D-STAR Use - Local

Summary

In this lesson, the student will learn how to use D-STAR to perform the same functions that a local, analog repeater provides. The material covers call sign entry and structure. The IC-91AD is used to provide examples of D-STAR operation. The student is encouraged to download the IC-91AD manual from icomamerica.com/amateur/ - click "Downloads".

Local D-STAR Operation

Whether digital or analog, the local simplex channel or repeater performs important functions for the amateur radio community. It's a meeting place, an intercom, a watering hole, and a bulletin board. Digital technology like D-STAR certainly provides many new features, but it's also important to support the functions ham find useful today. By learning how D-STAR provides and supports familiar functions, the student will find it easier to learn the new capabilities of D-STAR.

Listening In

The vast majority of time "on channel" is spent just listening or monitoring. New D-STAR users will find that monitoring works just the same on D-STAR as it does for analog FM. You do not have to enter any call signs for the radio to receive D-STAR packets. Once your radio is tuned to an active channel frequency, you'll hear every conversation. The only difference is the squelch function.

In the previous lesson you learned that the squelch function of digital radios does not function the same way as for an analog radio. Instead of "opening" the squelch to hear unmodulated white noise, your radio is silent until D-STAR packets are received, then the decoded digital voice will be heard over the speaker as long as the signal is strong enough to receive the packets properly.

If D-STAR's DV mode is in use, the new feature CSS (Call Sign Squelch) is available. When CSS is turned ON and a call sign entered, the radio will remain silent until D-STAR packets containing the specified call sign are received. Since the transmitting station's call sign is contained in every D-STAR packet, CSS does away with having to agree on a special code as with analog Digitally Coded Squelch where tone sequences are transmitted.

Along with speech, D-STAR data and digital messages can also be received and displayed by a listener. All digital information is carried by the D-STAR packet as "plain text."

Making a Call & Responding

What if your transmissions are not directed specifically at another station? There are many instances in which you might want to simply have everyone listening hear your voice. Of course, the most common example is announcing that you are listening yourself and are available for a contact - "This is N9JA, monitoring." At other times, you might want to make an announcement about traffic conditions or as a net control station, make frequent transmissions to manage net functions.

In cases like this, you would not enter another station's call sign as YOUR CALL SIGN, nor would you leave it empty. D-STAR's solution is to use the special text string "CQCQCQ" as seen in **Figure 6-1**. This string can be stored in a call sign memory, just like regular call

signs. Some radios will even have a "CQ" key to set YOUR CALL SIGN to "CQCQCQ" automatically.
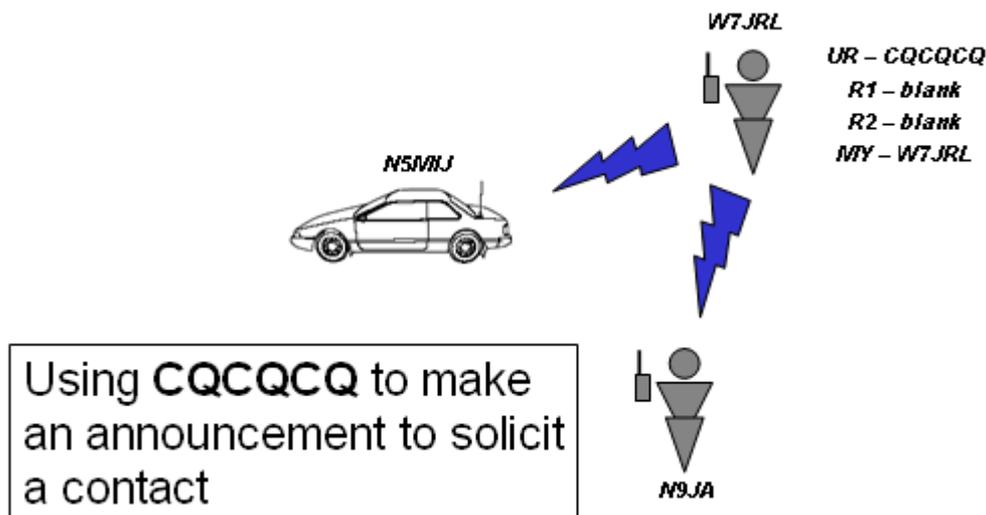
Figure 6-1

It's worth noting that if MY CALL SIGN is set to your call sign, any transmission that you make will be identified in the D-STAR packet header. However, it is good amateur practice to announce your call sign by voice as well.

Here's how to enter the call signs in a D-STAR radio for a simplex contact using the IC-91AD call sign entry labels; UR, R1, R2, and MY:

Calling CQ (Calling Station)

        UR: CQCQCQ
        R1: Blank
        R2: Blank
        MY: [calling station's call sign]

Responding to a CQ and during the QSO (Responding Station)

        UR: [calling station's call sign]
        R1: Blank
        R2: Blank
        MY: [listening station's call sign]

During the Contact (Calling Station)

        UR: [listening station's call sign]
        R1: Blank
        R2: Blank
        MY: [calling station's call sign]

Although this seems like a lot of call sign programming, the presence of the call signs in D-STAR packets lets the radio acquire them automatically. D-STAR radios have special keys to set up the radio to call CQ, respond to a caller, or use a repeater.

Emergencies

D-STAR also provides an "all-call" function to alert all stations within range that an urgent or emergency situation exists. **Figure 6-1** shows the D-STAR header. There are three bytes that make up the control flags. Each bit of these three bytes has a separate meaning.

D-STAR Packet Header
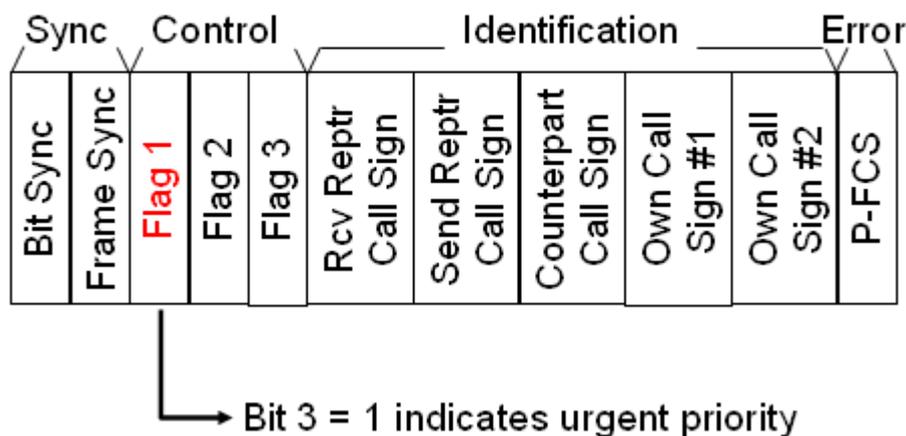
Figure 6-2

Bit 3 of the Flag byte 1 is used to indicate the emergency condition. Under normal conditions, bit 3 is clear (equal to 0). The bit can be set (equal to 1) to indicate that an emergency situation exists. Whenever a packet is received with this bit set to a 1 instead of a 0, the receiving radio ignores its current squelch settings and opens the speaker so that the received audio is heard.

The IC-91AD uses the "(decimal point)/EMR/DTMF" key to control the EMR function. If the key is pressed and held, three short and one long beeps are heard, the "EMR" indicator is shown on the display, and all further packets will carry the emergency flag. To turn off the EMR function, the key is pressed and held again.

Calling a Specific Station

There are two ways to call a specific station using a D-STAR radio. The first is to operate as if using analog FM. Set Counterpart Call Sign to "CQCQCQ" and call the station by voice. For example, "N9JA, N9JA, are you on frequency? This is W7JRL." If N9JA is listening and does not have the special squelch functions DCS or CCS enabled, W7JRL's call will be heard.

The second is to make a call directed specifically to N9JA by setting Counterpart Call Sign to N9JA as shown in **Figure 6-3**. That way, if N9JA has set his radio to use the Call Sign Squelch (CSS), the receiver will detect N9JA in the packets and output your voice.
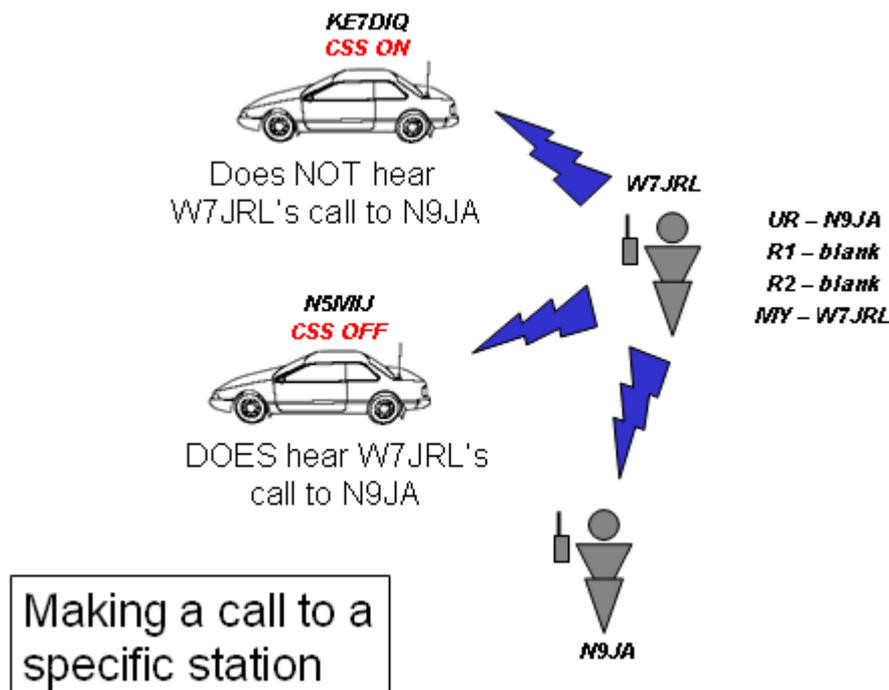
Figure 6-3

Using a Repeater

In the analog FM world, sub-audible CTCSS or PL tones are used to control access to a repeater. You must know the correct tone or the repeater receiver will not relay your voice to the transmitter. The D-STAR equivalent is the call sign stored in R1 or R1. If R1 is left blank or the call sign does not match the D-STAR repeater on the selected frequency, the repeater will not relay your signal.

The following sets of call signs assumes that both users are using the same repeater--the most common type of repeater operation.

Calling CQ (Calling Station)

UR: CQCQCQ
R1: [Repeater's call sign]
R2: Blank
MY: [calling station's call sign]

Responding to a CQ and during the QSO (Responding Station)

UR: [calling station's call sign]
R1: [Repeater's call sign]
R2: Blank
MY: [listening station's call sign]

During the Contact (Calling Station)

UR: [listening station's call sign]
R1: [Repeater's call sign]
R2: Blank
MY: [calling station's call sign]

If R1 is blank then simplex communications is required as described in the previous section

of this lesson.

Making a Contact Within a D-STAR Zone

In an analog system of linked repeaters, to make a call on the entire system the user might have to enter a special DTMF tone or sequence of tones to send the signal to all of the repeaters. In a D-STAR zone, the same function is performed by adding a slash character "/" before the repeater's call sign as follows:

    Calling CQ (Calling Station)

        UR: CQCQCQ
        R1: /[Repeater's call sign] - note the slash in front of the call sign
        R2: Blank
        MY: [calling station's call sign]

    Responding to a CQ and during the QSO (Responding Station)

        UR: [calling station's call sign]
        R1: [Responding station repeater's call sign] - note, no slash
        R2: [Calling station repeater's call sign]
        MY: [responding station's call sign]

    During the Contact (Calling Station)

        UR: [responding station's call sign]
        R1: [Calling station repeater's call sign]
        R2: [Responding station repeater's call sign]
        MY: [calling station's call sign]

As before, the D-STAR radio will automatically acquire the necessary call signs from the packets, allowing the user to set up the radio in a few key presses.

Click the "Review" button to review the topics covered in this lesson. When you are ready, click "Next" to continue...