XV th CONGRESS OF THE INTERNATIONAL
SOCIETY OF PHOTOGRAMMETRY AND REMOTE SENSING

COMMISSION III

Mr.Necati OLCUCUOGLU, Ms.Sc.
Milli Savunma Bakanligi
Harita Genel Komutanligi
Fotogrametri Sb.
Dikimevi- Ankara
TURKEY

EXPERIENCE WITH BLOCK TRIANGULATION BY INDEPENDENT MODELS AT THE GENERAL COMMAND OF MAPPING, TURKEY

A B S T R A C T

Aerial triangulation has long been applied in the organizations of which the fields of interest are map production by photogrammetric method in Turkey.

The initial stage of aerial triangulation started with the use of the analoque instruments by means of the polynomial strip adjustment method at the General Command of Mapping.However,upon availability of the PSK comparators analytically strip coordinates were obtained.

In accordance with the research works carried out at the General Command of Mapping, the M-43 block adjustment Programme with Independent Models has been developed and put into official application after the existing data pertaining to the test field is evaluated in this programme.

1. INTRODUCTION

In order to decrease the cost of map production caused by the field activities, aerial triangulation has been applied in Turkey for quite a long period of time. Aerial triangulation by polynomial strip adjustment method has been used at the General Command of Mapping after provision of the PSK stereocomparators and thus analytical aerial triangulation has been put into application in 1971. Polynomial strip adjustment has also been applied by using of analytically obtained strip coordinates.

According to the research works carried out at the General Command of Mapping, block adjustment programme with Independent Model M-43 version, with a capacity of up to 250 models, has been developed. This Programme named, "BAGMOD", has been verified and experimental results analysed with the data of test area.

2. SOME FEATURES OF THE "BAGMOD" INDEPENDENT MODEL PROGRAMME

(a) Independent model block adjustment programme is M-43 version.
(b) Maximum capacity is 250 models.
(c) Assumed , all photogrammetric data with equal weight and no correlation, as for ground control points are error-free.
(d) The coordinates of projection centers are used as model points.
(e) Model sequence in the block should be given at the beginning of the programme so that the band-width of the reduced normal equation will be minimum.
(f) Both total iteration number and planimetric and height iteration should be separately given at the begining of the programme.
(g) GAUSS-ELEMINATION method is used in solving the reduced normal equation.

3.1. TEST AREA

The test area used at the The General Command of Mapping is approximately 100 square kilometers with a lenght of 10.5 km. and width 9.5 km. With this purpose, aerial photography of 1:14 000, flight direction N-S, 60% forward, 30% lateral overlapping and wide angle camera RC8 15/23 are used. Five parallel strips consist of 30 models in total. In the test area approximately 100 ground control points are established and used both in adjustment and for checking purposes.

3.2. PRESENTATION OF RESULT

Measurements belonging to the test area have been carried out with PSK stereocomparators. For photo coordinates, a subprogramme is used to eliminate the systematic errors in the comparator coordinates. Model restitution is performed analytically and model coordinates are used for the "BAGMOD" as an input.
The results of the Adjustments applied to strips and blocks with various point distribution are shown at TABLE 1.

EMPIRICAL ACCURACY OF BLOCKS AND STRIPS

Test area : Established by the General Command of Mapping in KALECIK district.

Photography : Wide angle, 1:14 000 ,p=30%, q=60%, total 30 models

Instrument : PSK, artificial tie points, models are formed analytically.

CONTROL			ACCURACY (micron)						
Planimetric	Height	No. of Models	No. of check Points	$\sigma_{oX,Y}$	σ_{oH}	$\mu_{X,Y}$	μ_H	μ_H (%oh)	$\mu_{X,Y}$ / $\sigma_{oX,Y}$	μ_H / σ_{oH}
BLOCK										
Perimeter 4 Chains i=2b	i=2b	30	92	9.6	12.8	15.4	17.8	0.116	1.604	1.391
Perimeter 3 Chains i=2b	i=3b	30	90	9.5	12.6	15.9	18.2	0.118	1.673	1.444
Perimeter 4 Chains i=6b	i=2b	30	93	9.1	13.0	24.0	17.2	0.112	2.637	1.323
Perimeter 3 Chains i=6b	i=3b	30	99	9.2	13.0	24.6	18.0	0.117	2.673	1.385
4 Corners 4 Chains	i=2b	30	91	9.0	13.0	30.7	17.4	0.113	3.411	1.338
4 Corners 3 Chains	i=3b	30	99	9.0	12.8	30.8	17.6	0.115	3.422	1.375
STRIP										
i=2b		6	44	9.2	13.7	14.0	16.5	0.107	1.521	1.204
i=3b		6	42	9.1	13.9	13.6	20.2	0.131	1.494	1.453

TABLE 1

4. CONCLUSION

The limited number of examples of different adjustment due to insufficient number of models available in the test area are shown at TABLE 1. Two general iterations in each of which there are one planimetric and two height iterations have been used. The increase of the iteration number has not been effective in achievement of a higher degree of the accuracy.Three or four runs are sufficient for the elimination of blunders.

REFERENCES:

F.ACKERMANN : Matrix Structures in Block Adjustment. (ITC-Publication)

F.ACKERMANN : Aerotriangulation with Independent Models. BUL,Issue 4/1970

F.ACKERMANN : A Program Package For Block Adjustment
H.EBNER With Independent Models.
H.KLEIN

F.AMER : Adjustment of Aerial Triangulation Part I,II (ITC-Lecture Notes)

A.YASAYAN : Aerial Triangulation in Turkey ; Analysis and Proposals. (Karadeniz University , TURKEY)

E.SIGMARK : Block Triangulation by the Independent
A.ANDERSON Three-Dimensional Method. XIII Congress of ISP, Helsinki, 1976