

## C-BAND WEATHER RADAR



INVAP C-band weather radar has Doppler and Dual-polarization capabilities.

The system continuously transmits a train of pulsed electromagnetic energy to scan the atmosphere 360 degrees around, sweeping from 2 degrees below the horizon up to 92 degrees in elevation.

Argentina's weather network composed of 12 of this radars has been developed, manufactured, installed and supported by INVAP since many years.

It processes the signals received by the antenna and generates dual polarization variables to get improved rainfall estimates and separation of echoes produced by hydrometeors (drizzle, rain, snow, hail) from those produced by non-meteorological sources such as: insects, flocks of birds, buildings, mountains, etc.

By processing this data, users can locate and track the different sources of echoes.

Numerical models can also be used to make very good short-term forecasts.

## Technical specifications

**Operational frequency range** 5450-5820MHz (C-Band)

**Pulse duration (PW)** 0.4 - 3  $\mu$ s  
User adjustable at 20 ns steps

**Pulse repetition frequency (PRF)** 300 - 2000 Hz  
User adjustable at 1  $\mu$ s steps

**Typical operational range/ technical range** 240 km / 480 km

**Sensitivity** -20 dBZ at 25 km (3  $\mu$ s pulses)  
-10 dBZ at 25 km (1  $\mu$ s pulses)

**Clutter filtering capabilities** Better than 40 dB, adaptive identification and removal, dynamic clutter map, updated in real time, scan by scan.

**Doppler spectral moments** TH & TV, total (uncorrected) reflectivity  
DBZH, DBZV, corrected (clutter filtered) reflectivity  
VRAD, radial velocity  
WRAD, spectral width of the radial velocity

**Polarimetric variables** ZDR, differential reflectivity  
PHIDP, differential phase shift  
KDP, specific differential phase  
RHOHV, correlation coefficient

**Data quality variables** CMAP, cell identification map (clutter)  
SNR, signal to noise ratio  
SQI, signal quality index



## Technical specifications

### ANTENNA

<b>Type</b>	Center feed parabolic solid reflector linear dual polarization (H/V) feed horn
<b>Diameter</b>	4.48 m
<b>Half power beam width</b>	< 0.9 °
<b>Gain</b>	45 dBi typical
<b>Peak side lobe</b>	Better than -27 dB
<b>Cross pol isolation</b>	Better than -35 dB

### PEDESTAL

<b>Position accuracy</b>	Better than 0.1 °
<b>Elevation range</b>	-2° to 92°
<b>Rotation</b>	360° continuous to 6 rpm
<b>Scan modes</b>	PPI, RHI, Manual

### ANALOG RECEIVER

<b>Type</b>	Superheterodyne, dual down conversion, with image reject mixing
<b>Intermediate frequency (IF)</b>	905 / 70MHz
<b>Linear dynamic range</b>	> 90 dB
<b>Minimum Discernible Signal (MDS)</b>	-114 dBm typical
<b>Noise figure</b>	Better than 3 dB

### DIGITAL RECEIVER

<b>Type</b>	Modular, 4 channels, 16 bits ADC, FPGA based signal pre-processor
<b>Sampling frequency</b>	100 MHz
<b>I/Q time series</b>	24 bits, 5 Mega sample/s
<b>Host computer</b>	Commercial off-the-shelf, rackable PC
<b>Operating system</b>	Linux

### TRANSMITTER

<b>Type</b>	High power coaxial Magnetron
<b>Modulator</b>	Digital, solid state
<b>Peak power</b>	320 kW
<b>Duty cycle</b>	0.1 %

### SIGNAL PROCESSOR

<b>Type</b>	Scalable, multicore parallel processing, PCIExpress 2496 cores GPU
<b>Doppler</b>	PPP and FFT
<b>Velocity dealiasing</b>	Staggered PRF, 2/3, 3/4 and 4/5
<b>Host computer</b>	Commercial off-the-shelf rackable PC
<b>Operating system</b>	Linux

### SAFETY AND SECURITY

<b>Automatics interlock</b>	Radome inner door
<b>Manual interlock</b>	Emergency stop switch, RF lock switch, pedestal lock switch
<b>Receiver protections</b>	TR cell and power limiter
<b>Transmitter protections</b>	VSWR isolator and automatic overduty detection
<b>RF sector blanking</b>	Per azimuth, below user selectable elevation
<b>User authentication</b>	Required to control the radar

### LOCAL STORAGE

<b>Disks</b>	6, SATA (1 TByte each)
<b>Base data</b>	2 TB redundant, RAID 1+0
<b>I/Q time series</b>	2 TB Stripping 1+1





INVAP's headquarters are located in San Carlos de Bariloche at the foot of the Patagonian Andes. The company has offices in several cities throughout Argentina and operates in various countries.



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