with no horizontal offset
- Example (vertical 1/2 wave dipole):
 - 10 ft vertical separation is approx. = 50 ft horizontal (36 dB)
 - 20 ft vertical separation is approx. = 225 ft horizontal (48 dB)
 - Source: <http://www.repeater-builder.com/antenna/separation.html>
- If possible, locate different net controls at different places
 - Alleviates constraints on frequency selection, antenna placement
 - Resource net is very flexible – three repeaters to choose from

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Net Schedule



- Be ready to go at least 15 min. early
 - Verify radio operations, check repeater links, ...
- Start on time
 - Read intro, begin taking check-ins
- Every 10 minutes, like clockwork - regular announcements/ID
- Every 15-30 minutes, as appropriate – health and welfare checks
- Rotate staff on a regular basis
- Shorter shifts can accommodate more training/eval opportunities
 - Minimum shift recommendation: 1 hr
- Allow minimum of 15 minutes for shift changes
 - Sign-in, briefing, get up to speed, hand-off
 - More time needed for briefing, hand-off if shift is longer
- Demobilization – allow for possibility of event running overtime

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Finalizing the Plan




- Personnel requirements/assignments
 - Net control and scribe for each shift
 - Back-up/waiting list in case of no-shows
 - Pre-assign first and last shift
- Net control script contents
 - Introduction, check-ins, instructions, regular announcements/ID, health and welfare, check-out/hand-off, closing
- Briefing
 - Purpose/objectives of net
 - Schedule
 - Net control script
 - How paperwork will be handled
 - Any procedures specific to this net or event or served agency

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Summary

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Summary




You should now be able to

- Understand the role of advanced net control operator (N2)
- Understand the concepts, techniques, equipment and procedures required to operate:
 - County Resource Net Level 2
 - County Resource Net Level 3
 - County Message Net
 - Other critical and/or high-traffic nets
 - Two nets simultaneously
- Understand the basics of net planning

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Next Steps



- Being a better net control requires experience
 - Classes make you aware
 - Practice makes you good
- Plenty of opportunities to practice exist:
 - Weekly nets
 - Quarterly drills
 - Semi-annual advanced drills
 - Many different types of public service events throughout the year
- Step up. Volunteer. Get On The Air. Most of all – have FUN!

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Thank You!

Questions, comments, suggestions?
 Michael Fox – n6mef@arrl.net

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