

DUAL-SCALAR FEED TEST RESULTS

MAY 21, 1971

Summary

A dual-scalar feed was tested on the 140' telescope at $\lambda = 2.8$ cm on May 19, 1971. A photograph of the dual-scalar feed along with a horn feed tested for comparison is attached. The results are as follows:

1) Antenna temperature at zenith,

Dual-scalar - 22°K

Horn feed - 28°K

Absolute values may be high by as much as 7°K but difference is accurately 6°K. A plot of antenna temperature vs. zenith angle for both feeds is attached.

2) Efficiency - The dual scalar gave 1.22° on 3C218 near the meridian. This means 34% at this zenith angle ($\sim 50^\circ$) or about 45% at zenith. The horn feed gave a few percent less signal.

3) Beam widths -

	α	δ
Dual-scalar	- 2.92'	3.11'
Horns	- 3.10'	2.88'

Dual-scalar beam separation: 7.5'

4) Balance of dual-scalar

- a) The antenna temperature of one beam relative to the other varied from +0.5°K to -2.0°K dependent on antenna position and polarization.
- b) The receiver output on 3C273 was 10% greater on one beam relative to the other as shown on the attached figure. This may be a polarization effect. Not enough time was available for further tests.

Conclusions

The dual-scalar is superior to horn feeds and should be used for switched beam operation in future receivers. Some further tests should be made to determine:

- 1) What caused the signal imbalance described in 4b)?
- 2) What is the effect of the focus shield?
- 3) Is the dual-scalar as good as a single scalar? (If it is we could also use the dual scalar for line observations.)
- 4) Can a dual-polarized dual-scalar be built?

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ANTENNA
TEMPERATURES

OK

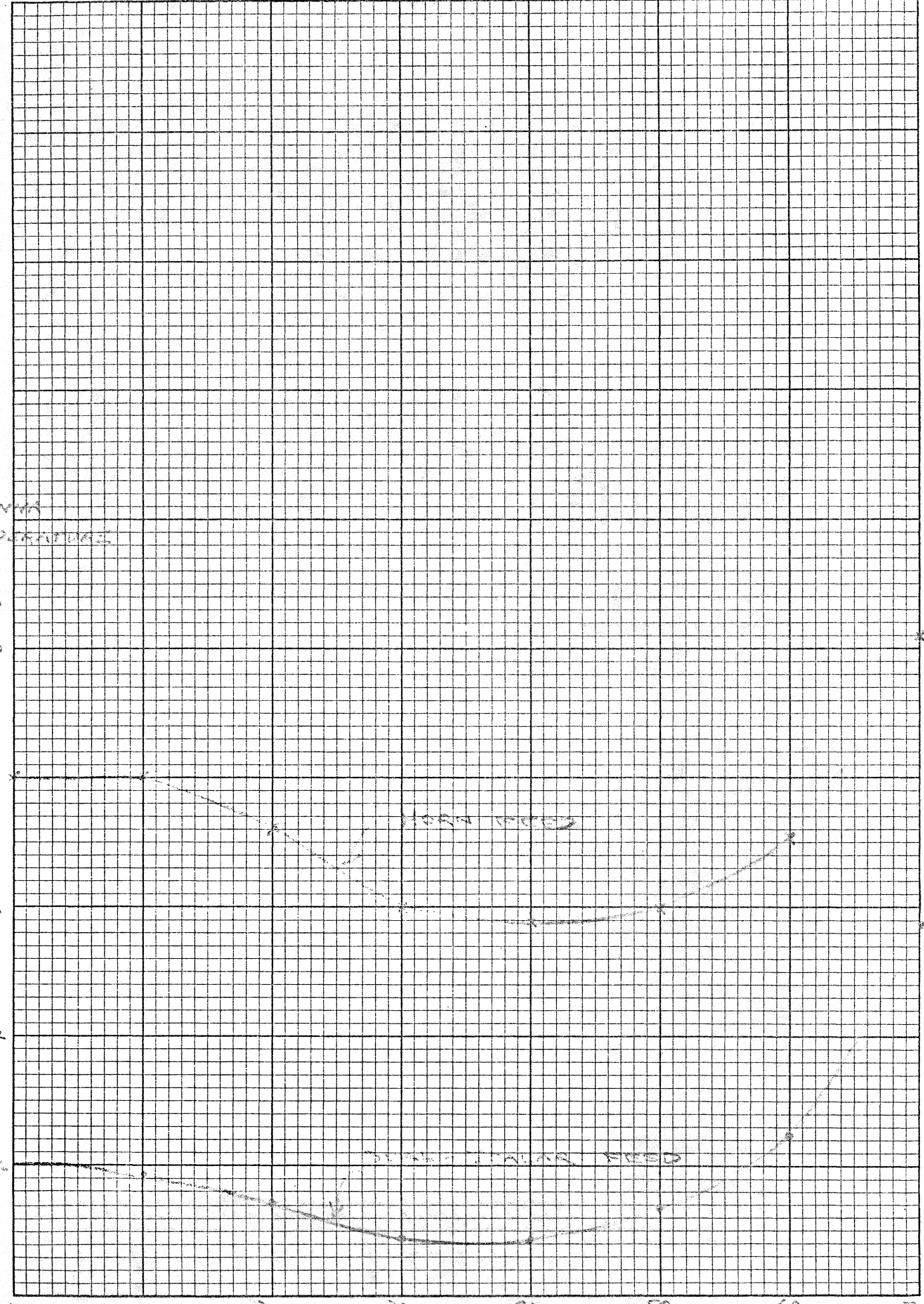
30

28

26

24

22



HORN FEED

SPLIT-PALAN FEED

0 10 20 30 40 50 60 70°
ZENITH ANGLE

30273
2.8 CM
5/19/71
2300 EDT

0.85°/CM

1PK

20'

250

200

150

150

50

0

101

120

100

05'

170° 20' + 02° 04'

PEAKED POSITION AND FOCUS OF THIS BEAM

120MM

131mm

10% MORE SIGNAL ON THIS BEAM

MINIMUM 5 @ N

2025

