AT file

AT/15.5/027

CSIRO DIVISION OF RADIOPHYSICS

INTERFERENCE SURVEY 5 - TASMANIA

26/10/84

1.0 INTRODUCTION

This report presents results of interference tests done at three sites near Hobart, Tasmania between 15/10/84 and 19/10/84. The sites and a brief description follow.

Mt CANOPUS ; the location of the University of Tasmania's Optical Observatory. This site is exposed to the weather and overlooks Hobart, to the south-west, and in particular Mt Wellington and adjacent peaks where a number of transmitters are located (TV, radio stations, Telecom links).

UNIVERSITY of TASMANIA FARM ; on the flats with some protection from the nearby hills (shielding Hobart) however is close to the airport and the airports DME beacon.

QUOIN RIDGE ; the location of the Department of Communications monitoring station which overlooks Hobart to the South and is also exposed to the weather.

All sites were constrained to where we could get electric power and don't necessary represent in the intended proposed locations of the antenna. Figure 1 gives a map depicting the locations of these sites.

This report refrains from drawing conclusions as to the suitability of the three sites but rather relates the observations to previous surveys done at Siding Spring Mtn, Parkes and Culgoora. We also refrain from dribble in the form of discussion concerning the uncertainity caused by future transmitter installations, not knowing the on times of transmitters or the lack of sensitivity of the equipment used etc.

The reference source which summarises the interference surveys at the other AT sites, in an equivalent form, is document AT/15.5/024.

2.0 RESULTS

The attached graphs give the spectrum vs azimuth angle and the tables list the stronger transmitters and their most probable direction (uncertainity due to temporal variations in transmitter strength). Figures 2 and 3, though, represent an overview of the frequency situation as seen from Quoin Ridge. These plots where done on 'max hold' with 3kHz vidio filter (slow scan) over all azimuth angles (a simulated integrating, peak detecting, omnidirectional antenna).

The following general points are made, highlighting interesting features found in the survey.

- Canopus 327 MHz extensive low level interference was probably induced from the relative proximity of the Forestry Commisions Base Station (@ 75 MHz?) and another unknown yagi repeater(@ 600 MHz?) on the roof of the observatory building, though peaks at 307.6 and 333.5 MHz seem to be non-local.

- Similiarly Canopus 625 MHz has spurious garbage not present at the other sites.

- 408 MHz results at all sites clearly show a clear 6 MHz valley near the Radio Astronomy 406.1-410.0 MHz band. However a transmitter at 406.4 MHz impinges on this band.

- The protection afforded by the hills surrounding the farm site is apparent. At 843 MHz we can see at least 20dB attenuation against the other two sites with decreasing protection the lower we go in frequency (as expected). We acknowledge the fact the test sites are at different azimuth angles to the boresight of the directed beams and this correction is excluded in the general comments above.

- The yagis used at the two lower frequencies have relatively strong back and side lobes increasing the uncertainity in the direction determination. The horns used at the two higher frequencies have more satisfactory beam characteristics.

- Figures 16 and 17 show respectively the digital average and the max hold appearance of the spectrum between 0 and 500 MHz at the farm site. The source of this interference is the airport DME beacon. The nature of the digital average (smoothing) is that, being an accurate measure of the average power in a given frequency (resolution) bandwidth, the pulsing signal doesn't contribute signifiacntly to the average flux, due to its wide frequency dispersion. The sweeping seems irregular, as attempts to see a regular periodic frequency structure by aliasing with various spectrum analyser sweep rates, failed. There does seem to be a marked concentration at frequency 206 MHz. This same interference was observed from Quoin Ridge.

• The low level spikes at frequencies 308.5 and 310.9 MHz are produced by the spectrum analyser and hence been excluded from the tabulated data.

3.0 CONCLUSIONS

It is apparent that the farm site provides the best environment in which to operate the Radio Telescope of the three sites tested, although the close proximity of the DME may be of concern. Further sites may prove more suitable locations for the telescope (valley sites would be preferred).

As a general comparison the extent of the interference at Hobart is as great if not worse than Culgoora. (Parkes is considerably better than both.) Frequency 408 MHz has the greatest extent of CW interference. The remaining frequencies 327, 625 and 843 MHz are typified by few isolated transmitters and represent better possibilities for broadband receivers (with suitable notches). Document AT/15.5/024 gives results from Culgoora, Siding Spring Mtn and Parkes.

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P.BUTTON
G.GOWLAND

TABLE 1 STRONG CW TRANSMITTERS

FREQ(MHz)	Mt CANOPUS		UNI TAS FARM		QUOIN RIDGE	
	Dir	Power	Dir	Power	Dir	Power
307.6	300	-65				
333.5	60	-54	300	-59	150	-49
400.7	120	-81	180	-91	180	-91
401.9			210	-89		
403.3	240	-38	210	-81	150	-50
404.4	30	-63	330	-60	60	-66
404.8	150	-88			300	-84
405.3	270	-68	0	-77	270	-48
406.4	270	-40	240	-73	180	-54
406.9	180	-90			330	-91
409.9	30	-90	210	-90	210	-90
410.8	180	-89			180	-90
411.5	120	-89			150	-90
412.9	210	-68	270	-87	150	-42
413.9	300	-47	210	-74	60	-79
414.4	330	-75	300	-73	300	-63
414.8	240	-37	240	-83	150	-36
415.9	270	-71	180	-90	180	-86
416.5	90	-89			180	-90
599.6			300	-72		
838.2	30	-86	210	-90	180	-91
846.8	180	-66	240	-84	180	-66

NOTES

- Direction 0 - North ; 30 deg azimuth increments (clockwise rotation). These directions are estimates only.
- Power is the dBm power into the spectrum analyser (in the resolution bandwidth of 100 kHz) where -91 dBm corresponds to appoximately 400°K antenna temperature of the test equipment.
- Scaling through the antenna gain (appoximately 11dB) and defining harmful interference as the flux required in the 0dB sidelobes of the individual AT antenna element to raise the system temperature by 1% assuming no (filter) attenuation, we obtain the value -85 dBm (in the above power units). Such calculations, and the remaining parameter values used in such calculations is given in AT/15.5/022. The above harmful level holds roughly for all four frequencies tested.
- Frequency accuracy +/- 0.1 MHz.

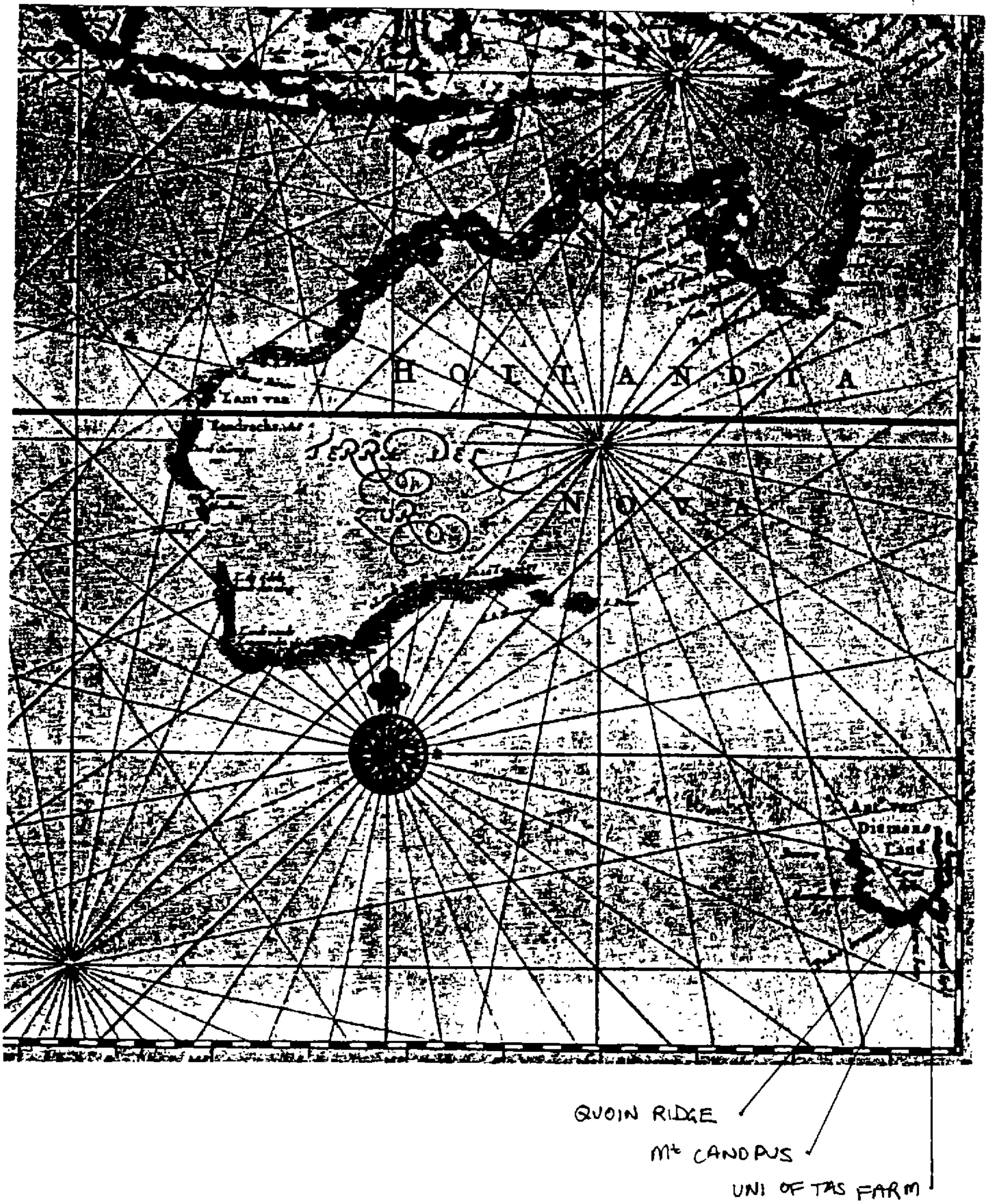

HOLLANDIA
NOVA
Diemens Land
QUOIN RIDGE
Mt CANOPUS
UNI OF TAS FARM

FIGURE 1.

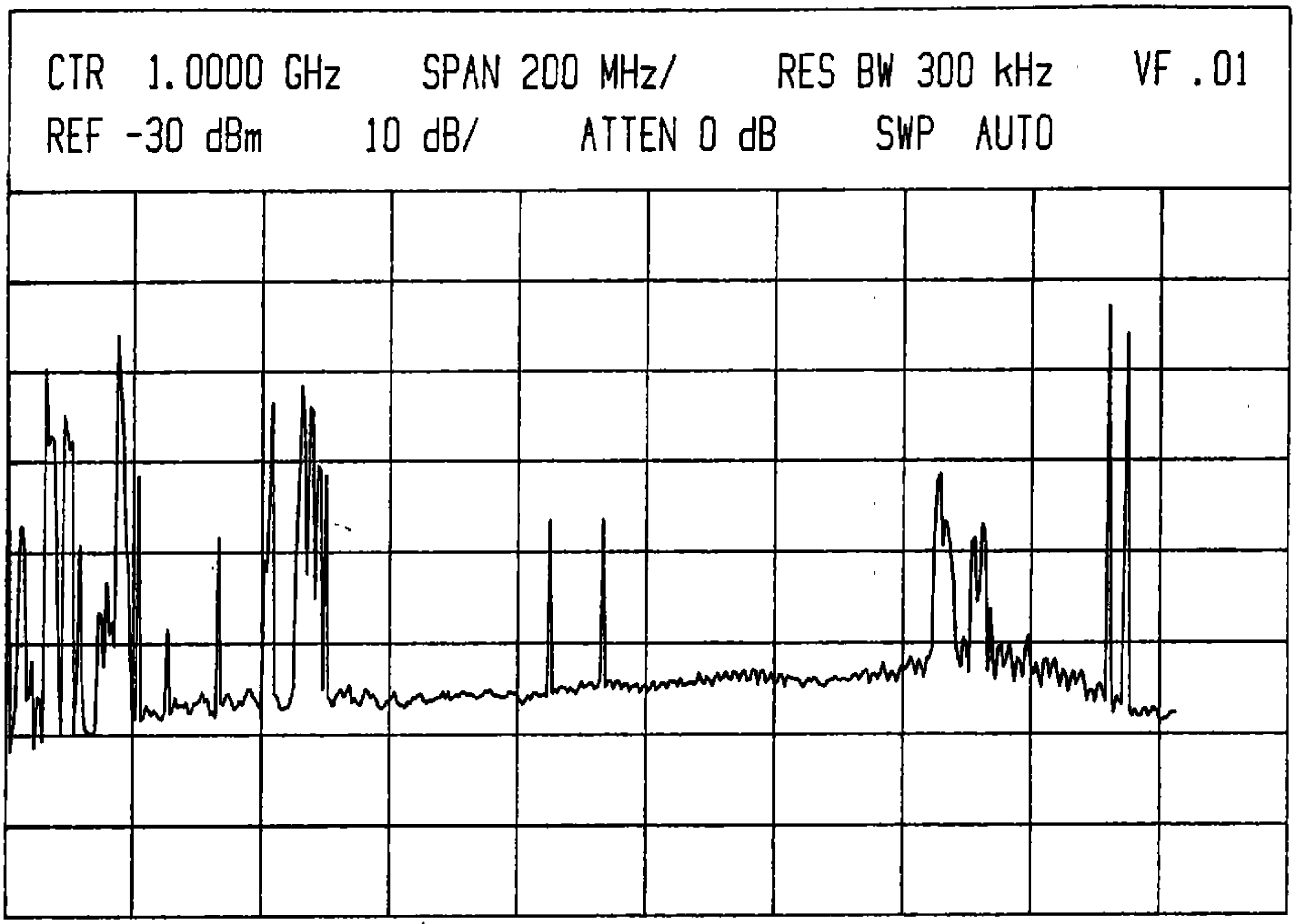


FIGURE 2.

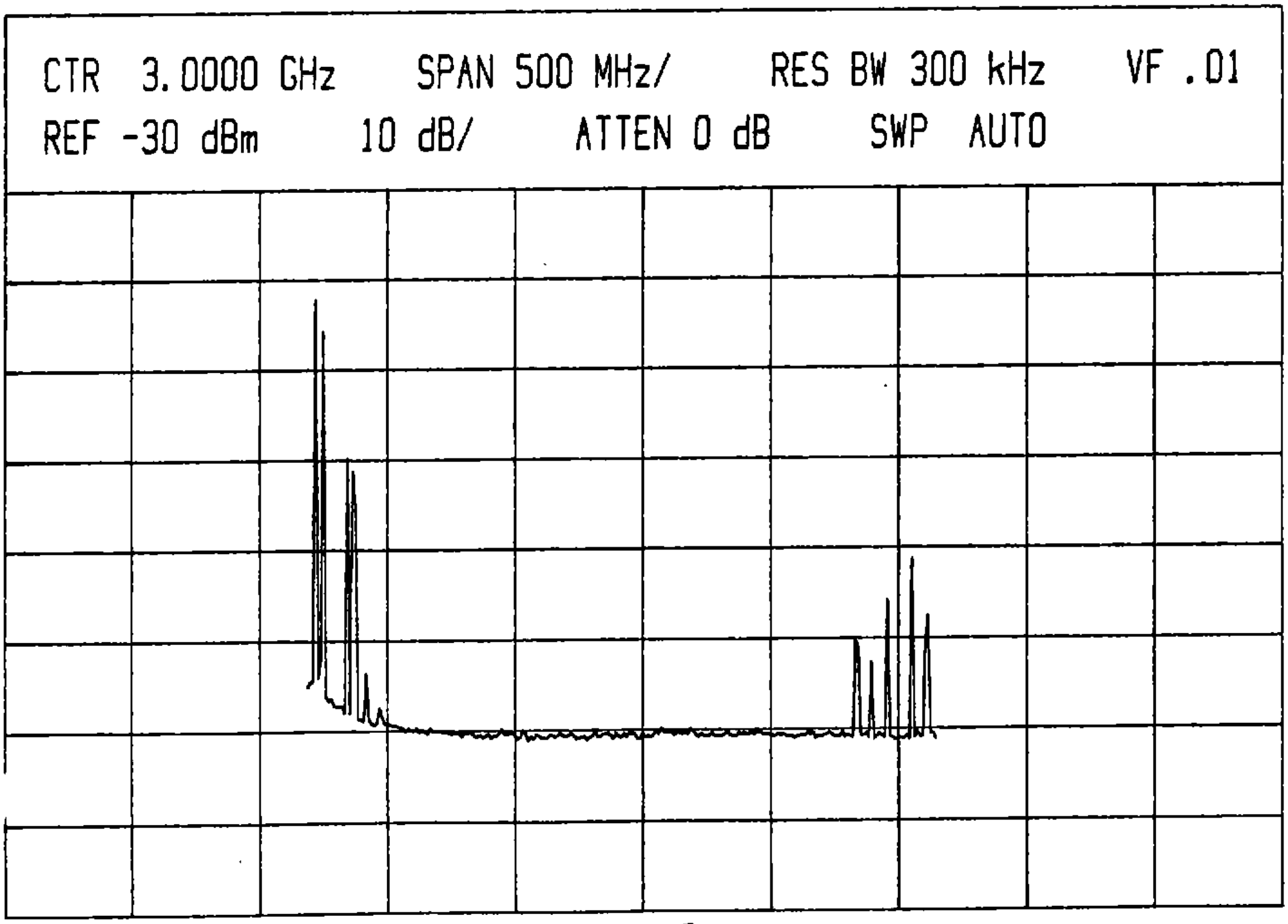


FIGURE 3.

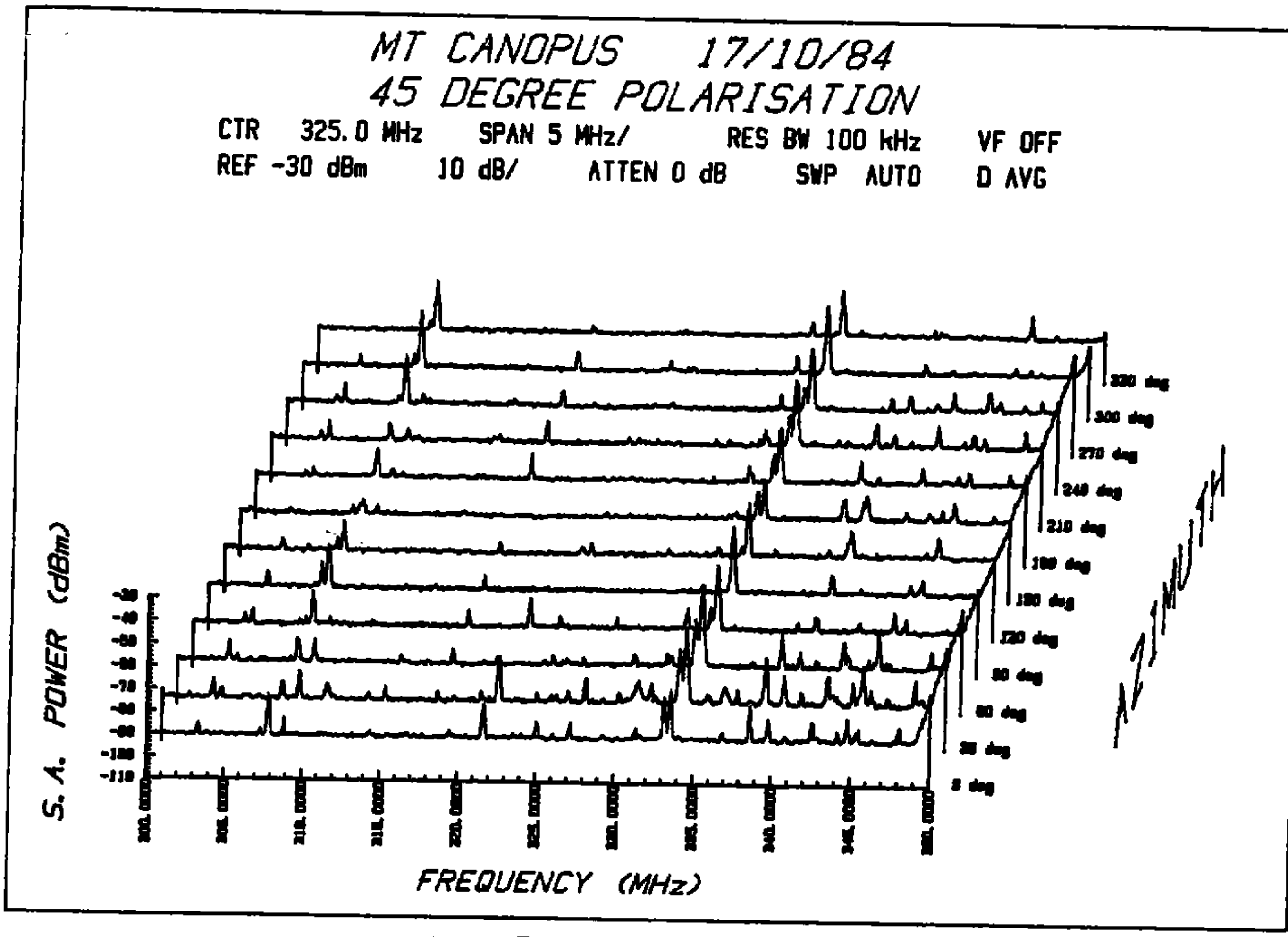


FIGURE 4.

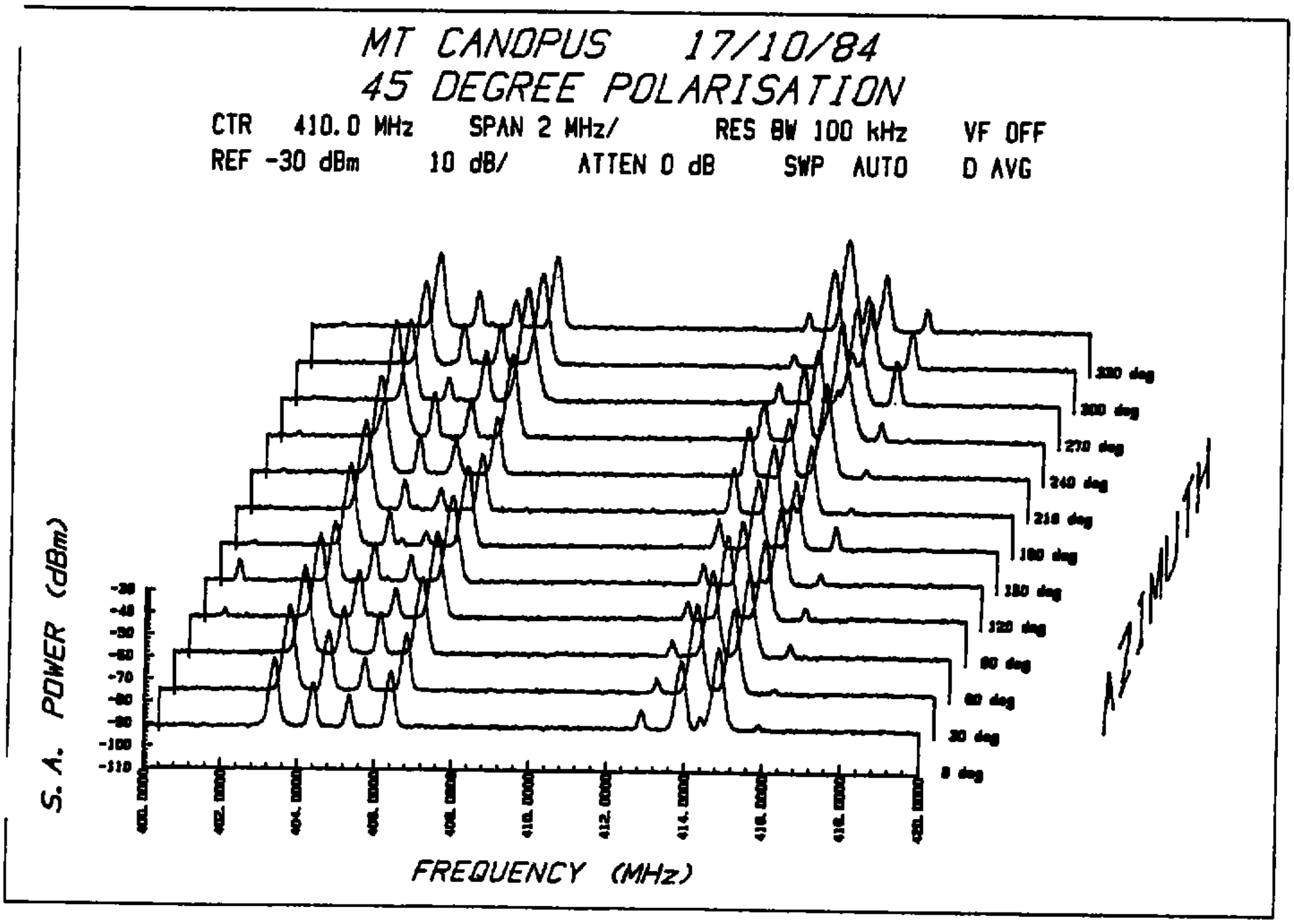
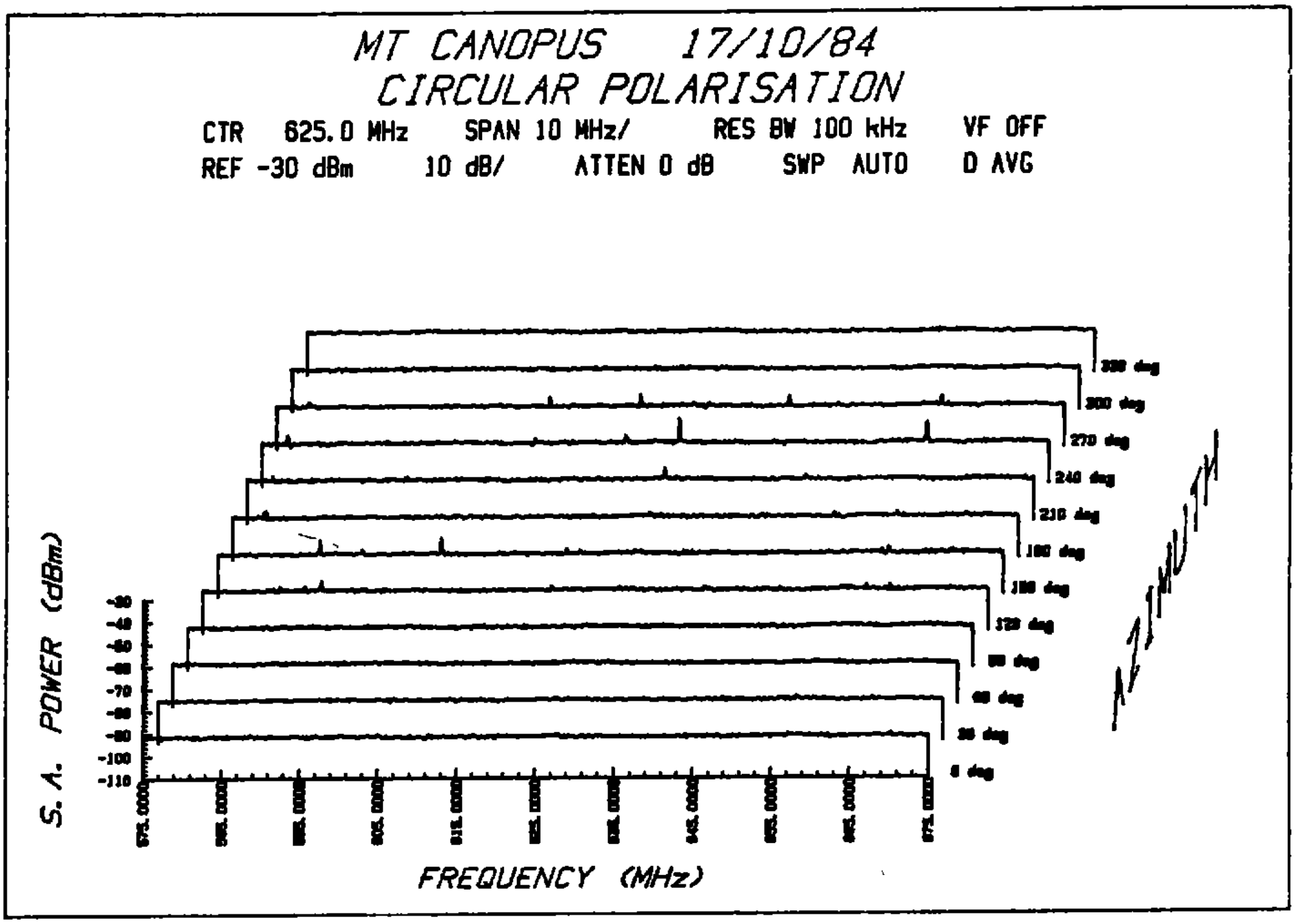


FIGURE 5.



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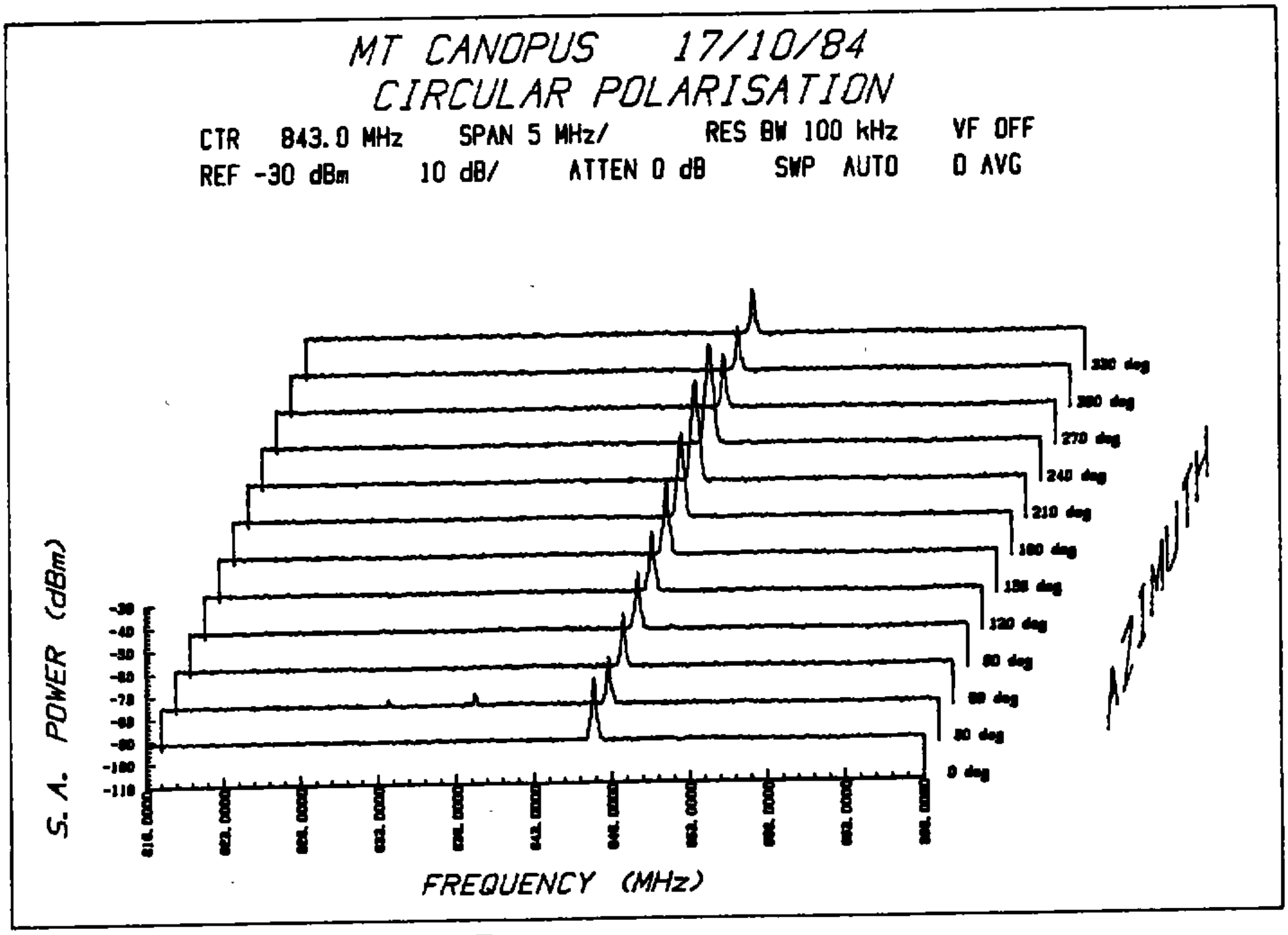

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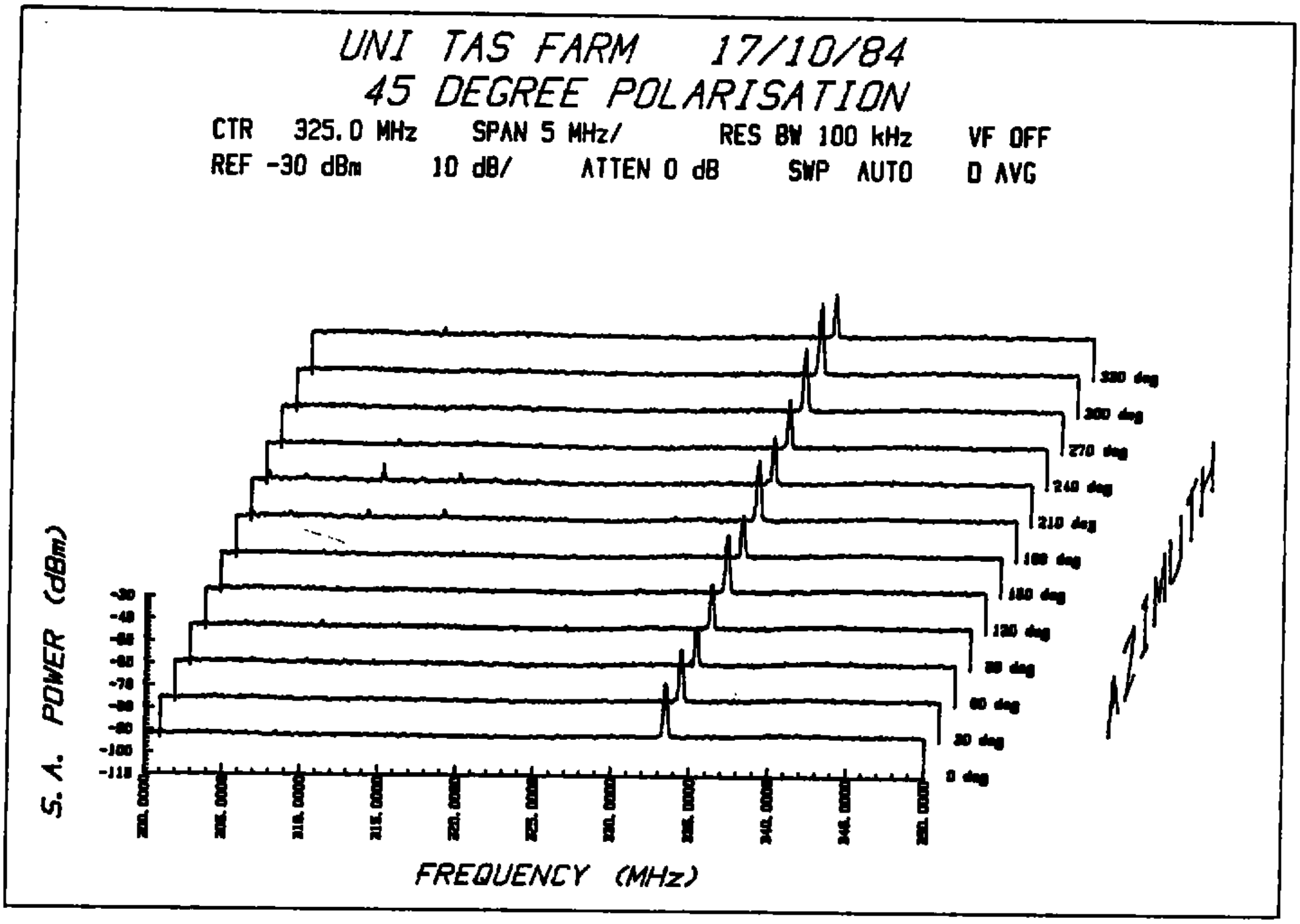

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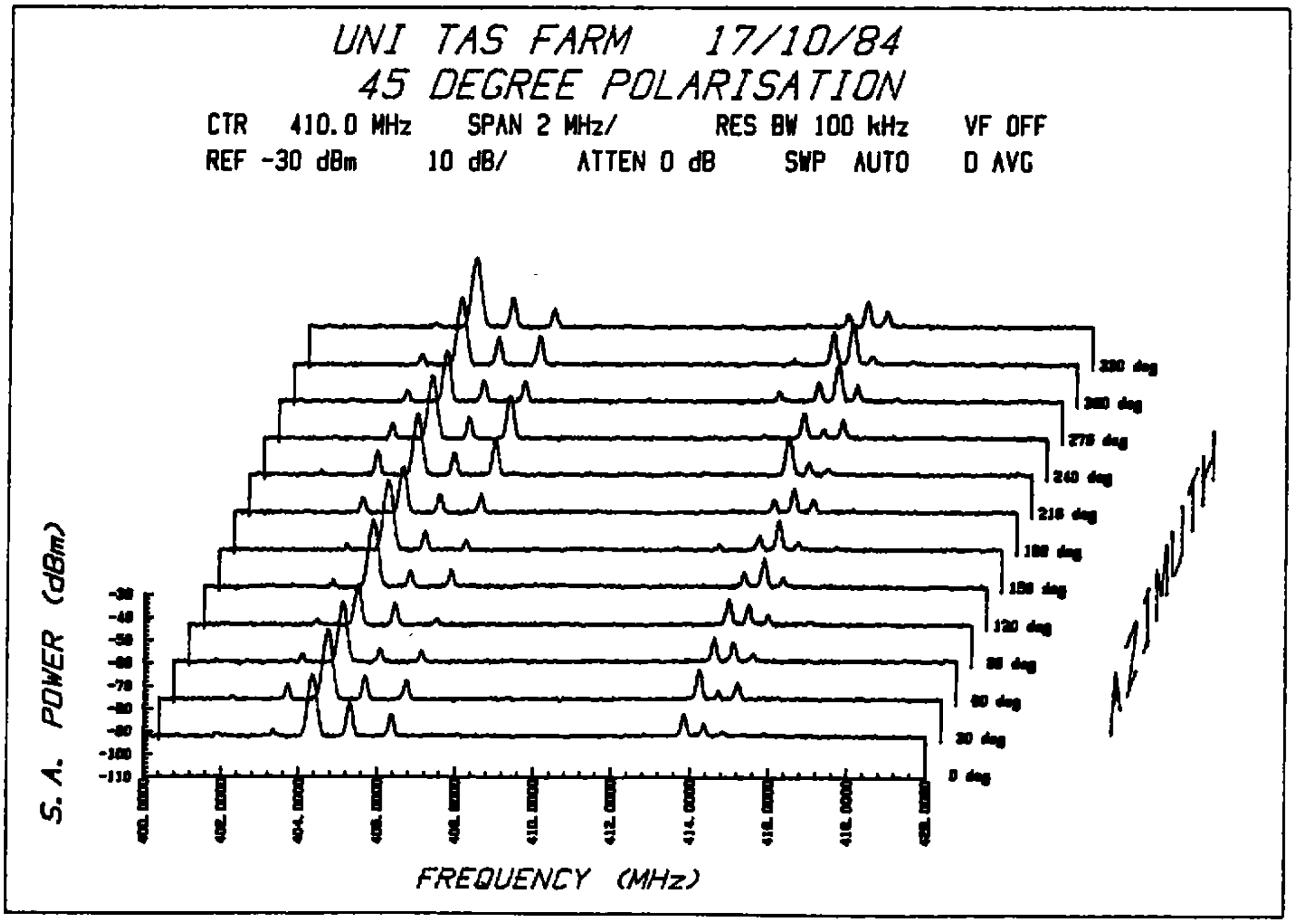

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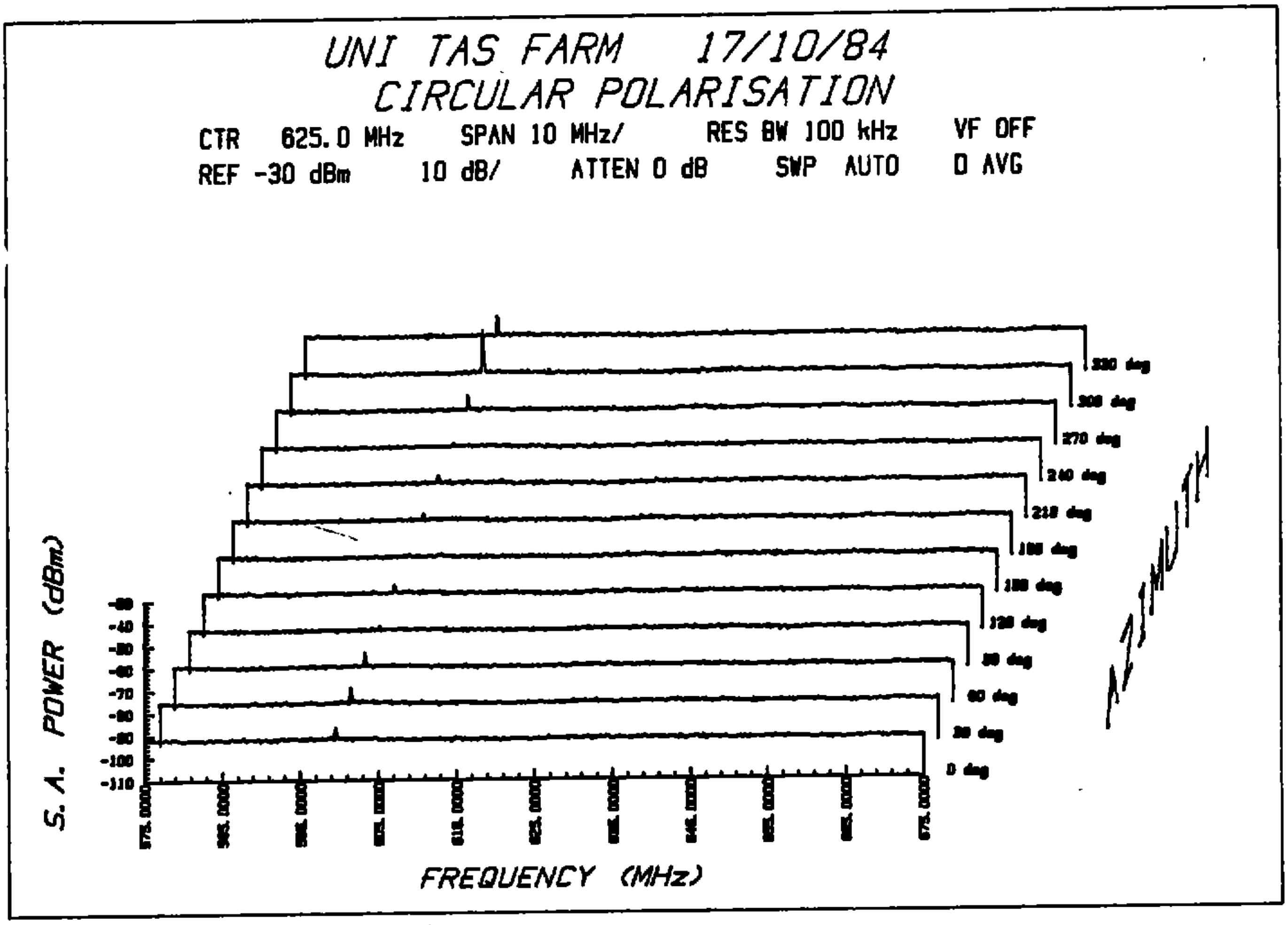
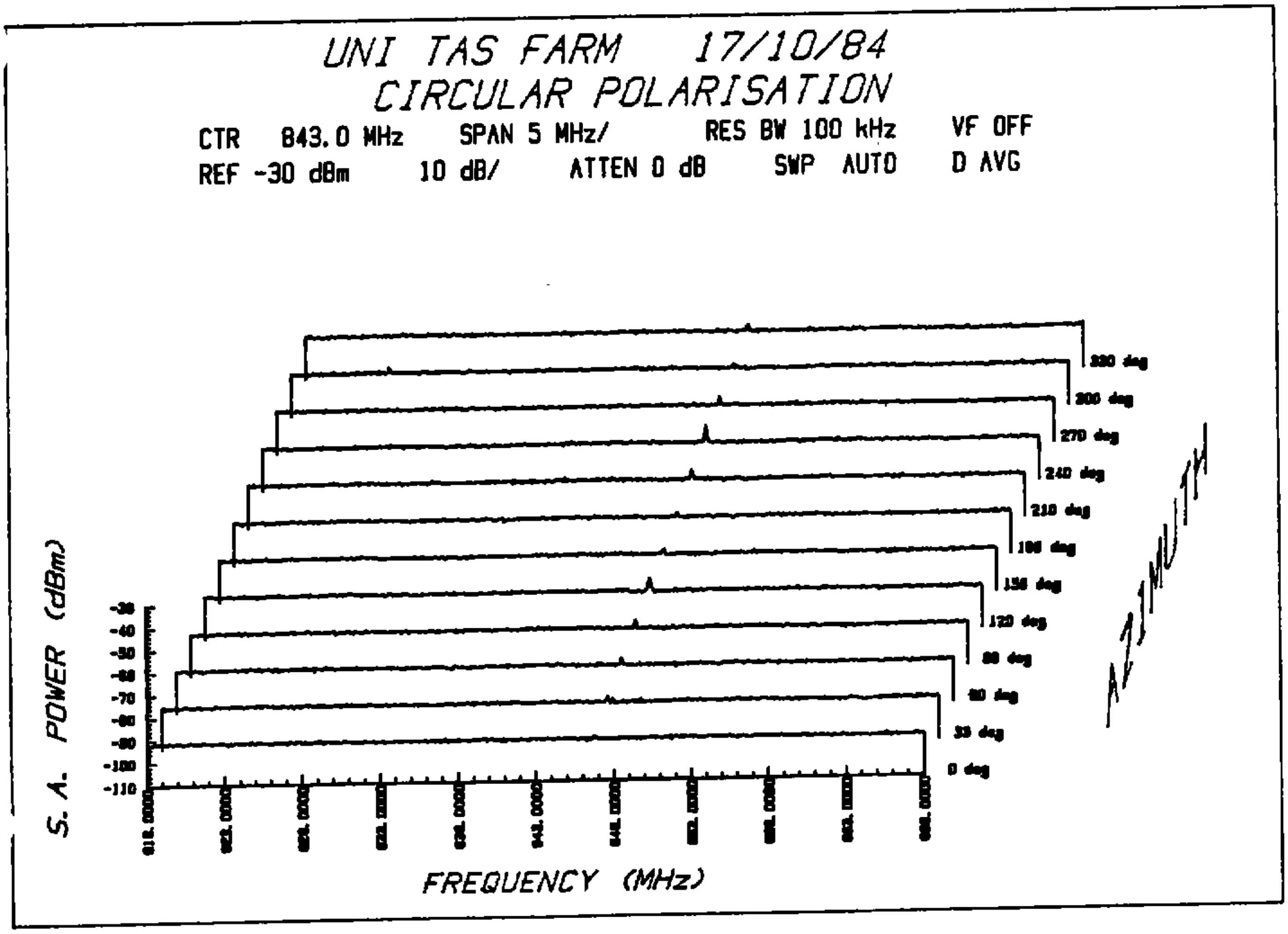


FIGURE 10.



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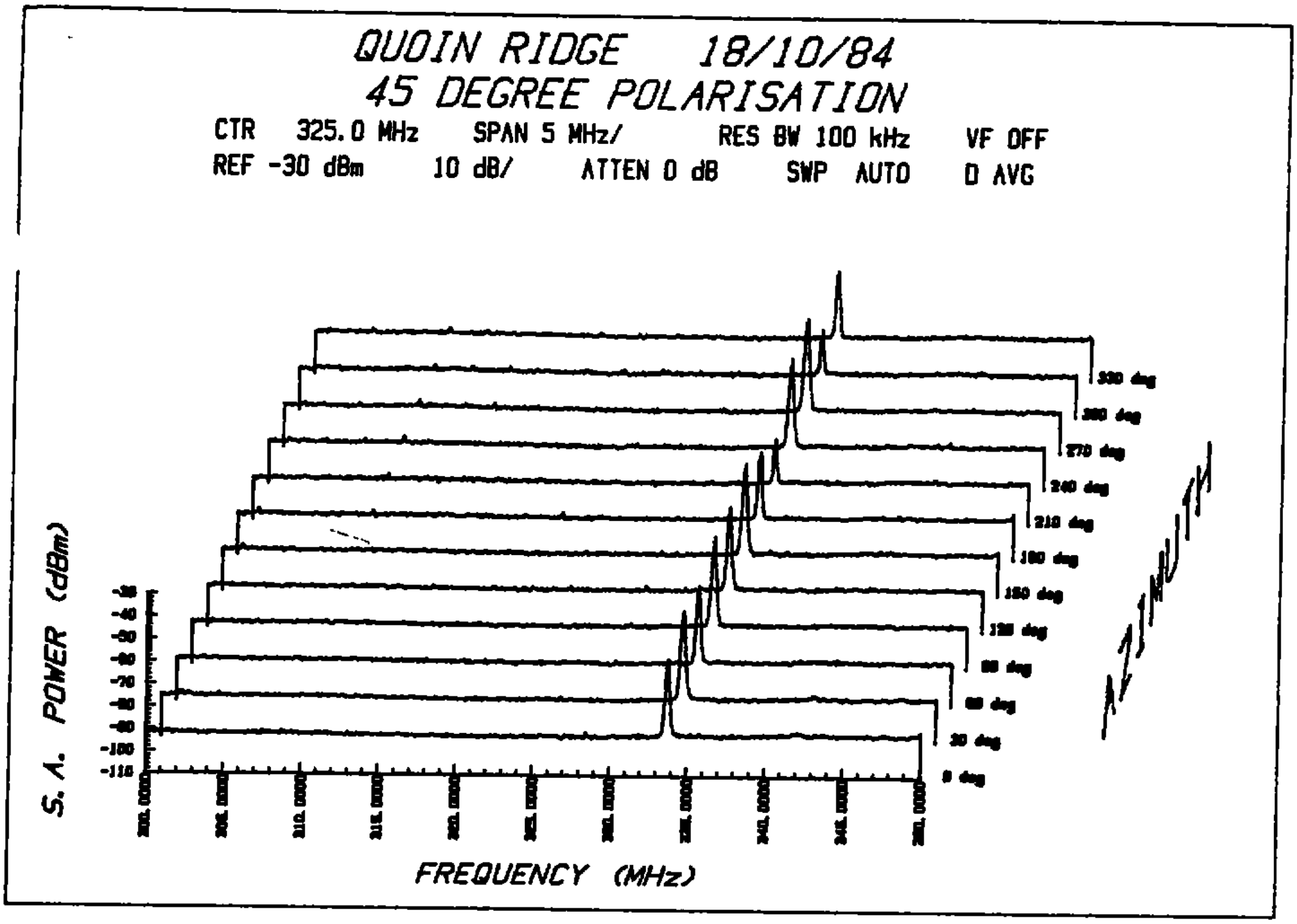

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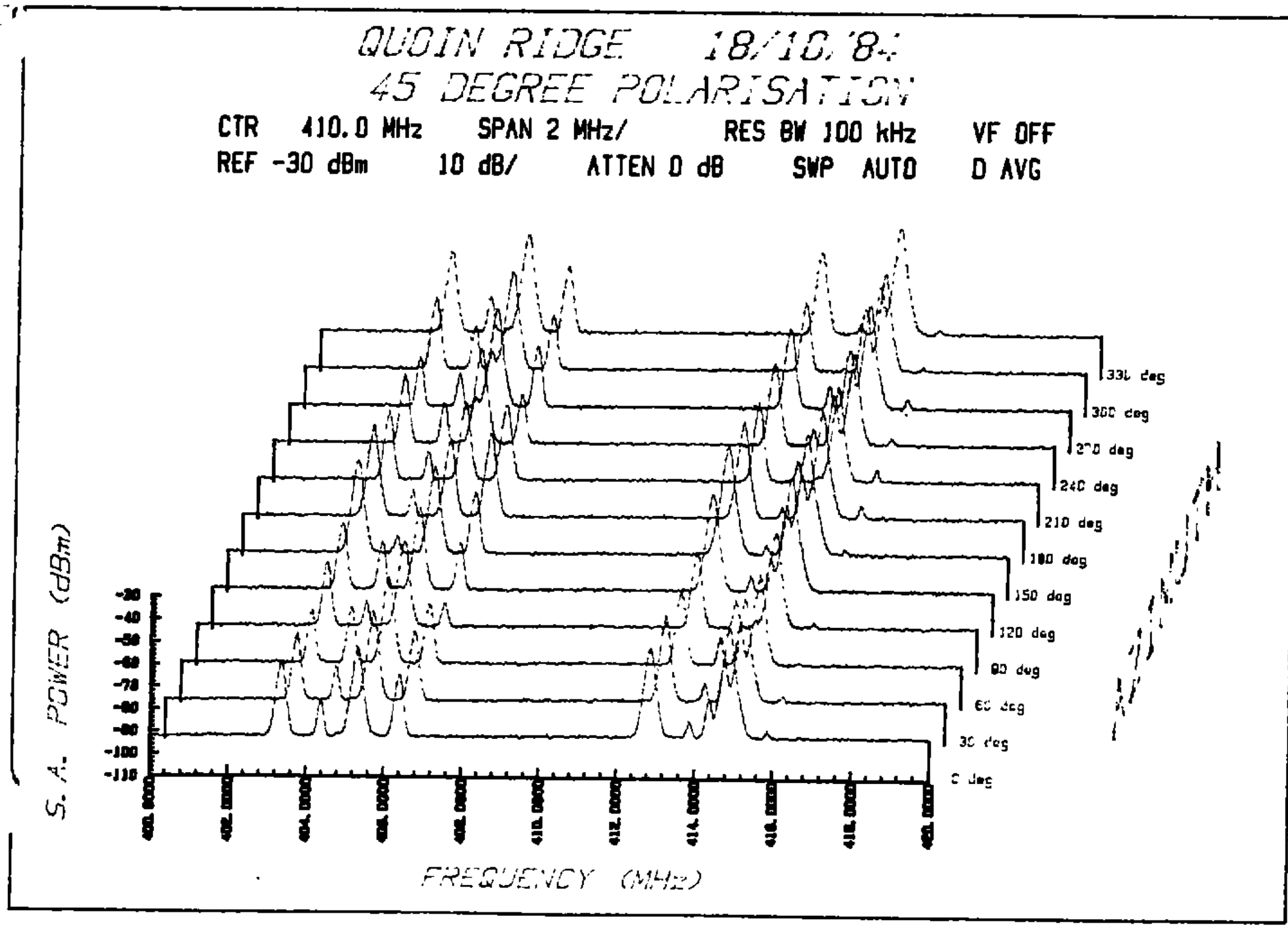

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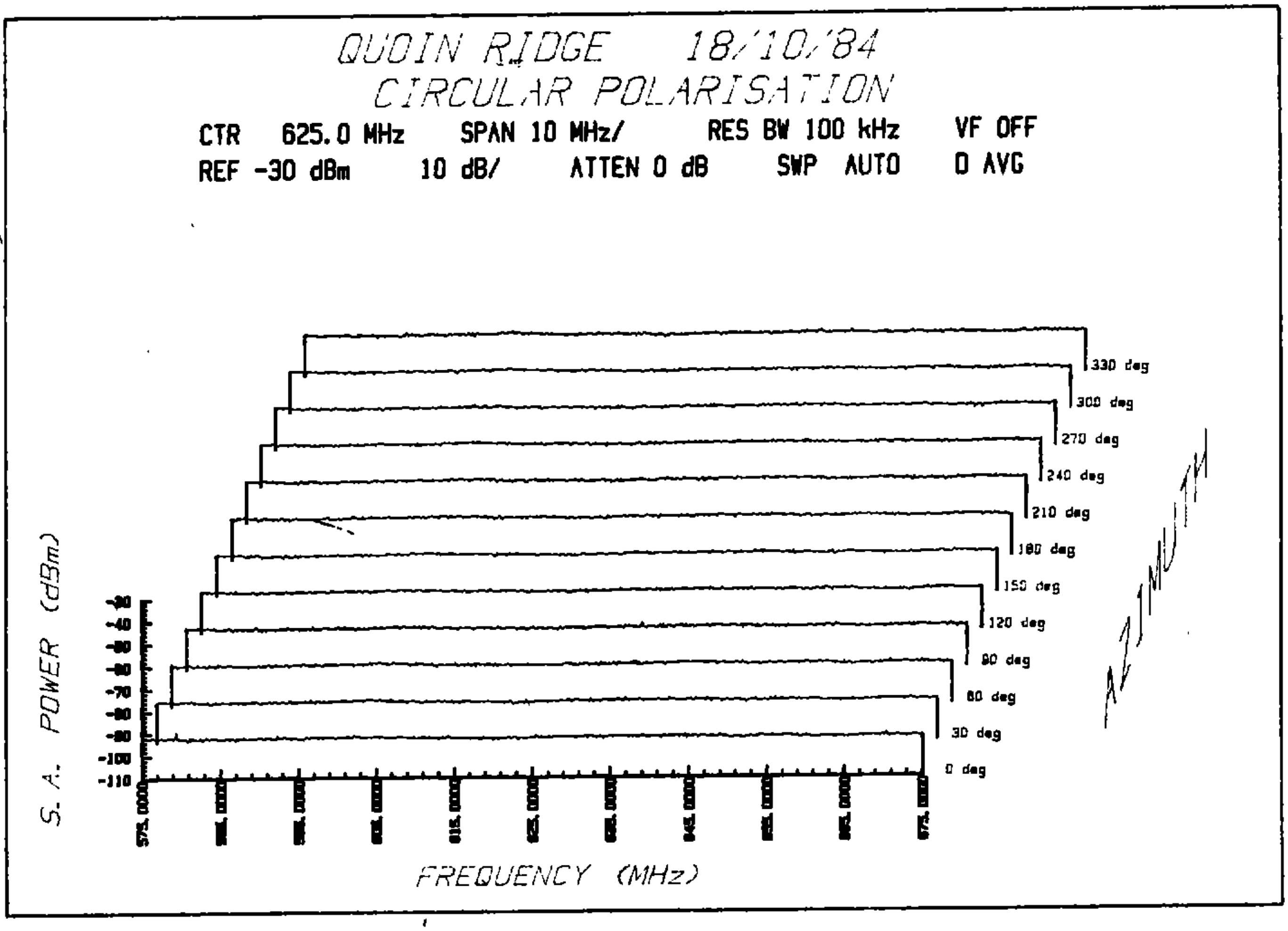

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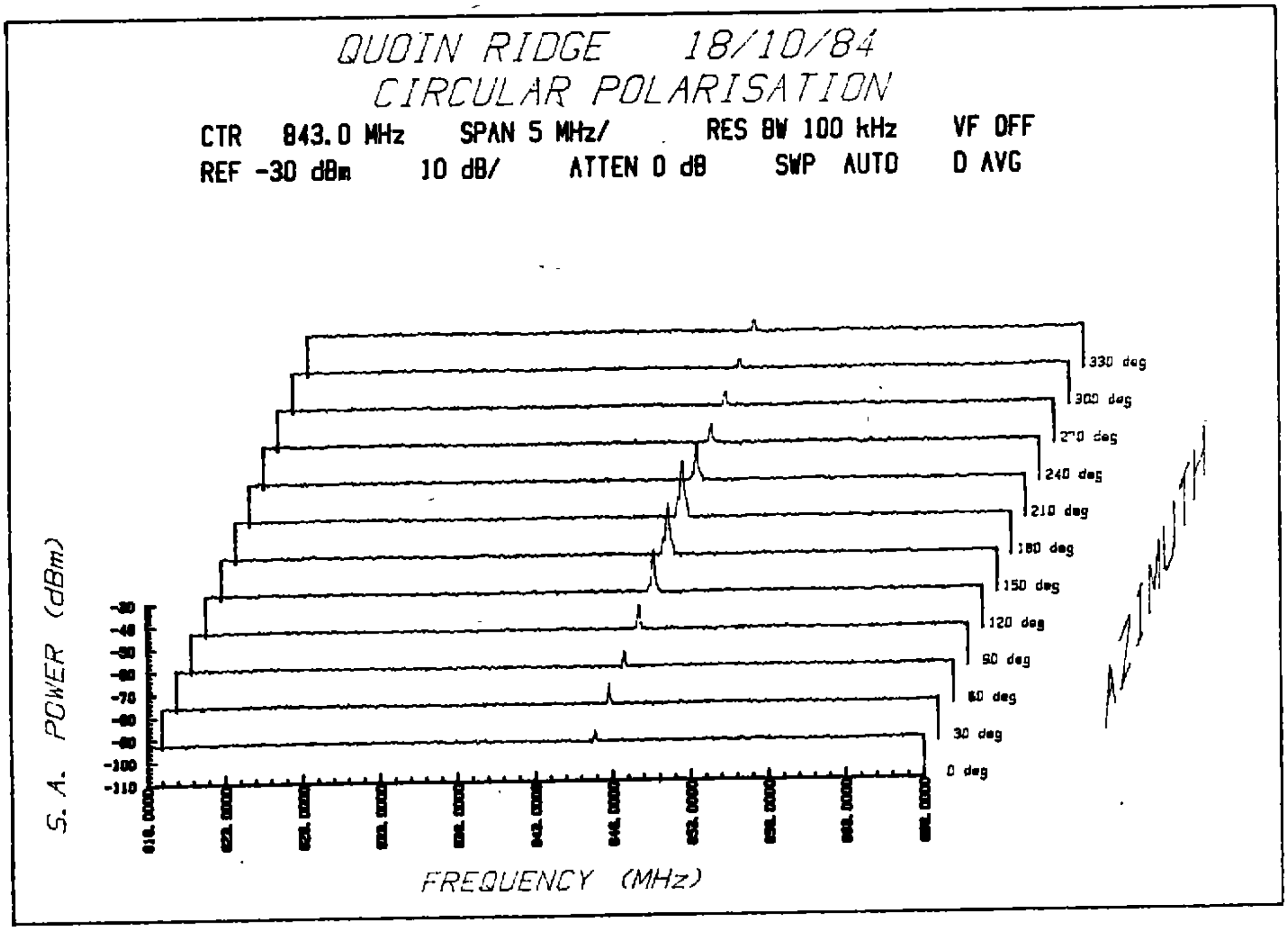

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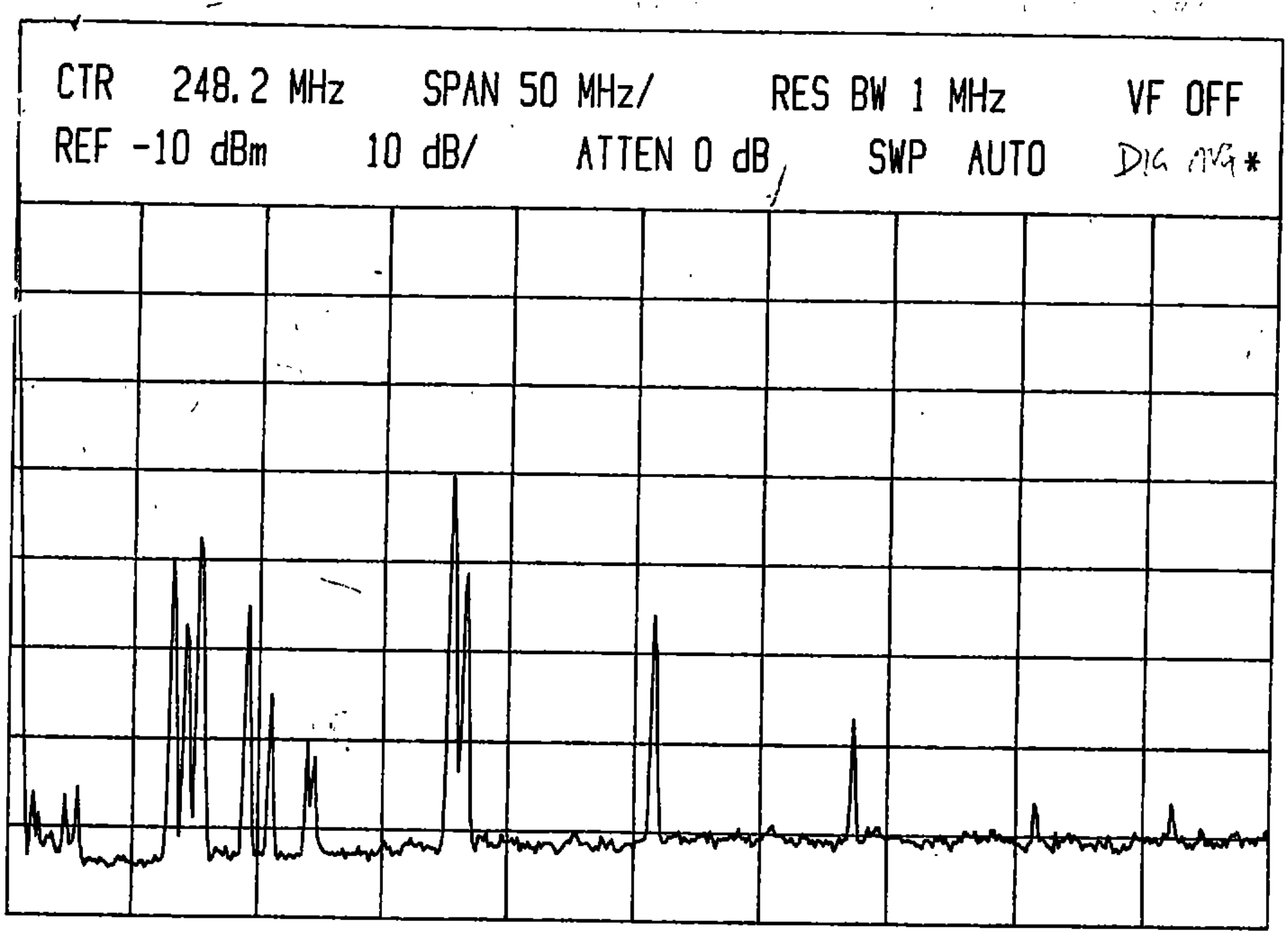

FIGURE 16.

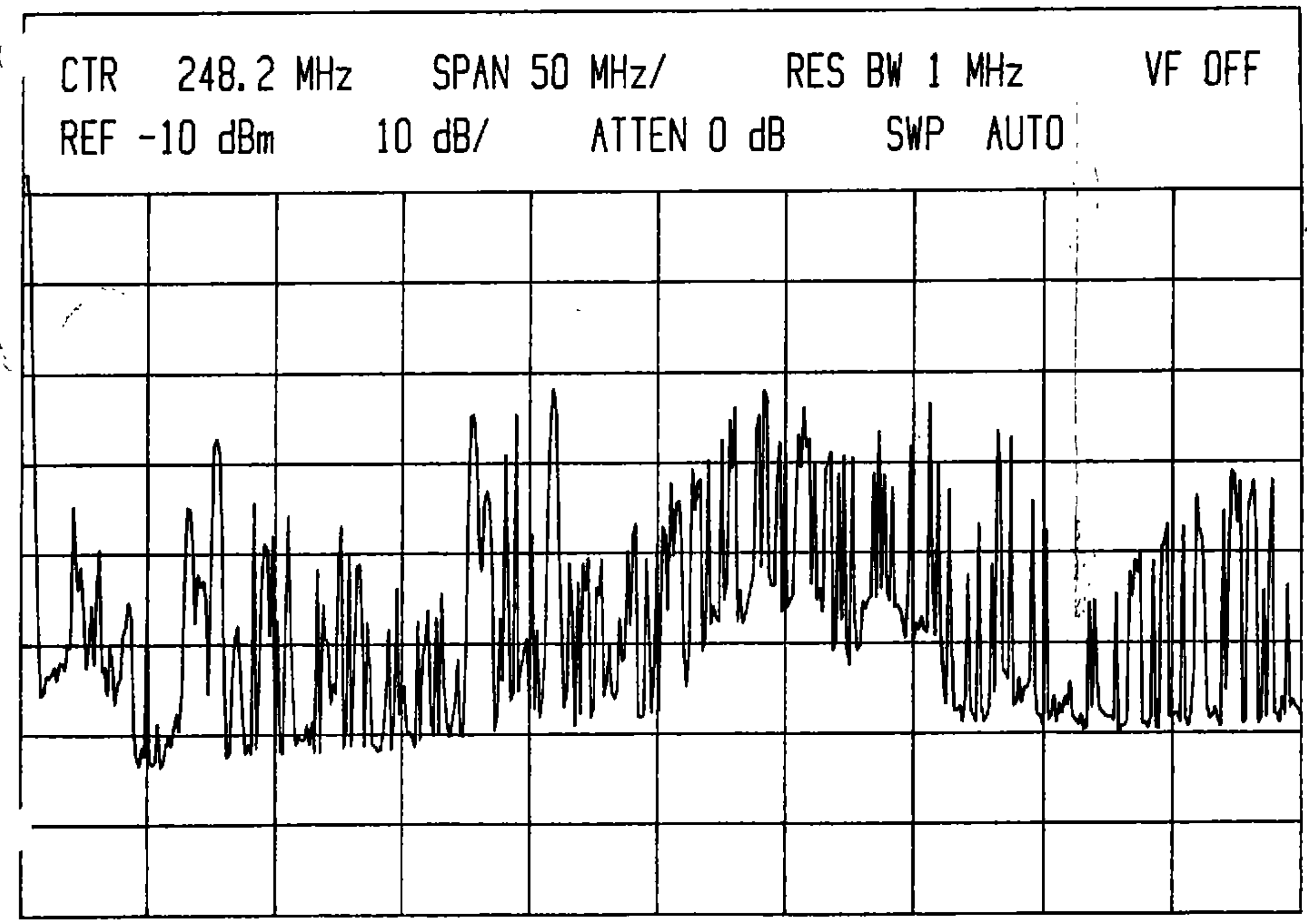

FIGURE 17.