All Things iCOM

Microphone Basics

Icom HF rigs fall into two distinct categories, as far as microphone interfacing is concerned: these are the "low-gain" models (earlier designs like the IC-735/745/751/761/765/781, non-Pro 746/756, and early IC-706), and the "modern" designs (which include the 746Pro, 756Pro series, IC-7700/7800, IC-7000, and the IC-706MkIIG).

To accommodate the low-gain Icom designs, Heil Sound developed a high-quality condenser element, called the "iC" in our products designations, that provides the optimum frequency response, impedance, and (most importantly) sufficient gain to drive these earlier rigs. The "iC" element also works tremendously well with the "modern" types of Icom rigs, making it an ideal all-around microphone. This element is found in products including the iCM base station microphone, the Handi Mic iC, the Pro Set iC, Pro Set Quiet Phones iC, Pro Set Plus iC, BM-10 iC, the Traveler series, and the Classic iC.

Owners of "modern" Icom rigs wishing to utilize the specialized characteristics of Heil Sound dynamic elements (like the HC-4 and HC-5) need only obtain the proper adapter cable (AD-1-I, AD-1-IM, CC-1-I, CC-1-IM or CC-1-XLR-I) to ensure proper interfacing. The AD-1-I and AD-1-IM include blocking capacitors that prevent the phantom power supplied by the radio from affecting performance of the dynamic elements. If you try to use the AD-1-iC or AD-1-iCM adapter cable on an dynamic-element microphone, the lack of a blocking capacitor will cause the element to seize up, and no output will be heard. Microphones like the GM series, Heritage, Classic 4/5 Handi Mic 4/5, and the HM-10 Dual sound great on modern Icom rigs.

Heil Sound recently introduced the model PR 781 dynamic microphone, which sounds simply wonderful on modern Icoms. It rolls off at about 150 Hz on the low side, and it has a few dB of boost at about 2100 Hz, but its response otherwise is very natural, and its large-diameter element provides sparkling, beautiful audio that responds very well to the audio adjustment capabilities of today's Icom transceivers.

Pin connections on Icom rigs are very straightforward, and are shown below.

Pin Connections

8-pin Round (IC-730/735/745/751/761/765/720/725/726/728/781/901/910/3200/7700/7800 etc.)
Pin 1: Microphone In*
Pin 5: PTT
Pin 6: PTT Ground
Pin 7: Microphone Ground

*Pin 1 also carries voltage for the electret elements used in Icom mics. This voltage must be blocked for use of Heil Sound dynamic elements.

8-pin Modular (IC-703/706/2000/7000)
Pin 4: PTT
Pin 5: Microphone Ground
Pin 6: Microphone In*
Pin 7: Ground

*Pin 6 also carries voltage for the electret elements used in Icom mics. This voltage must be blocked for use of Heil Sound dynamic elements.

DSP and Mic Gain Settings

When using a dynamic element on rigs like Icoms, which were designed for electret microphone elements, one must not be afraid to do two things: (1) utilize the full range of Mic Gain available, and (2) turn on the Compression, using the Compression Level control as a secondary Mic Gain control if necessary.

It is impossible for us at Heil Sound to know what settings will sound "best" on your voice, in your station environment, with your microphone, for your interest (DX, Contest work, rag-chewing, or maximum fidelity) The recommendations below are just starting points; listen to yourself in a separate receiver (with its antenna disconnected) to determine what sounds best in your unique situation. Monitoring of your signal is particularly important when setting Menu item Q4, which has a huge effect on your transmitted tonal quality.

IC-746Pro/756Pro/7700/7800

Mic Gain: About 2 o'clock to 3 o'clock for dynamic elements, 10 o'clock for "iC" elements.

Bass: -2

Treble: +5

Compression: 10 o'clock (Set to Wide for Fidelity, Mid for everyday operation, or NAR for very aggressive DX pile-up busting (significant roll- off of low frequencies will occur).

VOX Gain: About 65%

Anti-VOX: About 10%

VOX Delay: About 8%

IC-746 (non-Pro)

Menu Mi/F4 (TCN): 10

Mic Gain: About 3 o'clock

Compression: 10 o'clock

IC-706

Compression: Adjust for ALC mid-scale on voice peaks.

Mic Gain: 9

Carrier Point (Q4): Try +100 for DX/Contest work, -100 for rag-chewing.

IC-7000

Compression: Set for 10 dB on voice peaks on COMP meter.

Transmit filter: Set to WIDE for fidelity, MID for everyday operation, and NAR for DX pile-up busting.

Mic Gain: Set to 50% for "iC" elements, 80% for dynamic elements.

Hi-Fi on the IC-7000

For really beautiful audio, using a studio microphone like the Heil Sound PR 40 or PR 781, connect the microphone via an outboard equalizer like one of the fine products from W2IHY, and then apply the output from the equalizer to pins 2 and 11 of the rear-panel "Accessory" jack. Set the Transmit Bandwidth to Wide (100-2900 Hz), and you will be the talk of the band!

Heil Sound Traveler on the IC-7000, IC-706, and other Icom Rigs

The popular "Traveler" boomset works exceptionally well with the IC-7000 and IC-706. Just contact your dealer to get the HSTA-706 Adapter Cable, and the Traveler should work perfectly using the factory default settings on the rig.

For use on earlier Icom 8-pin (round) equipped rigs, use the HSTA-I8 adapter cable. For Icom mobile rigs, use the HSTA-706, and for Icom HTs use the HSTA-iHT.

DC De-coupling on Icom Rigs
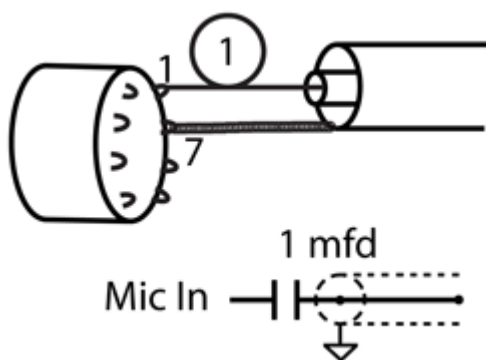
All ICOM transceivers utilize "phantom power" on their microphone inputs. Borrowing technology from the recording studios, DX power is applied via the mic line to energize the electret elements used in stock Icom microphones. At the same time, DC flows DOWN the mic cable while the mic audio is fed UP the same wire. Of course, the voice signal is AC, so DC flows one direction while AC flows the other direction - all on the same cable. This is pretty cool until you start having RFI problems, but we shall ignore that possibility for now.

The BIG problem with this is when you try using a REAL (dynamic) microphone. Connecting a dynamic into your mic input will provide a nice short of the +8V DC power straight to ground. SMOKE CITY!!!

To use any dynamic element on these phantom powered inputs (which should NEVER be applied to a mic input of a radio transmitter, IMHO), the input must be de-coupled so the mic audio AC signal can pass through to the mic preamp, while simultaneously blocking the DC voltage from reaching that mic element. Simply install a 1 µF non-polarized tantalum capacitor in series with mic lead. You may get by with a .68 F or a .47 F, but anything less (.01 µF, .005 µF, etc.) will not pass any speech audio worth listening to). The cap MUST be a non-polarized type. This will keep the DC factor into the mic preamp circuitry.

All Heil microphones have a 1 µF capacitor inside. All AD-1 boomset adapters have the decoupling capacitor installed in the 8 pin Foster connector. The coupling capacitor is NOT installed in our new high-impedance GM "VINTAGE" microphone, as this model should never be used with ICOM low impedance inputs.

For best results please consult your manual.

All Things Kenwood

Microphone Connection Basics

Kenwood rigs present relatively few problems in interfacing to Heil products. Kenwood HF transceivers have long been designed for dynamic microphone inputs, so the microphone amplifier stages have plenty of gain to accommodate the wide range of Heil dynamic microphones.

Pin Connections

8-pin Round (All Models)
Pin 1: Mic
Pin 2: PTT
Pin 7: Microphone Ground
Pin 8: PTT Ground

4-pin Round (TS-120/130/700/520/530/820/830, TR-2200/7200/7400/7500)
Pin 1: Microphone In
Pin 2: PTT
Pin 3: PTT Ground
Pin 4: Ground

8-pin Modular (TS-480, VHF/UHF Mobiles)
Pin 3: Ground
Pin 4: PTT
Pin 5: Microphone Ground
Pin 6: Microphone In

HT 3-pin 3.5 mm Plug (All VHF/UHF HT except TH-F6/7*)
Tip: +4V
Ring: Microphone In
Shaft: PTT
Note: Ground is sourced from the shaft of the 2.5 mm plug.
Heil Sound is investigating interfacing issues on these models at the present time.

DSP and Microphone Settings

Several Kenwood rigs have DSP and other settings that will allow the operator to adjust the response of the radio to your speech input from the microphone. These are easy to adjust in seconds.

It is impossible for us at Heil Sound to know what settings will sound "best" on your voice, in your station environment, with your microphone, for your interest (DX, Contest work, rag-chewing, or maximum fidelity) The recommendations below are just starting points; listen to yourself in a separate receiver (with its antenna disconnected) to determine what sounds best in your unique situation.

TS-950SDX
Menu 20 (DSP 1 HPF): 100
Menu 21 (DSP 1 LPF): 3100

TS-570
Menu 13 (Bandwidth): 2.4 kHz
Menu 14 (TX EQ High Boost): H
Microphone Gain: 50 (Default Level)

TS-870
Menu 29 (Bandwidth): 3000 Hz
Menu 30 (Bandshift): 0 or 100
Menu 31 (TX EQ): H or C
Menu 32 (RCV EQ): C or Off
Microphone Gain: 50 (Default Level)
Menu 22 (Mic AGC): 1 (but try 0 and 2)

TS-2000
Menu 22 (Bandwidth): 3000 Hz
Menu 21 (TX EQ): H or C
Menu 20 (RCV EQ): C or Off
Microphone Gain: 50 (Default Level)

For best results please consult your manual.

All Things Yaesu

Microphone Connection Basics

Since about 1975, Yaesu HF rigs have been designed with low-impedance (600-) inputs. Prior to that time, 50-k microphones were utilized. Starting in 1980, many HF rigs used a standard 8-pin round connector, and the wiring of this plug has been consistent through the years. On the FTdx9000 series, a standard 3-pin XLR was incorporated (in addition to an 8-pin jack on the rear panel), allowing direct connection of studio microphones. The pin configurations are shown in the next section.

Note that many HF rigs also include a "PATCH" jack on the rear panel. This is a common RCA jack, wired in a "Y" manner with the Mic input from the front panel. For the do-it-yourselfer, the PATCH jack provides a simple means of connecting a microphone to a Yaesu rig. There usually is also an RCA-type PTT jack on the rear panel.

Pin Connections

8-pin Round (FT-1000/2000/dx9000/990/847/736/747/757/767/650/840/920)
Pin 6: PTT
Pin 7: Ground
Pin 8: Microphone In

4-pin Round (FT-7/101/101Z/201/221/223/225R/227R/301/901/902)
Pin 1: Ground
Pin 2: Microphone In
Pin 3: PTT
Pin 4: No Connection (*Ground on FT-221R)

3-pin XLR (FTdx9000 Front Panel)
Pin 1: Ground
Pin 2: Microphone (+)
Pin 3: Microphone (-)

7-pin Round (FT-290/690/790)
Pin 1: Ground
Pin 2: Microphone In
Pin 3: PTT

6-pin Modular (FT-100/90/8100R)
Pin 4: Ground
Pin 5: Microphone In
Pin 6: SW1 (Connect PTT line via series 27-k resistor to this pin)

6-pin Modular (FM Mobiles: FT-1500/1802/2800/7800/8800/8900)
Pin 3: +8V
Pin 4: Ground
Pin 5: Microphone In
Pin 6: PTT

8-pin Modular (FT-450/817/857/897/900)
Pin 2: Ground
Pin 3: PTT
Pin 4: Microphone In
Pin 5: Microphone Ground

Handie-Talkie 4-pin Mini-plug (VX-1/2/3/5/110/150/170)
Tip: Speaker Out
Ring 1: PTT
Ring 2: Microphone In
Shaft: Ground

DSP and Carrier Point Settings

Yaesu has, since the 1980s, provided means for adjusting the carrier insertion point (identical to "IF SHIFT" used on receive, only this is on your transmitted signal). This allows the operator to roll off lows, or roll off highs, to change the articulation or bass response of your voice wave-form.

Beginning with the FT-1000MP, DSP settings were added to many rigs, allowing the bandwidth to be varied, and additionally it was possible to perturb the envelope to do things like peaking both high and low while putting a null in the center of the transmitted passband, etc.

It is impossible for us at Heil Sound to know what settings will sound "best" on your voice, in your station environment, with your microphone, for your interest (DX, Contest work, rag-chewing, or maximum fidelity) The recommendations below are just starting points; listen to yourself in a separate receiver (with its antenna disconnected) to determine what sounds best in your unique situation.

FT-1000MP Series (including Mk-V and Field)

Menu 5-9: 6.0

Menu 7-7: Set "SSB-T" to 300-3100 Hz for DX/Contest, 100-3100 Hz for more fidelity.

Menu 4-4: Set to "OFF" while setting Menu 7-7 to your liking, then try each selection ("1" through "4") while listening in separate receiver to see if any of these improve your voice signal's characteristics. Oftentimes "OFF" is best.

Menu 8-9: Generally, you don't need to touch this one. However, the settings are identical, in principle, to those found in the discussion below for the FT- 920. Try them while listening on a separate receiver.

Speech Processor: Don't be afraid to use it; the audio quality is excellent for most applications.

FT-2000/FTdx9000

Because Menu numbers may change over time, the "Title" of the Menu item is used below, to avoid confusion across different production lots.

EQ1: -6 dB at 200 Hz, Bandwidth of 2 (set to -10 dB if using PR 40 and you get Reports of too much bass).

EQ2: -6 dB at 900 Hz, Bandwidth of 2.

EQ3: +6 dB at 2100 Hz, Bandwidth of 2. Set to +10 dB for DX/Contest work.

SSB TX BW: Set to 400-2600 Hz for DX/Contest work, 300-2700 Hz for everyday operation, 100-2900 Hz for more fidelity. Note that power output meter will show "lower" power as bandwidth is increased; this is normal, reflecting lower power density per Hertz of passband.

FT-847

Menu 42: On (this engages the "Extended" Menu).

Menu 92: +5 to +10 to start, +15 for DX/Contest work.

Menu 93: -5 to -10 to start, -15 for DX/Contest work.

Note: The ideal setting may differ between USB and LSB, depending on other alignments in rig. The LSB settings are "inverted" from USB, so a setting of -10 on LSB and +10 on USB should sound the same.

FT-920

Menu U-59 (TLSB): +100 for DX, +150 for Contest work, -100 for rag- chewing.

Menu U-60 (PROC LSB): +100 for DX, +150 for Contest work, -100 for rag- chewing.

Menu U-62 (T USB): +100 for DX, +150 for Contest work, -100 for rag- chewing.

Menu U-63 (PROC USB): +100 for DX, +150 for Contest work, -100 for rag- chewing.

Menu U-51: Set to OFF initially.
1: Mid- and high-frequency emphasis.
2: High frequency emphasis (DX/Contest setting).
3: Low- and high-frequency emphasis, dip in middle.
4: Wide "broadcast" setting.

FT-450

The FT-450's Microphone Equalizer Menu item ("MIC EQ") is very simple in its adjustment. Basically, there are three ranges (low, Mid, and High) for equalization; you can roll off any one of these, peak any one of these, or peak one and roll off another.

For DX and Contest work, use selection 9 (this rolls off lows and peaks highs). To roll off excessive bass in a microphone like the PR 40, use selection 1 (this rolls off lows while leaving mid-range and highs flat). To increase high-frequency articulation, without rolling off lows or mid-range, use selection 4.

See page 81 of the Operating Manual for details.

FT-100

Menu 16 (MIC EQ): Set to OFF initially. Selection "2" emphasis high frequencies, while "3" cuts both low and high frequencies, emphasizing mid-range.

Menu 25 (MIC GAIN): 85

Menu 27 (Compression) 80

Menu 64 (T LSB CAR): Set to -100 Hz for rag-chewing, _150 Hz for DX/contest work.

Menu 65 (T USB CAR): Set to -100 Hz for rag-chewing, _150 Hz for DX/contest work.

For best results please consult your manual.