WHY SSB ON VHF, UHF, AND SHF?

Understanding Why Weak Signal Operators Choose SSB Instead of FM

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For many Amateur Radio operators, especially those who got started on local repeaters and FM mobile rigs, VHF and UHF often seem simple: key up, talk, unkey, and move on. For a lot of folks, that is their entire experience on 2 meters and 70 centimeters. They think of those bands as "local only," good for a repeater, short-range simplex, emergency work, and not much else.

That idea is one of the biggest missed opportunities in Amateur Radio.

Once you move into **SSB on VHF, UHF, and SHF**, you step into an entirely different world. Suddenly those same bands many operators think are "short range only" become bands where 100 miles, 200 miles, 500 miles, and sometimes far beyond are very realistic under the right conditions and with proper station setup. On the microwave bands, even very modest stations can do impressive things when operated correctly.

This article is written for the brand-new Amateur Radio operator, but with enough technical depth to help you truly understand what is happening and why. My goal is not just to tell you that SSB works better than FM for distance. I want you to understand **why** it works better, **how** to take advantage of it, and **what** you need to do with the equipment you already own.

The First Big Question: Why SSB?

The simple answer is this:

SSB is far more efficient for weak-signal work than FM.

That one sentence is the heart of the whole discussion.

If your goal is:

• local, strong-signal chatting,
• easy mobile operation,
• simple repeater use,

then FM is excellent.

But if your goal is:

• greater range,• better weak-signal performance,
• making contacts beyond normal local coverage,
• working tropospheric enhancement, meteor scatter, EME, aircraft scatter, rain scatter, and other forms of propagation,

then **SSB is the better tool**.

FM and SSB are not just two different audio choices. They are two entirely different methods of putting information onto a radio signal, and that difference directly affects range.

Why SSB Goes Farther Than FM

Let's put this in plain English.

FM has a capture effect

FM generally works wonderfully when the incoming signal is strong. But FM tends to reach a point where it goes from:

• clean and quiet

to

• noisy and unreadable
very quickly.
This is one of the reasons people love FM. When the signal is strong, it sounds great. It is also one of the reasons FM is poor for weak-signal work. Once the signal gets weak, it falls apart fast.
By contrast:

SSB remains usable much farther down into the noise

With SSB, you can often understand speech that sounds weak, hissy, or "thin," but is still perfectly copyable. That means a signal that would be unreadable on FM can often still produce a solid QSO on SSB.
That is the practical reason SSB has greater range.

The Efficiency Difference

FM uses a wider signal and requires a stronger received signal for quieting and intelligibility.
SSB uses much less bandwidth and concentrates your transmitter power more efficiently.
A typical FM signal on VHF/UHF may occupy roughly:• 10 to 16 kHz or more, depending on deviation and system design
A typical SSB signal occupies around:
• 2.4 to 3 kHz
That means the signal energy in SSB is packed into a much narrower slice of spectrum.

Narrower bandwidth means better signal-to-noise ratio

When the receiver only has to listen to 2.4 or 2.7 kHz instead of a much wider channel, less noise is admitted into the receiver passband. Less noise means the signal stands out better.
That is one of the biggest reasons SSB performs so well for weak signals.
A simple way to picture it:
• FM spreads the message over a wider lane
• SSB keeps the message in a much narrower lane
Less road to fill means more efficient use of power.

Same Power, Different Results

Let's say you have a 50-watt radio.
On FM, that power is being used in a mode that needs stronger signal conditions at the receiving end to sound good.
On SSB, that same 50 watts is usually much more effective for distance work because:
• the bandwidth is narrower,
• the receiver can dig it out better,
• the mode is inherently more weak-signal friendly.
This is why SSB weak-signal operators can do remarkable things with what, by HF standards, are very modest stations.

Why SSB Became the Standard for Weak Signal VHF/UHF/SHF

The weak-signal community did not choose SSB by accident. It became standard because it

works.On VHF and above, operators discovered long ago that for line-of-sight extension, tropospheric
bending, scatter modes, and moonbounce, SSB gave better performance than FM. It allowed weak, marginal signals to be worked reliably. Over time, that became the accepted operating standard for general weak-signal voice work.

That is why on 2 meters, for example, the traditional calling frequency for weak-signal SSB is **144.200 MHz** in North America. That portion of the band became the home of serious weak-signal work.

FM remained dominant for repeaters, mobile work, and local simplex because it is convenient, simple, and very effective when signals are strong.

So over time the hobby split into two operating cultures:

- **FM for local strong-signal work**
- **SSB for distance and weak-signal work**

Why SSB Usually Uses Horizontal Polarization

This is another area that confuses new operators.

Most VHF/UHF/SHF SSB work is done with horizontally polarized antennas

Examples include:

- horizontal Yagis
- horizontal loops
- horizontal long-boom arrays
- dishes with proper feed polarization on microwave bands

Why?

Because the weak-signal SSB side of the hobby evolved around fixed stations trying to maximize range and reject unwanted man-made noise.

Why Horizontal Helps

There are several reasons.

1. Reduced man-made noise

A lot of man-made electrical noise tends to be vertically polarized or at least stronger on vertical
antennas. Horizontal antennas often hear less local junk. That alone can improve weak-signal reception.

2. Better consistency for weak-signal work

Once the weak-signal community standardized on horizontal polarization, everyone knew how to aim and configure stations. Standardization matters. If one station is horizontal and the other is vertical, you can have a very large polarization mismatch loss.

That mismatch can cost you roughly **20 dB or more** in real-world situations.

That is enormous.

To put that in simple terms:

if one station is horizontal and the other is vertical, it is almost like throwing away most of your signal.

3. Antenna designs for gain and directivity

Many of the most effective weak-signal antennas—especially Yagis and microwave antennas—are naturally suited to fixed directional horizontal operation.

For weak-signal work, gain and directivity are everything. Horizontal Yagis became the natural standard.

Why FM Went Vertical

FM on VHF and UHF grew up mostly around:

- mobile operation,
- repeater systems,
- omnidirectional coverage,
- easy station compatibility.

A vertical antenna is ideal for a mobile whip on a car. It is easy to mount, mechanically practical, and works well for all directions around the horizon. Repeater antennas are usually vertical for the same reason: they need to serve lots of users in many directions, especially mobiles.

Once that became the standard for FM, everybody wanting to work repeaters and FM simplex used vertical antennas so they could all hear each other properly.

So the split happened naturally:

• FM became vertical because of mobile and repeater practicality• SSB became horizontal because of weak-signal performance and standardization

Why Polarization Matters So Much

If you take a good horizontal SSB station and switch the antenna to vertical while trying to work another horizontal station, your performance may collapse badly. The same is true in reverse.

A new operator sometimes says:

“I can hear them on my vertical, so why bother with horizontal?”

Because hearing them a little is not the same as hearing them well, and hearing them well is not the same as being able to complete a contact reliably.

Weak-signal work is all about small advantages adding up:

- lower noise,
- better polarization match,
- narrower bandwidth,
- better receiver setup,
- better feedline,
- proper operating habits.

Each one may seem modest. Together, they are the difference between “I almost heard him” and “QSO complete.”

How to Take Advantage of SSB With the Radio You Already Own

This is where many operators leave performance on the table.

Owning an all-mode radio does not automatically mean you are getting the most out of it. To operate SSB effectively, you need to understand the basic controls and avoid common mistakes.

The good news is that most modern radios already have what you need.

Microphone Gain: One of the Most Common Mistakes

A lot of operators think:“More mic gain equals more talk power.”
That is not how it works.
If microphone gain is set too low:
• your transmitted audio will be weak,
• your ALC may barely move,
• your signal may sound thin or under-driven.
If microphone gain is set too high:
• your audio becomes distorted,
• splatter increases,
• speech becomes harsh,
• intelligibility may actually get worse.

What you want

You want enough mic gain to drive the transmitter properly, but not so much that you are overdriving it.
On most radios, this means:
• speak in a normal voice,
• at a consistent distance from the microphone,
• adjust mic gain so the ALC action is present but not excessive.
If the radio has an ALC meter, watch it. You usually want moderate ALC indication, not slamming hard to the end on every syllable.

Plain English rule

Do not scream into the mic.
Do not eat the microphone.
Do not whisper from three feet away.
A normal, steady speaking voice with correct mic gain beats “loud” bad audio every time.

Speech Compression: Useful, But Easy to Abuse

Compression can help improve average talk power by making your speech denser and more consistent. Used properly, it can help weak-signal contacts.

Used badly, it makes you sound awful.

What compression does

Speech is naturally uneven. Some syllables are loud, some soft. Compression reduces that range so your average transmitted energy is higher.
That can help on weak-signal SSB.

The danger

Too much compression causes:
• harsh, tiring audio,

• pumping,
• distortion,
• splatter,
• reduced intelligibility.
A brand-new operator often hears “compression adds punch” and cranks it up. Bad idea.

Best practice

Use just enough compression to improve average talk power without making the audio sound unnatural. On many radios, modest compression is best. If other operators say you sound “processed,” “crunchy,” or “wide,” back it down.

The goal is not “broadcast audio.” The goal is **copyable audio under weak-signal conditions**.

Use the Right Filters

Filters are one of the most powerful tools in SSB operation, and many operators either ignore them or misuse them.

Why filters matter

The receiver filter determines how much audio bandwidth your radio allows through. Wider filters pass more audio, but also more noise. Narrower filters reduce noise, but if you go too narrow, speech may sound pinched.

For general SSB voice work:
• use the normal SSB filter, often around 2.4 to 2.8 kHz
If signals are weak and noisy:• a slightly narrower filter can improve readability
If conditions are crowded:
• tighter filtering can reduce interference from adjacent signals

What not to do

Do not assume the widest audio sounds best for weak-signal work. Wider often sounds prettier, but it also admits more hiss and junk.

Do not go so narrow that the other station sounds like they are talking through a pipe unless conditions really demand it.

Beginner rule

Start with the radio’s normal SSB filter. If the signal is weak, gradually narrow it until readability improves, but stop before speech becomes too unnatural.

RF Gain and AGC

Many operators leave these controls alone, and that is usually fine at first, but they are worth understanding.

RF Gain

This controls how much signal the receiver front end allows through before the AGC system handles it. In noisy or crowded conditions, slightly reducing RF gain can sometimes make reception more pleasant and improve copy.

AGC

Automatic Gain Control helps smooth out signal levels. On SSB voice, normal or medium AGC settings are often a good starting point. Fast AGC can make noise more tiring. Slow AGC can

sometimes help on voice, depending on the radio.
There is no single setting for every radio, but the important point is this:
these are not mysterious controls. Learn what they do on your rig. Small adjustments can help.

Don't Overprocess the Audio

Weak-signal SSB is not an audio beauty contest.The best weak-signal audio is:
• clear,
• articulate,
• undistorted,
• not too bassy,
• not too sharp,
• easy to understand in noise.
Many operators make their audio worse by trying to make it sound "big" or "broadcast quality."
Heavy bass, too much EQ, too much compression, too much mic gain—these all reduce readability.
For VHF/UHF/SHF SSB, clarity beats "richness."

Talk Like a Weak-Signal Operator

This may sound simple, but it matters.
For better weak-signal results:
• speak clearly
• do not rush
• use standard phonetics
• repeat important information
• avoid mumbling
• keep consistent mic distance
Weak-signal communication is partly technical and partly operating skill.
An operator with average equipment and excellent technique will often outperform an operator with better equipment and poor technique.

Pros and Cons of FM Simplex vs SSB

Now let's compare them honestly.

FM Simplex – Pros

FM simplex is excellent for:
• local communications
• mobile-to-mobile work• quick and easy operation
• emergency and public service use
• strong-signal ragchews
• portable work with simple antennas
FM is simple. It sounds clean when signals are good. It requires less fiddling. For nearby communication, it is a great mode.

FM Simplex – Cons

The disadvantages are:
• shorter effective weak-signal range

• poorer performance near the noise floor
• wider bandwidth
• generally less efficient for long-distance weak-signal work
• vertical polarization standard, which is less ideal for serious weak-signal DX work
FM tends to be "all or nothing." Once signals get marginal, readability drops quickly.

SSB – Pros

SSB excels at:
• much greater range for the same power
• better weak-signal readability
• narrower bandwidth
• more efficient use of power
• serious DX work on VHF/UHF/SHF
• use with high-gain directional horizontal antennas
• exploiting propagation enhancements
SSB is the standard for a reason. It is the better mode when reaching farther is the goal.

SSB – Cons

SSB also has drawbacks:
• requires more operator skill
• needs more careful station setup
• directional antennas are often preferred
• horizontal polarization means it is not directly compatible with most FM stations
• audio quality is less "quiet" than strong FM
• all-mode radios are often more expensive than FM-only rigs

SSB asks more from the operator. But it gives much more back.

Why SSB Can Make Your Existing Radio Feel Like a Better Radio

Many people assume they need huge towers and giant antenna arrays before SSB is worth trying. That is simply not true.
Even a modest all-mode radio with:
• decent feedline,
• a small horizontal Yagi,
• proper setup,
• good operating technique,
can outperform an FM vertical setup by a very noticeable margin for distance work.
The reason is not magic equipment. The reason is that you are finally using the mode best suited to weak-signal operation.

A Simple Practical Example

Let's say two stations are 80 miles apart.

On FM vertical simplex:

• They may not hear each other well at all

• One may be noisy
• The contact may fail entirely

On horizontal SSB:

• The narrower bandwidth helps
• The better weak-signal performance helps
• Polarization match helps
• Directional antenna gain helps

Now the same path may be perfectly workable.

That is why so many operators who try weak-signal SSB for the first time suddenly realize:

"I had no idea my radio could do this."

What You Need for Success

You do not need perfection. But you do need to get the basics right.

A successful SSB weak-signal station should focus on:

• correct polarization
• decent antenna height
• low-loss feedline
• proper radio setup
• moderate and clean mic gain
• careful use of compression
• proper filters
• clear speaking technique
• patience and listening skills

The operator who understands these basics will usually do far better than the one who simply buys hardware and starts twisting knobs.

So Which Mode Is Better?

That depends entirely on what you want to do.

If you want:

• convenience,
• local chat,
• mobile compatibility,
• repeater operation,
• easy everyday communication,

FM is excellent.

If you want:

• range,
• weak-signal performance,
• long-distance simplex,
• real VHF/UHF/SHF exploration,
• better use of your power and antenna system,

SSB is the better choice by a wide margin.

This is not an argument against FM. FM has an important place in the hobby.

But for serious simplex distance work on VHF, UHF, and SHF, **SSB is where the real magic**

begins.

Final Thoughts

One of the biggest mistakes in Amateur Radio is assuming VHF and UHF begin and end with repeaters and FM. They do not. Those bands have a whole second life that many operators never discover.

SSB opens that door.

It gives you more range, better weak-signal performance, and access to a part of the hobby that is highly technical, deeply rewarding, and often far more exciting than many people expect.

The best part is that you may already own a radio capable of doing it.

Learn how to set it up correctly.

Learn how to speak cleanly.

Learn how to use the filters.

Learn why polarization matters.

Learn why horizontal is the standard.

And then get on the air and try it.

Because once you make that first real VHF or UHF SSB contact beyond what you thought was possible, you will understand exactly why so many of us never looked back.

SSB on VHF/UHF/SHF is not just another mode.

It is the mode that lets those bands truly shine.

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