2-24. PROGRAM INPUTS.

2-25. The inputs to the targeting and MSS programs are the predetermined constants, fixed or chosen, and the necessary control cards required to attain successful program operation. Basically there are two types of inputs: static and dynamic.

2-26. STATIC INPUTS.

2-27. The static inputs are insensitive to target-launch site locations and remain the same for all targeting problems computed with a particular program model. The inputs of this type are the constants and parameters that describe the following:

a. Physical Earth Model
b. Standard Atmosphere Model
c. Guidance Logic and Hardware
d. System Parameters
e. Constraint Parameters
f. Miscellaneous Constants

2-28. Subprogram CØMLØD together with its satellite subprogram CTLMB generates the static parameters in the Common Area record on the master program binary tape. The listing of the CØMLØD subprogram contains the actual values of the static parameters which it generates.

2-29. In the following listings of inputs, the Common Area refers to that area reserved in core memory for data storage and communication among subprograms. Common Tag defines the register or registers in the Common Area containing a certain parameter. Dimension defines the number of storage locations in the Common Area assigned to each of the parameters defined by a Common Tag. Symbol defines the algebraic code used for referencing a parameter.

2-30. PHYSICAL EARTH PARAMETERS. Physical earth parameters describe the earth model and include ellipsoidal and gravitational parameters. These parameters are defined in the Common Area as follows:

COMMON TAG	DIMENSION	ITEM	SYMBOL	UNITS
GØMGA	2	Rate of earth rotation	Ω	rad/sec
GRAVA	2	Gravitational parameter	a	feet
GRAVD	2	Gravitational parameter	d	pure no.
GRAVJ	2	Gravitational parameter	J	pure no.
GRAVM	2	Gravitational parameter	GM	ft^3/sec^2
GRAVZ	2	Gravitational parameter	g_o	ft/sec^2
FCGR	2	Conversion constant: mass in slugs to weight at sea level in pounds force (= 32.174)		ft/sec^2

2-31. STANDARD ATMOSPHERE PARAMETERS. Standard atmosphere parameters describe the following:

COMMON TAG	DIMENSION	ITEM	UNITS
GPØLY	2,5	Coefficients of PRSDEN denominator polynomial	pure no.
GPRNC	2,5,6	Coefficients of PRSDEN pressure numerator polynomials	pure no.
GDNNC	2,5,5	Coefficients of PRSDEN density numerator polynomials	pure no.
GPRB	2,6	Altitude band levels for PRSDEN pressure calculations	feet
GDNB	2,6	Altitude band levels for PRSDEN density calculations	feet
GPRM	2	M factor for normalizing altitude in PRSDEN pressure calculations	$feet^{-1}$
GDNM	2	M factor for normalizing altitude in PRSDEN density calculations	$feet^{-1}$
GAMMA	2	Ratio of specific heats standard atmosphere (=1.4)	pure no.

2-32. GUIDANCE LOGIC AND HARDWARE PARAMETERS. Guidance logic parameters are constants used in the equations of the ground guidance simulator subprogram GGDSIM. Guidance hardware parameters describe time intervals and measured units required by the program. These parameters are defined in the Common Area as follows:

COMMON TAG	DIMENSION	ITEM	UNITS
XS	2,160	System constants table used by guidance program	pure no.
RDRUM	330	Guidance computer drum slot addresses and scaling factors to appear on output paper tape	address
LEAVE	1	Phase difference between guidance and simulation intervals (=6)	RPU
GFLRH	2	Guidance radar pulse time unit (= 0.0097603)	seconds
GFHSQ	2	Square of GFLRH (= 9.5263456×10^{-5})	seconds^2
GFRRU	2	Number of feet per radar range unit (= 9.765625×10^{-1})	ft/RRU
GSYNC	2	Time interval between end of last FSIMLC interval and end of current GGDSIM cycle (0.3517465)	seconds
GDRAU	2	Number of degrees per radar angular unit (= 7.6293945×10^{-5})	deg/RAU
GMRAU	2	Number of code wheel angular mils per radar angular unit (= 1.08505×10^{-2})	mils/RAU
GCØDT	2,2	Mean sustainer and vernier cutoff transmission delay times (not including "Whoosh" times)	seconds
UBLUE	24,1	R/V card image for missile 1	Hollerith
UWITE	24,1	R/V card image for missile 2	Hollerith
UYELØ	24,1	R/V card image for missile 3	Hollerith

2-33. SYSTEM PARAMETERS. System parameters include measured constants of the system. These parameters are defined in the Common Area as follows:

COMMON TAG	DIMENSION	ITEM	UNITS
RNMAX	1	Maximum number of tolerable inconsistent machine errors between check points	integer
ITAMP	1	Trajectory, atmosphere, and missile parameters number for target kit	integer
GAIR	2	Altitude above mean sea level of upper limit of atmosphere (= 3.0×10^5)	feet
GMSDX	2	Maximum allowable miss distance of final flight	feet
GAZEZ	2	Time interval after sustainer engine cutoff when A_o and E_o are measured	seconds
GRZRØ	2	Radius of earth used in computing surface range (=2.0902900×10^7)	feet
GDELT	2,3	Length of output intervals of FSIMLC, powered ballistic and re-entry	seconds
ILEVL	3	Number of output intervals per simulation interval powered, ballistic and re-entry	positive integer
LLIX	3	Number of output intervals per integration interval-powered, ballistic and re-entry	positive integer
GTAA	2,10	TAA storage block	seconds, degrees
GKNØT	2	Conversion factor, knots (wind) to feet per second (= 1.6878065)	$\frac{ft/sec}{knot}$

2-34. CONSTRAINT PARAMETERS. Constraint parameters describe specific limits in operation of the system. These parameters are defined in the Common Area as follows:

COMMON TAG	DIMENSION	ITEM	UNITS
GXVBT	2	Maximum allowable deviation of vernier burning time from 50 seconds after sustainer engine cutoff (= 10.1)	seconds
GLFVC	2	Constraint: fuel margin at vernier engine cutoff (420/FCGR = 13.054)	slugs
GLMVL	2	Maximum impact velocity below 4500 feet altitude (= 2500.0)	ft/sec
GLXRA	2	Maximum re-entry angle above local horizontal(=31.0)	degrees
GLNRA	2	Minimum re-entry angle above local horizontal(=11.0)	degrees
GLXRS	2	Maximum re-entry air speed (= 24000.0)	ft/sec
GLNRS	2	Minimum re-entry air speed (=17000.0)	ft/sec
GLQVR	2	Maximum value of qVa between re-entry and detonation	lb/ft-sec
GLTLT	2	Maximum tilt angle delta (=5.25)	degrees
GLQMX	2	Maximum value of dynamic pressure q (=768.0)	lb/ft^2
GLQST	2	Maximum value of q during staging (=22.0)	lb/ft^2
GLQVB	2	Maximum of integral of qVa from liftoff to staging	lb/ft
GLXQA	2	Maximum angle of attack vs dynamic pressure q	deg vs lb/ft^2
GADTL	2	Maximum radar antenna slew rate (= 0.098179)	rad/sec

2-35. MISCELLANEOUS CONSTANTS. Miscellaneous constants are additional constants required for program operation which do not fall directly into one of the previously described classifications. The parameters are defined in the Common Area as follows:

COMMON TAG	DIMENSION	ITEM	UNITS
IPGRM	1	Current program model number (targeting system number)	pure no.
FCØFS	2,11	Coefficients used in arcsine evaluations	pure no.
GK2	2	Constant of subprogram ØFFSET ($r_o V^2 \sin^2 g/GM$) (= 0.59206995)	pure no.
GK3	2	Constant of subprogram ØFFSET ($r_o{}^2 V^4 \sin^3 g \cos g/GM^2$) (= 0.15142828)	pure no.
TRNDM	97	Table of random normal numbers	pure no.
FDT	2	Current integrators derivative of time of flight (= 1.0)	sec/sec
ØFF	1	C(ØFF) sets switches ØFF	Hollerith
ØN	1	C(ØN) sets switches ØN	Hollerith
FDP1	2,2	Double precision 1.0	pure no.
FDP3	2,2	Double precision 3.0	pure no.
FHEPI	2,2	Double precision $\pi/2.0$	pure no.
FPI	2,2	Double precision π	pure no.
F3PI2	2,2	Double precision $3.0\pi/2.0$	pure no.
FINIT	2,2	Largest positive floating point number expressible in memory	pure no.
FRTØD	2	Conversion constant, radians to degrees ($180.0/\pi = 57.295780$)	deg/rad

2-36. DYNAMIC INPUTS.

2-37. The dynamic inputs for the targeting and MSS programs are sensitive to target-launch site locations and vary for different targeting problems computed with a particular program model. These inputs are fed into the system on punched cards and/or magnetic tapes and express the following:

a. Non-standard Meteorological Data (optional)

b. Target Data

c. Ground Guidance Complex Data

d. TITAN I Missile Model

e. Trajectory Selection Criteria

f. Re-entry Vehicle Model Parameters

2-38. The inputs are read in under control of DØCNT. The input section describing each of the functions contains a description of the inputs necessary for operation of that function. For operation of all functions, R/L and M/T tape information and target data is required.

2-39. NON-STANDARD METEOROLOGICAL DATA. The non-standard meteorological data include surface winds and deviations of density and pressure from standard atmosphere. The parameters are defined in the Common Area as follows:

COMMON TAG	DIMENSION	ITEM	UNITS
FLPRS	2,21,1	Pressure deviation - current launch area MET data table	pure no.

COMMON TAG	DIMENSION	ITEM	UNITS
FLDNS	2,21,1	Density deviation - current launch area MET data table	pure no.
FLEST	2,21,1	East wind component - current launch area MET data table	ft/sec
FLNTH	2,21,1	North wind component - current launch area MET data table	ft/sec
FIPRS	2,21,1	Pressure deviations - current detonation area MET data table	pure no.
FIDNS	2,21,1	Density deviation - current detonation area MET data table	pure no.
FINTH	2,21,1	North wind component - current detonation area MET data table	ft/sec
FIEST	2,21,1	East wind component - current detonation area MET data table	ft/sec

2-40. TARGET DATA. The target data for each target are described as follows:

COMMON TAG	DIMENSION	ITEM	UNITS
UTDIN	10,1	Target data inventory number	
IDGZP	10,1	Desired ground zero point	
TOLT	2,10	Geographic latitude of target	
TOLN	2,10	Geographic longitude of target	
TOGS	2,10	Geoidal separation from ellipsoid at target location	feet

COMMON TAG	DIMENSION	ITEM	UNITS
TOAL	2,10	Altitude above mean sea level	feet
TODA	2,10	Detonation altitude above target	feet
TOPU	2,10	Longitude of prearm boundary circle	
TOPL	2,10	Geographic latitude of prearm boundary circle	
TOPD	2,10	Highest latitude of prearm boundary circle	
TOPR	2,10	Maximum longitude of prearm boundary	
FRFSG	2,6,10	Fuzing parameter quantization adjustment factors on aim points	
RBIAS	2,3,10	Horizontal bias vector components	
IDPTG	10,1,1	Duplicate target slot number storage	

2-41. GROUND GUIDANCE COMPLEX DATA. For each set of targeting computations the following data will be required to specify the particular ground guidance complex and missile constants:

COMMON TAG	DIMENSION	ITEM	UNITS
PLWAL	2,1,1	Launch pad altitude above mean sea level	feet
PLWAN	2	Launch pad north component of gravitational anomaly	
PLWAW	2	Launch pad west component of gravitational anomaly	degrees

COMMON TAG	DIMENSION	ITEM	UNITS
PLWR	2	Launch pad reference azimuth	degrees
PLWLN	8	Longitude of launch pad west of Greenwich	degrees
PLWLT	8	Launch pad geodetic latitude	deg, min, sec
PLLØN	2	Geographic longitude of this launch pad	degrees
PLWGS	2	Launch pad geoidal separation	feet
PRWAL	2,1,1	Radar altitude above mean sea level	feet
PRWAN	2,1,1	Radar prime vertical component of gravitational anomaly	degrees
PRWAW	2,1,1	Radar meridian component of gravitational anomaly	degrees
PRWMZ	4,1,1	Radar reference monolith azimuth	degrees
PRWLT	6,1,1	Radar geodetic latitude	deg, min, sec
PRWLN	6	Radar geodetic longitude	deg, min, sec
PRWGS	2,1,1	Radar geodial separation	feet
PRMCW	4,1,1	Radar azimuth code wheel reading	RAU
PRRCN	4,1,1	Radar range calibration number	RRU
XM	2,50	Missile constants table used by guidance program	

2-42. TITAN I MISSILE MODEL PARAMETERS. TITAN I missile parameters describe missile thrust and mass and define values pertinent to the missile. These parameters are defined in the Common Area as follows:

COMMON TAG	DIMENSION	ITEM	UNITS
VPP	2,5,2	Pitch programmer nominal parameters and standard deviation	sec and deg/sec
VGYD	2,3,3	Gyro drift rate standard deviation; pitch, yaw, roll; booster, sustainer, vernier	deg/sec
VIBUL	2,2	Pre-ignition booster usable* LOX, nominal value and standard deviation	slugs
VIBUK	2,2	Pre-ignition booster usable* fuel, nominal value and standard deviation	slugs
VISUL	2,2	Pre-ignition stage II usable* LOX, nominal value and standard deviation	slugs
VISUK	2,2	Pre-ignition stage II usable* fuel, nominal value and standard deviation	slugs
VLBLC	2,2	Ignition to liftoff booster LOX consumption nominal value and standard deviation	slugs
VLBFC	2,2	Ignition to liftoff booster fuel consumption nominal value and standard deviation	slugs
VISLB	2,2	Ignition to liftoff stage II LOX bleed, nominal value and standard deviation	slugs
VLBLD	2,2	Liftoff to stage II ignition stage II LOX bleed rate	slugs/sec

* Usable fuel or LOX is the amount of fuel and LOX above the low-level sensors in the fuel and LOX tanks; non-usable is that amount below the low-level sensors and in the missile plumbing and fuel pumps.

COMMON TAG	DIMENSION	ITEM	UNITS
VIBES	2,2	Pre-ignition booster empty shell plus non-burnable propellant, nominal value and standard deviation	slugs
VISES	2,2	Pre-ignition stage II shell (not including staging rockets or re-entry vehicle), nominal value and standard deviation	slugs
VSRPP	2,2	Staging rockets propellants, nominal value and standard deviation	slugs
VSRCS	2,2	Staging rockets cases, nominal and standard deviation	slugs
VREVM	2,2	Mass of re-entry vehicle plus warhead (not including adapter ring) nominal value	slugs
VBFRT	2,2	Booster fuel flow rate, nominal value and standard deviation	slugs/sec
VBFMR	2,2	Booster LOX/fuel mass mixture ratio nominal value and standard deviation	pure no.
VGBFR	2,2	Stage II gas generator bypass fuel flow rate, nominal value and standard deviation	slugs/sec
VGBFM	2,2	Stage II gas generator bypass LOX/fuel mass mixture ratio, nominal value and standard deviation	pure no.
VGNFR	2,2	Stage II gas generator non-bypass fuel flow rate, nominal value and standard deviation	slugs/sec
VGNFM	2,2	Stage II gas generator non-bypass LOX/fuel mass mixture ratio, nominal value and standard deviation	pure no.

COMMON TAG	DIMENSION	ITEM	UNITS
VSFRT	2,2	Stage II sustainer fuel flow rate, nominal value and standard deviation	slugs/sec
VSFMR	2,2	Stage II sustainer LOX/fuel mass mixture ratio, nominal value and standard deviation	pure no.
VBSLT	2,2	Booster sea level thrust, nominal value and standard deviation	pounds
VBTK1	2,2	Booster thrust coefficient K1 nominal value and standard deviation	$inches^2$
VSBLC	2,2	Sustainer build-up total LOX consumption, nominal value and standard deviation	slugs
VSDFC	2,2	Sustainer decay total fuel consumption, nominal value and standard deviation	slugs
VSDLC	2,2	Sustainer decay total LOX consumption, nominal value and standard deviation	slugs
VSIGN	2,2	Stage II ignition time delay after liftoff, nominal value and standard deviation	seconds
VSSIG	2,2	Sustainer ignition delay time since t_2, nominal value and standard deviation	seconds
VSBTM	2,2	Sustainer thrust build-up effective time, nominal value and standard deviation	seconds
VISBU	8,2	Total impulse of sustainer thrust build-up	ft/sec
VSDTM	2,2	Sustainer thrust decay effective time, nominal value and standard deviation	seconds
VSRDL	2,2	Staging rockets ignition delay time since t_2, nominal value and standard deviation	seconds

COMMON TAG	DIMENSION	ITEM	UNITS
VSRBT	2,2	Total staging rockets burning time, nominal value and standard deviation	seconds
VVDTM	2,2	Vernier thrust decay effective time, nominal value and standard deviation	seconds
VSPTM	2,2	Re-entry vehicle separation delay time, nominal value and standard deviation	seconds
VCØG	2,1,1	Distance of missile center of gravity above launch pad at liftoff	feet
VSVT	2,2	Stage II sustainer vacuum thrust nominal value and standard deviation	pounds
VSTK2	2,2	Sustainer thrust coefficient K2 nominal value and standard deviation	$inches^2$
FPN	2	Nominal sea level atmospheric pressure used in thrust model (=14.6958)	lb/in^2
VBDIM	2,2	Booster thrust decay normalized integral, nominal value and standard deviation	pure no.
VBSSD	2,2	Separation bolts firing delay time since t_2, nominal value and standard deviation	seconds
VSRNT	2,2	Staging rocket total vacuum thrust, nominal value and standard deviation	pounds
VGBNT	2,2	Stage II gas generator bypass vacuum thrust, nominal value and standard deviation	pounds
VGNNT	2,2	Stage II gas generator nonbypass vacuum thrust, nominal value and standard deviation	pounds

COMMON TAG	DIMENSION	ITEM	UNITS
VSPMP	2,2	Velocity impulse imparted to re-entry vehicle at separation, nominal value and standard deviation	ft/sec
VBDFC	2,2	Booster decay total fuel consumption, nominal value and standard deviation	slugs
VBDLC	2,2	Booster decay total LOX consumption, nominal value and standard deviation	slugs
VSBFC	2,2	Sustainer build-up total fuel consumption, nominal value and standard deviation	slugs
VLGA	2,3	Sine of maximum gimbal angles during booster, sustainer, and vernier stages	pure no.
VCRØS	2,3	Effective cross section area entire missile, stage I and stage II	$feet^2$
VCMT	2,3	Center of motor thrust, booster, sustainer, and vernier engines	feet
VTCAB	2,25,1	C_A vs mach number table, entire missile ensemble	pure no.
VTCAS	2,7	C_A vs mach number table, stage II missile ensemble	pure no.
VTCNB	2,25,1	C_N vs mach number table, entire missile ensemble	pure no.
VTCNS	2,25,1	C_N vs mach number table, stage II missile ensemble	pure no.
VTCPB	2,79	Center of pressure table vs mach number and angle of attack α, entire missile	feet
VTCPS	2,17	Center of pressure table vs mach number alone, stage II missile ensemble	feet

COMMON TAG	DIMENSION	ITEM	UNITS
VTCGB	2,21,1	Center of gravity table vs weight, entire missile ensemble	feet
VTCGS	2,21,1	Center of gravity table vs weight, stage II missile ensemble	feet
VNRTB	2,21,1	Pitch, yaw moment of inertia table vs weight, entire missile ensemble	$\frac{\text{slug-ft}^2}{\text{radians}}$
VNRTS	2,21,1	Pitch, yaw moment of inertia table vs weight, stage II missile ensemble	$\frac{\text{slug-ft}^2}{\text{radians}}$

2-43. TRAJECTORY SELECTION CRITERIA PARAMETERS. These parameters describe the optimum trajectories defined by the delta matrices as follows:

COMMON TAG	DIMENSION	ITEM	UNITS
RANGE	13,4	Inertial range table vs azimuth and range entries	degrees
TMFLT	13,4	Total time of flight table vs azimuth and range entries	seconds
GKICK	13,4	Kick angle vs azimuth and range entries	degrees
AZERØ	13,4	A_o vs azimuth and range entries	degrees
EZERØ	13,4	E_o vs azimuth and range entries	degrees
RNGLE	13,4	Re-entry angle vs azimuth and range entries	degrees
TLZTH	13	Azimuth values vs azimuth entries	degrees
INAZM	1	Number of azimuth entries in TLZTH table	integer
INRNG	1	Number of range entries	integer

2-44. RE-ENTRY VEHICLE MODEL PARAMETERS. Re-entry vehicle parameters are used in calculations of missile drag and the fuzing parameter. These parameters are defined in the Common Area as follows:

COMMON TAG	DIMENSION	ITEM	UNITS
FKLMD	2,20,1	K_1, λ_{ij}, V_{ref}, γ_{ref} coefficients for re-entry vehicle drag calculations	pure no.
FRCDR	2,61	C_D vs mach number table for re-entry vehicle calculations	pure no.
FRDCD	2,41	ΔC_D vs altitude table for re-entry vehicle drag calculations	pure no.
FRCDP	2,41	C_D' altitude table for re-entry vehicle drag calculations	pure no.
FRCDD	2,31	C_D'' vs altitude table for re-entry vehicle drag calculations	pure no.
VABAR	2	Effective cross section area of re-entry vehicle for re-entry vehicle drag calculations	feet^2
VMBAR	2	Effective mass of re-entry vehicle for re-entry vehicle drag calculations	slugs
GTAUC	2,11,1	C_{ij}, V_{ref}, γ_{ref} coefficients for determining fuzing parameter	pure no.

2-45. PROGRAM CONTROLS.

2-46. To provide for the possibility of computational error or machine malfunction, certain controls are provided in the subprograms which perform the targeting and MSS functions. These controls are incorporated by means of subprograms whose sole function is to verify computations or re-establish program entry points to reprocess information which was not correctly computed.

2-47. The program design provides certain automatic checking features at specific points where previously computed values are verified. The following paragraphs discuss the reliability and tolerance of computed values and the special features which will cause recomputations when an error has been detected.

2-48. RELIABILITY.

2-49. For reliability purposes, redundancy is incorporated into most of the subprograms by duplexing computations. The dual computations are performed in parallel, unless otherwise specified under the individual subprogram descriptions.

2-50. Certain operations are performed in the simplexed mode. These operations do not perform complex mathematical computations and are usually of a routine utility nature.

2-51. TOLERANCE.

2-52. The results of duplexed computations are compared at certain stages throughout the program. If the results of the duplexed computations compare within a specified tolerance, the values compared are set equal.

2-53. Whenever a subroutine successfully completes its operation, a computation tally register tagged CUTIE is stepped by one. If the duplexed values of a computation do not agree to within a specified tolerance, a subprogram identification integer is stored in a register tagged IFLAG.

2-54. ROLLBACK CONTROL.

2-55. Whenever a computational error occurs, subprogram RLLBCK is entered. RLLBCK causes the successful computation tally (CUTIE), and the identification integer of the subprogram in which the error occurred (IFLAG), to be stored and compared with previously stored settings. If program continuation is possible, RLLBCK causes re-establishment of core as it was at the last check point and enables the program to continue at the first instruction after the last check point. A check point is a location in the program established by subprogram CKPTCK at which all previous computations were performed successfully and the Common Area was written on a tape.

2-56. SUBPROGRAMS.

2-57. The descriptions of subprograms are arranged according to their classification. The classification and the descriptive format used are discussed in the following paragraphs.

2-58. CLASSIFICATION.

2-59. Subprograms are classified according to their core allocations. The classifications are defined as follows:

a. Loader Subprograms. Loader subprograms load the targeting and MSS programs into core.

b. Hardcore Subprograms. Hardcore subprograms perform utility read, write, and print functions.

c. A Subprograms. A subprograms remain in core at all times. These subprograms execute the more commonly required functions.

d. B1 Subprograms. B1 subprograms are of a control nature or perform computations other than those during missile flight simulations.

e. B2 Subprograms. B2 subprograms perform input card and SENSE switch interpretations.

f. B3 Subprograms. B3 subprograms are specifically concerned with the Offset Target Computation function.

g. B4 Subprograms. B4 subprograms generate the output target kit.

h. B5 Subprograms. B5 subprograms are the enter and control programs of the Target Accessibility Area Determination function.

i. B6 Subprograms. B6 subprograms are concerned with card correction, data modification, and M/T tape generation.

j. B7 Subprograms. B7 subprograms perform the Range Safety Data Extraction function.

k. B8 Subprograms. B8 subprograms perform simulation control functions.

l. B9 Subprograms. B9 subprograms generate or update the R/L tape.

m. B10 Subprograms. B10 subprograms generate the binary input tape to the TTP.

n. C1 Subprograms. C1 subprograms are required during non-powered portions of missile flight simulations.

o. C2 Subprograms. C2 subprograms are the radar data and ground guidance simulator subprograms.

p. Manufacturing Subprograms. The programs of this section generate the Common Area. Also included are utility subprograms which are used independently of the targeting and MSS functions.

2-60. DESCRIPTIVE FORMAT.

2-61. The individual subprograms which are used to perform the targeting and MSS functions are described in five parts according to the format shown in the following paragraph. The descriptions conform to this format wherever possible and begin on right-hand pages to facilitate removals and insertions.

2-62. TITLE AND FUNCTION. The first part of each subprogram description states the FORTRAN or FAP name to which the subprogram is referred and describes the function it performs.

a. Inputs. Inputs are defined as all data which must be available for the subprogram to execute its function. The inputs to a subprogram will be given as arguments in the statement used in referring to it, or as values stored in the Common Area by a previous computation or logical decision.

b. Outputs. Outputs are all data generated by the subprogram in executing its function. The outputs may include statements which are printed and/or written. Printing is done on the on-line printer and writing is done on output tape A7.

c. Program Logic. The program logic describes the method by which the program performs its function. Computations are performed in duplex unless otherwise specified. The program logic describes each method of computing duplexed output values. The program logic is supplemented by a flow diagram to illustrate the step flow of operation whenever the program contains a conditional branch. When a flow diagram is used, the paragraph headings in the program logic section will refer to the program identification.

d. Expressions. In many cases the functions of a subprogram are the evaluation of a particular mathematical expression. Whenever this condition exists, the program logic refers to the expression using an index number. The expression will then be given in the paragraph headed Expressions, with reference to the index number.

2-33. LOADER SUBPROGRAMS.

2-34. The subprograms described in this area load the targeting and MSS subprograms into core from tape for TTP execution. The subprograms are as follows:

a.	CØNTL	U35	Loader Control
b.	U32	U32	Two Card Absolute Binary Loader
c.	U33	U33	Bootstrap-Self Loader
d.	U51	U51	Octal Correction Processor
e.	U52	U52	Relocatable Binary Loader

2-6[illegible]. SUBPROGRAM U35 (CØNTL). CØNTL initializes the registers ØN and ØFF for use in the setting of simulated SENSE switches and controls U52, the Binary Card Loader. The FAP reference instruction is TSX U35, 4.

a. Inputs. No inputs are defined since the function of this subprogram is control.

b. Outputs. The outputs are the following statements printed and written:

a. HOLLERITH CARD USE INCORRECT.

b. OCTAL CORRECTION CARD STORAGE ERROR.

c. HOLLERITH CARD READER ERROR.

d. RETURN FROM LOADER WITH AN END OF FILE.

e. RETURN FROM LOADER WITH AN ERROR.

The card image area CDIO-CDI11 is also available for printing.

c. Program Logic. FD U35

(1) Steps 1-5. Registers ØN and ØFF are set for use in setting simulated sense switches. U08 output mode indicator SW(120) is set ØFF. U52 loads the binary cards. The contents of index register 4, which is the main program entry address from U52, are saved.

(2) Steps 6-8. If there is an end-of-file from U52, control is transferred to step 42. If SW(70) is ØN, an error has occurred in U52 and control is transferred to

step 44. If there was no error or end-of-file all the SENSE lights are turned OFF.

(3) Steps 9-10. The card image area, CDIO-CDI13, is initialized to zero. U20 reads a Hollerith card into this area.

(4) Steps 11-17. If SW(70) is ØN, an error has occurred in U20 and control is transferred to step 39. If the Remarks card was read in, control is transferred to step 23; if an Octal Correction card, to step 25; if an End card, to step 32; if a Transfer card, to step 36. If none of the above conditions exists, the calling sequence for U08 is initialized to print statement a. Step 21 is modified to continue at step 22.

(5) Steps 18-20. U08 writes statement a. SW(120) is set ØN and U08 prints statement a. SW(120) is set ØFF for the next delayed print.

(6) Step 21. This step is modified to continue at steps 22, 9, 27, 31, 34, 38, or 41.

(7) Step 22. The subprogram halts for manual intervention. If the subprogram is to continue, control is transferred to step 9.

(8) Steps 23-24. The calling sequence for U08 is initialized to print the contents of the Remarks card in CDIO-CDI11. Step 21 is modified to continue at step 9 and

control is transferred to step 18.

(9) Steps 25-26. The calling sequence for U08 is initialized to print the contents of the Octal Correction card in CDI0-CDI11. Step 21 is modified to continue at step 27 and control is transferred to step 18.

(10) Steps 27-30. U51 places the octal correction in core. SW(70) is interrogated to determine if an error has occurred in U51. If ØN, the calling sequence for U08 is initialized to print output statement b. If ØFF, control is transferred to step 9. Step 21 is modified to continue at step 31 and control is transferred to step 18.

(11) Step 31. The subprogram halts for manual intervention. If the subprogram is to continue, control is transferred to step 9.

(12) Steps 32-33. The calling sequence for U08 is initialized to print the contents of the End card in CDI1-CDI2. Step 21 is modified to continue at step 34 and control is transferred to step 18.

(13) Steps 34-35. The contents of index register 4 are stored for entry to U52. U52 continues the binary load.

(14) Steps 36-37. The calling sequence for U08 is initialized to print the contents of the Transfer card in CDI1-CDI2. Step 21 is modified to continue at step 38 and

control is transferred to step 18.

(15) Step 38. The subprogram exits to the main program CØMLØD to begin operation.

(16) Steps 39-40. The calling sequence for U08 is initialized to print statement c. Step 21 is modified to continue at step 41 and control is transferred to step 18.

(17) Step 41. The subprogram halts for manual intervention. If the subprogram is to continue, control is transferred to step 9.

(18) Steps 42-43. The calling sequence for U08 is initialized to print statement d. Step 21 is modified to continue at step 34 and control is transferred to step 18.

(19) Steps 44-45. The calling sequence for U08 is initialized to print statement e. Step 21 is modified to continue at step 34 and control is transferred to step 18.

2-64. SUBPROGRAM U32 (U32). U32 loads absolute column binary cards from tape B10. It loads U52, U08, and U04 into core for tape generation.

a. Inputs. No inputs are defined.

b. Outputs. No outputs are defined.

c. Program Logic. FD U32

(1) Steps 1-2. The subprogram loads the two card binary loader and begins execution. The end-of-file and redundancy tape test indicators, channel B, are set ØFF.

(2) Step 3. Index register 1 is initialized to read a record seven times.

(3) Steps 4-12. The first (next) binary card is read as the first (next) record on tape B10. If the end-of-file indicator is ØN, the subprogram continues at step 19. If the end-of-file indicator is ØFF and the redundancy indicator is ØN, the record is backspaced; and, if the record has not been read seven times, the subprogram continues at step 4. Otherwise the program halts for manual intervention. If the redundancy indicator is ØFF the first word is picked up and the word count is saved. If the word count is less than or equal to zero the subprogram branches to exit. Otherwise the subprogram continues at step 13.

(4) Steps 13-18. The card words are set to the proper

core registers and the card checksum is computed. If all the words have not been read from the card the subprogram continues at step 13. If all words have been read and the card checksum is zero the subprogram continues at step 3. If the card checksum is not equal to zero, the card checksum is compared with the computed checksum. If both checksums agree, the subprogram continues at step 3. Otherwise the ignore bit of the first word is tested. If the bit was punched, the checksum is ignored and the subprogram continues at step 3. Otherwise the subprogram continues at step 19.

(5) Step 19-20. If the subprogram is to continue, it continues at step 3. Otherwise the subprogram halts for manual intervention.

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