

NATIONAL RADIO ASTRONOMY OBSERVATORY
SOCORRO, NEW MEXICO

VERY LARGE ARRAY PROGRAM

VLA ELECTRONICS MEMORANDUM NO. 212

VLA Ku BAND PERFORMANCE AT OUT-OF-BAND FREQUENCIES

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Some tests of the performance of the VLA 2-cm receivers at frequencies outside the specified 14.4-15.4 GHz range have recently been made.

There are several factors which limit the out-of-band performance.

1) Range of the F3 first LO module. This is specified as 17.2-20.1 GHz, giving an Fsky range of 12.2 to 15.6 GHz. It is found that many of the F3's will operate to 20.6, giving Fsky to 16.1. Other factors listed below, however, will limit use to a smaller range.

2) T_{sys} , determined by the 2-cm FET amplifier and mixer. A plot of $T_{receiver}$ vs frequency is shown as Fig. 1. This is a measurement of only one system, but is thought to be typical.

3) Gain of the 2-cm FET and mixer. The out-of-band gain falls off rapidly. When it has dropped sufficiently, the F4 ALC circuit can no longer compensate and the total power levels will fluctuate. Fig. 2 shows the percentage of F4's holding the total power level vs frequency. The 50% frequencies are about 13.9 and 15.9 GHz.

4) Antenna, feed, and waveguide. These add about 25 degrees to T_{sys} within the band. The amount of these contributions outside the band is not known, but will certainly be larger. Feed horn efficiency and polarizer performance will deteriorate outside the band.

This information is provided only as a guide for those wishing to observe at out-of-band frequencies and willing to accept the inconveniences and risks attached. The VLA does not undertake to guarantee the feasibility of such observations.

Fig. 1

830603
PAZ 1PG

#22 ABU

TRX VS FREQ.

RECEIVER, KELVINS

10^5
 10^4
 10^3
 10^2

STANDARD VLA BAND

Semi-Logarithmic
4 Cycles x 19 to the inch

13.0 14.0 15.0 16.0

FREQ. MHz

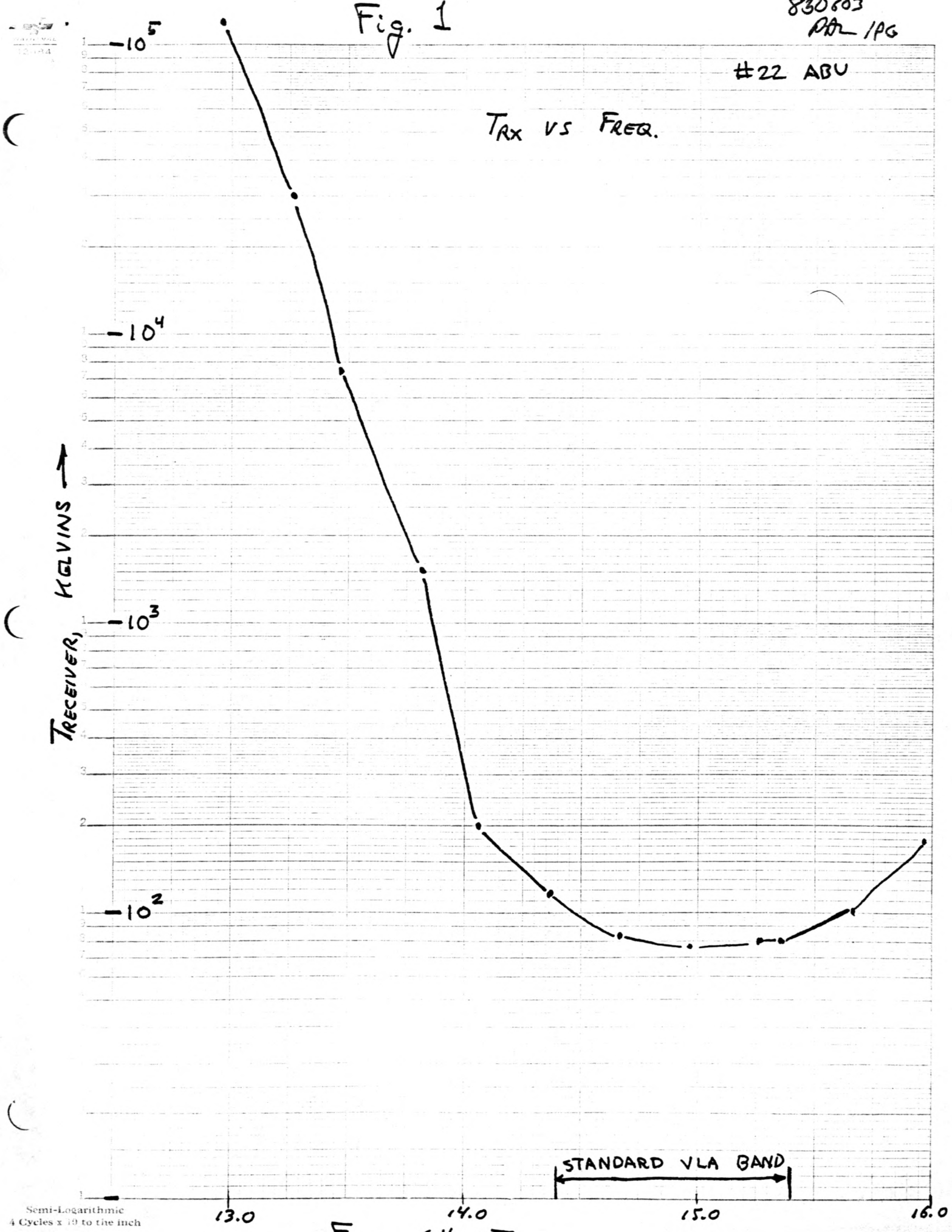


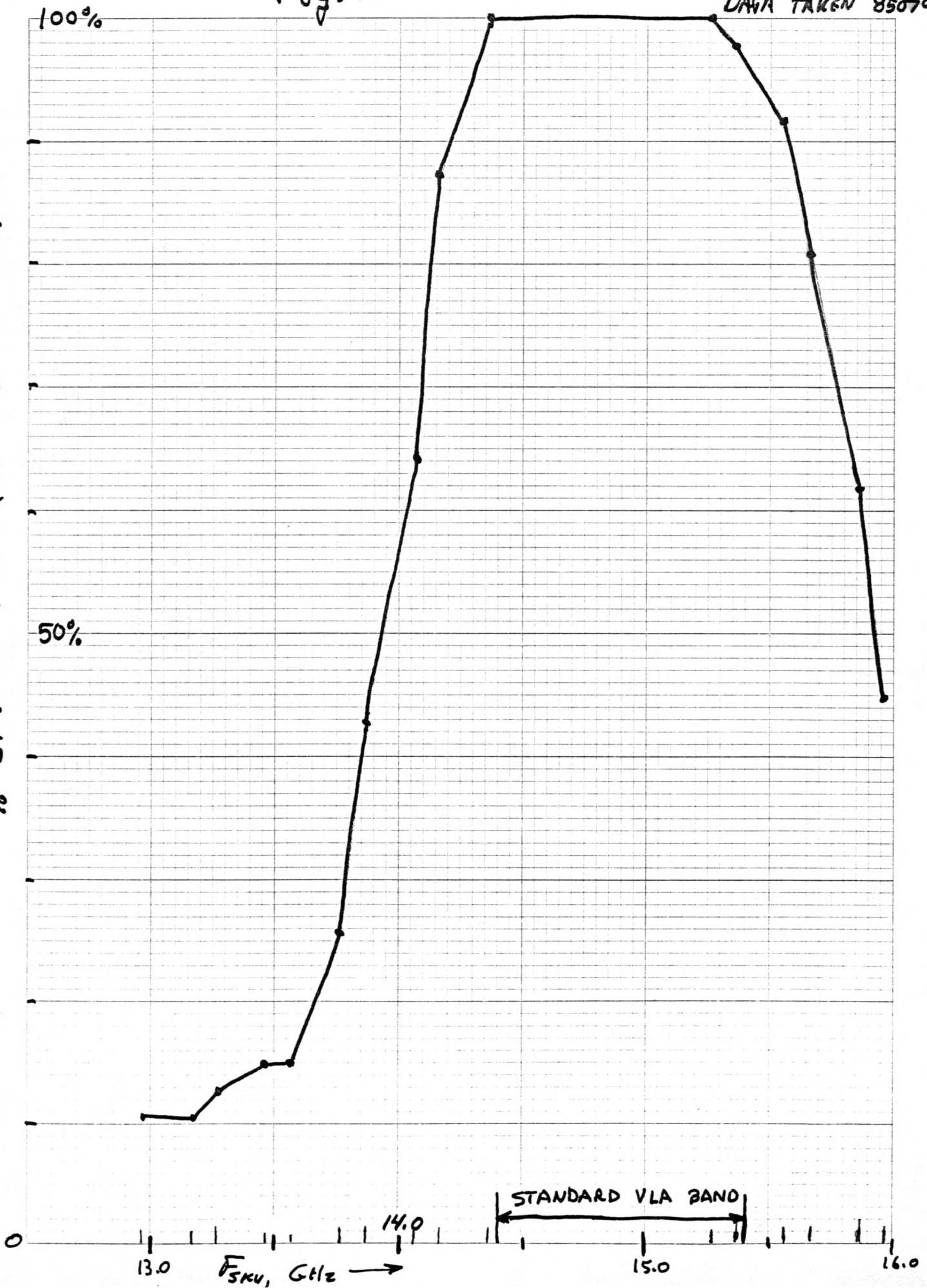
Fig. 2

850722 PAR
DATA TAKEN 85070

46 0700

10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

% IF's FUNCTIONAL (AFC LOOP OPERATING) →



STANDARD VLA BAND

13.0 F_{SKU} , GHz →

15.0

16.0