

# Main Injector NonLinear Devices

## *HLRF Power Scaling*

Fri, Jun 5, 1998

Each Main Injector High Level RF System IRM front end connects to 8 analog readings that must be scaled in a nonlinear fashion. The chosen scaling of these RF power readings is simply proportional to the square of the voltage reading. Traditionally, Acnet supports such devices at the host application library level. But this would leave out such support via other pathways into the front end IRMs, such as the Classic protocol that is commonly used for local access and diagnostics. To allow for such support, our traditional approach is to linearize the readings of those channels so affected, so that any host level requestor can perform engineering units scaling using the simple linear formula that is usable for all devices. This note describes the functioning of a local application SQR1 that is designed to perform the required linearization.

According to the DABEL input that describes the RF power reading devices for Acnet database entry, the chosen formula for units was  $250*v^2$  watts, where  $v$  is the A/D voltage. This same formula is applied for all 8 signals in each of the 18 RF stations, or 144 channels in all. The local application SQR1 merely accepts a selection of analog channels as parameters, along with the coefficient to be used (such as 250) in the formula  $c*v^2$ . Using the linear scaling factors stored in the analog descriptor entry for each channel, the result is transformed backwards into the appropriate raw 16-bit value. This allows a host requestor who uses linear scaling to produce the same engineering units results values. The following are the required parameters for SQR1 as seen via Page E:

```
E LOCAL APPL PARS 06/05/98 1019
NODE<06D3> NTRY<18>764 H<0508>
NAME=SQR1 CNTR=D5 DT= 0.5 MS
TITL"POWER VIA V SQUARED "
SVAR=00045F70 06/02/98 1741
ENABLE B<00D3>*SQR1 ENABLE (F)
NUMER <00FA>
DENOM <0001>
CHANS C<010E> SD03F1 0.022 V
      C<010D> SD03F2 0.002 V
      C<010C> SD03F3 0.009 V
      C<0107> SD03F4 0.001 V
      C<0000> 0
      C<0000> 0
      C<0000> 0
```

Up to 7 channels may be specified to receive the same linearization treatment, using the common coefficient, whose value is specified as a fraction of two integers.