Date: May 5, 1995
To: EISCAT Data Representatives
From: Peter Collis
Subject: Common programme results tapes

Data from the following experiments have now been analysed and a tapes containing results in the standard format will shorttly be distributed. Plots of system temperature and transmitter peak power during these experiments are enclosed.

(1995)

CP -1 - K	28 FEb - 2 Mar	(1400 - 1723 UT)
CP -4 - B	28 FEb - 2 Mar	(1400 - 2218 UT)
CP -1 - K	28 - 29 Mar	(1455 - 2000 UT)
CP -7 - F	28 - 29 Mar	(1500 - 2000 UT)
CP -6 - B	2 - 5 May	(1300 - 0535 UT)

NOTES

1. CP-1-K, 28 February (1400 UT) to 2 March (1712 UT), and CP-4-B, 28 February (1400 UT) to 2 March (2218 UT), 1995.

General

Both experiments were tested on 28 February. A faulty LO2 was discovered in channel 3 in Sodankyla. This was replaced by a Zeta oscillator from channel 1, after which the system worked properly. As the tests showed both systems to be working well, both experiments were started at 14 UT, one hour ealier than the scheduled start.

Status up to 1712 UT, 2 March

All 3 UHF receivers and both VHF receivers performed well for the first 51 hours and 12 minutes of the scheduled operations, producing excellent data. All 3 klystrons operated nominally for the duration of the experiments, but with a number of breaks of several minutes in data-taking following crowbars. Specifically, these were:

28 Feb:	1447-1452 UT
	2117-2124 UT
1 Mar:	0945-0956 UT
	1335-1342 UT
2 Mar:	0014-0018 UT
	0327-0332 UT
	0509-0516 UT
	1447-1450 UT
	1456-1458 UT

Status after 1712 UT, 2 March

At 1712 UT on 2 March the UHF radar controller lost synchronisation with the real-time clock and could not be forced back to the correct time by stop/start cycles on the radar controller, on the experiment or on the computer. The same phenomenon began to be observed with the VHF experiment at 1724 UT. CP-1 was stopped for good at 1941 UT to allow CP-4 to run uninterrupted as far as possible. The VHF transmitter began to crowbar more often, and at lower HV, than earlier, and the radar controller problem persisted, so the experiment was eventually stopped at 2220 UT.

Geophysical Conditions

Ionospheric conditions were disturbed most of the time (sometimes very disturbed), but with quieter daytime periods. Strong geomagnetic disturbances occurred during the night periods, with particle precipitation (mainly cloudy skies, however). Radio absorption was observed by the dynasonde and local riometer for significant periods, both day and night.

2. CP-1-K and CP-7-F, 28 March (1450 UT) to 29 March (2000 UT), 1995.

The operations were virtually trouble-free, with brief breaks of a few minutes due to crowbars at :

1650 UT, 28 March
1907 UT, 28 March
0058 UT, 29 March
0904 UT, 29 March
1430 UT, 29 March

The only significant loss of data (about 12 minutes for CP-1) was after the crowbar at 0058 UT.

The heater was operwted in continuous mode at 4.04 MHz between 1200 and 1205UT on 29 March. Effects were seen in both the UHF and VHF data.

Geophysical conditions were weakly-to moderately-disturbed. Local (Tromsø) sky conditions were cloudy with snow, though inland Scandinavia reported clear skies.

3. CP-6-B, 2 May (1300 UT) to 5 May (0535 UT), 1995.

Scheduled and Run Experiments

The experiments scheduled were CP-6-B-V and SP-EI-CP6BV-NS (ie. A split-beam CP-6 operation with one beam vertical and second pointing to the north) with a start time of 10 UT on 1 May and an end time of 16 UT on 5 May. As described below, however, only single-beam CP-6 operation was possible over a shorter period than scheduled.

1 May:

The UHF receiver side was configured to take the off-vertical VHF sibnals in the usual way with split-beam operation. However, despite much effort, the transmitter could not be coaxed into transmotting due to high vac-ion current on the A-side. When it seemed clear that no progress was

possible with the available resources (being a public holiday), the operation was cancelled at about 14 UT, with the intention of resuming the next day after the staff had arrived.

2 May:

On starting up the VHF system, none of the difficulties with the transmitter which were observed yesterday were now encountered. No definite explanation for this change in behaviour is readily available.

After the start at 0820 UT, the experiments appearedto perform nominally, but with no ionospheric signals observed by either beam. As geophysical conditions were quiet, this was put down to absence of precipitetion, but when no results at all were produced by the data analysis, other reasons were examined to explain the lack of signals.

Both CP-4 and CP-7 were tested, and verified that some signals were passing down the receiver chain. This was also tested independently by using the small VHf transmitter near the antenna-those signals were seen on both the oscilloscope and with RTGraph (as a DC spike).

The configuration was reverted to CP-6 at 1210 UT, but no signals were visible. After a short period of pondering and observing, weak signals became visible in the data coming through the UHF recording system (off-vertical beam). This coincided with a significant increase in geomagnetic activity, and since the signals were quite weak but then grew in magnitude, it is possible that there really was no D/E-region signal at earlier times. Other causes (er. An intermittent fault) cannot be ruled out, however.

Although signals were seen from the off-vertical beam, nothing was seen from the vertical beam. The geams were then made parallel to be absolutely sure that both were pointing at the same target. Still the Aiside (panels 1 and 2) showed no signal. The cables were interchanged at the input to the receiver, resulting in the expected switch in where the signals would be seen and not seen, confirming that the receivers were operating correctly. The signal cables were then interchanged at the antenna, with the same result. Thus no signal was coming from the antenna panels 1 and 2, indicating a fault with the t/r switch. That meant dual-beam operation was not possible, so the wast panels were pointed vertically and the signal from them taken through the normal CP-6 receiver path, this being the quickest solution to start recording reliable data. This occurred at 1313 UT.

The experiment continued with both klystrons transmitting, but for operational reasons klystron “A” was taken out at 1359 UT and the experiment resumed with just klystron “B” at 1420 UT. This results in RTGraph showing a peak power of 0 kW and the integration and analysis programs had to be changed to pick up the peak power from position 101 in the parameter block (rather than 99 for klystron “A” operations). The experiment continued uninterrupted, producing very good data.

3 May:

The experiment ran well all day, producing good data, until a crowbar at 2122 UT. This was followed by a gap of about an hour when the transmitter was up and down, and the ND computer caused problems too, in retrospect due to a problem with INTCP after every crowbar. This also happened on……

4 May:

…at 0327-0427 UT. For two hours after the restart, until 0540 UT when the ND wsa rebooted and the experiment restarted, the initial analysis produced constant electron densities at all heights and times (log rawne=10.925), but all other parameters looked alright. The reason for this was that the value of peak power in the parameter block was zero. These data were analysed assuming a power of 1.4 MW and all the data were reanalysed following a calibration using the UHF radar later in the day.

Crowbars at 0716, 0856 and 1014 UT all caused INTCP to go into a state such that tha ND almost ground to a halt. This was cured each time using ABORT INTCP followed by RT INTCP.

CP-1 and CP-7 had been carefully calibrated during the run of 28/29 March using heater and dynasonde data, and the CP-1 power profiles are considered accurate for calibration of the ongoing CP-6 experiment. CP-1 was run for test purposes at 1050 UT, and the initial analysis of the CP-6 data produced electron densities a factor of 1.8 higher than the CP-1 power profiles (this CP-6 analysis had used a system constant of 1.18).The system constant was thus changed to 0.66 and the data re-analysed, giving close agreement with the CP-1 profiles.

5 May:

The peak power was again not recorded in the parameter block following a crowbar at 0013 UT. This became correct at 0236 UT; the data were analysed assuming a power of 1.4 MW.

A HV trip at 0527 UT produced a ’MAPS overload’ fault and the transmitter could not be revived. Despite further work during the day, the fault could not be cured and the experiment was terminated.