

## LOOKING BACK AT A QUARTER CENTURY OF RESPECT

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Photogrammetrists around the world have the opportunity of assisting Prof. Dr. Friedrich E Ackermann to celebrate his 60<sup>th</sup> birthday in November 1989 by contributing to a commemorative anniversary publication. Having myself been retired on reaching that age last year, I am not in a position to make a scientific contribution; undoubtedly older, and wiser, photogrammetrists than I will do so with distinction. Instead I must avail myself of the prerogative of a Senior Citizen and shelter behind a retrospection. I have selected for this an event, just a few minutes in time, during the 1964 Lisbon Congress of ISP (as ISPRS was then known). This event probably seems quite trivial but it was significant enough to me for it to have stayed in my mind for a quarter of a century.

I would like, as is my wont, to provide a lengthy introduction, provided the Editors of this Memoir permit, and actually go back to 1960. Then, having worked in Military Survey on altimetry, geodesy, astronomy, map production control and cartography in that order, for about one year each, I was posted to Ordnance Survey where it was still policy to employ Army Officers in most of the professional posts. My first task was to write a textbook on the OS system of Analytical Aerial Triangulation (AAT) [1], a topic of which I was totally ignorant, and though also involved in various R & D projects I was allowed the luxury of six months without managerial responsibilities in order to learn the subject and write my book.

This tended to result in my becoming the OS spokesman on AAT including papers to the Photogrammetric Society [2] and Conference of Commonwealth Surveyors [3]. Unfortunately the former of these resulted in an acrimonious correspondence with Prof. Dr. W Schermerhorn, Dean of ITC, for having had the temerity to suggest that analytical block adjustment cost less than the Jerie Analogue Computer, and I became **persona non grata** at that establishment. However the latter of those papers improved matters since Willi Schermerhorn attended my presentation and participated actively in the discussion: our getting to know each other eased things and besides this Dr Fouad Amer, who had given a paper [4] on a topic very similar to mine [2] at the same meeting of the Photogrammetric Society, had

subsequently joined the staff of ITC where developments such as **Anblock** were being programmed for their **Zebra** computer. Perhaps I should not have been quite so surprised at being asked to give a paper [5] to the ITC Symposium on Aerial Triangulation in August 1964.

That was a fairly select assembly and my arrival in Delft to attend was my first encounter with young Dr Fritz Ackermann whose name was already known to me in connection with the developments above. He outshone my one presentation by giving five [6,7,8,9 and 10] and one of these was a discussion of no less a topic than his Invited Paper [11] to ISP Commission III and another discussed his Doctorate Thesis. It was a privilege and an education for me to attend this symposium. The Ordnance Survey then had some 10 years experience of using stereocomparators for analytical aerial triangulation as a routine mapping process, in which respect they (we) were world leaders by about 9 years. Had my presentation been in the first (Monday morning) of the 10 half-day sessions rather than the last (Friday afternoon) it would probably have reflected the same self-satisfied tone which is evident in the paper; however having listened for 4½ days to those who were really developing the subject, with their keen mathematical minds and with genuine photogrammetric education (I had neither), I like to think my presentation was more sensitive and more aware of the clumsiness of our approach. The justification for ITC, rather than ISP Commission III, organising this symposium just two weeks before the Lisbon Congress became clear since much of the new thinking going into genuinely analytical techniques was then coming from ITC and obviously Fritz Ackermann was one of their leading lights. I have said it was a privilege to be present at the formal sessions; it was a novel experience to meet him, and others of similar calibre, at the social and domestic gatherings.

I give myself no credit for recognizing a bright new star in the field of analytical photogrammetry. **He had already arrived!** It was I who had only just become aware of the fact. To demonstrate this not only did he give an Invited Paper to Commission III [11] at Lisbon (a pinnacle to which I never aspired, the nearest being an Invited Paper to ISPRS Commission IV [12] in Kyoto last year) but also at that Congress he was the recipient of the first Otto von Gruber Award and this prestigious achievement meant a lot less to me then than it did in later years when I twice had the honour (in 1972 and in 1976) to serve on the jury. It was at one of the Commission III meetings at Lisbon that the event I wish to describe took place.

The discussion, for a reason I can no longer recall, had drifted onto the topic of determining the 'ground system co-ordinates' of the photographic aircraft at the instants of exposure of aerial photography (I think EDM and theodolites featured in the proposed techniques) and from there had degenerated into an argument about how to transfer these co-ordinates into those of a ground point whose image could be observed photogrammetrically. That is to say whether deriving the tilt of each photograph led to the identification of the plumb point as an observable image which could now be used as a planimetric control point or whether it was better to observe the principal point of each photo and derive the tilt and length of this vector to compute all three co-ordinates of its intersection with the ground surface. I entered the discussion! Though I was unenthusiastic about the proposed method for determining the aircraft position I could see no problem in using such co-ordinates, if reliable values for them were available; the air-stations featured in the block adjustment and there was nothing to prevent their use as controls if their positions were known. I was scorned and virtually told to stop wasting the time of eminent photogrammetrists. One can feel very small after saying something stupid but all of us, at some time or another, speak without full consideration; it is doubly humiliating to, apparently, say something stupid and then be too thick to see what was wrong with it! I was in such a position and would have preferred to expand on my argument. At the end of the session Fritz Ackermann came to me and pointed out that of course I was quite correct in the case of analytical block adjustment but he added that virtually all the others at that meeting thought aerial triangulation was a process observed, at best, on stereoplotters using the base-in/base-out facility or maybe even on Multiplex bridges. I felt a great deal better after this friendly interjection. I was gratified that I had been able to appreciate a potential advantage of an analytical adjustment procedure, but then so I should have done as the use of such a procedure was routine for me. However Fritz Ackermann had been able to see both sides of the question and, since I had not, he took the trouble to seek me out and reassure me.

Twenty-five years is a long time to remember an event of such apparent triviality but it meant a lot to me then because of the humiliation and chagrin I was feeling. Since then much has happened to make it more relevant to photogrammetry, and Fritz Ackermann has been in the forefront of most of it. Whenever the use of **auxiliary data** has been under investigation he has made a valuable contribution, and how else can one describe camera station co-ordinates whether obtained from an improbable source such as EDM from the ground or, as in later years, APR,

statoscope, GPS, Inertial Systems or whatever. **But now it is a reality!** There are still problems, of course; take for instance the case of a GPS receiver in the aircraft, with or without simultaneous data from another on a known ground station. The vector from GPS antenna to camera node is (more or less) constant in length and is related to the camera axes so long as drift and tilt settings at the mount are unchanged:- perhaps for a whole strip. What else is this besides using the camera station as a "ground" control? I am sure that 25 years ago I had not appreciated the dependence of the Z-co-ordinate of perspective centres on a precisely known camera focal length but I would not be surprised if the subject of this monograph had done so. This may currently be an argument against having no ground control at all, not even in height, but does not alter the fact that it is now routine thinking that since camera stations are featured in both model and bundle adjustments then auxiliary data can be, and usually is, applied at them.

Initially data for aerial triangulation consisted of photogrammetric observations, including those of ground control points, and the fixed co-ordinates of those controls. One development permitted the simultaneous adjustment of the ground observations with the photogrammetry; another the incorporation of data from other sources (statoscope and APR being the most popular) which conventionally was called 'auxiliary data'. Perhaps now we should think of photogrammetric data and 'other data' (which would include both ground and airborne data collection) and think of a better name for the latter than auxiliary with its implication of that it is of secondary importance (perhaps supplementary or external would be more descriptive).

There have been frequent reminders, over the years, that such data, effectively being control, may be applied at the air-stations. The fact that the name Ackermann is usually associated with them directly or indirectly, has probably caused a certain brief conversation in Lisbon 25 years ago to stay fresh in my mind ever since. That encounter certainly confirmed the respect for the eminent Professor (as he is now) which I still have today. I like to think it also cemented a friendship between us. We have met many times since then, for instance at functions of Commission III (he was President 1972-76, I was Secretary 1968-72 and we have both retained that interest), he has often addressed our Photogrammetric Society in English which puts some of us to shame, I have given lectures (but only in English of course) to two Photogrammetric Weeks in Stuttgart and there have been other encounters as well. He has always

been a model of courtesy and friendliness, hospitable to a fault and modest in the face of world wide acclaim and renown. It is a privilege to consider him a friend, I can only hope it is not also a presumption.



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