



ISR-VA/EF/as

CM-P00071745

18 March 1974

## ISR PERFORMANCE REPORT

Run 430, 26.5 GeV/c, 9.3.1974

Vacuum limit Ring 2Summary

Two stacks have been made of 19.3 and 20.7 A. Ring 2 is clearly less good vacuum wise than Ring 1. The highest beam current with stable vacuum must be between 16 and 18 A. The worst sector is the RF Sector 82. But the RF cavities do not seem to be responsible. The newly installed VDM 216.6 shows signs of contamination. The region of the injection kickers is now very stable.

The stacks

Working line 5C.

A first stack was stopped at 10, 15 and 19.27 A for Schottky scans (see S. Hansens performance report). The final stack was kept circulating for 16 minutes for vacuum observations, during which time it decayed to 18.75 A. All gauges which had tripped off (4) or had shown a pressure rise were put on LOG range (totally 12 gauges). At 20.69 A the beam was lost due to tripping of the clearing voltage in Octant 8. 10 more gauges on linear range had tripped off.

A second stack was made 1½ h later without interruptions.

Pressure Observations

The harvest of observed pressure rises was, unfortunately, very rich. This is partly explained by the fact, that we had reached only very seldom in the past 20 A in Ring 2, and that, therefore, less work has been done to eliminate weak spots.

Figure 1 shows all pressures exceeding  $5 \times 10^{-11}$  torr a few seconds before the second stack was lost at 20.69 A. The gauges, which were found OFF after the beam loss, are added to the list. But, of course, one does not know by how much they had exceeded  $2 \times 10^{-9}$  torr. For the next experiment of this type one should put all gauges onto LOG range.

The vacuum logging programme VLØG was running.

Pressure versus time plots have been made for all gauges of Ring 2 showing many interesting details which otherwise would have passed unnoticed.

In the following, also minute pressure rises are listed, since - with a few amps more - they will be critical.

VG 216.6 (newly installed VDM)

This pressure bump is sharply centered at VG 216.6, placed very close to the newly installed vertical damping magnet VDM 216.7. The neighbour gauge VG 216.1 which is on a theoretically critical place and VG 220 remained both always an order of magnitude or more below VG 216.6. The first stack must have produced a much higher bump than the second one, indicating that the bump had essentially grown during the 15 minutes of circulating beam. The second bump reached  $2 \times 10^{-9}$  torr.

VG 248.5 (first FKI tank)

At the end of the second stack the pressure has risen from  $1.9 \times 10^{-11}$  to  $2.2 \times 10^{-11}$ . Otherwise this region which has been equipped in the January shut-down with 8 more sublimation pumps and which had been before the worst place of Ring 2, remained perfectly quiet.

VG 264.1 and VG 306 (beam dump region)

Small bumps have appeared near the end of the second stack, but before the beam had dumped itself.

VG 416.3 (critical place type B)

The gauge 416.1 closest to the critical place was not operating. VG 416.3 was stable around  $1 \times 10^{-11}$  torr until at 18h05 during stacking with about 18 A the gauge tripped off ( $p > 2 \times 10^{-9}$  torr?). (See VG 756).

VG 448.8 (critical place type A)

Small pressure rise at the end of the second stack from  $1.5 \times 10^{-11}$  to  $3 \times 10^{-11}$  torr.

VG 464.4 (BP 2)

During the second stack the pressure has risen from  $2 \times 10^{-11}$  to  $9 \times 10^{-11}$  torr. VG 464.8 at the newly installed bicone I5 had been high all the time around  $1.1 \times 10^{-10}$ . It rose to  $1.3 \times 10^{-10}$ . VG 464.1 from  $1.1$  to  $1.3 \times 10^{-11}$  torr. The source of the pressure rise is, therefore, close to the beam profile monitor no. 2 and not the new bicone. But there could be a leak on the bicone.

VG 524, VG 528 and VG 532 (outer arc)

These three gauges at most unobtrusive places of an outer arc showed beam pumping: VG 524 from  $1.9$  to  $1.1 \times 10^{-11}$ , at 20 A, VG 528 from  $3.0$  to  $2.2 \times 10^{-11}$  and VG 532 from  $1.7$  to  $1.5 \times 10^{-11}$  torr.

VG 564 and VG 608

(near the maxima of  $\beta_v$  on either side of I6)

The pressures have risen at VG 564 from  $1.8 \times 10^{-11}$  to  $1.4 \times 10^{-10}$  at 20 A at VG 608 from  $1.6 \times 10^{-11}$  to  $2 \times 10^{-10}$  at 20 A. VG 604 and 616.1 followed the movement at a lower level. The pressure has started to rise 2 minutes before the beam was lost, contrary to the following VG 652 and VG 710.

VG 652 and VG 710

(near the maxima of  $\beta_v$  on either side of I7)

VG 652 tripped off and VG 710 reached  $6 \times 10^{-11}$  torr at the moment of the loss of the beam of 20.69 A. It seems that these pressure rises have been caused by the catastrophic beam loss.

VG 756 (critical place type D)

This gauge tripped off at 18h04 one minute before VG 416.3.

VG 808 and VG 812

(place with  $\beta_v = \max$ )

These two gauges have tripped off at the moment of beam loss.

VG 816.3 (critical place type B)

Contrary to the previous gauges the pressure has started to rise a few minutes before the beam was lost, but tripped off at this moment.

VG 824 (critical place type C)

This is one of the two strongest pressure rises of the whole ring. It reached  $1.9 \times 10^{-8}$  torr. It influenced the neighbour gauges VG 832.1 and 832.3.

VG 840 (critical place type C)

Although this gauge had tripped off, it can be seen from the pressure decay later, that the pressure rise was even stronger than that of VG 824. The gauges VG 836, VG 848.1, VG 848.6, and VG 848.8 were influenced.

VG 860

This gauge has for quite some time a static pressure of  $7$  to  $8 \times 10^{-11}$  torr in linear range. We consider this a residual contamination after a partially successful partial bakeout. The gauge had tripped off during the first stack of 19 A. It was then put on logarithmic range. In this range the static pressure was  $1.4 \times 10^{-11}$  torr. During the second stack the pressure rose steadily to  $6 \times 10^{-11}$  torr.

D. Blechschmidt

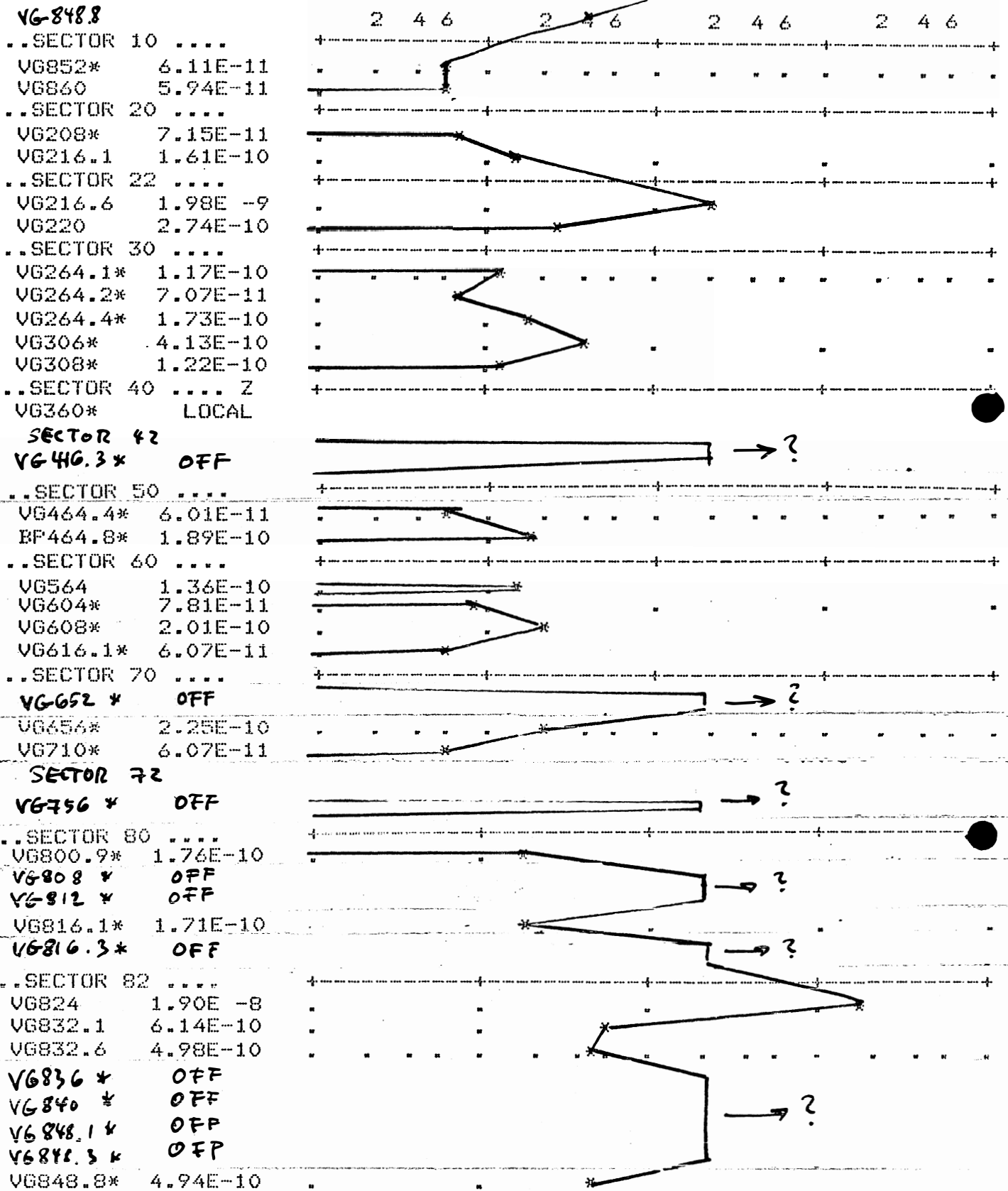
E. Fischer

O. Gröbner

PLVG(R2,5.0E+1)

DATE: 74-03-09 TIME: 18H 9M 35S

1.0E-11 1.0E-10 1.0E -9 1.0E -8 1.0E -



--- BEAM CURRENT: I = 20.685 A ---

--- MAGN. FIELD : M = 26.588 GEV/C ---

DATE: 74-03-09 TIME: 18H 9M 35S

--- END PLVG ---

RUN 430

FIGURE 1