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IPD/NPIC-104-65  
27 April 1965

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MEMORANDUM FOR: Assistant for Plans and Development, NPIC

ATTENTION: [REDACTED] Plans Branch

SUBJECT: DOD Code Matrix Block

REFERENCE: NPIC/P&DS-120/65 dated 25 March 1965

1. There appears to be some confusion as to what steps are involved in the collection, recording, transcription, and utilization of frame-specific data in various photo-reconnaissance and exploitation systems. Since our response to the question posed in the referenced memorandum is based on our understanding of these steps we propose to briefly outline the process. This outline will serve as a common base of understanding for subsequent intercourse between our respective organizations.

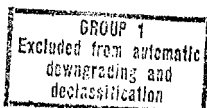
2. The DOD data block can be described or characterized at several different levels:

a. Bit-format specification. In this sense the DOD data block is described as being a certain number of binary point symbols arranged in a certain pattern on the film.

b. Code specification. This states the manner in which the bits in the matrix are grouped together in n-bit groups and the manner in which the elements of some m-element ( $2^n \geq m \geq 2$ ) symbol set (Arabic numerals, Roman alphabet, or the union of these two sets) are mapped into the  $2^n$  possible n-bit strings (i.e. the encoding to be used).

c. Field description. This gives us the assignment of names to groupings of (encoded) symbols. (For a hypothetical example - vehicle speed to be given in the 6th through 10th symbol positions to 10ths of a knot.)

3. We now turn to the steps that are involved in using the data recorded on a frame of reconnaissance photography "using the DOD Data Block". We can recognize at least these separate operations that would hold in a large scale exploitation effort.



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a. The bit pattern recorded on each frame must be transcribed into a computer-readable media (such as punched cards or magnetic tape) along with some unique identification of the frame to which the data pertains. If subsequent processing is to be done with a binary computer the transcription can be a one-to-one mapping into the bits of a string of binary computer words. The timely and accurate accomplishment of this transcription task is basic to any automated system to use the data recorded on the film. A contract is now being let to [REDACTED] by the Development Branch of your organization for the production of a "data block reader" that will accomplish this function for several different formats. In particular, it will do this for the bit pattern specified for the DOD data block.

b. The next phase of the exploitation process consists of the translation of the bit patterns into symbols of the higher level language. Assuming an encoding that is well-defined in advance (for example, XS-3 code) this translation logic can be wired into the "reading" hardware. An alternative approach (and a more practical one if several different codes are to be used) is to perform this translation as a trivial programmed function in the first computer program that accesses the data.

c. The third and subsequent steps in this chain are those that now pluck out the values from their respective fields and use these values in some manner in the various parametrically expressed mathematical models that are used as the computational frameworks for the exploitation process.

The steps that we have just lumped together as (c) are completely dependent on the camera systems that were employed in collecting the photography. That is, the mathematical models reflect the camera system rather than the manner in which the data pertaining to the camera system is recorded. It is to these mathematical models that the great bulk of our photo-metrical programming effort is directed. The programming involved in decoding the bit patterns is, as previously remarked, trivial and would scarcely be undertaken as an independent project in advance of some requirement to incorporate a specific camera

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system (that uses the DOD data block) into the set for which we provide metrical data reduction services. With regard to the process of transcribing the bit patterns into computer-readable media, we have been working with [REDACTED] to insure full compatibility of "reader" output with the input requirements of our present and subsequent computers.

4. If you are witting of any plans to supply photographic inputs to this Center from reconnaissance systems using the DOD data block and if these plans are of such nature as to warrant our providing photo-metrical and photo-coverage plotting capability to the Center we would ask that you forward such requirement to us.

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[REDACTED]  
Chief, Information Processing Division  
NPIC

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