Security Classification: ~~CONFIDENTIAL~~

~~FOR INDOCTRINATED RECIPIENTS ONLY~~

In Reply Please Quote

T/126/12/5

Telegrams: "Weapons" Adelaide

For further information refer to Telephone LX 9, Ext.

All correspondence to be addressed to ~~Controller~~ Director Box 1424H, G.P.O., Adelaide

COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF SUPPLY

WEAPONS RESEARCH ESTABLISHMENT,
SALISBURY, SOUTH AUSTRALIA

8th July, 1965

Declassified by ASD - 02/08/2022
Information removed for national security and/or personal sensitivities

[redacted]
Defence Signals Division,
C/- Defence Registry,
Victoria Barracks,
MELBOURNE, VIC.

Dear [redacted],

Please find enclosed two copies of [redacted] report on his noise measurements at Darwin. You might care to send one to Darwin or to the appropriate R.A.N. officer. There are a few comments which I would like to add.

The numerical noise figures quoted in [redacted] report are not directly comparable with any figures quoted previously by [redacted]. [redacted] has recalibrated the noise measuring equipment and his figures can now be accepted as a basis for any future comparisons.

It would appear that the present Darwin site is very noisy and that it would be useless to erect a vertical aerial there. Also, it would seem impossible to erect an appropriate horizontal aerial, e.g., rhombic, because of area required and mast height needed. However, before being one hundred percent dogmatic on the above conclusions, it would be wise (in view of the poor gain and noise figures of the splitting amplifiers) to make some observations on appropriate targets using the existing aerials but reducing the splitting amplifier noise figures to a more acceptable level.

It should be possible to estimate when the splitting amplifier noise figure has been reduced to an acceptable value by listening to the character of the noise and finding when its true impulsive character becomes clearly distinguishable. Alternatively, you might arrange to bypass the splitting amplifier for the special measurements.

If, after taking care of the splitting amplifier, you are unable to detect the target signals, then, the only alternative is to seek a quiet site. This should be possible within a couple of miles of the present location.

Copy to [redacted] D/DEFS RAN
[redacted]

Yours sincerely,

[redacted]

[redacted]

P.O./I.S.

~~CONFIDENTIAL~~

NOISE MEASUREMENTS AT DARWIN, MAY 1965

[redacted]

1. Electrical Noise Field Strength

The equipment used to measure the noise field strength consisted of:

(a) Calibrated HF receiver, Eddystone Model 960 (battery operated).

(b) 30 ft. vertical antenna, coupled to the receiver via a loading coil.

(c) 90 ft. horizontal antenna centre fed, coupled to the receiver via a balun coil.

The noise measurements were made at 8 different sites (numbered 1 to 8 in Tables 1 and 2). Sites 1 to 6 were located at Coonawarra West and are shown in figure 1. Sites 4 and 5 were chosen to obtain a comparison between vertical and horizontal antennas in approximately the same location. Sites 7 and 8 were approximately 50 miles away from Darwin; and were selected in order to obtain measurements at quiet locations. Site 7 was approximately 3 miles east of Tumbling Waters while site 8 was at Berri Springs.

All the measurements were made between 1000 to 1400 hours local time. Table 1 lists the results of noise measurements taken at 5 Mc/s with the vertical antenna. En gives the r.m.s. value of the noise field strength in a 1kc/s bandwidth, for a short vertical antenna. The units of En are db relative to 1 μV per metre. Table 2 shows the noise at 5 Mc/s with a low horizontal antenna, where En again gives the r.m.s. noise field strength in a 1 kc/s bandwidth (db rel. to 1 μV/m). Measurements of the noise field strength at 9 Mc/s at the same sites, gave figures which were approximately 5 to 10 db less than the corresponding values at 5 Mc/s.

In tables 1 and 2, QRM refers to impulse type noise which almost certainly originates from teleprinter equipment, etc. Because of its impulsive character, the peaks of this QRM were not recorded on the S metre of the receiver. Therefore, at the sites where this QRM predominates (i.e. sites, 1, 3 and 4), reception conditions are considerably worse than the values of En indicate. How much worse is difficult to estimate, but a rough guess might be 6 db.

At most sites, bursts of atmospheric noise were recorded which had a strength of 20 to 30 db above the minimum noise level listed.

2. Splitting Amplifier Noise Figures

These measurements were made with a Kay Mega-Node Noise Generator Model 240B, the Eddystone receiver, and a Marconi power meter. The noise figure measurements could not be made with any great accuracy because of the extremely high noise output from the splitting amplifiers. However, the error in the final figures would not be greater than $\pm$2db. See Table 3.

3. Remarks

The noise measurements obtained with a horizontal antenna cannot be compared directly with the figures for a vertical antenna because of the low height of the horizontal antenna. However, the figures do indicate the manner in which a horizontal antenna can discriminate against the surface wave propagation of QRM and power line noise.

The figures for a vertical antenna show that the noise at Coonawarra West is at least 10 to 15 db greater than the noise at a quiet site. This comparison indicates that Coonawarra West is probably not a suitable location for the erection of a vertically polarised antenna to cover

frequencies in the range 5 to 9 Mc/s. The advantages to be gained from a quiet site were evident when making noise measurements at Berri Springs between 1200 and 1400 hours. At this site, with a short vertical antenna, the large number of signals received between 5 and 9 Mc/s made it very difficult to find a gap in the spectrum at which to measure the background noise.

The extremely high noise figures of the splitting amplifiers is evident from Table 3. The values of power gain were not measured directly, but were calculated from the noise results. However, even if it is assumed that the amplifiers have unity gain, the noise figures are still in excess of 20 db. Apart from the disadvantage of not having any gain in these splitting amplifiers, the 6CH6 values used are probably an unsuitable type for such applications.

TABLE 1

SITE	En (Min)	NOISE CHARACTER
1	-25	QRM
2	-22	Power line noise, some QRM
3	-23	QRM
4	-20	QRM
6	-32	Power line noise
7	Less than -35	Receiver noise only
8	Less than -35	Receiver noise only

TABLE 2

SITE	En	HEIGHT ABOVE GROUND	NOISE CHARACTER
5	-34	25ft.	Power line noise, little QRM
7	<-35	12 ft.	Receiver noise only

TABLE 3

SPLITTING AMP. NO.	LOCATION	YEAR OF MANUFACTURE	FREQUENCY (Mc/s)	POWER GAIN	NOISE FIGURE (db)
27	1RS	1955	5	0.3	26
35	1RS	1955	5	0.3	26
8	1 RS	1955	5	<0.1	>30
?	2RS	1963	5	0.2	27
35	1RS	1955	9	0.15	28
?	2RS	1963	9	0.1	29

Measurements taken at 15 and 30 Mc/s indicated that the noise figures were greater than 20 db, and probably only 1 to 2 db less than the values obtained at 5 Mc/s.