

# CARVER

QUARTZ SYNTHESIZED  
FM STEREO TUNER  
MODEL TX-11





Finally an FM stereo tuner which can drastically reduce multipath and distant station noise and still provide fully separated stereo reception with space, depth and ambience.

We were almost tempted to say, a sound as it was intended thirty years ago.

Thirty years?

Yes. Back then, FM was noise-free, wide-band alternative to static-filled AM. But it was in mono and in the Fifties the stereo phenomenon hit.

And unfortunately the transmission system selected to augment mono FM ended up degrading the ratio of signal to noise FIFTEEN TIMES! (More than 23db)

That's the system we live with today: hiss and distortion-filled unless you're in direct line with a strong station.

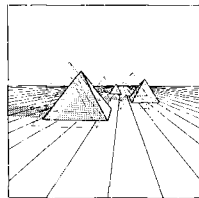
**Understanding FM.** Stereo Frequency Modulation transmission is a lot more complicated than you might think. But understanding it will clarify both the problems and Carver's brilliant solution.

Stereo FM is not like a 2-track cassette with separate signals next to each other. Rather there is a Left - Minus - Right and a Left - Plus - Right signal. A receiving circuit adds and subtracts sums and differences to get Left - only and Right - only Signals. (As you might have guessed, Left Plus Right comes in just fine on mono receivers because it IS mono.)

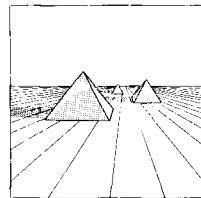
It's that Left - Minus - Right signal that's to blame.

These signals are transmitted at different parts of the audio spectrum and unfortunately L - R is extremely prone to mishaps on the way to your home.

**Audio Ghosting.** To get stereo FM perfectly, you'd have to be the only house in the middle of a vast flat plain with no other buildings anywhere on the plain.



Multipath is caused by multiple reflections of the L - R signal.



Charge-coupling circuitry cancels all but the true L - R signal.

Because any protruding mass - hills, mountains, skyscrapers, other antennas, even bridges - looms up to reflect signals while on their way to your tuner.

Then you get TWO signals. One directly, and one or more a fraction of a second later, after it's taken a longer angular path of bouncing off something. (This happens with TV and AM, too. AM isn't audibly affected, but you can see the frustrating result on TV: a second, third and fourth image.)

These additional images are disastrous to FM reception because they reinforce and then remove part of the signal alternately. As the main signal deviates in frequency, it beats with the reflective signal, causing constructive and destructive interference patterns which bear no resemblance to the original signal. An engineer calls these "beats" *phase modulation*.

While stereo FM receivers have made much of cancelling one component of this interference, they have never addressed the truly audible distortion caused by phase modulation.

Without waxing too technical, suffice to say that your FM receiver is tricked into reading phase modulation as frequency modulation, which is

decoded and made into a brand new signal. The better your current tuner, the more faithfully it's deceived!

Thus instead of just degrading the existing signal, multipath reception problems actually CAUSE NEW AUDIBLE SOUNDS. And we've all heard how bad these sounds sound.

**Charge-Coupling Delay:** The "Find and Cancel" circuit. Almost all noise and distortion is exactly 180 degrees out of phase with itself. For every instantaneous noise or distortion voltage, there is a replica in the opposite channel.

Simply put, the TX-11's Charge-Coupled Delay Line detects these tell-tale dirty mirror images and cancels them before they reach your ears.

But mere elimination of redundancy is not enough. The L - R channel is a necessary evil and throwing the baby (our stereo signal) out with the bathwater (noise and multi-path), is too sonically drastic.

While eighty five percent of the information carried in the crud-filled L - R channel is duplicated by clean L + R signal (and can be compared and "edited" by Charge Coupling), fifteen percent is totally different. It contains instantaneous phase relationships which produce our ambient stereo experience.

Stopping at 85% would give us stereo plus 15% distortion. Here's how we shaved that number considerably finer.

**The Leading Edge Detector.** Through ear-brain research which brought us Sonic Holography, Carver discovered that, if properly matrixed, only one third of non-redundant L - R information is required to convince our senses of a fully separated stereo experience.

The Carver Leading Edge Detector operates only that part of the L - R signal required for our ears and brain to construct true stereo localization, using only one third of the critical 15%. By combining that 5% in the FM receiver's matrix, a net reduction of 93.5% or in excess of 20dB of noise reduction is achieved!

All of the ambient and localizing information is recovered.

Without the hiss.

Without the distortion.

**Sixteen presets for a reason.** All this technical discourse is given meaning when you hook even a modest "t" antenna to the TX-11 and press the sweep panel. The TX-11 will stop at places where only static existed before.

You'll suddenly pull in stations in surprisingly distant cities and suburbs. Underpowered but interestingly-programmed college FM stations will be noise and distortion-free. Stations previously overpowered by strong adjacent signals will sound as steady as if they were alone on the dial. Stations which threw intermittent tantrums of intolerable racket will be pacified. The TX-11's special circuitry can't

make weak stations louder - you'll have to do that with your volume control - but when you crank up a feeble station it will not be submerged in a sea of hiss and multipath.

So unless you live in Adak, sixteen presets might not be enough!

Because the TX-11 is built around two precedent-setting, problem-solving circuits, we've left its superb regular tuning features until now. But even if the TX-11 didn't sport special features, it would be a superb value.

**Quartz synthesis.** The TX-11 uses an incredibly precise circuit which generates a perfect replica of the desired FM frequency and then matches the incoming signal for perfect drift-free reception.

**Digital tuning... with your digits.** Touch the UP or DOWN button and the tuner electronically moves across the FM band, stopping at each FM station it can adequately tune.

**The TX-11 remembers.** Not only will it store sixteen stations - even when unplugged for up to three weeks - it also remembers the last station you played before it was shut off.

**Wide and narrow band selection.** Remember, unlike AM, an FM station isn't a fixed frequency... it's a BAND of frequencies. In areas with many FM signals, these bands can end up close enough to cause interference. The Narrow setting "focuses" the edge of the station's frequency by "cropping" it just slightly. In the Wide mode, you receive un-interfered stations with slightly greater dynamic range.

**Full instrumentation.** Not only does the TX-11 digitally read out station response, it also reads out six 10-dB signal strength stops, indicates when the Quartz circuitry has closed on a station and when a stereo (that ole' L - R band) station has been detected.

**How to sell yourself a TX-11.** Visit your dealer and ask to hear the most expensive, famous or esoteric tuner he sells. Tune to a multipath-ravaged, hiss filled station and compare the sound to the basic Carver TX-11.

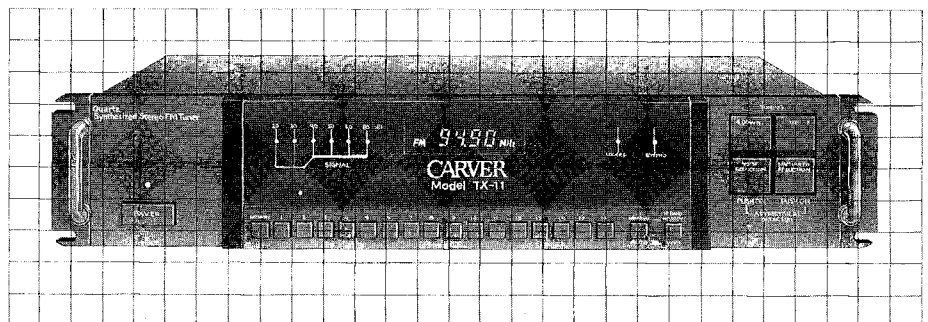
Now press TX-11's Multipath and Noise Reduction Circuits. And appreciate what Carver technology has done for the FM tuner.

### Specifications

Tuning range: 87.5 MHz - 108 MHz. Antenna term: 75 ohms unbal coax input. 300 ohms bal. Intern freq: 10.7 MHz. Freq resp: 20 Hz - 15 kHz, ±1 dB. Selectivity: 90 dB at 400 kHz (narrow), 35 dB (wide). Capture ratio: 1.0 dB. AM suppression ratio: 50 dB, 65 dB with CCD. Image resp. ratio: 110 dB. IF resp. ratio: 110 dB. Spurious resp. ratio: 110 dB. Output lev: 75 kHz dev: 1.700 mV, 600 ohms. System: PLL crystal-locked digital synthesizer system. Power req: 120 Vac, 60 Hz. Power consumption: 15 W. Dim (w/h/d): 17 1/2" x 3 1/2" x 12 1/2" (w/o rackmount). Wt.: 11 1/4 lb. Supplied access: FM ribbon antenna, RCA patch cords.

	Mono		Stereo W/O Charged-coupled Detect.		Stereo With Charged-coupled Detect.	
	75 ohms	300 ohms	75 ohms	300 ohms	75 ohms	300 ohms
Usable Sens	11.3 dB @ 1.00 μV	3.0 dB @ 2.00 μV	34 dB @ 14 μV	34 dB @ 28 μV	16.3 dB @ 1.78 μV	3.0 dB @ 3.57 μV
50 dB quieting Sens.	16.1 dB @ 1.7 μV	16.1 dB @ 3.47 μV	37 dB @ 19 μV	37 dB @ 39 μV	21 dB @ 3.1 μV	21 dB @ 6.2 μV
S/N ratio	82 dB @ 85 dB	82 dB @ 85 dB	74 dB @ 85 dB	74 dB @ 85 dB	85 dB @ 85 dB	85 dB @ 85 dB
Stereo Separation (wide)			1 kHz: 45 dB 100 Hz: 36 dB 10 kHz: 38 dB		45 dB @ -10 dB 30 dB @ -15 dB 15 dB @ -23 dB	

\* Includes full carrier jitter of test instrumentation. † Without carrier jitter.



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# CARVER

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