

METRIC

MIL-G-89106

6 May 1994

SUPERSEDING

PS/4BF/300

NOVEMBER 1991

**MILITARY SPECIFICATION
GRIDDED AIRFIELD PHOTOGRAPHS (GAP)**

This specification is approved for use by all
Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. These specifications are for use by all Department of Defense activities which have authorization to validate Mapping, Charting and Geodesy requirements and submit production requests.

1.2 Purpose. These specifications are designed to provide guidelines for the preparation, acquisition, handling, and destruction of hardcopy Gridded Airfield Photographs.

1.3 Security. These specifications are UNCLASSIFIED. Products generated from these specifications may be classified as high as "SECRET". Destruction notice for unclassified, distribution limited documents: "Destroy by any method that will prevent disclosure of contents or reconstruction of this document".

2. APPLICABLE DOCUMENTS

This section is not applicable to this specification.

<p>Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Director, Defense Mapping Agency, ATTN: PR, ST A-13, 8613 Lee Highway, Fairfax, VA, 22031-2137. by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.</p>
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AMSC N/A

AREA MCGT

DISTRIBUTION STATEMENT A. Not approved for public release; distribution is limited.

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3. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection (see 6.3) in accordance with 4.3.

3.2 Accuracy. 109 feet Circular Error (CE) (90 percent assurance).

3.3 Product identifier. Each GAP will be identified by installation name, coordinates, country name (country code), and BE number (if available). Each sheet necessary to provide coverage of a site will have an individual stock number.

3.4 Product attributes.

3.4.1 Production. The GAP will normally be produced by plane rectification of latest date suitable source materials available to DMA. A plane rectification, which removes image projection distortions due to camera roll, pitch and yaw, is a suitable procedure for producing GAPs since airfields are essentially located on level terrain and there is little or no image distortion due to terrain relief.

3.4.2 Orthorectified imagery. Under some circumstances, there may be a valid requirement to produce a GAP in an area where terrain relief is greater than would normally be expected at an airfield. In that circumstance, if the combination of relief and image obliquity angle results in a theoretical absolute horizontal error greater than 109 feet CE, that airfield/installation will be considered a candidate for production using orthorectified imagery. Each such candidate GAP will be referred to DMA(PR) for formal decision to produce or not to produce. DMA(PR) will coordinate with the requesting customer and determine if the candidate GAP, using orthorectified imagery, will meet the requesting customer's requirements.

3.4.3 Source material date. Source materials older than three years will not be used. GAPs should be evaluated every three years to insure currency of detail. Maintenance updates should be prioritized with new area requirements and submitted when operational use of the data has been seriously degraded by major changes to the primary movement surfaces of the airfield.

3.4.4 Scale. GAPs will normally be produced at a scale of 1:6,000. Although multiple GAPs will be used to provide complete coverage of the area of interest, alternative scales may be available to accommodate large areas. These instances will be thoroughly reviewed by DMA and the requesting command on a case by case basis. NOTE: Scale changes may affect grid spacing and product accuracy evaluation.

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3.4.5 Grid spacing. The geodetically controlled latitude and longitude grid will normally be plotted at 0.02 arc min. intervals. This interval results in a grid spacing of 120 feet in latitude and a variable spacing in longitude. The grid will carry index values at 0.20 min. intervals.

3.4.6 Overprinted grid. Placement of overprinted grid must permit determination of WGS 84 horizontal coordinates accurate to 109 feet CE where terrain is essentially level.

3.5 Margin information. The following information will be carried in the GAPs margin or in an area of the GAP that does not obscure the airfield.

- a. Installation name, country code, and BE number (if available).
- b. DMA credit note, production date, and month/year of source.
- c. Statement of coordinate units (degrees, minutes, hundredths of minutes).
- d. Estimated absolute horizontal accuracy, at 90%, in feet and relative to WGS 84.
- e. Elevation values in feet, relative to MSL, for center of parking apron, and center and endpoints of each runway.
 1. If multiple parking aprons are requested each will be identified by an alpha character on the image and will be keyed similarly to a list of elevations in the margin.
 2. Runway elevation values will be listed by runway numbers in the margin.
- f. Graph bar scale in feet and meters and scale statement.
- g. Classification control note and declassification note.
- h. Stock Number. Each sheet produced will have its own unique stock number. When used alone the stock number, or list of stock numbers, is unclassified.

Column	Explanation
1-2	Program. GP, Gridded Photographs
3-5	Product. GAP, Gridded Airfield Photograph
6	Producer code. "A" DMA Aerospace Center
7-11	Sequential stock (site) number (00000-99999)
12-13	Sheet numbers, a site may have multiple sheets
14	Slash (/)
15	Edition number (1 - 9)

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3.6 Evaluation procedures. Should product evaluation procedures indicate an accuracy worse than 109 feet at 90% reliability, DMA(PR) will coordinate with the customer to determine if the product is usable, will list the product as being inadequate, and will schedule the product for maintenance.

3.7 Size. Maximum size of the GAP is 24 inches x 30 inches (60.96 X 76.20 centimeters). If more than one sheet is required to cover large airfields, the maximum size of any sheet will be 24 inches X 30 inches (60.96 X 76.20 centimeters).

3.8 Reproduction. Reproduction of GAPs will be accomplished by standard quality photographic processing.

a. Photographic copies will be produced flat for distribution unless the print quantity requirement exceeds 200. Over 200, lithographic copies will be produced and the user must specify "flat" or "folded", the latter being an eight panel fold.

b. Duplicate negatives, including overprinted grid and textual information, will be provided to the customer upon request.

3.9 Distribution (unless otherwise requested).

3.9.1 Initial production. Requests for new production of a GAP over an airfield, or maintenance update of a current product, must be submitted to HQ DMA(PR) in accordance with MOP 31 guidance for MC&G Area Requirements.

3.9.1.1 CONUS sites. For GAPs over CONUS sites, three copies will be furnished to Base Operations of the airfield and one copy to the Command or Service that submitted the requirement. Shelf stock will be maintained by DMA Combat Support Center (DMACSC).

3.9.1.2 OCONUS sites. For GAPs over OCONUS sites, three copies will be furnished to the Command or Service that submitted the requirement and two copies to the Command in whose Area of Responsibility the airfield falls. Shelf stock will be maintained by DMACSC.

3.9.2 Reorder. DMACSC will receive and process all orders for post-initial production/update maintenance GAP's in accordance with guidance contained in GP product listings and/or DMA catalogs.

3.10 Product listing.

a. Availability of GAPs will be depicted in a "Gridded Photo (GP) Listing" produced approximately monthly by DMA Aerospace Center (DMAAC) and distributed by DMACSC. The GP Listing will include the Airfield/Locality name, stock number, country code, geographic area

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coverage by latitude/longitude, BE number (if available), production date, photo source date, elevation of airfield/locality, horizontal accuracy and number of photographs needed to cover each site. Each listing will contain two complete text sections; alphabetical by airfield or locality name and numerical by BE number.

b. Upon migration of the inventory listings to a standard DMA catalog (TBD), the GP Listing will cease, and all recipients of DMA catalogs who have requested that publication containing Gridded Photos will have the current inventory.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements; however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2 Classification of inspection. The inspection requirements specified herein are classified as follows:

- a. Visual examination (see 4.4).
- b. Review of construction records (see 4.5).

4.3 First article inspection. When a first article inspection is required (see 3.1 and 6.2), it shall be examined for defects specified in 4.4 and the construction record reviewed for compliance with 4.5.

4.4 Visual examination. GAP's shall be examined for defects and errors as specified by the contracting officer or by internal DMA standard procedures. Required corrections shall be made to manuscripts, drafting positives, and reproducible material before the GAP is sent to the next production stage. Defects detected

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during the inspection of the printed "catch copy" shall be evaluated by DMA for criticality, and suitable corrective action.

4.5 Review of construction records. Records about the construction of the GAP shall be maintained. The records shall document sources, decisions regarding reconciliation of conflicting data, etc. GAP records/construction histories shall be reviewed concurrently with visual examinations (see 4.4) to ensure that proper cartographic procedures have been followed.

4.6 Customer review. Users finding errors within the product which would impact successful conduct of operations or hazard US military personnel should notify HQ DMA (PR) by message, detailing sheet stock number, error, method of error detection/measurement, and explanation of correction if necessary for clarity. Less critical errors should be submitted by letter to HQ DMA (PR), copy to command and service MC&G offices.

5. PACKAGING

5.1 General. Handling regulations for wrapping classified materials up to a level of SECRET, NOFORN must be anticipated.

5.2 Packaging. Packaging shall be level C (see 6.2) unless otherwise specified. This packaging provides minimum protection, and it is needed to protect materiel under known favorable conditions. The following criteria determine the requirements for this degree of protection:

- a. Use or consumption of the item at the first destination.
- b. Shock, vibration, and static loading during the limited transportation cycle.
- c. Favorable warehouse environment for a maximum of 18 months.
- d. Effects of environmental exposure during shipment and intransit delays.
- e. Stacking and supporting superimposed loads during shipment and temporary storage.

5.3 Marking. In addition to any special markings required by the contract or order, markings shall be in accordance with requirements of MIL-STD-129 for military levels of protection.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The GAP is an aerial photograph of a specified area of interest that is plane rectified to remove some camera distortions and produced at a 1:6,000 scale. Overprinted on the

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rectified photo is a World Geodetic System 84 (WGS 84) geographic coordinate grid. The GAP also has elevations based on Mean Sea Level (MSL) for specifically identified points within the image area of the GAP. The GAP and its associated User's Guide are designed as a simple and low cost means of deriving latitude, longitude, and selected elevation information to meet U.S. Air Force aircraft Inertial Navigation Systems (INS) initialization requirements.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. When first article is required (see 3.1, 4.3, and 6.3).
- c. Levels of packaging (see 5.2)

6.3 First article. When a first article is required, it shall be inspected and approved under appropriate provisions of FAR 52.209. The first article shall be a preproduction sample. The contracting officer shall specify the appropriate type of first article and the number of units to be furnished. The contracting officer shall also include specific instructions in acquisition documents regarding arrangements for selection, inspection, and approval of the first article.

6.4 Supersession. These specifications supersede Defense mapping Agency Product Specifications for Gridded Airfield Photographs, PS 4BF/300, November 1991.

6.5 Acronyms/definitions.

- a. BE number - Basic Encyclopedia Number; site point identification number.
- b. CE - Circular Error; an accuracy figure representing a 90 percent probability that any point expressed as a function of two linear components (e.g., horizontal position) will be within the given figure.
- c. CONUS - Continental United States; contiguous forty-eight states of America.
- d. GP - Gridded Photograph; the program line within which specific items are produced as standard products.
- e. GAP - Gridded Airfield Photograph; processed photo product with geographic grid overlay.
- f. INS - Inertial Navigation System; on board computational point to point navigation system.
- g. MSL - Mean Sea level - The average height of the surface of the sea for all stages of the tide, used as a reference for elevations. [Usually determined by averaging height readings observed hourly over a minimum period of 19 years.]

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h. OCONUS - Outside continental United States; regions outside of the borders of the contiguous forty-eight states of America.

i. WGS - World Geodetic System - A consistent set of parameters describing the size and shape of the Earth, the positions of a network of points with respect to the center of mass of the Earth, transformations from major geodetic datums, and the potential of the Earth (usually in terms of harmonic coefficients).

6.6 International standardization agreements.

This section is not applicable to this specification.

6.6.1 International Standardization Agreements (STANAGs). This section is not applicable to this specification.

6.6.2 Quadripartite Standardization Agreements (OSTAGs). This section is not applicable to this specification.

6.6.3 Air Standardization Coordinating Committee Agreements (ASCC). This section is not applicable to this specification.

6.6.4 International MC&G Agreements. This section is not applicable to this specification.

6.6.5 Executive Orders. This section is not applicable to this specification.

6.6.6 InterAgency Agreements. This section is not applicable to this specification.

6.6.7 Other Documentation. This section is not applicable to this specification.

6.7 Subject term (key word) listing.

BE number
INS
MOP 31
Plane rectification

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APPENDIX

GAP STYLE SHEET

10. SCOPE

10.1 Scope. This Appendix is a graphic illustration of the design, composition, and location of the margin data. This Appendix is a mandatory part of the specification. The information contained herein is intended for compliance.

20. APPLICABLE DOCUMENTS

This section is not applicable to this Appendix.

30. GAP STYLE SHEET

30.1 Style sheets. See next pages for style sheet information.

a. Page 10 shows the style sheet using a vertical format. The maximum image area is 20.75 X 24.25 inches (52.70 X 61.59 centimeters).

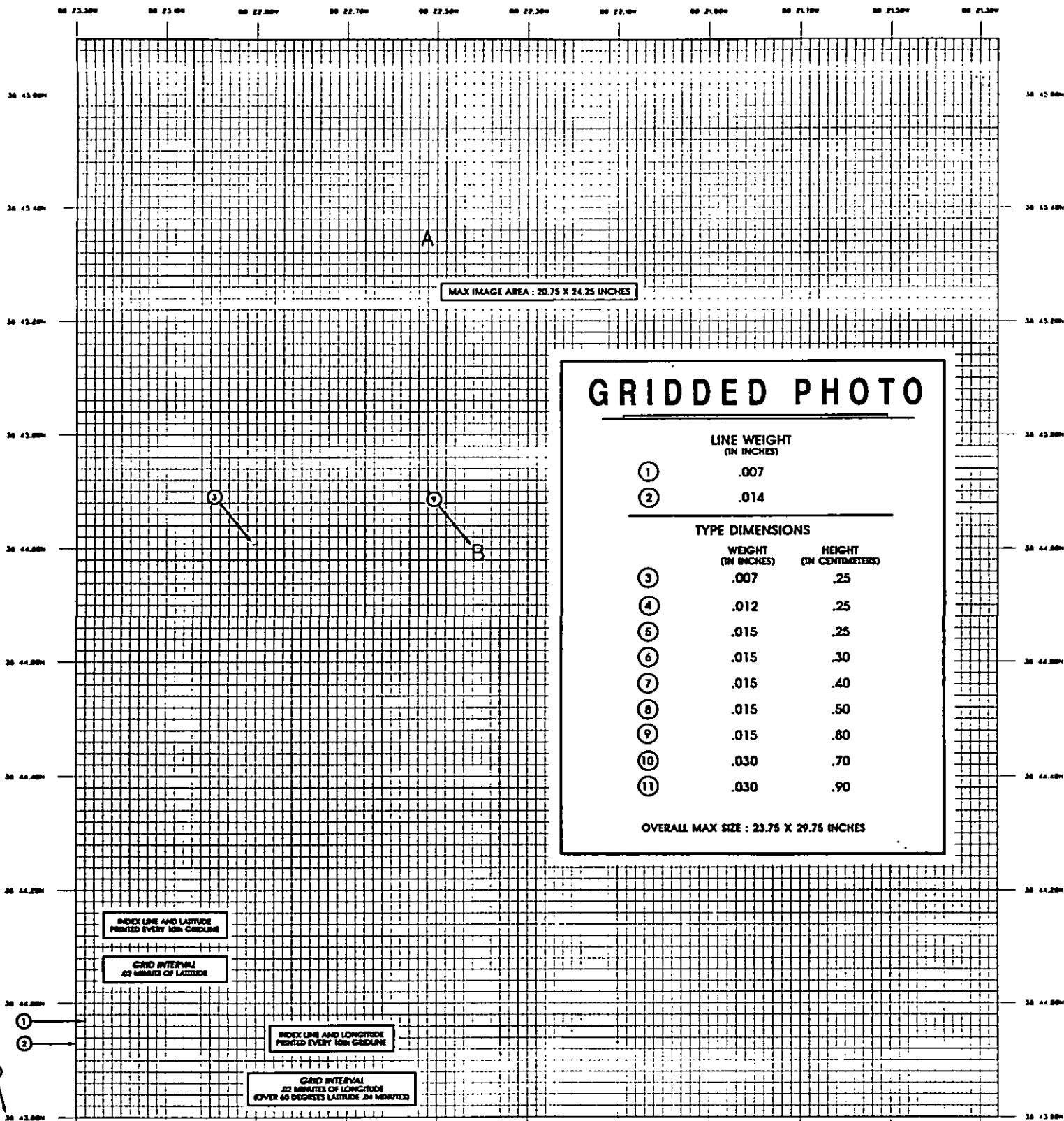
b. Page 11 shows the style sheet using a horizontal format. The maximum image area is 18.25 X 26.75 inches (46.35 X 67.94 centimeters).

⑩ — CLASSIFICATION

⑪ — AIRFIELD NAME, CC

⑪ — W

⑪ — B.E. NUMBER



GRIDDED PHOTO

LINE WEIGHT (IN INCHES)	
①	.007
②	.014

TYPE DIMENSIONS		
	WEIGHT (IN INCHES)	HEIGHT (IN CENTIMETERS)
③	.007	.25
④	.012	.25
⑤	.015	.25
⑥	.015	.30
⑦	.015	.40
⑧	.015	.50
⑨	.015	.60
⑩	.030	.70
⑪	.030	.90

OVERALL MAX SIZE : 23.75 X 29.75 INCHES

INDEX LINE AND LATITUDE PRINTED EVERY 10th GRIDLINE

GRID INTERVAL 32 MINUTE OF LATITUDE

INDEX LINE AND LONGITUDE PRINTED EVERY 10th GRIDLINE

GRID INTERVAL 32 MINUTES OF LONGITUDE (OVER 60 DEGREES LATITUDE 24 MINUTES)

PHOTO DATE WITH YR
COORDINATE UNITS ARE DEGREES, MINUTES AND HUNDRETHS OF MINUTES

FEET	100	200	300	400	500	600	700	800	900
0	1	2	3	4	5	6	7	8	9

METERS

1/6000 SCALE
HOR DATUM WGS 84
HOR ACC' FT 90 PERCENT CE

CLASSIFICATION
RELEASABILITY

RUNWAY ELEVATIONS MSL
① ② ③
④ CENTER ⑤
⑥ NO FT
⑦ NO FT

PARKING APRON ELEVATIONS MSL
⑧ A
⑨ B NO FT
⑩ C NO FT

MAXIMUM ENTRIES 6

MAXIMUM ENTRIES 7

PREPARED BY
DEFENSE MAPPING AGENCY
AEROSPACE CENTER
ST. LOUIS AFB, MO 63104-3300

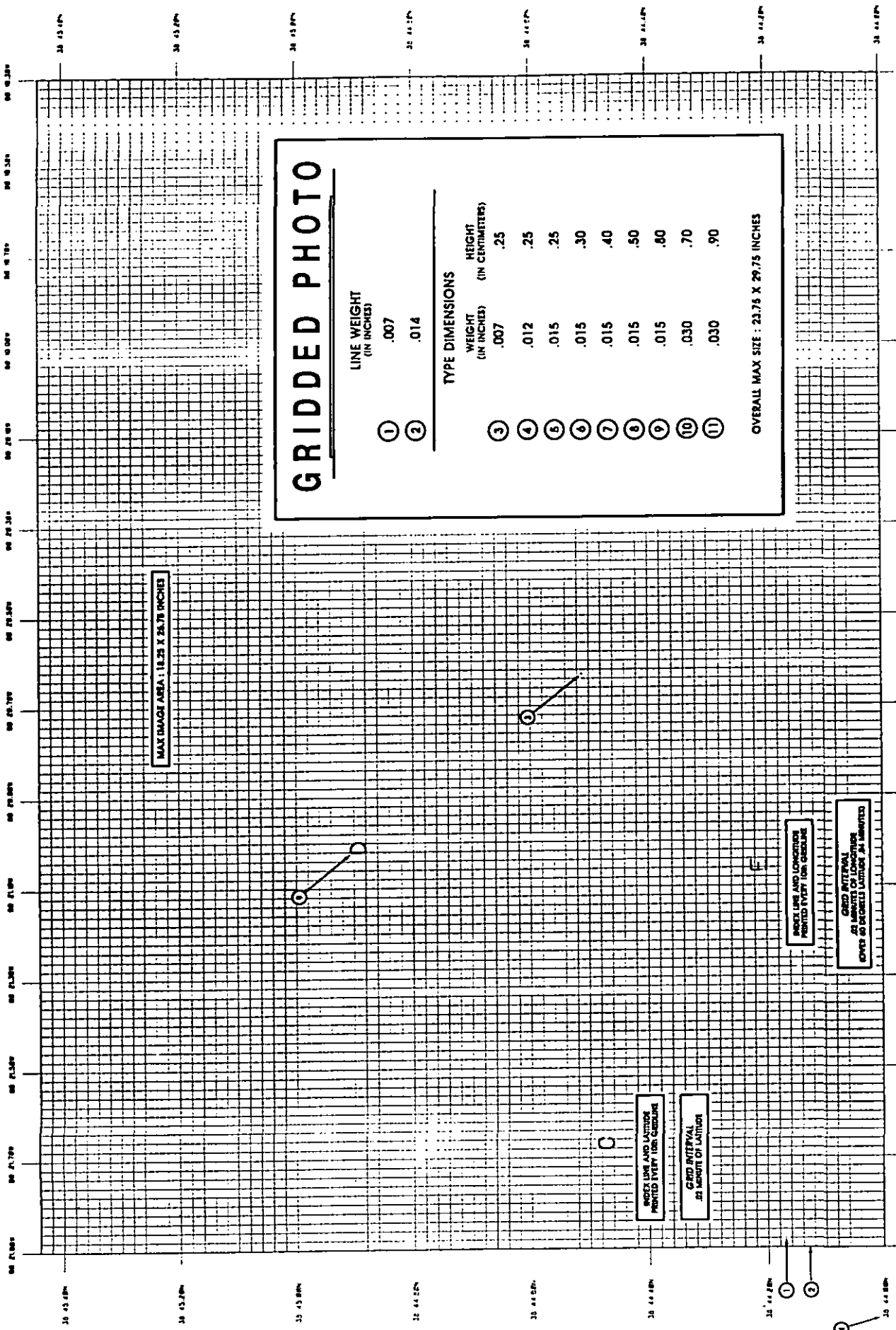
CLASSIFIED BY DOD TS-SIBS.2111-3
DECLASSIFY ON OADR

WNINTEL
STOCK NR GPGAPA000001

① AIRFIELD NAME, CC

① CLASSIFICATION

① B.E. NUMBER



GRIDDED PHOTO

LINE WEIGHT (IN INCHES)	
①	.007
②	.014

TYPE DIMENSIONS	
WEIGHT (IN INCHES)	HEIGHT (IN CENTIMETERS)
③	.25
④	.25
⑤	.25
⑥	.30
⑦	.40
⑧	.50
⑨	.60
⑩	.70
⑪	.90

OVERALL MAX SIZE : 23.75 X 29.75 INCHES

MAX IMAGE AREA: 18.25 X 24.75 INCHES

GRID INTERVAL
OF 10 SECONDS
PRINTED EVERY 10M GRIDLINE

GRID INTERVAL
OF 10 SECONDS
PRINTED EVERY 10M GRIDLINE

GRID INTERVAL
OF 10 SECONDS
PRINTED EVERY 10M GRIDLINE

GRID INTERVAL
OF 10 SECONDS
PRINTED EVERY 10M GRIDLINE

SCALE
1/60000
HOR DATUM WGS 84
HOR ACC FT 90 PERCENT CE

CLASSIFICATION
RELEASABILITY

PREPARED BY
SCIENCE APPLICATIONS
CORPORATION
31. LOUISIANA, MO 63100-3300
CLASSIFIED BY DOD IS-SMS, P111-3
DECLASSIFY ON OADR

STOCK NR GPGAP0000002/1
WHINTEL

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CONCLUDING MATERIAL

Custodian:
DMA - MP

Preparing activity:
DMA - MP

Review activities:
Air Force - 09
" "
Navy - NO, MC

(Project MCGT-0090)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:		1. DOCUMENT NUMBER MIL-G-89106	2. DOCUMENT DATE (YYMMDD) 940506
3. DOCUMENT TITLE Military Specification for Gridded Airfield Photographs (GAP)			
4. NATURE OF CHANGE <i>(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed)</i>			
5. REASON FOR RECOMMENDATION			
6. SUBMITTER			
a. NAME <i>(Last, First, Middle Initial)</i>		b. ORGANIZATION	
c. ADDRESS <i>(Include Zip Code)</i>		d. TELEPHONE <i>(Include Area Code)</i> (1) Commercial (2) AUTOVON <i>(if applicable)</i>	7. DATE SUBMITTED (YYMMDD)
8. PREPARING ACTIVITY			
a. NAME Defense Mapping Agency		b. TELEPHONE <i>(Include Area Code)</i> (1) Commercial 703-285-9333	(2) AUTOVON 356-9333
c. ADDRESS <i>(Include Zip Code)</i> ATTN: PR, ST A-13 8613 Lee Highway, Fairfax, VA 22031-2137		IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA. 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	