MGE-DC
8 April 1969

SYSTEM MAINTENANCE CONTROL (SMC)
COMPUTER INFORMATION FOLDER

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PURPOSE: This folder has been written in an attempt to achieve a better understanding of the AN/FSQ-7 Computer equipment in the minds of our Maintenance Control personnel. It is hoped that this information will provide a smoother running, overall operation of this installation

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EXPLAINATION OF BLOCK DIAGRAM:

On the next to the last page of this folder, there is an overall block diagram of the AN/FSQ-7. I will make use of the next few lines to give a brief explaination of the equipment represented by these blocks.

MANUAL INPUT ELEMENTS:

A Manual input is any bit of information that has to be loaded into the computer to supplement the general DCA tape loaded program. This information, such as weather, bomarc status, etc, is put in the compter by means of a Computer Entry Punch (CEP). The CEP's are maintained by our display trained personnel. The information is entered in the form of IBM punched cards. The people who work in MI do the punching of the cards. This information is then placed on our input drums and into our permanent core in memory to be use by DCA to control the flight of aircraft in our sector.

LRI INPUT CHANNALS:

These channals are monitored at the simplex maintenance consele in the computer monitor room. This information is made up of all our radar input drums to be decoded and transfered to the display drums for the displays on the fourth floor.

XTL INPUT CHANNALS:

This information is input to us from other sites like ourselves. It is also monitored at the simplex Maintenance consol. This information is made up of the tracks and other information that is present at the other sectors.

INPUT DRUM SYSTEM:

The input, output and display drum systems are all used for the same purpose. This is to supply a buffer time storage between the rapid central computer equipment, which operates in the microsecond range, and the othe systems which operate in the millisecond range. The information is loaded on the drum and taken off at whatever speed is applicable to the equipment using it. In order to prevent any misunderstandings, it is necessary to mention that the input, output, and display drums are all the same type, but each drum is broken down into fields with certain number of fields allocated for each purpose.

CENTRAL COMPUTER PROCESSING EQUIPMENT:

This area is made up of memory and all of the arithmetic frames in the computer. ANY PROBLEM IN THIS AREA WILL PROBABLY CAUSE A SIMPLEX CONDITION. This portion of the computer also contains our Program Control, Instruction Control, and Program Element.

OUTPUT DRUM SYSTEM:

The output drum system is the buffer time storage system for all of the output equipment. The central computer equipment loads these drums with all the information that goes out of the building. This drum system is responsible for timing pulses also known as SYNC pulses, used throughout the output system.

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DISPLAY DRUM SYSTEM:

The display drum system is composed of two complete drums. These are the TRACK DATA drum and the RADAR DATA drum. The combination of these two drums are responsible for all of the information on the SD scopes on the fourth floor. The DD drum is responsible for all the DD Displays on the fourth floor.

*XTL AND DATA LINK OUTPUTS:

All of our outputs go through the same equipment to get out of the computer. This equipment is all duplexed (we have two output systems-one for A Computer and one for B Computer) until it leaves the second floor.

COMMAND POST AND DISPLAY CONSOLES:

This equipment is maintained by our display personnel. This display picture is the up to the minute air picture as seen by the 33rd Air Division radar equipment.

SAFE DATA TRANSFERS:

The safe data transfers are the communications between our two computers. This only takes place when the stand-by computer is cycling Stand-by Control or DCS. When the stand-by computer is getting safe data transfers, it is capable of taking over the live-air picture with all the information previously contained in the active computer. The active computer must be cycling well in order to make the safe data available to the stand-by machine.

*Although is is commonly believed that all our outputs are united into one, this is a definate misconception. The output system is brokin down into a few areas that function independently of each other. These ares are:

Ground to ground outputs.....

Channal 1 Crosstell to other air divisions.

" 2 Height finder request to other sites and Bactell to BUIC. Since all of the Height Finder request go out on the same line, it would be impossible for one site to be effected by a computer problem without all of the sites having the same trouble.

" 3 Forwardtell to 1st Air Force.

" 4 Missile to AADCAP's.

" 5 [illegible] status to Bomarc computer while missile is grounded.

TELETYPE OUTPUTS

This section has the capability of 25 lines but only uses 3 for DCA

Channel [illegible] Backtell to Fort Fisher, Norfolk Birdie and Charleston, NC.

" [illegible] TDC printouts

" [illegible] SDC printouts

GROUND TO AIR TD

This sections is used to provide data-link operation to intercepters and Bomarc (while airborne).

BOMARC OUTPUTS

One channal only. Used to provide suplementary information to Bomarc while they are in flight.

-IMPORTANT-

IT IS POSSIBLE TO LOOSE ANY ONE OF THESE SECTIONS OR SUB-SECTIONS AND STILL HAVE THE COMPLETE USE OF ALL OF THE REMAINING CHANNELS.

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There also seems to be a need for the explaination of some of the terms used by the computer maintenance personnel. A short summary of these terms is as follows:

DUPLEX - both computers capable of cycling the live-air program.
SIMPLEX - one computer is not capable of cycling the live-air picture.
NOPLEX - neither computer is capable of cycling the live-air program.
START-OVER - to re-cycle the DCA program one of the following ways:
CONTINUE - to stop the computer and start it again without dropping any of the information in the computer at that time.
RESTABLISH - to stop the computer and start it again after checking the information for bad parity on the display drums. This start-over will throw out any information not having the proper parity.
INITIATE - This starts the computer over after clearing all the information in our core memorys.
**BRAINWASH - This starts the computer over after taking all the information in the computer and throwing it away.
SWITCH-OVER - This means that the active computer becomes stand-by and the stand-by computer becomes active. This may be done in any one of three ways.
CONTINUE - in this mode, all the information is retained in the switch.
REESTABLISH - in this mode, all the information is retained but it may be as much as three minutes old.
INITIATE - in this mode, none of the information is retained.

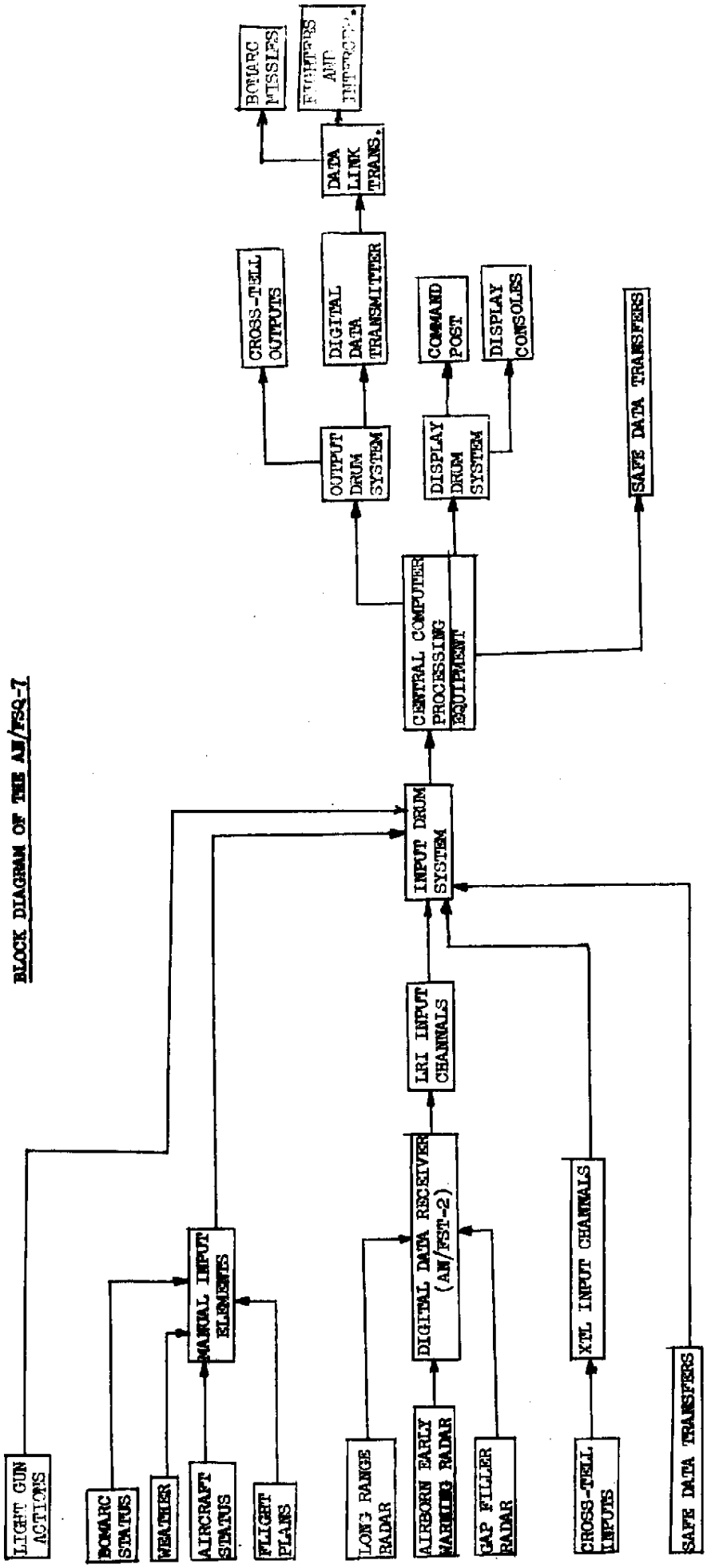
CLEAR DRUMS - this is a program that writes zeros on all of the drums. This distroys all the information previously stored on the drums.

There are a few things that have to be done by our section that takes a little time to confirm that it is done. A few of these things are:

TURN ON THE CAMERAS - The switch action to do this takes only seconds, but the computer has to recognize this action and start the cameras cycling. This takes as much as 30 seconds to complete depending upon how much information the computer is handling at that time.
LOAD THE OCTALS - This must be done by having a continue mode start over. This takes about a minute to set up and complete.
SWITCHING THE COMPUTERS - If we are running one of the two programs that allow safe data transfers, this can be done in no more than a minute. If we are in maintenance or a user is on the other computer, this may take up to five minutes to complete.
CHECKING AN OUTPUT OR INPUT PROBLEM - There is a small panal in the rear of the computer area at which we can check all our inputs and all our outputs. The inputs must be other them those that come from the fourth floor.

**The BRAINWASH startover is the same as an INITIATE except that all of the drum systems are cleared out.

4.


BLOCK DIAGRAM OF THE AN/FSQ-7
LIGHT GUN ACTIONS
BOMARC STATUS
WEATHER
AIRCRAFT STATUS
FLIGHT PLANS
MANUAL INPUT ELEMENTS
LONG RANGE RADAR
AIRBORN EARLY WARNING RADAR
GAP FILLER RADAR
DIGITAL DATA RECEIVER (AN/FST-2)
CROSS-TELL INPUTS
XTL INPUT CHANNALS
LRI INPUT CHANNALS
SAFE DATA TRANSFERS
INPUT DRUM SYSTEM
CENTRAL COMPUTER PROCESSING EQUIPMENT
OUTPUT DRUM SYSTEM
DISPLAY DRUM SYSTEM
CROSS-TELL OUTPUTS
DIGITAL DATA TRANSMITTER
COMMAND POST
DISPLAY CONSOLES
SAFE DATA TRANSFERS
DATA LINK TRANS.
BOMARC MISSLES