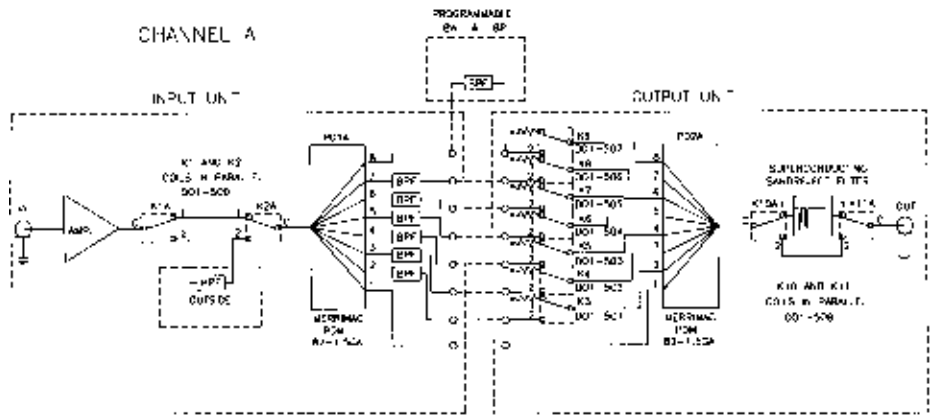


Innovative Filter Design Protects L-band Observations

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Radio astronomy observations are becoming increasingly difficult in a world of *global communication*. While the telescope itself must be sensitive to incredibly weak signals from other galaxies, it must also be able to withstand simultaneous strong earth based signals, often on adjacent signal channels! Such is the case for Arecibo L-band observations.

The new wide-band L-band receiver (L-wide) can cover a frequency range of about 1.0-1.9 GHz, albeit with slight degradation of the system performance towards the band edges. However, there are many other active spectrum-users in this range whose radiation field at the Observatory can cause gain-compression in the RF post-amplifiers of this receiver. From our round-the-clock, hill-top spectrum monitoring, and also from data gathered through the receiver in the Gregorian dome, it was indeed confirmed to be so. The electromagnetic environment at the Obser-



Schematic diagram of L-Band filter bank.

vatory within this range of frequencies can be schematically represented as shown in the L-band Environment figure, where ONLY the very strong radar/radio transmitters are marked.

In order to be able to use most of this wide frequency range, an innovative computer-controlled filter-bank system, plus a programable radar blanker are currently under construction.

A schematic diagram of the filter-bank circuitry is shown above. The radar blanker will be described in a future issue.

The filter bank will be located immediately following the cooled RF amplifiers and before the post RF amplifiers. The present status of various filters constituting the filter-bank is :

Category A

1. HPF1: 1370 MHz and above (wave guide filter); in place.
2. HPF2: 1640 MHz and above (wave guide); under construction.
3. HPF3: 1320 MHz and above (wave guide); available soon (this option may have to be used in conjunction with the radar blanker, blanking the two FAA radars at 1330 and 1350 MHz).
4. BPF1: 1150-1750 MHz; in place.
5. BPF2: 1120-1220 MHz; ordered.

Category B - Filters covering 1220 - 1320 MHz (radar) band: For these, the possibilities are:

1. A number of Band-pass filters of 25 MHz bandwidth, covering the above range, along with the radar blanker, called into action for blanking the appropriate radars within the pass-band.
2. A bandpass filter similar to BPF2, but covering 1120-1265 MHz. This way, 1220-1265 MHz will be useable in conjunction with the blanker being used for just the two aerostat radars. However, this will also mean that 1265-1320 MHz will be very difficult to use, where one would need to employ the full potential of the newly designed blanker and might lose a lot of time to blanking.

Category C - Special filter:

1. Superconducting band-reject filter to remove IRIDIUM down-link, between 1621.35-1626.5 MHz: The prototype filter, already tested at Superconductor Technologies, provides 55 dB suppression over this range, with much less than 1 dB loss in the radio astronomy band. It operates in a 70 K dewar.

We hope that this gives the users an opportunity to gather reasonably clean L-band data where software techniques can thereafter be applied to extract the cosmic signal.

L-band EM Environment at AO (Schematic diagram)

