

# **SOUTH COUNTY ACS PACKET MANUAL – May, 2016**

## **INTRODUCTION**

This manual is intended as a guide to setting up and using VHF/UHF packet radio in a field operation. It does not cover every aspect of ACS operations, nor does it cover the details of specific radio equipment. Please refer to the ACS Field Operations Guide (FOG) manual, the Kantronics KPC3+ manual, and to your personal equipment manuals, for details not discussed here.

### **A NOTE TO THOSE NEW TO PACKET RADIO**

In order to increase a newcomer's chance of success, and to eliminate undue frustration, there are certain prerequisites to learning and using packet radio.

Packet radio adds a complicated layer of computer and equipment skills on top of the radio skills already necessary. Generally, a "computer person" will be better suited for packet than an occasional computer user. Maybe something about the technical and finicky nature of amateur radio software dealing with TNCs would be a different way to provide a helpful warning.

The computer skills required include installing and troubleshooting driver software, assigning COM ports, and installing and configuring software programs. It is a simple fact that packet radio is not for everyone. If the shoe fits, wear it. The worst possible time to learn a new skill is when you are alone and in an emergency situation, so advanced training is essential to successful packet operation.

### **A NOTE TO EXPERIENCED OPERATORS**

When involved in a deployment of packet radio, it is best practice to have operators own, maintain and operate their own gear. This will avoid having to struggle with another operator's kit. Loaned gear causes many complications and potential failure points that are avoided by owning, maintaining, and using your own gear.

Technical support will likely not be possible during an event, so having cheat sheets, self-taken notes and the associated manuals is a must. A good packet operator must be able to troubleshoot their own technical issues or know when to call it quits if they can't.

Editor's note: This manual was compiled by members of the Sonoma County Auxiliary Communications Service (ACS), South County Unit. A special thanks for their contributions go to Steve Fisher, K6ETA, Susie Demarinis, KJ6ORL, and Eric Swanson, WB6MVT, and to the members of the South County Unit who conducted field tests.

Paul Kidd, KK6H  
May, 2016

## EQUIPMENT

There are a number of pieces of equipment that are essential elements of a packet radio station:

1. An **FM radio** which is capable of sending and receiving data transmissions. There are many such radio units available, and the choice is yours.
2. A **Terminal Node Controller (TNC)**. We have pretty much standardized on the Kantronics KPC3+ unit, and we do recommend it, but there are other choices available. The KPC3+ manual is available online at [www.kantronics.com/documents/kpc-3plus\\_manual\\_RevD.pdf](http://www.kantronics.com/documents/kpc-3plus_manual_RevD.pdf)
3. A **laptop computer**, preferably running Windows operating system
4. All the **cables and connectors** necessary to connect the laptop to the TNC, and the TNC to the radio. These will depend on what equipment you have, so refer to your radio and TNC manuals for details.
5. **Power supplies** for the radio and TNC (12v) and the laptop. This could be either batteries of sufficient capacity or a 110VAC-12VDC power supply. In addition, DC power distribution strips, such as the "RigRunner" are very useful. All DC power connectors should be the **Anderson PowerPole** type, which is a standard.
6. An **Antenna**, preferably of a type which could be easily erected in the field, such as a mag-mount mobile antenna or a vertical on a telescoping mast, with sufficient lengths of **coax cable**. A light-weight 3-4 element beam (yagi) antenna is highly recommended for point-to-point operation and/or when additional signal gain is needed.

### INITIAL EQUIPMENT SET-UP AND TESTING

1. **Connectors and cables:** Suffice it to say, consult your equipment manuals for details. You may be required to assemble them yourself, or there are probably ready-made cables available commercially. Your choice.
2. **TNC programming:** Initially, use the manufacturer's default settings. Only parameters that need to be adjusted for our purposes will be discussed here. TNC parameters are notoriously "finicky," in that the use of exact syntax, letter case and punctuation is critical to success. Always consult the KPC3+ manual for details.
3. Unless there is a reason to change a default parameter, **ACCEPT** the default value.  
**If it ain't broke, don't fix it!**
4. Before changing *any* TNC parameters from their default values, make a list of all default settings. **SAVE IT**. More on this later.

(Initial Set-Up, continued)

5. Make all *necessary* changes before you attempt to go on the air.  
There are very few command parameters that need to be changed, the most likely of which are:

BEACON  
BTEXT  
MAXUSERS  
MYCALL  
MYNODE  
MYPBBS  
NTEXT  
NUMNODES  
PBLIST  
PTEXT  
USERS

6. Follow the manufacturer's instructions carefully when you make changes and when you make your first on-the-air connection attempt.
7. After everything has been tested and proven to be correct and reliable, make a copy of all of your **TNC parameters** and save it to a text file. The DISPLAY command will generate a complete list, which can be copied and pasted into a text file for later use.

## **SOFTWARE**

There are two software programs that are used by South County ACS: RMS EXPRESS and OUTPOST. Recommended set-up procedures for each appear in the appendices.

**RMS EXPRESS** is Winlink software, and it is the county-wide standard for emergency operations. Winlink is a very powerful system with world-wide application. It is especially useful for long-haul or regional communications. It has local application, as well, particularly when using the ICS-213 message form. See the appendix for details.

**OUTPOST** is mainly used for communications support for non-emergency events, such as bicycle rides, races, parades, and other special community events. Although it is not ACS sanctioned, it is very useful for local events, and...once properly configured...is very user-friendly. ICS-213 forms are also supported by Outpost, but an extra step is needed to read them. See the appendix for details.

## **TRAINING**

There is no substitute for proper training and practice. Our mission is to provide efficient communications in the event of an emergency, and we must be prepared for that. The initial training is often an informal session with an "Elmer", but the best training of all occurs during a field operation.

From time to time, there will be formal ACS drills scheduled. In addition, we may be asked to volunteer for other community events. At such times, one can gain valuable experience when paired with a "veteran" operator.

## **PREPARATION FOR DEPLOYMENT**

Apart from training and testing your equipment, it is important to have a personal plan for deployment. Refer to the South County ACS FOG Manual for suggestions. Remember to bring whatever you need for your personal safety and comfort. Make a "72 Hour Go Kit" and keep it handy.

There are all sorts of ways to organize your equipment for rapid deployment, operating convenience, and protection. Consult with other group members and have a look at the various individual solutions that they have come up with.

Again, periodic training and equipment testing is essential. Spare parts and equipment redundancy are desirable elements of your plan.

## COMMUNICATIONS IN THE FIELD

There are two main strategies for using packet radio at an event or in an emergency:

### 1] Centralized messages

This strategy would have a single mailbox or Winlink P2P server at Net Control (or up on the mountain). The upside would be having a single place that everyone checks. The downside to this strategy is everyone has to check periodically to see if a message is waiting (using battery power for the radio, the TNC and the computer fairly often). Laptop computers tend to only have a few hours of battery life at most, so external power or spare laptop batteries may be necessary. This also causes increased traffic on the frequency (especially at Net Control), which slows down communications.

We use this strategy only if everyone has sufficient power capacity, especially for laptops, and knowing that Net Control may get congested at times. A bonus when using Winlink P2P is the ability to send attachments such as maps and images, though large attachments will take a very long time to send and may not be practical.

### 2] Packet PBBS mail boxes at each station (de-centralized, non Winlink messages)

This strategy allows for only a TNC and radio to be powered continuously, and the computer only turned on when the "new message" light is illuminated on the TNC. This saves a lot of computer battery power and allows for This also allows more efficient use of the frequency as the message is delivered directly from Net Control to the intended station or vice versa. However, this strategy does not allow for sending attachments and can only support text-based messages and ICS-213 traffic.

## BEST PRACTICES

For voice comms the use of tactical callsigns is highly recommended. If an operator is relieved after several hours, the new operator keeps the same call. This also avoids confusion about to whom each message is addressed.

On packet radio, the use of tactical callsigns ONLY is nearly essential! Computers, and computer-controlled devices (i.e., message software and TNCs) are absolutely literal in their interpretation of names and commands. A *tactical* callsign must be assigned to each field operation, and that tactical callsign must be used *exclusively* for identification and message handling. Any variations will probably result in mishandled messages and...worst case... computer crashes.

In any field operation, establishing reliable voice comms is our primary objective. Packet radio is secondary and is useful for list-based and periodic information updates and logs. Packet / Winlink should never interfere with voice and every attempt should be made to limit such interference, both on the air and with nearby voice operators and scribes.

Use low power for packet whenever possible and keep antennas apart from each other. Voice comms have priority and to avoid de-sensing the voice radios, packet comms should be set up to avoid interference. As the FCC regulations state, "Output power should be limited to the minimum needed to maintain communications." In practice, this also serves to minimize interference at an operation site, especially if two radios are both operating on the same band.

To minimize such interference, the use of beam antennas for packet operations is recommended. By putting the other nearby 2M antenna in the null of the beam, interference can be greatly reduced. Also, if possible, it is recommended that 2M be used for voice comms, and UHF or 220 for data.

## **SAFETY CONSIDERATIONS**

No attempt will be made here to discuss all aspects of field operations. Every effort should be made to ensure your safety and others around you. The primary concerns are possible electrical, RF and physical hazards, such as generators, extension cords, antenna placement, and stray wires and ropes.

Consult other amateur radio publications or "Elmer" for complete discussions.

## **POST EVENT**

### **DEBRIEFING**

With every deployment, something new or useful is learned, so it is important to share the group experience when it's all over and the group has a chance to rest and to consider all of the successes and failures in a quiet moment. The goal of a debriefing is to improve operations for the next time. Discussions can be via email or, best of all, by having a face-to-face meeting. It would be useful to write a summary of the discussion and pass it around. Any changes or improvements needed should be incorporated into future training and event plans.

### **RESTORATION - RETURN TO READINESS**

1. Equipment checks: make sure that everything still works, and/or make necessary repairs.
2. Re-stock consumable items: food, water, message forms, office supplies, etc.
3. Re-set TNCs to their "normal" set of parameters (callsigns, texts, etc.), using the saved parameter list.
4. Re-assemble and re-stock your Go Kit. Recharge or replace all batteries.

## **APPENDICES: SET-UP SAMPLES AND PROCEDURE NOTES**

On the following pages are samples of TNC parameter adjustments that might be needed for a field operation. They are only samples, and there probably will be different parameters required for each event. The event organizer or the Net Control operator should make the necessary changes available to all operators, *prior* to the event.

It is impossible to mention every conceivable variation, so there are many examples where a suggested parameter is given in parentheses. Follow your TNC manual to confirm the syntax, i.e., when to use capital or lower case letters, or specific words for a command parameter.

Also, these examples are subject to change in the future, as we fine tune operations.

## **APPENDIX ONE: TNC SET-UP PARAMETERS FOR A FIELD STATION**

Make a note of the following parameters on your TNC. You will need to re-enter them after the event is over in order to restore your TNC to normal.

BEACON  
BTEXT  
CTEXT  
CMMSG  
MAXUSERS  
MYCALL  
MYNODE  
MYPBBS  
NTEXT  
NUMNODES  
PBLIST  
PTEXT  
USERS

**IMPORTANT NOTE: ALL TACTICAL CALLSIGNS, PBBS NAMES, NODE NAMES, ETC. WILL BE ASSIGNED BY NET CONTROL. DON'T MAKE UP YOUR OWN!**

First open Outpost, enter your callsign, as you normally do, on the "Identification" window.  
Then check the "Use Tactical Call" option  
Enter your tactical call sign. (The one assigned to you by Net Control)  
Enter something appropriate for Additional ID Text, such as location  
Click APPLY and OK

On the main Outpost screen, select the "Setup" pulldown menu.  
Select "BBS"  
BBS Name = (enter the name of the pbbs of Net Control, such as EOCMB)  
Connect Name = (enter the tactical name of Net Control, such as EOC)  
Description = (enter a location name or other designated descriptor)

Select PATH tab  
Select the path.  
If you can connect to Net Control direct, then select Direct.

If you need a node to relay, select KaNode Access.  
Fill in the rest of the node info:

Node Name Enter node name (options = SMRSND, SONND, etc.)  
Successful connect = Help ? (NOTE: CAPITAL "H", lower case "elp"; with a space between Help and ?)  
Connect = c (lower case)  
Connect with BBS/Node name check  
Port 0 (zero)  
Unsuccessful connect ####DISCONNECT  
Click APPLY and OK

(Appendix One, continued)

Select "Tools" pulldown menu  
Select "Interactive Packet" then "Serial/Comm Port"  
That opens the "IPSerial" page  
Click "Connect"  
Type ECHO ON, then enter, then  
cmd: INTERFACE TERMINAL  
The TNC will reset. Now change the following parameters to the stated values:

BEACON ON EVERY 9 (THIS IS IMPORTANT)  
BTEXT YOUR FULL LEGAL FCC CALLSIGN (THIS IS IMPORTANT)  
CMMSG ON PBBS  
CTEXT (enter "Connected to {tactical callsign}, {your legal callsign}")  
HTEXT NCA.CA.USA.NOAM  
MAXUSERS 3  
MYNODE (enter the short form of your tactical call +ND, such as PETAND for Petaluma node)  
MYPBBS (enter the short form of your tactical call +MB, such as ROCKMB for Two Rock)  
NOTE: both of the above are limited to 6 characters only such as  
NTEXT (enter your node name, such as COTND)  
NUMNODES 1  
PBBS 400  
PBLIST Before using this command, consult the KPC3+ manual  
PTEXT (enter your PBBS name, such as ROCKMB)  
USERS 2

**TO RETURN TO NORMAL**

Open the IP/Serial screen  
Enter INTERFACE TERMINAL  
Then re-enter (copy and paste) your "normal" parameters from the text file that you saved.  
Disconnect from tnc and Exit IPserial

## **APPENDIX TWO: TNC SET-UP PARAMETERS FOR A NET CONTROL STATION**

Make a note of the following parameters on your tnc. You will need to re-enter them after the event is over in order to restore your tnc to normal.

BEACON

BTEXT

CTEXT

CMSG

MAXUSERS

MYCALL

MYNODE

MYPBBS

NTEXT

NUMNODES

PTEXT

PBLIST

USERS

**IMPORTANT NOTE: NET CONTROL IS RESPONSIBLE FOR ASSIGNING ALL TACTICAL CALLSIGNS, PBBS NAMES, NODE NAMES, ETC. FOR ALL OTHER STATIONS INVOLVED IN THE EVENT.**

First, open Outpost, enter your callsign, as you normally do, on the "Identification" window.

Then check the "Use Tactical Call" option.

Enter your tactical call sign.

Enter something appropriate for Additional ID Text (i.e. "Net Control")

Click APPLY and OK

Now, on the main Outpost screen, select the "Setup" pulldown menu.

Select "BBS"

BBS Name = (enter the name of the pbbs of Net Control, such as EOCMB)

Connect Name = (enter the tactical name of Net Control, such as EOC)

Description = (enter a location name or other designated descriptor)

Click APPLY and OK

Select "Tools" pulldown menu

Select "Interactive Packet" then "Serial/Comm Port"

That opens the "IPSerial" page

Click "Connect"

Type ECHO ON, then enter, then

cmd: INTFACE TERMINAL

The TNC will reset. Now copy and paste the following text into the dumb terminal window and hit enter:

MYNODE (enter the short form of your tactical call +ND, such as EOCND for EOC node)

MYPBBS (enter the short form of your tactical call +MB, such as EOCMB for EOC PBBS)

NOTE: both of the above are limited to 6 characters only

(Appendix Two, continued)

Then enter the following:

BEACON EVERY 9

BTEXT (enter your legal callsign and "Tactical {your tactical callsign} and your location)"  
such as " KK6H, Tactical EOC, Cotati"

CMSG ON PBBS

CTEXT (enter "Connected to {tactical callsign}, {your legal callsign}

HTEXT NCA.CA.USA.NOAM

MAXUSERS 5

NTEXT (enter your node name, such as EOCND)

NUMNODES 1

PBBS 400

PBLIST Before using this command, consult the KPC3+ manual

PTEXT (enter your PBBS name, such as EOCMB)

USERS 3 (or more, if needed, but each additional costs memory space on the PBBS)

**TO RETURN TO NORMAL**

INTERFACE TERMINAL

Then re-enter your "normal" parameters, using the list you made your normal command set.

Disconnect from tnc and Exit IPserial

## APPENDIX THREE

### MESSAGE ORIGINATION USING OUTPOST

#### NEW MESSAGE (DEFAULT)

1. Select "NEW" from the menu line
2. "BBS" (enter the destination PBBS, such as EOCMB)
3. "FROM" your Tactical callsign
4. "TO" the destination Tactical callsign
5. SUBJECT "Who the message is for...Who is the final recipient". ex, "For Incident Commander"
6. Enter the message text
7. end message with "/ex", on the very last line, all by itself
8. Click SEND

## APPENDIX FOUR

### USING THE ICS-213 MESSAGE FORM IN OUTPOST

Note: The ICS-213 message form in Outpost is not a Sonoma County ACS approved form.

To use the default ICS-213 message form:

1. Open Outpost
2. Fill in the Identification information. Select "Use Tactical Callsign" and fill in each field accordingly.
3. Click "Apply" and "OK"
4. On the main screen, select "FORMS" from the pull-down menu bar
5. Select ICS-213 Message Form
6. Select "Set-Up" from the menu bar
7. Select "Properties"
8. Fill in whatever Incident Name is pertinent to the event
9. Click "OK", and you will return to the message form screen
10. To create a message, click "NEW"
11. "TO" and "FROM" are personal names; "POSITION" is their job title or ICS designator.
12. Enter message text.
13. When complete, click "SEND"
14. A New Packet Message screen will pop up
15. Fill in the "TO" field with the DESTINATION where the intended recipient is located, such as "ACSEOC". This will be a TACTICAL name or callsign, not a person.
16. The message will then be listed in the "OUT TRAY" until sent.
17. Click "SEND" to send all messages located in the Out Tray.

## APPENDIX FIVE

### SENDING A MESSAGE DIRECTLY TO A PBBS USING THE IP/SERIAL SCREEN

Assume you want to send a message to EOC, directly from your PBBS

1. Use the Send Private command: SP EOC and the TNC responds with: SUBJECT:
2. Now enter a short subject line, such as: "For Race Manager", and the TNC responds with:  
ENTER MESSAGE—END WITH CTRL-Z OR /EX ON A SINGLE LINE
3. Now enter the text of your message.
4. To end the message and have it saved, type a <Ctrl+Z> (hold down the control key and press Z) or type /EX.  
NOTE: The <Ctrl+Z> or /EX must be on a line by itself —do not type anything else on this line.
5. When the message has been ended properly, the PBBS responds with:  
MESSAGE SAVED ENTER COMMAND: B, J, K, L, R, S, or Help >

You may now enter more mailbox commands.

#### **Short-cut on Outpost:** Setting a default Signature

1. On the Outpost main screen, select TOOLS, then MESSAGE SETTINGS
2. Under the SIGNATURES heading, check the "INSERT A SIGNATURE" BOX.
3. Enter your personal name, callsign, title, position, etc.
4. On the next line, type in "/EX " as the signature. This must be the very last line in the message body.
5. Click OK to save and close the window.

## APPENDIX SIX

### RETRIEVING A MESSAGE FROM YOUR OWN PBBS, VIA THE IP/SERIAL SCREEN

If you're using Outpost, received mail should automatically appear in the "IN TRAY". However, if for some reason it gets stuck in the PBBS, you can use the IP Serial/Comm port function to retrieve the messages.

When a message is received in your own PBBS, the yellow "Mail" LED will light up. Go to the IP Serial screen (Tools>Interactive Packet>IP Serial/Comm Port) To retrieve your messages, do the following:

1. Go to COMMAND mode (if you are not already there), where you will see the —cmd: prompt.
2. Type CONNECT call (where "call" is your MYPBBS) and press the ENTER (return) key to enter the command.

**Note:** To see the current mailbox callsign, type MYPBBS and press the ENTER (return) key. The callsign shown is the one to use when connecting to your mailbox (PBBS)

3. Your KPC-3 Plus will connect you to the mailbox. Your screen should look something like this:

```
cmd: CONNECT NØKN-1 cmd: *** CONNECTED to NØKN-1 [KPC3P-9.1-HM$] 47500 BYTES
AVAILABLE IN 15 BLOCK(S) ENTER COMMAND: B, J, K, L, R, S, or Help>
    The commands now shown as available are just for the mailbox
```

4. Now you can give any of the mailbox commands shown: B, J, K, L, R, S, or Help
5. If you now type the HELP command and press return, you will see the KPC-3 Plus mailbox help file and then the standard mailbox prompt: ENTER COMMAND: B, J, K, L, R, S, or Help.
6. Now disconnect (just like you would disconnect from any other user).

First, return to command mode by typing a <Ctrl+C> on your keyboard.  
To do this, hold down the control key (usually marked Ctrl) and type the letter C.  
Then let go of the control key.  
You should now see the —cmd: prompt.

7. Next type the DISCONNECT command and press return.

You will receive the message \*\*\* DISCONNECTED and a new command prompt.

## APPENDIX SEVEN

### USING RMS EXPRESS

The RMS Express program contains a straightforward installation routine and a very extensive HELP menu. If the instructions and prompts are followed carefully, there shouldn't be any difficulty installing and using the program. However, remember that packet radio demands that all instructions must be read carefully. When entering data, precise spelling and syntax must be used, or things can begin to go haywire rapidly.

**There is a Sonoma County ACS approved ICS-213 form available for RMS Express. Add-on files are required. Contact your Unit Leader for details.**