

DSTAR GUIDE
For ICOM 9700

DSTAR GUIDE for ICOM 9700

Table of Contents

What Is D-STAR?	3
Register	5
Basic Configuration	7
GPS Configuration	9
GPS Configuration: Manual Position.....	11
Add Repeaters.....	13
Add a Repeater as a Channel	15
Adding a simplex Hotspot	17
DR Mode	19
Direct Commands.....	21
Pictures.....	23
Appendix:	25
ODC Repeaters	25
D-STAR Special URCALL Commands Cheat Sheet	26

What Is D-STAR?

D-STAR (Digital Smart Technologies for Amateur Radio) is a digital voice and data protocol developed specifically for amateur radio by the Japan Amateur Radio League (JARL). It allows licensed operators to communicate using digital voice and low-speed data over VHF, UHF, and microwave bands.

Key Features:

- Digital voice (DV) and digital data (DD) modes
- Internet linking via gateways
- Callsign-based routing
- Reflectors for group communication (like conference rooms)

How D-STAR Routing Works

D-STAR uses **four key fields** to route your signal:

Field	Purpose
MYCALL	Your own callsign
URCALL	Who you're calling (e.g., CQCQCQ for general)
RPT1	The repeater you're transmitting into (with port letter)
RPT2	The repeater or gateway you're routing through (with port letter)

Example for local repeater use:

- **URCALL:** CQCQCQ
- **RPT1:** VE3ABC C
- **RPT2:** VE3ABC G
- **MYCALL:** VA3XYZ

DSTAR GUIDE for ICOM 9700

Nuances of Shorter Callsigns and Spacing

D-STAR fields are **exactly 8 characters long**. If your callsign is shorter than 7 characters, you must **pad it with spaces** so that the **port letter (A, B, C, G, etc.) is in the 8th position**

Padding Rules:

Callsign Length	Example	Port Letter	Correct Format
4 characters	W1AW	C	W1AW C
5 characters	K9DOG	B	K9DOG B
6 characters	VE3XYZ	G	VE3XYZ G
7 characters	NOCALLS	A	NOCALLSA

 **Spaces are invisible**, so it's easy to misplace the port letter. Always count carefully!

Tips for Programming D-STAR Fields

- Use a programming app like **Icom's CS-9700** or **RT Systems** to visualize spacing.
- When entering callsigns manually, use the radio's keypad to insert spaces before the port letter.
- Double-check that the **8th character** is the port letter, not earlier.

Register

How to Register Your Callsign on the D-STAR Network (Canada)

Why Register?

Registering your callsign is required to:

- Use **reflectors** (like XLX405D)
- Operate in **Terminal Mode** or **Access Point Mode**
- Use **hotspots, DV Dongles, or network routing**

Step-by-Step Registration via BCFMCA

Step 1: Go to the Registration Portal

Visit:  <https://dstar.bcfmca.bc.ca/Dstar.do>

Step 2: Create an Account

1. Click **Register**.
2. Fill in:
 - **Callsign** (in **ALL CAPS**, no suffixes like /9700)
 - **Name, email, and a password**
3. Read and accept the **User Agreement**
4. Click **OK** to submit

 You'll receive an email once your registration is approved. This may take a few hours to a couple of days.

DSTAR GUIDE for ICOM 9700

◆ Step 3: Register Your Terminal (Radio)

Once approved:

1. Log in with your **callsign** and **password**
2. Click **Personal Information**
3. On the first blank line:
 - Check the box on the left
 - In the **Initial** box, press the **space bar once** (this creates a blank terminal ID)
 - **Do NOT** check the “AccessPoint” box
 - Click **Update**

 This step is mandatory. Without it, your radio won't be recognized by the D-STAR network.

◆ Step 4: Program Your Radio

On your IC-9700 (or other D-STAR radio):

- Go to Menu > Set > My Station > My Call Sign
- Enter your **registered callsign exactly** (e.g., VA3XYZ)
- Do **not** include suffixes like /9700 in this field

Check Your Registration

Use the D-STAR registration checker:  <https://regist.dstargateway.org/regcheck/index.php>

Basic Configuration

Here's a simple guide to help you get started with **D-STAR**

1. Set Your My Call Sign (DV Mode)

This is your **registered D-STAR callsign**, and it's used to identify your station on the network.

Steps:

- Go to: Menu > Set > My Station > My Call Sign
- Enter your callsign, e.g.:
 - VA3XYZ
 - or VA3XYZ /9700 (if you want to identify the radio model)

Why use /9700?

Adding /9700 helps others (and dashboards) know which radio you're using. It's especially useful if you operate multiple D-STAR radios or hotspots.

 **Note:** Some systems may truncate or ignore characters beyond 8, so this is mostly cosmetic and for TX message or DD mode—not for RPT1/RPT2 fields.

2. Set Your TX Message (DV Mode)

This message is transmitted with your voice and appears on other users' screens.

Steps:

- Go to: Menu > Set > My Station > TX Message (DV)
- Enter up to **20 characters**, e.g.:
 - VA3XYZ /9700
 - Chatham ON /9700
 - IC-9700 via XLX405D

 This is where /9700 is most useful—it's visible to others during QSOs.

DSTAR GUIDE for ICOM 9700

3. Set My Call Sign (DD Mode)

If you're using **DD Mode** (Digital Data over 1.2 GHz), you can set a separate callsign.

Steps:

- Go to: Menu > Set > My Station > My Call Sign (DD)
- Enter your callsign (e.g., VA3XYZ/9700)

 This is used for identifying your station in DD mode, such as when using the IC-9700 as a network interface.

4. Terminal/AP Call Sign (for Terminal Mode)

When using **Terminal Mode**, you must set a unique 8-character callsign with a module letter.

Steps:

- Go to: Menu > Set > DV Gateway > Terminal/AP Settings
- Set **Terminal/AP Call Sign** to:
 - VA3XYZ T (7 characters + T)
 - You can optionally use VA3XYZ/9 or similar if it fits within 8 characters

 This field must be **exactly 8 characters**, with the module letter (T) in the 8th position.

Summary Table

Setting	Example Value	Purpose
My Call Sign (DV)	VA3XYZ or VA3XYZ /9700	Identifies your station on D-STAR
TX Message (DV)	IC-9700 Chatham	Transmitted with your voice
My Call Sign (DD)	VA3XYZ /9700	Used in DD mode
Terminal/AP Call Sign	VA3XYZ T	Required for Terminal Mode

GPS Configuration

Here's a complete guide to **configuring** so that **DR Mode's "Near Repeater"** feature works properly. This allows your radio to automatically list nearby D-STAR repeaters based on your current location.

Why Enable GPS?

Enabling GPS on the IC-9700 allows you to:

- Use **"Near Repeater"** in DR Mode to find local D-STAR and FM repeaters
- Automatically update your position for **D-PRS** (D-STAR Position Reporting System)
- Log GPS coordinates with received signals or photos

Step-by-Step: Configure GPS for DR Mode

Step 1: Connect a GPS Receiver

The IC-9700 does **not have a built-in GPS**, so you'll need to connect an **external GPS receiver**.

Options:

- **ICOM UX-241** GPS antenna (plugs into the GPS port)
- **Any NMEA-compatible GPS** with a 2.5mm plug (4800 or 9600 baud)
- **GPSDO or GPS puck** with serial output and proper voltage

Plug the GPS into the **GPS port** on the rear panel of the IC-9700.

◆ Step 2: Enable GPS Input

1. On the radio, go to: Menu > Set > GPS > GPS Select
2. Choose: **External GPS**
3. Then go to: Menu > Set > GPS > GPS Set
4. Set:
 - **GPS Auto Time:** ON (optional)
 - **GPS Indicator:** ON (to show GPS lock on screen)

📌 Once the GPS locks onto satellites, a small satellite icon will appear on the top of the screen.

◆ Step 3: Use “Near Repeater” in DR Mode

1. Press the **DR** button to enter DR Mode.
2. Tap the **FROM** field.
3. Tap **Near Repeater**
4. Choose:
 - **ALL** (for all repeaters)
 - **DV** (for D-STAR only)
 - **FM** (for analog repeaters)

The radio will now display a list of nearby repeaters sorted by distance!

✅ Tips for Best Results

- Make sure your GPS antenna has a clear view of the sky.
- Allow a few minutes for the GPS to acquire satellites after power-on.
- You can also manually enter your position under: Menu > Set > GPS > Manual Position if GPS is unavailable.

GPS Configuration: Manual Position

Manually Set GPS Coordinates on the IC-9700

Why Use Manual GPS?

- You don't have a GPS antenna connected
- You want to simulate a location for testing
- You're operating indoors or in a fixed location

Step-by-Step Instructions

1. Open the GPS Settings Menu

- Press MENU
- Tap Set
- Tap GPS
- Tap GPS Select
- Choose **Manual**

2. Enter Your Coordinates

- Go back to the GPS menu
- Tap Manual Position

You'll now see fields for:

- **Latitude** (e.g., 42° 24.000' N)
- **Longitude** (e.g., 82° 11.000' W)
- **Altitude** (optional)

3. Input Your Location

- Use the touchscreen keypad to enter your **latitude and longitude**
- Be sure to select the correct **N/S** and **E/W** directions
- Tap **Enter** or **OK** to save

 You can find your exact coordinates using a smartphone, GPS app, or Google Maps by right-clicking your location and copying the decimal or DMS format.

Confirm It's Working

- In DR Mode, tap FROM > Near Repeater
- The radio will now use your **manual coordinates** to list nearby repeaters

Add Repeaters

Here's a **step-by-step guide** to help you **add new D-STAR repeaters** using an SD card:

What You'll Need

- A computer with internet access
- An SD card (formatted in the IC-9700)
- A card reader (if your PC doesn't have an SD slot)
- The latest repeater list from Icom

Step 1: Download the Repeater List

1. Go to the Icom Support Page
2. Search for your model: **IC-9700**
3. Download the **Repeater List Update** ZIP file
4. Extract the ZIP file on your computer

Step 2: Copy to SD Card

1. Insert the SD card into your PC
2. Locate the extracted files:
 - If using a **CSV file**, copy it to the RptList folder on the SD card
 - If using an **ICF file**, copy it to the Setting folder
3. Safely eject the SD card

 Tip: Format the SD card in the IC-9700 before use to ensure correct folder structure.

DATA LOSS WARNING: Don't do it again if you already formatted it previously.

 **Step 3: Import into the IC-9700**

1. Insert the SD card into the IC-9700
2. Go to Menu > SD Card > Load Settings
3. Choose the appropriate file (CSV or ICF)
4. Confirm and load the data

 **Step 4: Access New Repeaters**

1. Press and hold the DR button to enter DR mode
2. Tap FROM > Repeater List
3. Browse or search for your newly added repeaters
4. Tap to select and operate

 **Bonus: Manually Add a Repeater**

If you want to add a repeater manually:

1. Go to Menu > Set > My Station > Repeater List
2. Tap Add and enter:
 - **Repeater Callsign**
 - **Frequency**
 - **Offset**
 - **RPT1 and RPT2 Callsigns**
3. Save and access it via DR mode

Add a Repeater as a Channel

What You'll Need

- Your D-STAR repeater's:
 - **Frequency**
 - **Offset**
 - **RPT1 and RPT2 callsigns**
- Your own **callsign** entered in the radio (Menu > Set > My Station > My Callsign)

Step 1: Enter Memory Mode

1. Press the **MENU** button.
2. Tap **Memory CH** to enter memory channel mode.
3. Choose an empty memory slot or tap MW (Memory Write) to create a new one.

Step 2: Set Frequency and Offset

1. Set the **receive frequency** of the repeater.
2. Set the **transmit frequency** (based on the repeater offset).
3. Choose **DV mode** (Digital Voice) by pressing the **MODE** button.

Step 3: Set D-STAR Parameters

1. Tap Menu > Set > DV Memory
2. Enter the following:
 - **URCALL**: CQCQCQ (for general QSOs)
 - **RPT1**: Repeater callsign + module (e.g., VE3ABC C)
 - **RPT2**: Gateway callsign + module (e.g., VE3ABC G)
3. Save the settings to the selected memory channel.

 **Modules:**

- C = VHF
- B = UHF
- A = 1.2 GHz
- G = Gateway (for internet linking)

 **Step 4: Save to Memory**

1. Press and hold the **MW** button.
2. Choose the memory slot.
3. Confirm to save.

 **Step 5: Use the Channel**

- Switch to **Memory Mode**
- Select your programmed channel
- You're ready to transmit on D-STAR just like FM!

 **Example: Programming VE3ABC on 145.670 MHz**

Parameter	Value
Frequency	145.670 MHz
Offset	+600 kHz
Mode	DV (Digital Voice)
URCALL	CQCQCQ
RPT1	VE3ABC C
RPT2	VE3ABC G

Adding a simplex Hotspot

Here's a **step-by-step guide to adding a simplex D-STAR hotspot (like Pi-Star)** to your **IC-9700**. This setup allows you to use your personal hotspot for D-STAR communication without relying on a repeater.

What You'll Need

- A **Pi-Star-based hotspot** (e.g., ZumSpot, MMDVM, etc.)
- Your **hotspot frequency** (typically 433.550 MHz or 145.670 MHz)
- Your **callsign**
- The **Icom IC-9700** in **DV mode**

Step 1: Configure Your Pi-Star Hotspot

1. Power on your Pi-Star device.
2. Connect to it via a browser at <http://pi-star.local> or its IP address.
3. Go to **Configuration > General Configuration**:
 - **Callsign**: Your callsign
 - **Frequency**: Match what you'll program into the IC-9700 (e.g., 433.550 MHz)
 - **Mode**: Enable **D-STAR**
 - **Duplex**: Set to **0** (for simplex)
4. Under **D-STAR Configuration**:
 - Set **RPT1 Callsign**: YOURCALL B (for UHF) or YOURCALL C (for VHF)
 - Set **RPT2 Callsign**: YOURCALL G (for gateway)
5. Click **Apply Changes**

DSTAR GUIDE for ICOM 9700

Step 2: Program the IC-9700

Option A: Manual Entry

1. Set the radio to **DV mode**
2. Set the **frequency** to match your hotspot (e.g., 433.550 MHz)
3. Set **URCALL** to CQCQCQ
4. Set **RPT1** to YOURCALL B (or C for VHF)
5. Set **RPT2** to YOURCALL G
6. Save to a memory channel if desired

Option B: Using DR Mode

1. Press the **DR** button
2. Tap FROM > Repeater List > Add
3. Enter:
 - **Name:** e.g., MyHotspot
 - **Callsign:** YOURCALL B
 - **Frequency:** 433.550 MHz
 - **Offset:** 0.000 MHz
 - **Use Repeater Type:** Simplex
4. Tap TO > Use Reflector or CQCQCQ to talk

Test It Out

- Try an **echo test** by setting **URCALL** to _____E (7 spaces + E)
- Or link to a reflector with REF030CL in URCALL

DR Mode

DR Mode simplifies D-STAR operation by letting you select repeaters and reflectors from a menu instead of manually entering callsigns.

What Is DR Mode?

DR Mode (Digital Repeater Mode) is a user-friendly interface for D-STAR that allows you to:

- Easily select repeaters and reflectors
- Link/unlink from reflectors
- Perform echo tests and info queries
- Use GPS-based repeater search (if enabled)

Step-by-Step: Using DR Mode on the IC-9700

◆ Step 1: Enter DR Mode

- Press the **DR** button on the front panel.
- The screen will now show two fields:
 - **TO** (who or what you're calling)
 - **FROM** (which repeater or hotspot you're using)

◆ Step 2: Set the FROM Field (Your Repeater or Hotspot)

1. Tap the **FROM** field.
2. Choose one of the following:
 - **Repeater List:** Select a preloaded repeater
 - **Near Repeater:** If GPS is enabled, shows nearby repeaters
 - **Direct Input:** Manually enter a repeater callsign
3. Select your desired repeater (e.g., VA3ODC B)

 If your repeater isn't listed, you can add it manually or import a CSV file via SD card.

◆ Step 3: Set the TO Field (Your Command or Destination)

1. Tap the **TO** field.
2. Choose from:
 - **Use Reflector** → CQCQCQ (for normal QSOs)
 - **Link to Reflector** → Enter a reflector (e.g., XLX405D)
 - **Unlink Reflector** → Sends unlink command
 - **Echo Test** → Sends _____E to hear yourself
 - **Information** → Sends _____I to get link status

 These options automatically format the **URCALL** field correctly—no need to enter it manually.

◆ Step 4: Transmit the Command

- After selecting a command (like **Link to Reflector**), press **PTT** briefly to send it.
- You'll hear a voice confirmation if successful.
- Then go back to **TO > Use Reflector > CQCQCQ** to talk.

◆ Step 5: Save to Memory (Optional)

- Press and hold the **MW** (Memory Write) button to save your DR setup to a memory channel for quick access later.

Direct Commands

How to Enter Special URCALL Commands on the IC-9700

◆ Step 1: Switch to DV Mode

- Press the **MODE** button.
- Select **DV** (Digital Voice) mode.

◆ Step 2: Access the URCALL Field

1. Press the **DR** button to enter DR mode.
2. Tap the **UR** field on the screen (top right).
3. Tap **Direct Input**.

◆ Step 3: Enter the Special Command

Use the on-screen keyboard to enter the command. All URCALL entries must be **exactly 8 characters long**. Use **spaces** to pad shorter commands so the last character is in the 8th position.

Command	What to Enter in URCALL	Function
Link to REF	REF030CL	Link to REF030 Module C
Link to XLX	XLX405DL	Link to XLX405 Module D
Unlink	_____U	7 spaces + U
Info	_____I	7 spaces + I
Echo Test	_____E	7 spaces + E

 **Tip:** Use the space key on the on-screen keyboard to pad the command. The 8th character is where the command letter (L, U, I, E) must go.

◆ Step 4: Set RPT1 and RPT2

Make sure these are set correctly:

- **RPT1:** Your local repeater + port (e.g., VA3ODC B)
- **RPT2:** Same repeater + G (e.g., VA3ODC G)

To check or change:

1. Tap the **FROM** field.
2. Choose your repeater from the list or enter it manually.

◆ Step 5: Send the Command

- Briefly press **PTT** to transmit the command.
- You should hear a voice confirmation or see a message on screen.

After Linking

Once linked, change **URCALL** back to CQCQCQ to begin normal voice communication.

Pictures

Here's a complete guide to **sending and receiving pictures** over D-STAR. This feature is built into the radio and allows you to share images with other D-STAR users—great for emergency comms, SSTV-style fun, or just experimenting with digital modes.

What You Need

- **Icom IC-9700** with firmware **v1.20 or later**
- A **microSD card** (for storing images)
- Another D-STAR station with picture capability (e.g., another IC-9700 or compatible device)
- DV mode enabled and a simplex or repeater frequency set

Step-by-Step: Sending a Picture

1. **Insert a microSD card** into the IC-9700.
2. Press MENU > tap **Picture**.
3. Tap **Select Picture**:
 - Choose a preloaded image from the SD card (JPG format, 320x240 recommended).
4. Tap **Send Picture**:
 - Choose **DV Fast Data** (for faster transfer) or **DV Voice** (slower, but allows voice).
5. Press **PTT** to transmit the image.

 **Tip:** You can also take a photo with your phone, resize it to 320x240, and save it to the SD card as a .jpg.

Receiving a Picture

1. Ensure you're in **DV mode** and tuned to the same frequency as the sending station.
2. When a picture is transmitted, the IC-9700 will **automatically receive and display** it.
3. You can save the received image to your SD card for later viewing.

DSTAR GUIDE for ICOM 9700

Picture Mode Settings

- **DV Fast Data:** Sends images quickly but requires both stations to support it.
- **DV Voice:** Slower, but allows simultaneous voice communication.
- **Auto RX Save:** Enable this to automatically save received images to the SD card.

DSTAR GUIDE for ICOM 9700

Appendix:

ODC Repeaters

Location	Call Sign	Band	Frequency	Offset	RPT1 (Repeater)	RPT2 (Gateway)	Notes
Chatham	VA3ODC-C	VHF	145.100 MHz	-0.600	VA3ODC C	VA3ODC G	Linked to XLX405D
Chatham	VA3ODC-B	UHF	443.350 MHz	+5.000	VA3ODC B	VA3ODC G	Multimode
Wallaceburg	VE3XII-B	UHF	446.125 MHz	-5.000	VE3XII B	VE3XII G	Linked to XLX405D
Tilbury	VE3CRO-B	UHF	444.425 MHz	+5.000	VE3CRO B	VE3CRO G	Linked to XLX405D
Bala	VA3APW-B	UHF	442.850 MHz	+5.000	VA3APW B	VA3APW G	Linked to XLX405D
Ridgetown	VE3IJC-B	UHF	442.975 MHz	+5.000	VE3IJC B	VE3IJC G	Linked to XLX405D (pending)
Leamington	VE3ESP-C	VHF	147.300 MHz	+0.600	VE3ESP C	VE3ESP G	Linked to XLX405D (pending)

D-STAR Special URCALL Commands Cheat Sheet

URCALL	Function	Format Notes
CQCQCQ	Standard voice call	Use this after linking to talk
REFxxxCL	Link to a reflector module (e.g., REF030C)	Replace xxx with reflector number
XLX405DL	Link to XLX reflector module D	Use for XLX reflectors (e.g., XLX405D)
_____U	Unlink from current reflector	7 spaces + U (must be exactly 8 chars)
_____I	Info request (get current link status)	7 spaces + I
_____E	Echo test (hear your own transmission)	7 spaces + E
CALLSIGN E	Echo test via a specific repeater	Replace CALLSIGN with repeater call
CALLSIGN L	Link to a specific repeater	Replace CALLSIGN with target repeater

 **Spacing is critical:** All URCALL entries must be exactly **8 characters long**. Use spaces to pad shorter entries so the command letter is in the 8th position.