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A Technical Report:

Jampro's Dual Input Shared Aperture HD FM antenna:

This JMPC-2 + JMPC-2-HD is shown installed on a 24" triangle tower. Many other configurations are available to meet your HD Radio Needs. Shared Aperture offers 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. The Jampro System uses a special design to enhance the isolation between the analog and digital bays.



Measuring the Shared Aperture Antenna System:

Shared and separate aperture antenna systems do require special performance demands. The charts which follow show a typical antenna array with an even bay count demonstrating the similar band pass and isolation characteristics. Attention has been given to achieving the best control over downward radiation and similar elevation patterns for both analog and HD broadcast.

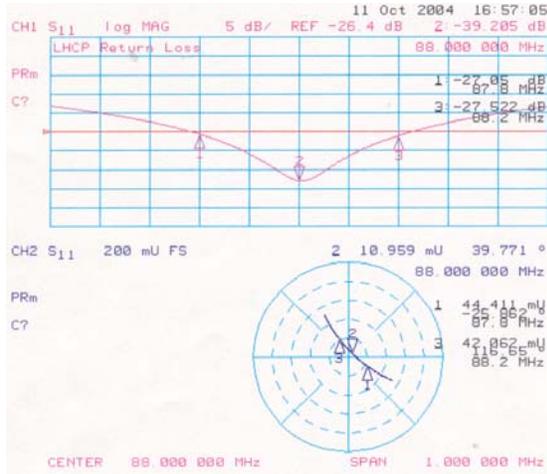
These plots are for a shared aperture, 2 bay, 1λ spaced system. Special design considerations have been used in the digital antenna design for extra isolation. Tests conducted at the bottom and middle of the FM band.



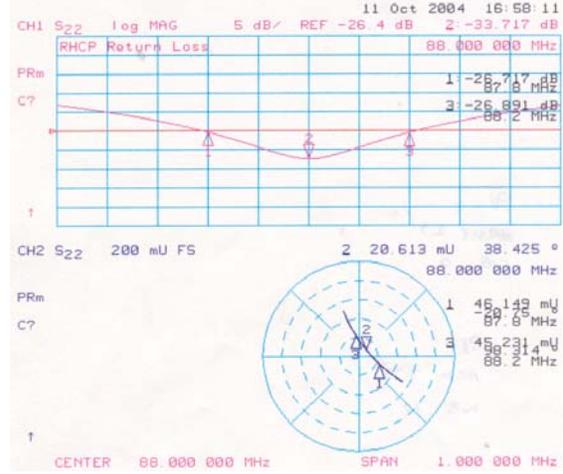
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First, tests on 88 MHz.

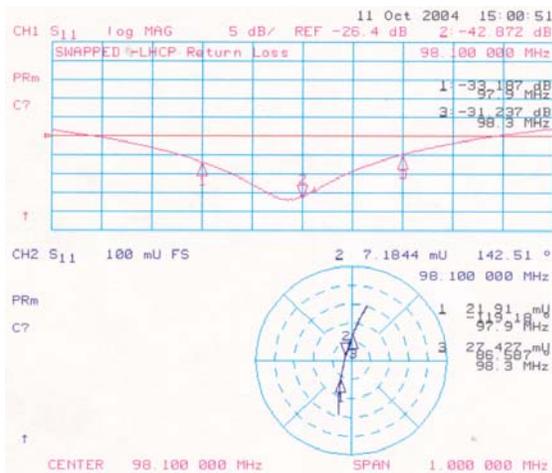


HD Digital CP Digital Bays

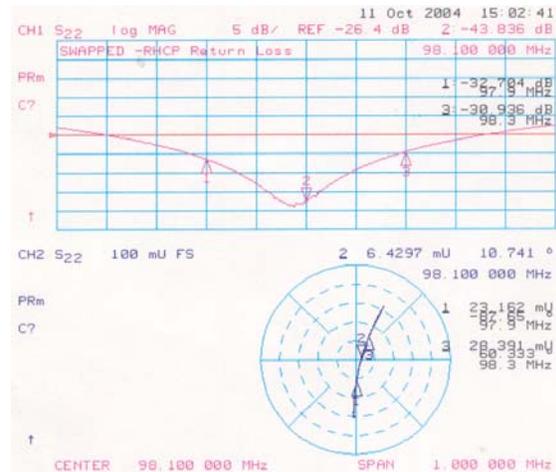


Analog CP Analog Bays

Next, tests on 98.1 MHz.



Analog CP Analog Bays



HD Digital CP Digital Bays

It is important that the band pass characteristics of the two antennas be as similar as technically possible. These are quite closely matched. Another critical issue is symmetrical band pass to assure both upper and lower HD data packets are transmitter without degradation. F_o should be, as noted in the above charts, in the center of the pass band and the return losses out to ± 200 kHz should be of a similar slope.



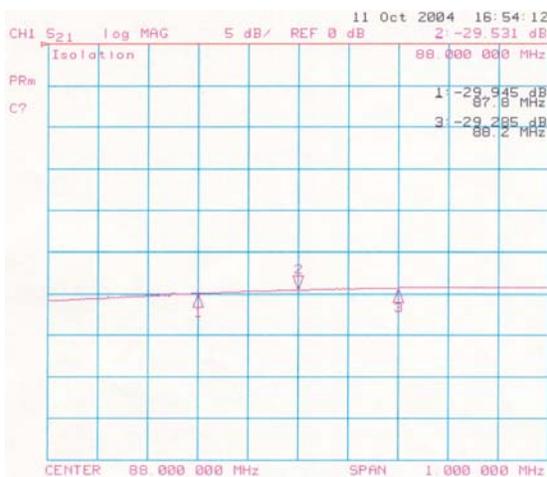
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Isolation between the Analog and HD Signals:

The next set of plots shows isolation of the digital signal from the analog signal. Note that the analog signal broadcast from the analog bays will be 'received' by the digital antenna and fed down the digital coax system and right into the output of the digital transmitter. Most engineers agree that this signal should be on the order of 36 dB down to prevent HD Transmitter problems.

Analog - Digital Isolation 88 MHz.

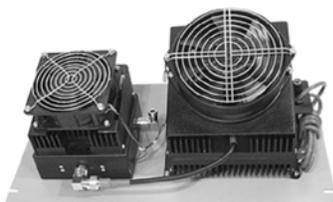


Analog - Digital Isolation 98.1 MHz.



Although these antenna tests demonstrate very high isolation, just a bit more might be desirable for some installations. The FM-7380 circulator-isolator is suggested, where required, to provide up to 32 dB additional isolation. Some installations have found the isolator is not needed. Jampro suggests budgeting for this inexpensive accessory and install it if needed or if recommended by the HD transmitter manufacturer.

Sometimes a circulator / isolator is needed more isolation



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. It provides even more isolation when needed by the HD-only transmitter.

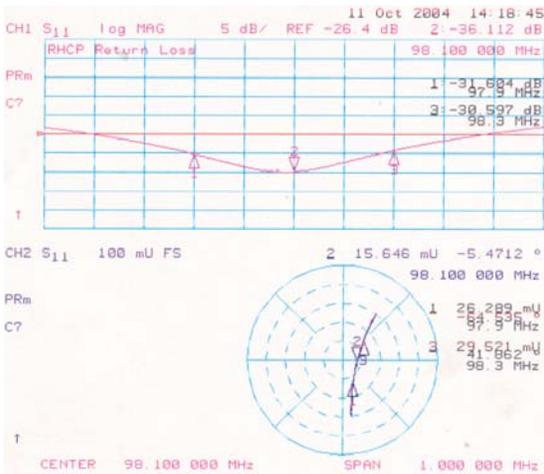


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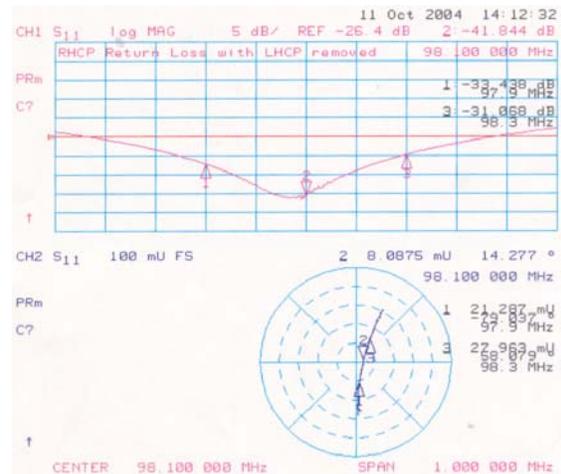
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Does an shared aperture antenna hurt analog performance?

Our conducted measurements show not much change. The return loss with or without the HD bays present comfortably meets or exceeds the published specifications. Jampro's return loss (VSWR) specs are among the best in the business 1.10:1 or better ± 200 kHz. Because of specialized antenna factory testing, field tuning on the tower is not normally required, saving the cost of an extra day of tower crew work found with testing procedures used by others:

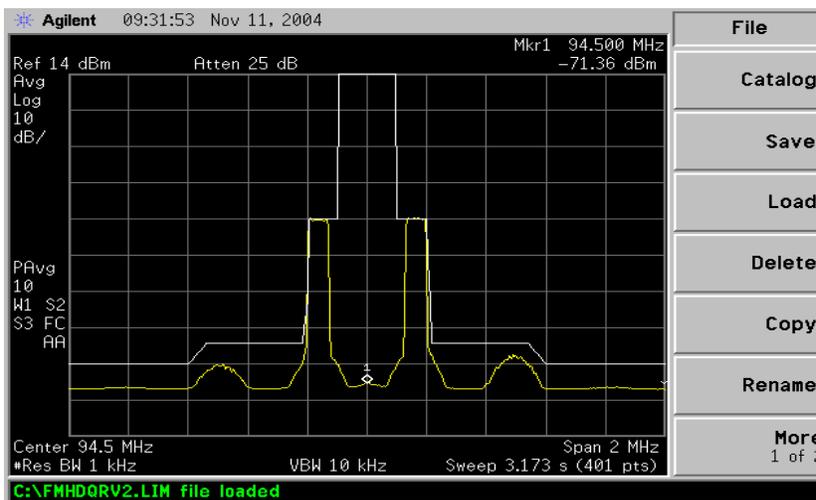


Analog Antenna with HD in place



Analog without the HD antenna

In the field, what's it look like?



This analyzer display shows the HD wave from fitting under the FCC limits measured in the field. The analog is shown with no analog modulation to simplify viewing the results.



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Conclusion:

Shared aperture antenna bays provide a solid, workable method of HD Digital FM Broadcast. Of the several methods available from Jampro for upgrading a station to digital, this method is a top choice where tower spaced is limited or weight - wind load restrictions apply. Other techniques available include: High Level Combining; Low Level Combining; Medium Level Combining; Dual Input Panel Arrays; Dual Input Side Mount Systems and Separate Aperture, Dual Input Analog and Digital Arrays.

Additional information is available for other HD antenna configurations for High Level Combining, Low Level Combining, Medium Level Combining, Dual input panel arrays and Dual Input Side Mount arrays.

Contact:

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