



6340 Sky Creek Drive  
Sacramento, California 95828 USA

Telephone (916) 383-1177  
Fax (916) 383-1182

## Review of HD Radio Antennas from Jampro:

Several Jampro antenna models manufactured entirely in the United States are suitable for I.B.O.C. or HD Radio broadcasting. The Ibiquty HD System has been discussed in depth elsewhere (see <http://www.ibiquity.com/> ) and is not repeated here. A quick summary of the methods to achieve FM Digital Broadcasting are as follows:

- ✓ **High Level Combining** using an HD Radio Injector
- ✓ **Low Level Combining** is done inside the transmitter
- ✓ **Medium Level Combining** uses one analog-only transmitter and one HD + analog transmitter
- ✓ **Dual input Panel** Antenna (Master Antenna Systems)
- ✓ **Dual input side mount** antenna
- ✓ **Same aperture** separate analog and HD bays
- ✓ **Separate aperture** analog and HD bays

Jampro manufactures products for each of the antenna categories. As the oldest FM + TV broadcast antenna manufacturer in the United States, and holder of 6 design patents, Jampro is well suited to provide antennas, injectors, circulators, installation and system design for the broadcast industry.

### Single Coax Run Systems:

Jampro's experience has shown that an existing FM antenna can be used for **Low Level Combining** with a transmitter which provides both HD + Analog signals. The antenna must have a symmetrical band pass with a return loss of 23 dB or better at  $\pm 200$  kHz from the carrier and at least 26.4 dB return loss at  $f_0$ . Many Penetrators built since 1976 can meet this criteria.

Likewise, **High Level Combining** systems might be able to use the existing antenna if it meets the same specifications noted for Low Level Combining (previous paragraph). This technology uses a HD Injector to combine an existing analog transmitter and a new HD-only transmitter and is used with a reject load.



6340 Sky Creek Drive  
Sacramento, California 95828 USA

Telephone (916) 383-1177  
Fax (916) 383-1182

The **Medium Level Combining** technique combines an older, analog transmitter combined with a new analog+HD transmitter. The antenna system should meet the specs just as the previous two examples.

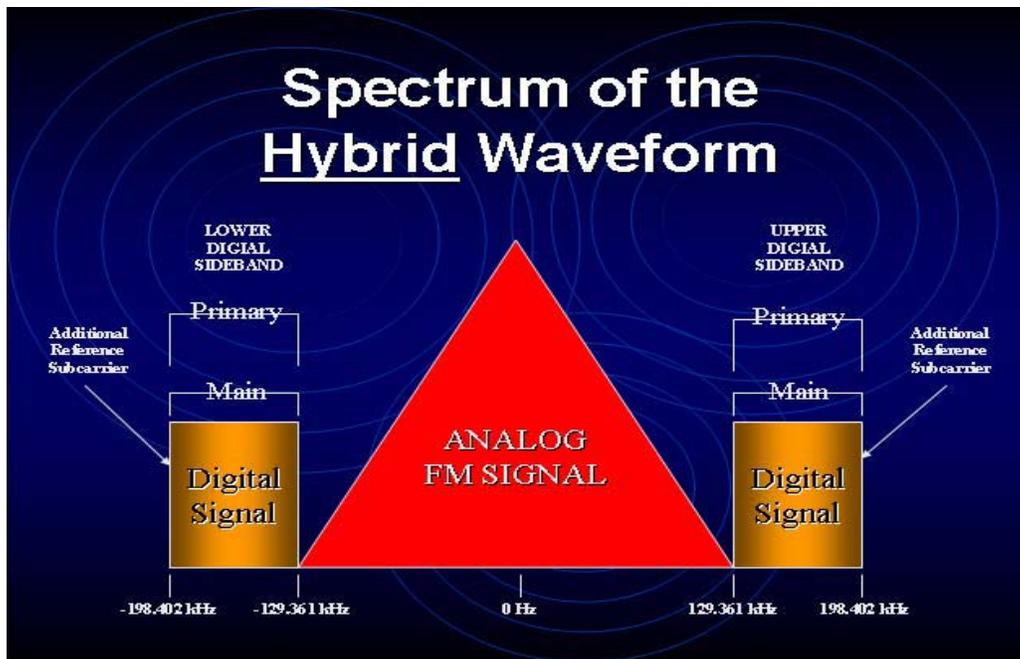
### Dual transmission line run systems:

**Same Aperture Bays** provide separate antenna bays for the HD and the analog signals. The digital bay count is usually half of the analog bays. There are concerns about the elevation pattern with this approach and almost always a circulator is needed between the output of the HD transmitter and the input to the HD coax system.

**Different aperture** bays are the easiest way to add HD to an existing analog system but does require a second coax. Run. Ideally, the HD antenna should be mounted one wave length below the analog array. The HD antenna should be of the same type as the analog to give about the same coverage for HD vs. analog.

Specialty antennas are the **Dual input Panel** for master station antennas and/or directional arrays. Some Jampro master station antennas can be field up graded to HD broadcasting. Another alternative antenna is the **Dual input side mount** which is useful where the bulk of a panel is desired, but the tower won't support the wind load.

A quick review of the spectrum for Analog + HD FM broadcasting:

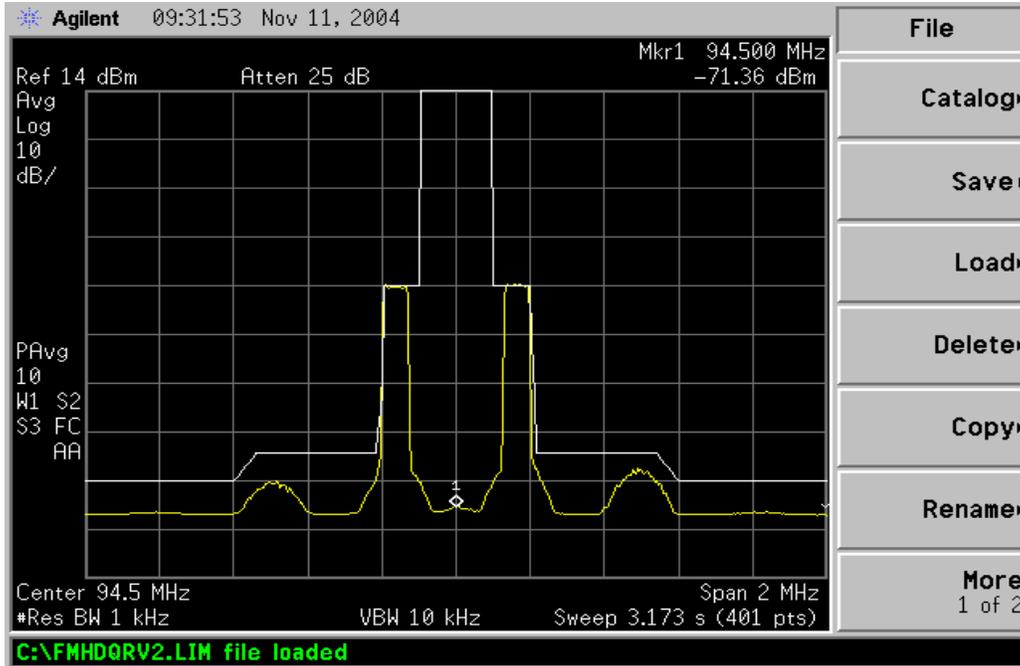




6340 Sky Creek Drive  
Sacramento, California 95828 USA

Telephone (916) 383-1177  
Fax (916) 383-1182

The allocation of analog (red) and HD Radio / Ibiquty signals (gold).



This snap shows a Jampro HD wave form fitting under the FCC limits. The analog modulation is 'off' for an easier view of the basics.

So what does a same aperture analog – HD array look like?

This [JMPC-2 + JMPC-2-HD](#) is shown installed on a 24" triangle tower. This is a good solution for a station with rented tower space and / or a limited aperture. This array will most often have lower weight and wind load than a dual input panel or side mount antenna. Additionally, some recent Penetrators might be retrofit- able. Contact the factory about your Jampro antenna model to see if this works for you. Interleaved Bays are not recommended for FM stations using a Directional Antenna System.





6340 Sky Creek Drive  
Sacramento, California 95828 USA

Telephone (916) 383-1177  
Fax (916) 383-1182



FM7380-6HF

The [FM-7380](#) Circulator / Isolator which installs between the output of the HD-Only transmitter and the input to the coax system feeding the HD antenna bays.

The Jampro [RCHC-323-10DB](#) High Power Digital Injector. Features 35 kW input rating for analog and up to 10 kW input for the HD Digital transmitter. A smaller sized [RCHC-222-10DB](#) Injector also available.



Let's review the appearance of the Dual Input antennas:



JADP-2/2 (4) HD



One bay of JAHD - HD



6340 Sky Creek Drive  
Sacramento, California 95828 USA

Telephone (916) 383-1177  
Fax (916) 383-1182

The [JSHD](#) dual input side mount antenna



Dual inputs: analog and digital provided ... no lossy injector needed. Allows for a lower power (TPO) HD transmitter, too.

The [JHPC-2 + JHPC-HD-1](#) side mount antenna

Dual Inputs: Analog for top bays and digital for bottom. The bays are spaced one wave length apart. A FM7380 Isolator/circulator may be needed at the output of the HD Transmitter.



For more detailed information custom tailored to your site, contact Jampro Antennas / RF Systems, Inc. at Telephone # 01+916-383-1177; FAX # 01+916-383-1182 or visit our web site at [www.Jampro.com](http://www.Jampro.com). You can email us at [sales@jampro.com](mailto:sales@jampro.com).