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1965-36

Haystack Pointing System:
Satellite

A. A. Mathiasen
J. D. Drinan
Editors

9 September 1965

Prepared under Electronic Systems Division Contract AF 19(628)-5167 by

Lincoln Laboratory

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Lexington, Massachusetts



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MASSACHUSETTS INSTITUTE OF TECHNOLOGY
LINCOLN LABORATORY

HAYSTACK POINTING SYSTEM: SATELLITE

A. A. MATHIASSEN

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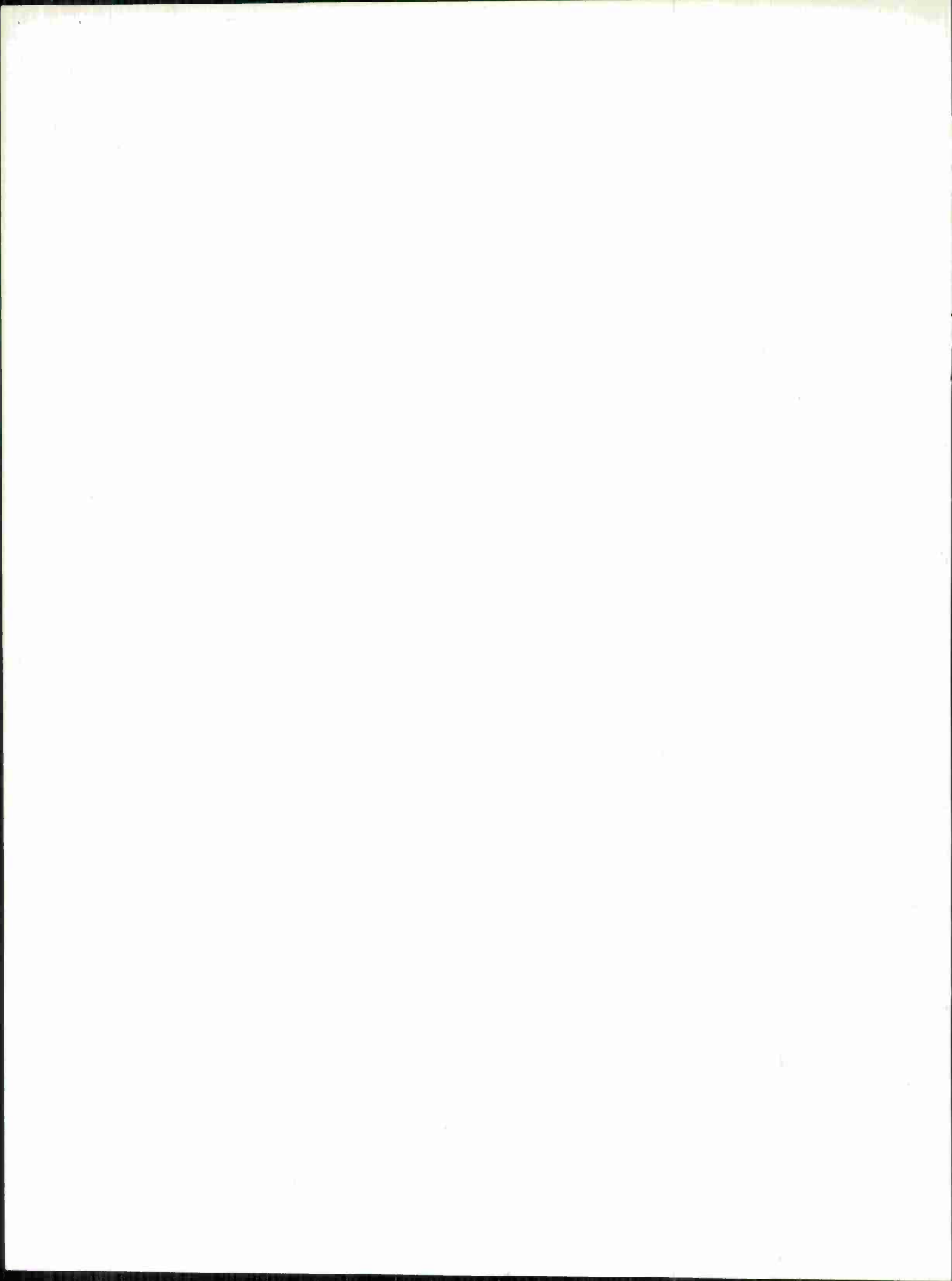
Group 62

TECHNICAL NOTE 1965-36

9 SEPTEMBER 1965

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MASSACHUSETTS



ABSTRACT

As one of its options, the Haystack pointing system can track satellites. Given mean orbital parameters of the type used by the Smithsonian Astrophysical Observatory, the Satellite program obtains osculating elements where the perturbations are caused by the ellipsoidal shape of the earth. From these elements, the program computes celestial coordinates and their rates of change which are used by other programs in the pointing system to provide antenna pointing angles, range, and doppler.

Accepted for the Air Force
Stanley J. Wisniewski
Lt Colonel, USAF
Chief, Lincoln Laboratory Office

PREFACE

This document was written by C. W. Adams Associates, 575 Technology Square, Cambridge, Massachusetts, under subcontract to Group 62 of Lincoln Laboratory, as part of a programming effort on the Haystack Pointing System.

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I. INTRODUCTION

The Satellite Celestial Computation Program (SATEL) was developed for the UNIVAC 490 used as part of the pointing system for the Haystack radar antenna operated by Lincoln Laboratory. Written in SPURT assembly language, this program calculates pointing information in celestial coordinates for a selected path of an earth satellite. Basically, it performs the calculations necessary to convert mean orbital elements valid as of a certain day to instantaneous (osculating) elements valid as of the time of computation; from these it then determines celestial coordinates and their first time derivatives for the object in orbit.

SATEL is divided into two main sections: an initialization and a working section. When the initialization section is entered with L(SYSTAT1) set to -0, the operator types in the requested parameters on the on-line typewriter; when entered with L(SYSTAT1) set to +0, the operator may examine the previous input values and, optionally, change or use them again. When the initialization section is entered with L(KYBRDLEVEL) not set to +0, no new input values may be entered and the program continues with the previous input values updated to the present time.

The initialization section is entered only once during initialization, but it may be re-entered an indefinite number of times for reinitialization purposes. When the working section is entered, a calculation is made for the right ascension, declination, range, and their derivatives as well as the sine and cosine of the orientation angle for the time contained in W(CELTIME). All subroutines save and restore all registers with the exception of B7.

Errors will fall into two general classifications: arithmetic or geometric, or invalid data. If an error occurs, control will be transferred to the location following the return jump to SATEL and the probable location of the error will be left in a word in core. A normal exit will transfer control to two locations after the return jump.

II. PROGRAM SPECIFICATIONS

Calling Sequence

RJP H(SATEL) (H = L if initialization or reinitial-
 Error return ization; H = U if normal operational
 Normal return entry for computation of a point set)

Input (by on-line typewriter).

<u>Label</u>	<u>Description</u>	<u>Unit</u>	<u>Range</u>
RA_n^*	right ascension of ascending node, Ω	deg	$-360^\circ \leq \Omega \leq +360^\circ$
W_n	argument of perigee, ω	deg	$-360^\circ \leq \omega \leq +360^\circ$
I_n	inclination, i	deg	$0 \leq i \leq 180^\circ$
E_n	eccentricity, e		$0 < e < 1$
M_n	mean anomaly, M	rev	$0 \leq M_0 \leq 1$ $\sim .25 < M_{1-5} < \sim 17^{**}$
EPOCH YEAR MONTH DAY	xxxx = year (e.g. 1965) (1-12)xx = month (e.g. 11) (0.000-31.999) day and decimal portion of day		
EQUINOX	1950 or present date		
MODE	track or jump		
JUMP INTERVAL	(if jump option chosen)	sec	

* $n = 0, \dots, 5$

**Limits derived from fact that limit on calculated semi-major axis, a is $1 < a < 16$.

Output (common storage)

<u>Label</u>	<u>Description</u>	<u>Units and Scaling</u>
RA	right ascension, α	revolutions B27
DEC	declination, δ	revolutions B27
SINORIENT	sine of orientation angle, $\sin\beta$	B29
COSORIENT	cosine of orientation angle, $\cos\beta$	B29
RADIUS	radius from center of earth to satellite, ρ	earth radii B22
DECDOT	time derivative of DEC, $d\delta/dt$	radians/sec B37
RADOT	time derivative of RA, $(d\alpha/dt) \cos\delta$	radians/sec B37
RADIUSDOT	time derivative of radius, $d\rho/dt$	nautical miles/ sec B24

Storage Areas Read

L(SYSTAT1)	+0 if reinitialization -0 if initialization	
W(CELTIME)	time of computation	days B28
L(KYBRDLEVEL)	$\neq + 0$ if previous input to be used	
W(FRAMESIZE)		sec B0
W(TIMEMODE)	+0 if realtime run -0 if simulation run	

Error Conditions

All errors exit to the system error return. The address of the location where the error occurred is left in the Q-register and L(ERRINST).

+0 indicates a calculation error.

Limitations on Present System

e must not = 0.

Declination (DEC) must not = 90° or 270° .

Reinitialization

KYBRDLEVEL $\neq$ +0, previous input is updated to zero hours of the present day, month and year.

KYBRDLEVEL = +0, SYSTAT1 = +0, new data may be entered.

III. SUBROUTINE DESCRIPTIONS

SATINIT

Function

Driver for initialization section of SATEL.

Calling Sequence

RJP SATINIT
Normal return

Input

None.

Output

None.

Subroutines Used

DATAIN, UPCALC, BLASTCONV, INCONVER, TCONVERT

Storage Areas Read

DMODE

Storage Areas Written

None.

Error Conditions

None.

DATAIN

Function

To request if necessary, via the console typewriter, and store as floating-point numbers the input parameters for SATEL.

Calling Sequence

RJP DATAIN
Normal return

Input

See input described in Section II. There must be at least one input parameter in each group with the exception of M_n which must have two, i.e., minimum input is: e_0 , i_0 , ω_0 , Ω_0 , M_0 , M_1 , t_0 (where $M_1 = n$, the mean motion and t_0 is the epoch).

Output

The original input parameters in their appropriate storage areas (see below) expressed as floating-point numbers.

Subroutines Used

INTERCOM

Storage Areas Read

DATALOC, SYSTAT1, KYBRDLEVEL

Storage Areas Written

TMZERO,...,TMFIVE
TEZERO,...,TEFIVE
TIZEROX,...,TIFIVE
TWZERO,...,TWFIVE
TRAMZERO,...,TRAMFIVE
RAMCNT,WCNT,ICNT,ECNT,MCNT,TJMPDELT,DMODE,
VDAY,VMONTH,VYEAR

Error Conditions

Errors made in entering the input are conditions recognized by a printout on the console typewriter and may be corrected by re-entering correct input.

UPCALC

Function

When the specified epoch time of the input parameters differs from the starting time of program, to update the input parameters to zero hours of the day of the starting time of the program.

Calling Sequence

RJP UPCALC
Normal return

Input

Epoch day, epoch month, epoch year, actual day, actual month, actual year, and parameter groups.

Output

Updated parameters in "Storage Areas Written" expressed as floating-point numbers.

Subroutines Used

FF (calls floating-point package)

Storage Areas Read

VDAY, VMONTH, VYEAR, YEARMONTH, DAY

Storage Areas Written

MZERO,...,MFOUR
EZERO,...,EFOUR
IZEROX,...,IFOUR
WZERO,...,WFOUR
RAMZERO,...,RAMFOUR

Method

The updated parameters for each group are found by means of the following equations:

$$X_0(\text{new}) = X_0 + X_1(t-t_0) + X_2(t-t_0)^2 + \dots + X_5(t-t_0)^5$$

$X_1(\text{new}) \dots X_5(\text{new})$ are found by taking successive derivatives of $X_0(\text{new})$. Each new parameter in a group is then divided by its appropriate factorial, i.e., $\frac{X_0}{0!}, \frac{X_1}{1!}, \frac{X_2}{2!}, \frac{X_3}{3!}, \frac{X_4}{4!}, \frac{X_5}{5!}$, to complete the updating process.

Error Conditions

None.

BLASTCONV

Function

To convert the time of computation from parts of a day to seconds. All conversions are done in floating-point formats.

Calling Sequence

RJP BLASTCONV
Normal return

Input

Time of computation (parts of a day, binary pt.28).

Output

Time of computation (sec., floating pt.).

Subroutines Used

FF (calls floating-point package)

Storage Areas Read

CELTIME

Storage Areas Written

TINIT

Error Conditions

None.

INCONVER

Function

To convert to their proper computational units the input parameters Ω_n , ω_n , i_n , e_n , and M_n , (e.g. Ω_n is converted from degrees/dayⁿ to radians/secⁿ).

Calling Sequence

RJP INCONVER
Normal return

Input

Input parameters in floating-point in "Storage Areas Read", and a constant which converts from degrees to radians.

Output

Converted parameters in floating-point in "Storage Areas Read."

Storage Areas Read

MZERO,...,MFIVE
EZERO,...,EFIVE
IZEROX,...,IFIVE
WZERO,...,WFIVE
RAMZERO,...,RAMFIVE
CONVERCON

Storage Areas Written

(Same as "Storage Areas Read") SECCNT

Method

Each successive higher-order parameter of a group has the form,

$$X_n/\text{day}^n \quad n = 0, \dots, 5$$

and is converted accordingly to

$$\frac{X_n \begin{Bmatrix} \text{radians} \\ \text{or rev} \end{Bmatrix}}{\text{sec}^n}$$

In order to obtain greater accuracy in further calculations, before the mean anomaly is converted to its proper computational units, its integer portion is dropped to allow for more significant digits in its fractional portion.

Error Conditions

None.

TCONVERT

Function

To convert the present date to its Julian equivalent.

Calling Sequence

RJP TCONVERT
Normal return

Input

The present year, and day of year.

Output

The Julian equivalent of the present date.

Subroutines Used

FF, FLTPT

Storage Areas Read

YEARMONTH, DAY

Storage Areas Written

DATE

Error Conditions

None.

MCALC

Function

To calculate at a given time, values for the functions $M(t)$, $e(t)$, $i(t)$, $\omega(t)$, $\Omega(t)$, $n(t)$, $\dot{\omega}(t)$, $\dot{\Omega}(t)$, $a(t)$, $\partial u(t)$, $\partial \rho(t)$, $\partial \Omega(t)$, $\partial i(t)$.

Calling Sequence

RJP MCALC
Error return
Normal return

Input

Mean anomaly, M , eccentricity, e , inclination, i , argument of perigee, ω , and right ascension of ascending node, Ω , in floating-point.

Time of computation, t .

Julian date (integer).

Counts for the number of parameters in each group.

Constants: $GM = 1.53618 \times 10^{-6}$ earth radii³/sec²
 $A_2 = 1.62354 \times 10^{-3}$ earth radii².

Output

Fixed-point values for the functions: mean anomaly, $M(t)$; eccentricity, $e(t)$; inclination, $i(t)$; argument of perigee, $\omega(t)$; right ascension of ascending node, $\Omega(t)$; mean motion, $n(t)$; first derivatives of $\omega(t)$ and $\Omega(t)$; semi-major axis, $a(t)$; increment to argument of latitude, $\partial u(t)$; increment to radius, $\partial \rho(t)$; increment to inclination, $\partial i(t)$; increment to right ascension of ascending node, $\partial \Omega(t)$.

<u>Variable</u>	<u>Units</u>	<u>Binary Point</u>	<u>Range</u>
$M(t)$	radians	26	$ M < 2\pi$
$e(t)$	radians	29	$0 < e < 1$

<u>Variable</u>	<u>Units</u>	<u>Binary Point</u>	<u>Range</u>
$\dot{z}(t)$	radians	26	$ \dot{z} < 2\pi$
$\dot{\omega}(t)$	radians	26	$ \dot{\omega} < 2\pi$
$\dot{\Omega}(t)$	radians	26	$ \dot{\Omega} < 2\pi$
$n(t)$	radians/sec	32	
$\dot{\omega}(t)$	radians/sec	41	
$\dot{\Omega}(t)$	radians/sec	41	
$a(t)$	earth radii	25	$0 < a < 16$
$\partial u(t)$	radians	26	$ \partial u < 2\pi$
$\partial \rho(t)$	earth radii	25	
$\partial \Omega(t)$	radians	26	
$\partial \dot{z}(t)$	radians	25	

Subroutines Used

CBROOT, COSX, SINX, SOVERFLOW, SERROR, ROUND, SADD, SSUB, SINII, PREDICTE, SINVV, SQRT, ATANX, ASINX, FF, FLTPT, MCALCAL, MCALMOD

Storage Areas Read

MZERO-RAMFIVE: contains input parameters

$M_0 \dots M_5, e_0 \dots e_5, \dot{z}_0 \dots \dot{z}_5,$

$\dot{\Omega}_0 \dots \dot{\Omega}_5, \omega_0 \dots \omega_5$

MTIME

WCNT-MCNT: Count of number of parameters of each type

Storage Areas Written

MM, EE, II, ZOMEGA, RAM, NN, DEROMEG, DERRAM, AA, DELTL, DELTR, DELTRAM, DELTI, VV, PP, EILAST, VVSIN, VVCOS, IISIN, IICOS.

Method

$$M(t) = M_0 + M_1(t-t_0) + M_2(t-t_0)^2 + \dots + M_5(t-t_0)^5 - \text{mean anomaly}$$

$$e(t) = e_0 + e_1(t-t_0) + e_2(t-t_0)^2 + \dots + e_5(t-t_0)^5 - \text{eccentricity}$$

$$i(t) = i_0 + i_1(t-t_0) + i_2(t-t_0)^2 + \dots + i_5(t-t_0)^5 - \text{inclination}$$

$$\omega(t) = \omega_0 + \omega_1(t-t_0) + \omega_2(t-t_0)^2 + \dots + \omega_5(t-t_0)^5 - \text{argument of perigee}$$

$$\Omega(t) = \Omega_0 + \Omega_1(t-t_0) + \Omega_2(t-t_0)^2 + \dots + \Omega_5(t-t_0)^5 - \text{right ascension of the ascending node}$$

$$n(t) = \dot{M}(t) = M_1 + 2M_2(t-t_0) + \dots + 5M_5(t-t_0)^4$$

$$\dot{\omega}(t) = \omega_1 + 2\omega_2(t-t_0) + \dots + 5\omega_5(t-t_0)^4$$

$$\dot{\Omega}(t) = \Omega_1 + 2\Omega_2(t-t_0) + \dots + 5\Omega_5(t-t_0)^4$$

$$a(t) = \left[\frac{GM}{n^2} \right]^{\frac{1}{3}} \left[1 - \frac{1}{3} \frac{A_2}{p^2} \left(1 - \frac{3}{2} \sin^2 i \right) \sqrt{1 - e^2} \right]$$

$$\begin{aligned} \partial u(t) = \frac{A_2}{p^2} & \left[\left(2 - \frac{5}{2} \sin^2 i \right) (v - M + e \sin v) + \right. \\ & \left(1 - \frac{3}{2} \sin^2 i \right) \left\{ \frac{2}{3e} \left(1 - \frac{e^2}{2} - \sqrt{1 - e^2} \right) \sin v + \right. \\ & \left. \frac{1}{6} (1 - \sqrt{1 - e^2}) \sin 2v \right\} - \left(\frac{1}{2} - \frac{5}{6} \sin^2 i \right) e \sin(v + 2\omega) - \\ & \left. \left(\frac{1}{2} - \frac{7}{12} \sin^2 i \right) \sin 2(v + \omega) - \frac{e}{6} \cos^2 i \sin(3v + 2\omega) \right] \end{aligned}$$

$$\partial r(t) = \frac{1}{3} \frac{A_2}{p} (1 - \frac{3}{2} \sin^2 i) \left[-1 - \frac{1}{e} (1 - \sqrt{1 - e^2}) \cos v + \right. \\ \left. \frac{r}{a} \frac{1}{\sqrt{1 - e^2}} \right] + \frac{1}{6} \frac{A_2}{p} \sin^2 i \cos 2(v + \omega)$$

$$\partial \Omega(t) = - \frac{A_2}{p^2} \cos i \left[v - M + e \sin v - \frac{1}{2} \sin 2(v + \omega) - \right. \\ \left. \frac{e}{2} \sin (v + 2\omega) - \frac{e}{6} \sin (3v + 2\omega) \right]$$

$$\partial i(t) = \frac{1}{4} \frac{A_2}{p^2} \sin 2i \left[\cos 2(v + \omega) + e \cos (v + 2\omega) + \right. \\ \left. \frac{e}{3} \cos (3v + 2\omega) \right]$$

$$P = \left[\frac{GM}{n^2} \right]^{\frac{1}{3}} (1 - e^2) - \text{semi-latus rectum}$$

$$V = \sin^{-1} \left[\frac{\sqrt{1 - e^2} \sin E}{1 - e \cos E} \right] - \text{true anomaly}$$

E = Eccentric anomaly

t₀ = updated epoch (zero hours of actual day)

Error Conditions

Overflow during arithmetic operations or an error in geometric operations. Both types of errors must be remedied before the calculation may be continued.

PREDICTE

Function

To calculate the eccentric anomaly by an iterative method.

Calling Sequence

RJP PREDICTE
Normal return

Input

Mean anomaly, (binary point 26),
eccentricity, (binary point 29)

Output

1. Predicted value of eccentric anomaly (binary point 26).
2. Value of eccentric anomaly used in further calculations after a comparison of predicted value and actual calculated value (binary point 26). (E1LAST contains current value being used - E2LAST contains last value used.)

Subroutine Used

SINX

Storage Areas Read

MM, EE

Storage Areas Written

E1LAST, E2LAST, EGVAL

Method

The first and second times through the routine a value of eccentric anomaly E is predicted from the following equation:

$$(1) \quad E(t) = M + \left(e - \frac{e^3}{8}\right) \sin M + \frac{1}{2}e^2 \sin 2M + \frac{3}{8}e^3 \sin 3M$$

After the second time through the routine a value of E is predicted from the equation:

$$(2) \quad E(t) = 2E(t-\delta t) - E(t-2\delta t)$$

Then the exact value of E is calculated from the equation:

$$(3) \quad M_n = E_n - e \sin E_n, \quad \Delta E_n = \frac{M - M_n}{1 - e \cos E_n}, \quad E_{n+1} = E_n + \Delta E_n$$

By iteration a ΔE is found which is less than ϵ .

Error Conditions

Geometric and arithmetic errors only.

MCALMOD

Function

To make modulo 2π and measure in a positive direction the angles, $M(t)$, $i(t)$, $\omega(t)$, $\Omega(t)$ and to convert to fixed point and store $M(t)$, $e(t)$, $i(t)$, $\omega(t)$, $\Omega(t)$.

Calling Sequence

RJP MCALMOD
Normal return

Input

Mean anomaly, $M(t)$; eccentricity, $e(t)$; inclination, $i(t)$; argument of perigee, $\omega(t)$; right ascension of ascending node $\Omega(t)$. All quantities are in floating-point format.

Output

$M(t)$, $e(t)$, $i(t)$, $\omega(t)$, $\Omega(t)$, in fixed-point, as described in MCALC output.

Subroutines Used

FF, MOD2PI

Storage Areas Read

MCALSUM

Storage Areas Written

MM (table)

Error Conditions

Errors from floating-point package.

MCALCAL

Function

To do the actual evaluation of the equations described in MCALC for $M(t)$, $e(t)$, $i(t)$, $\omega(t)$, $\Omega(t)$.

Calling Sequence

RJP MCALCAL
Normal return

Input

Time of computation, t ; right ascension of ascending node, Ω_n ; argument of perigee, ω_n ; inclination, i_n ; eccentricity, e_n ; mean anomaly, M_n ($MZERO-RAMFIVE=M_1, \dots, \Omega_5$). Also input n are counts for number of parameters in each group.

Output

$M(t)$, $e(t)$, $i(t)$, $\omega(t)$, $\Omega(t)$ in floating-point format, evaluated at the time of computation.

Subroutines Used

FF (calls floating-point package)

Storage Areas Read

MZERO...MFIVE	MCNT,
EZERO...EFIVE	ECNT,
IZEROX...IFIVE	ICNT,
WZERO...WFIVE	WCNT,
RAMZERO...RAMFIVE	RAMCNT

Storage Areas Written

MCALSUM

Error Conditions

Errors in floating-point package calculations.

SATWORK

Function

Driver for working section of SATEL.

Calling Sequence

RJP SATWORK
Error return
Normal return

Input

Time of computation, framesize, type of run: realtime or simulation.

Output

Constant used in calculating jump interval if jump option called, and time of computation.

Subroutines Used

SCALC, MCALC

Storage Areas Read

CELTIME, FRAMESIZE, TIMEMODE, JMPDELT

Storage Areas Written

MTIME, JMPPT, JMPPTX

Method

When the jump option is used the time of computation is calculated in the following way:

$$(1) \quad t_s = \text{CELTIME} + n(\text{FRAME SIZE})$$

$$(2) \quad t = t_s + \frac{1}{2} \Delta t$$

When $t > t_s + j \Delta t$, t_s is replaced by $(t_s + j \Delta t)$ and (2) is repeated giving a new time of computation

t_s = start time

t = time of computation

Δt = jump interval where $j=1,2,3,\dots$

$n \approx 4$, when simulation run

1, when realtime run

Error Conditions

Arithmetic and geometric errors from within SCALC and MCALC.

SCALC

Function

Given values for the mean elements of a satellite orbit to calculate the true right ascension, true declination, true radius, their time derivatives, and sin and cos of the orientation angle of the satellite at the time of computation.

Calling Sequence

RJP SCALC
Error return
Normal return

Input

Mean elements as described in MCALC.

Output

<u>Storage</u>	<u>Description</u>	<u>Units</u>	<u>Binary Point</u>
RA	true right ascension, α	rev.	27
DEC	true declination, δ	rev.	27
RADIUS	true radius, ρ	earth radii	22
RADOT	time derivative of RA, $\dot{\alpha}$	radians/sec	37
DECDOT	time derivative of DEC, $\dot{\delta}$	radians/sec	37
RADIUSDOT	time derivative of RADIUS, $\dot{\rho}$	naut. mi/sec	24
SINORIENT	sin of orientation angle, $\sin \beta$		29
COSORIENT	cos of orientation angle, $\cos \beta$		29

Subroutines Used

Fixed point trigonometric subroutines,

SADD, SSUB

Storage Areas Read

MM, EE, II, ZOMEGA, RAM, NN, DEROMEG, DERRAM, AA,
DELTL, DELTR, DELTRAM, DELTI.

Storage Areas Written

RA, DEC, RADIUS, RADOT, DECDOT, RADIUSDOT, SINORIENT,
COSORIENT.

Method*

$$\rho = a (1 - \cos E) + \partial \rho$$

$$\delta = \sin^{-1} (\sin i_f \sin u_f) - \frac{\pi}{2} < \delta < \frac{\pi}{2}$$

$$\alpha = \sin^{-1} \left[\frac{(\sin \Omega_f \cos u_f + \cos i_f \cos \Omega_f \sin u_f)}{\cos \delta} \right]$$

$$\text{if } (\cos \Omega_f \cos u_f + \cos i_f \sin \Omega_f \sin u_f) > 0, \begin{cases} 0 < \alpha < \frac{\pi}{2} \\ \text{or} \\ \frac{3\pi}{2} < \alpha < 2\pi \end{cases}$$

$$\text{if } < 0, \frac{\pi}{2} < \alpha < \frac{3\pi}{2}$$

* f = final, e.g., $\sin \Omega_f = \sin \Omega + \cos \Omega \partial \Omega$

$$\cos \delta \dot{\alpha} = \cos \delta \dot{\Omega} + \frac{\cos i}{\cos \delta} \frac{du}{dt}$$

$$\dot{\delta} = \frac{\sin i \cos u}{\cos \delta} \frac{du}{dt}$$

$$\dot{\rho} = \frac{aen}{\sqrt{1 - e^2}} \sin v$$

$$\sin \beta = \sqrt{1 - \cos^2 \beta}$$

$$\cos \beta = \sin i_f \cos(\alpha - \Omega)$$

Error Conditions

Arithmetic or geometric errors.

SINVV

Function

To calculate $\sin v$ and $\cos v$.

Calling Sequence

RJP SINVV
Normal return

Input

Eccentricity, e , binary point 29; eccentric anomaly, E , binary point 26.

Output

Cosine of v , binary point 28.
Sine of v , binary point 28.

Subroutines Used

SQRT, SINX, COSX

Storage Areas Read

EE, ELLAST

Storage Areas Written

VVSIN, VVCOS

Method

$$\sin v = \frac{\sqrt{1-e^2} \sin E}{1-e \cos E}$$

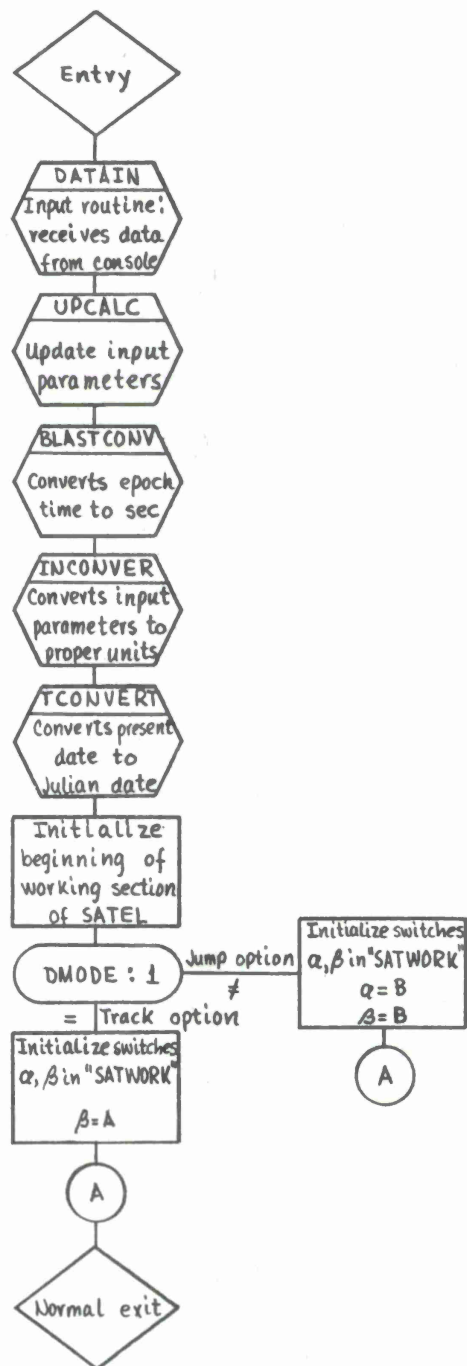
$$\cos v = \frac{\cos E - e}{1-e \cos E}$$

Error Conditions

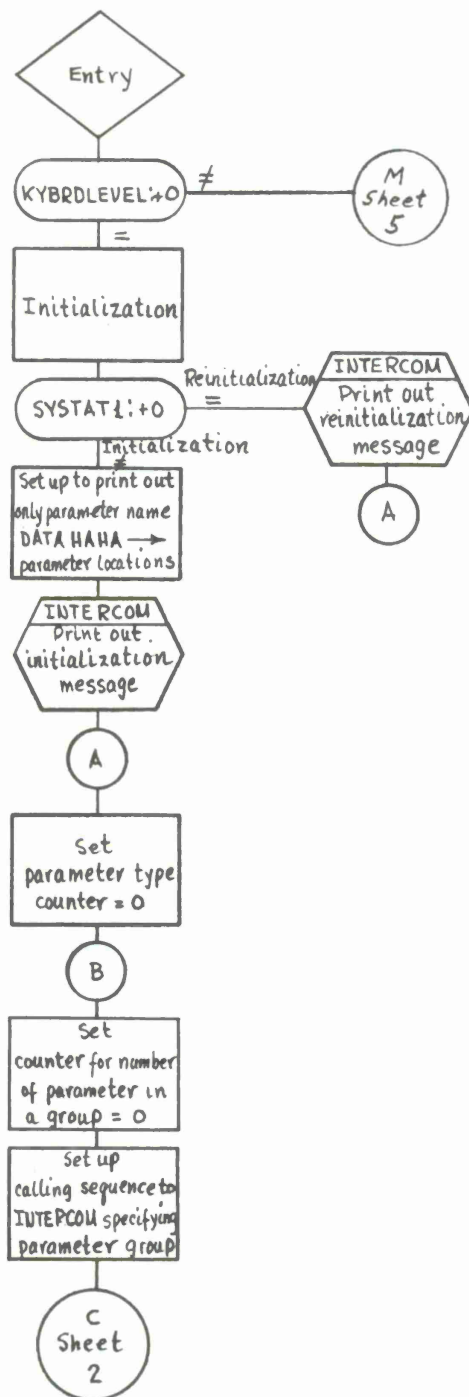
Overflow in arithmetic procedures.

IV. FLOW CHARTS

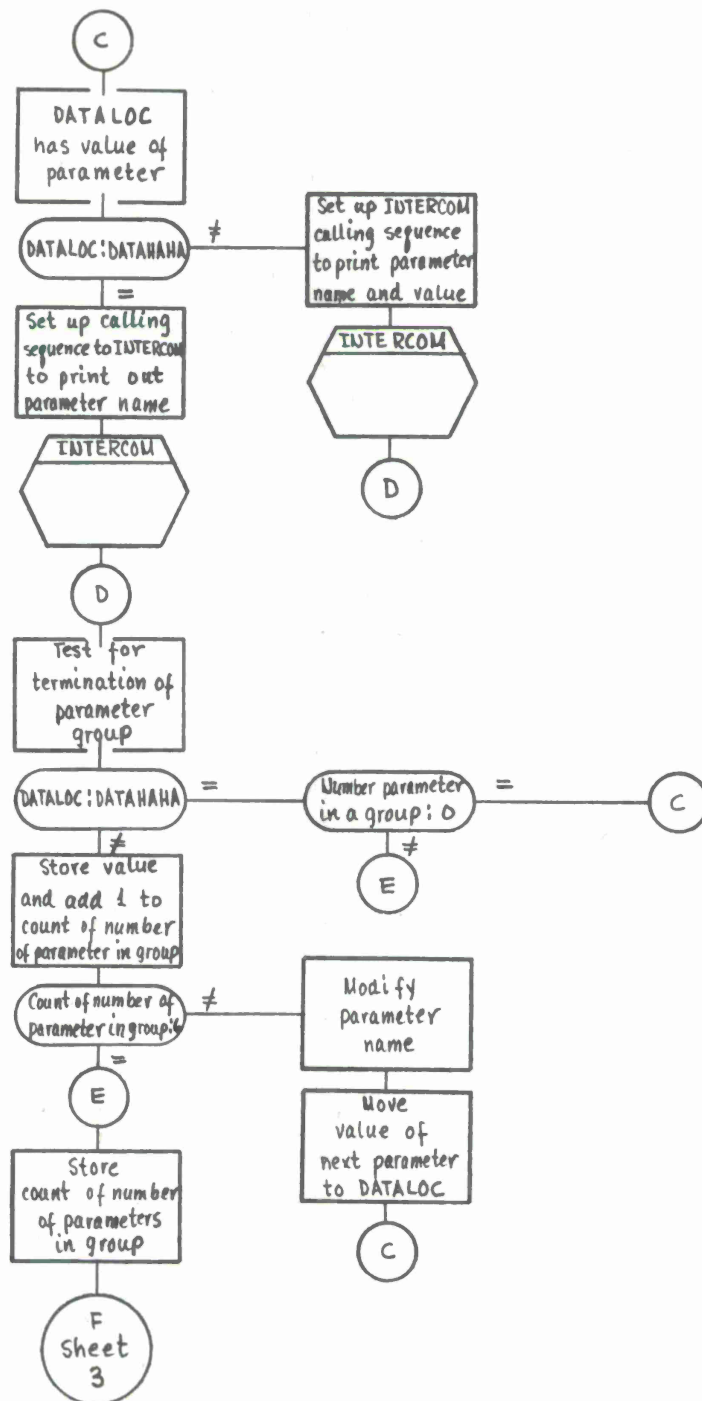
Flow charts for the subroutines described in the preceding section appear on the following pages.



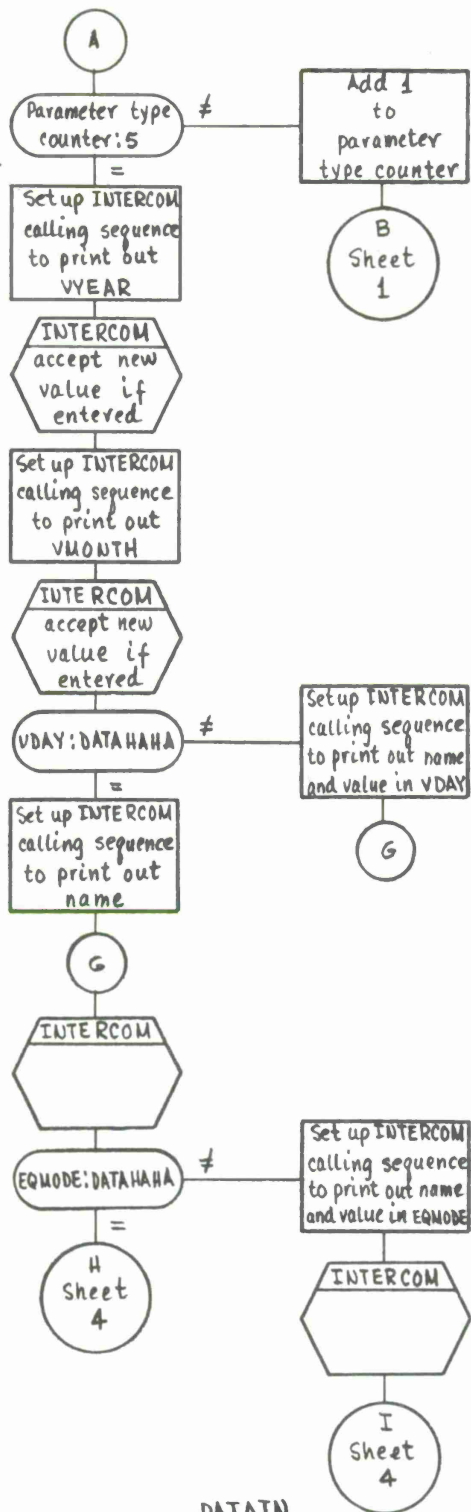
SATINIT



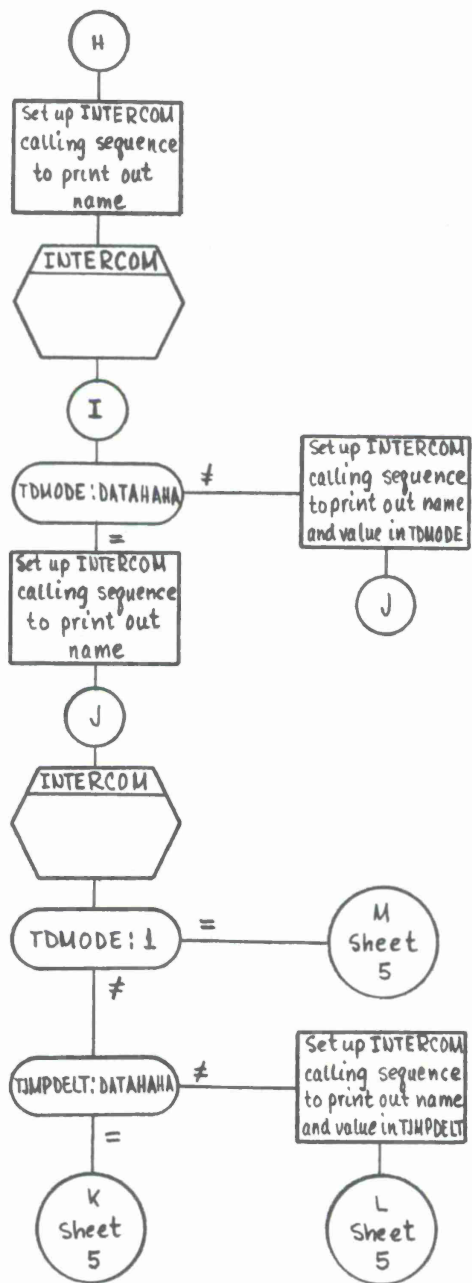
DATAIN
Sheet 1 of 5



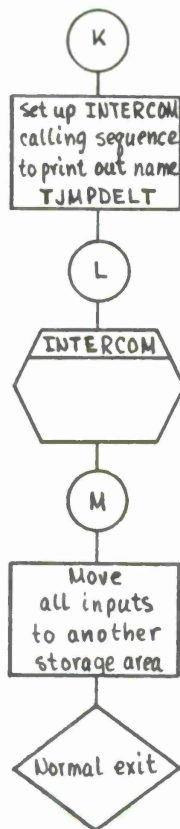
DATAIN
Sheet 2 of 5



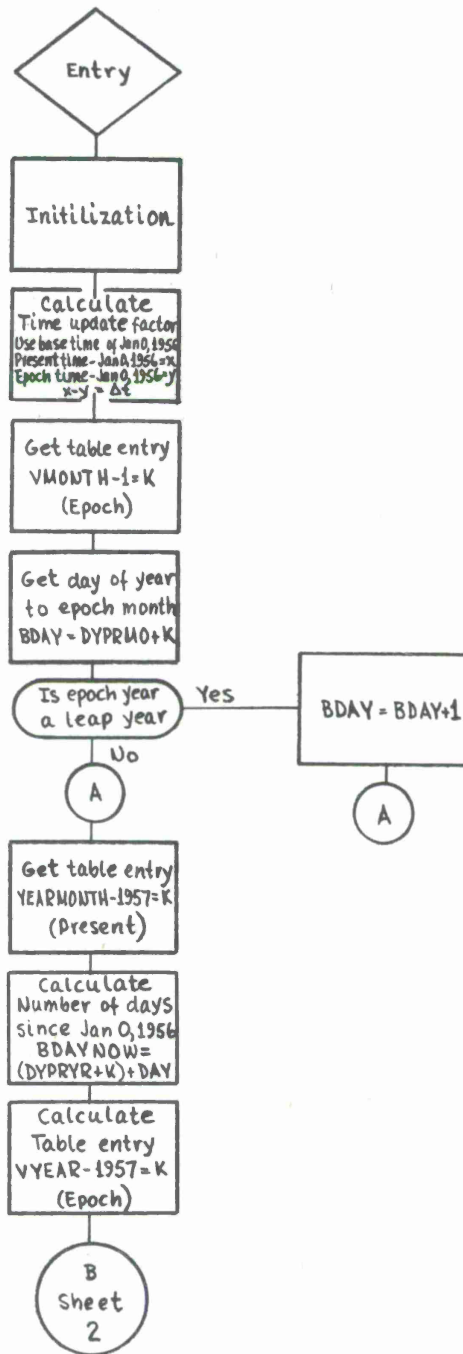
DATAIN
Sheet 3 of 5



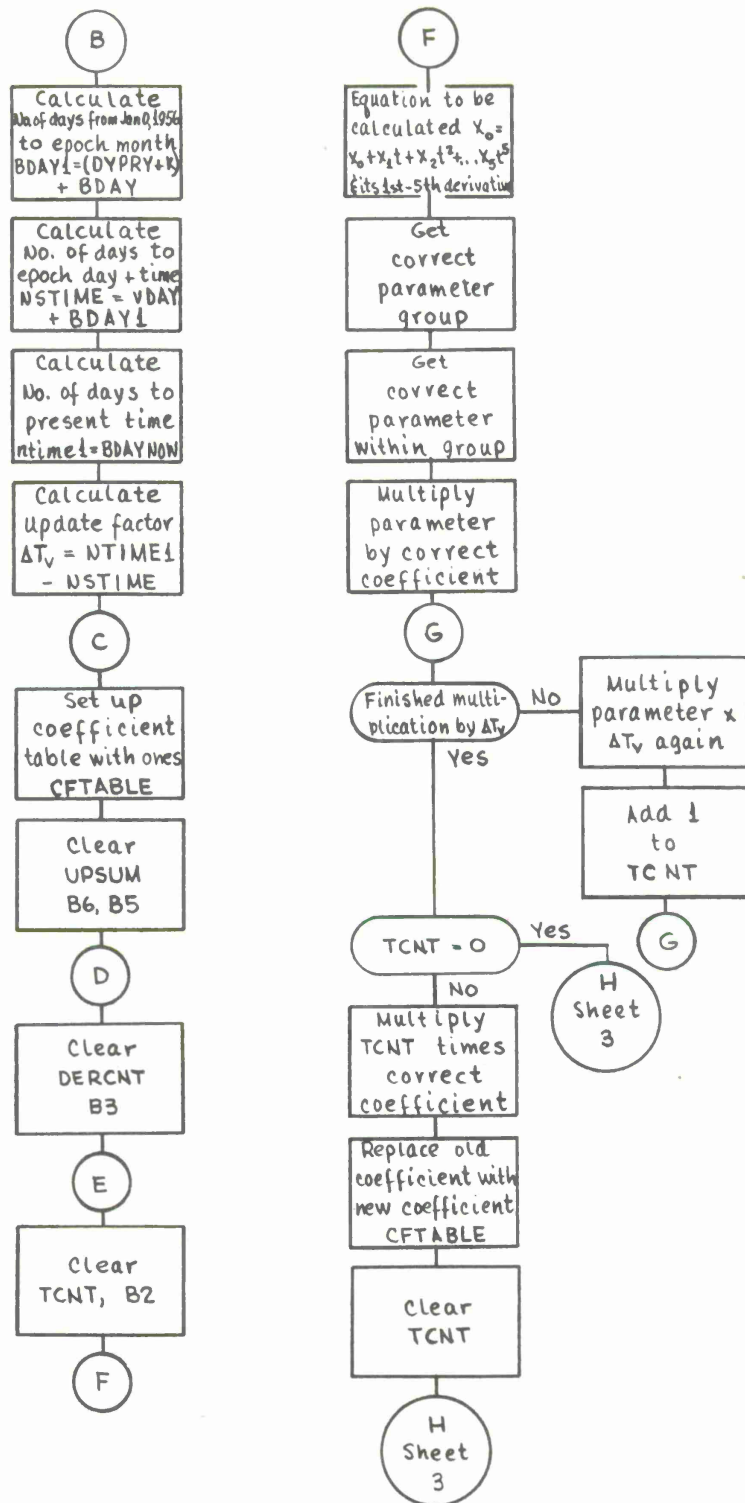
DATAIN
Sheet 4 of 5



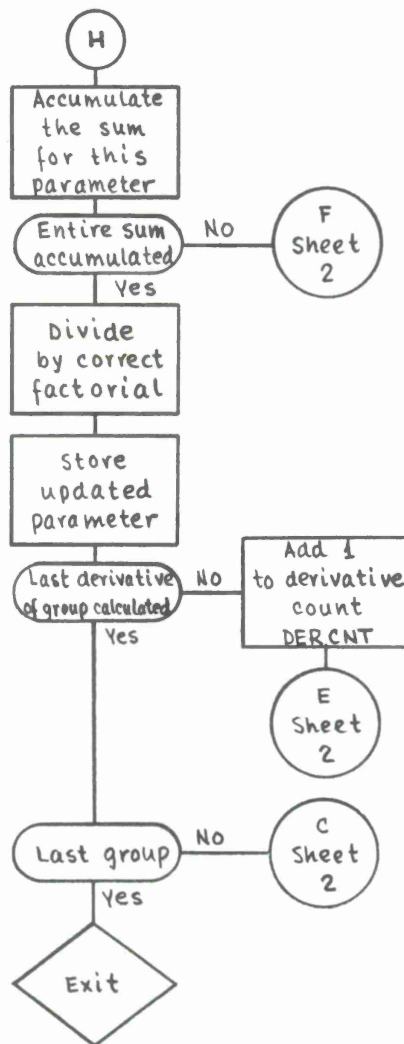
DATAIN
Sheet 5 of 5



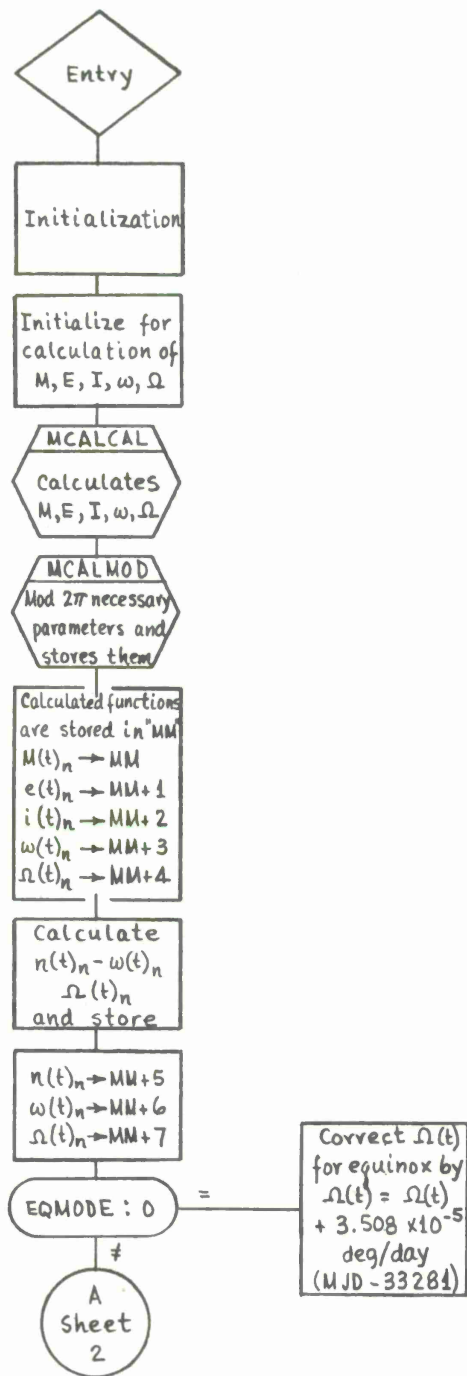
UPCALC
Sheet 1 of 3



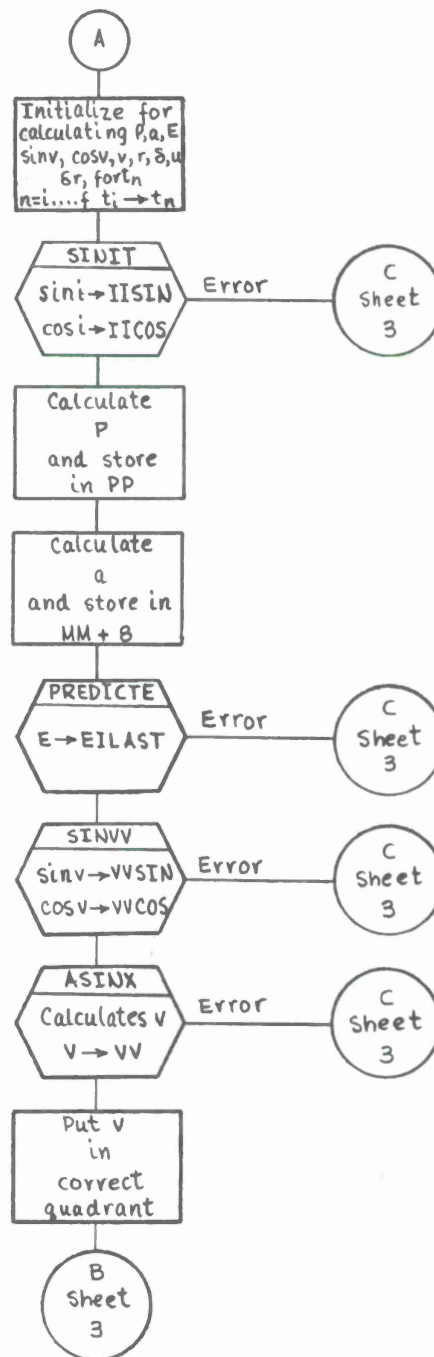
UPCALC
Sheet 2 of 3



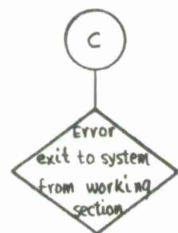
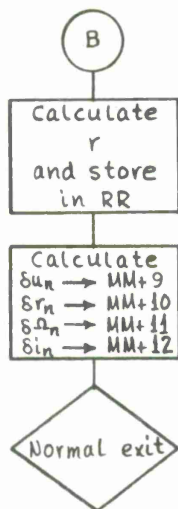
UPCALC
Sheet 3 of 3



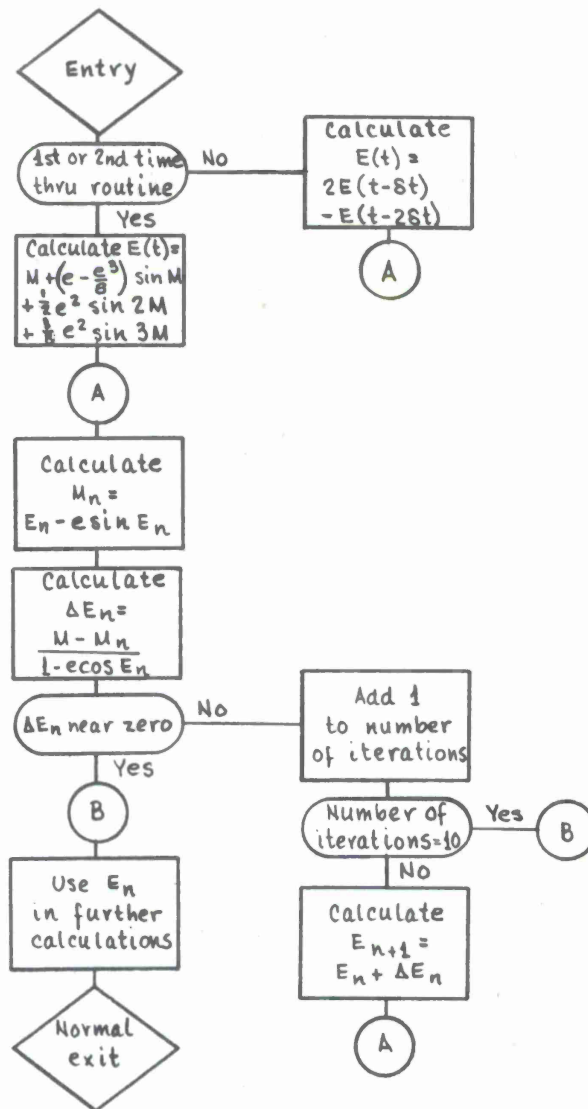
MCALC
Sheet 1 of 3



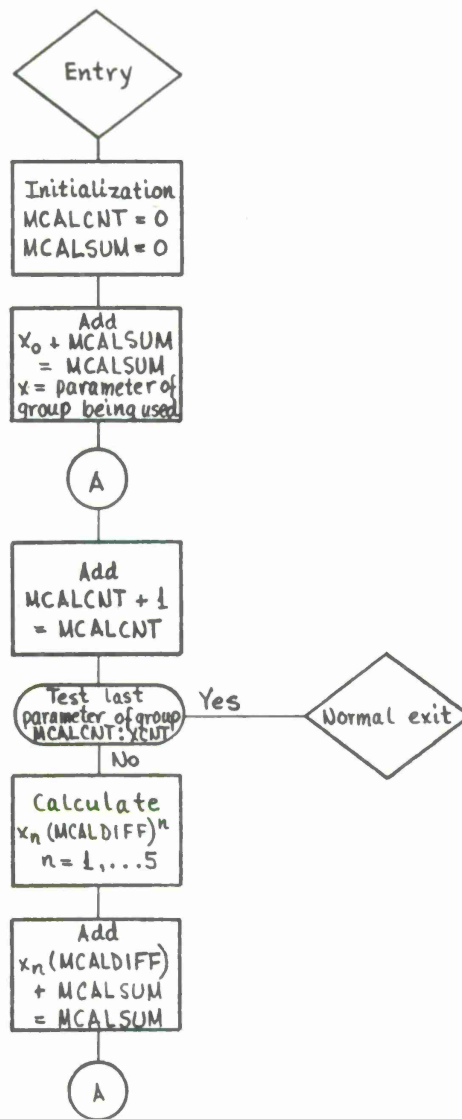
MCALC
Sheet 2 of 3



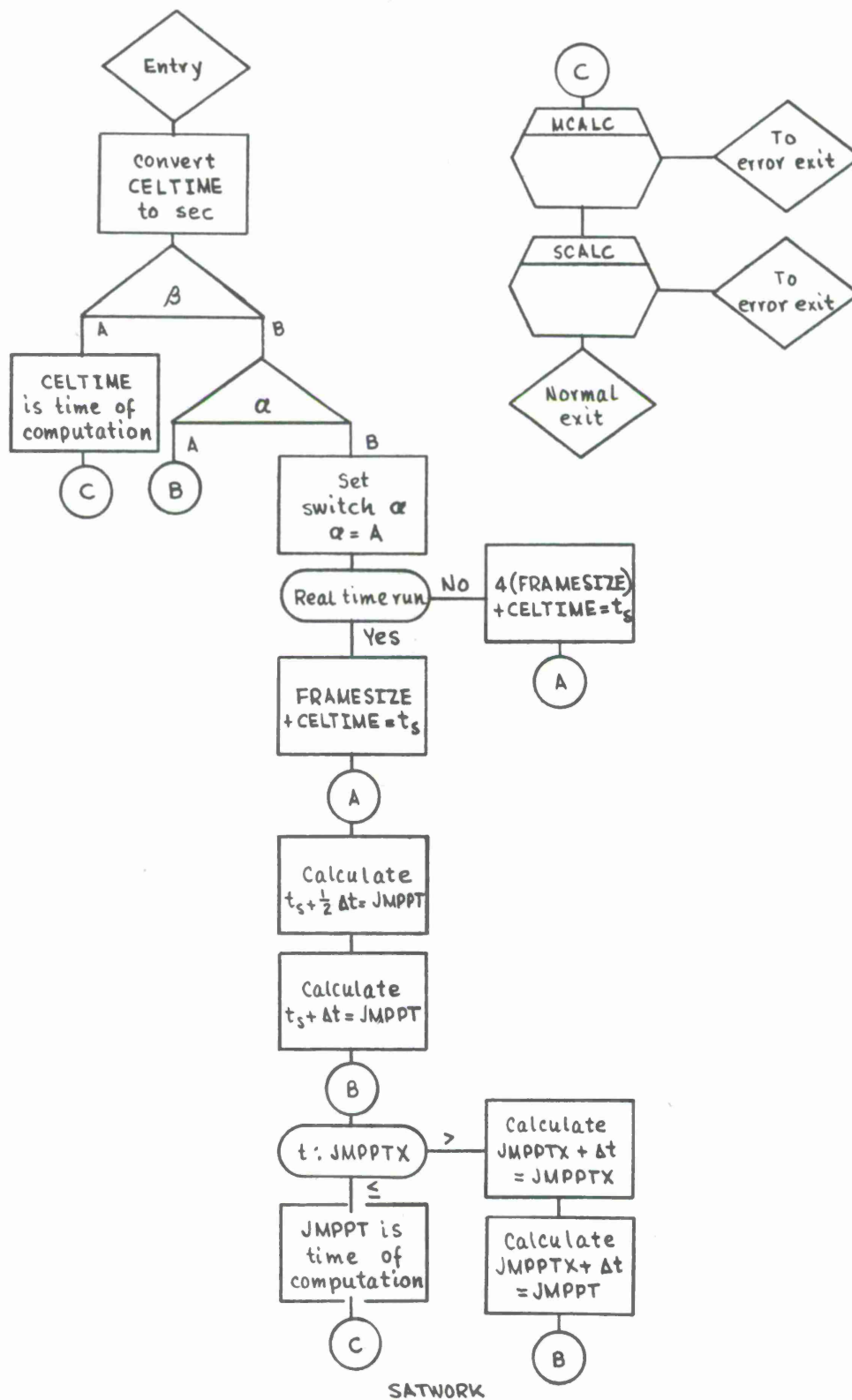
MCALC
sheet 3 of 3

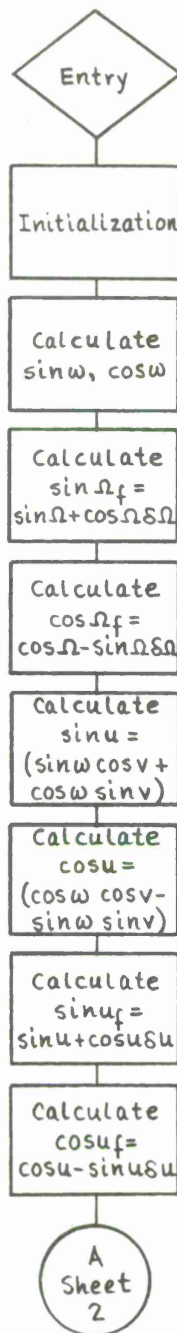


PREDICTE

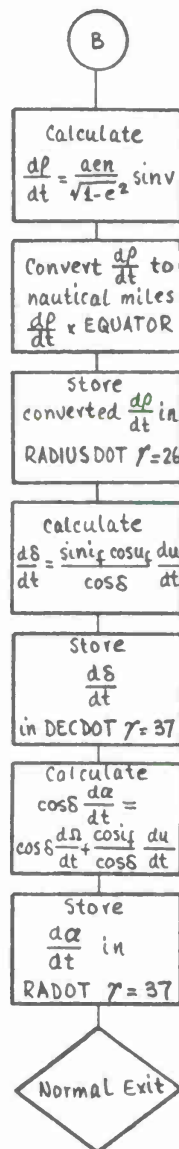
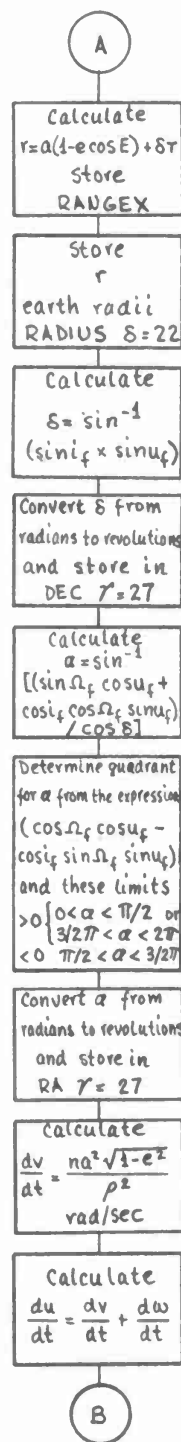


MCALCAL





SCALC
Sheet 1 of 2



SCALC
Sheet 2 of 2

..... SPURT OUTPUT NO. 210
 SATEL MCQUILKIN=7/1/65

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C00C0	SATEL PROGRAM MCQUILKIN=7/1/65					
.	C00C1	SATEL U-TAG SATWORK*SATINIT	00000	06040	06014		
.	C00C2	FD 1*SATEL	00001	30063	11221		
.	C00C3	CALL FLTP					
.	C00C4	COMMENT SATEL					DATA INPUT ROUTINE
.	C00C5	DATAIN ENTRY	00002	61000	00000		
.	C00C6	ENT A*W(KYBRDLEVEL)*AZERO	00003	11430	63110		USE PREVIOUS INPUT IF
.	C00C7	JP DATAEXIT+5	00004	61000	00242		
.	C0010	ENT A*W(DATAWRES)	00005	11030	01000		
.	C0011	STR A*W(DATAW)	00006	15030	00322		
.	C0012	ENT A*W(DATARAMRES)	00007	11030	01001		
.	C0013	STR A*W(DATARAM)	00010	15030	00334		
.	C0014	ENT A*W(DATAIRES)	00011	11030	01002		
.	C0015	STR A*W(DATAI)	00012	15030	00346		
.	C0016	ENT A*W(DATAERES)	00013	11030	01003		
.	C0017	STR A*W(DATAE)	00014	15030	00360		
.	C0020	ENT A*W(DATAMRES)	00015	11030	01004		
.	C0021	STR A*W(DATAM)	00016	15030	00366		
.	C0022	STR B5*L(DATAEXIT)	00017	16510	00235		
.	C0023	STR B6*L(DATAEXIT+1)	00020	16610	00236		
.	C0024	STR B3*L(DATAEXIT+2)	00021	16310	00237		
.	C0025	STR B4*L(DATAEXIT+3)	00022	16410	00240		
.	C0026	STR B7*L(DATAEXB7)	00023	16710	00246		
.	C0027	STR B2*L(DATAEXIT+4)	00024	16210	00241		
.	C0030	ENT A*LX(SYSTAT1)*ANEG	00025	11750	63313		+0 REINIT. -0 IN INIT.
.	C0031	JP DATRE2	00026	61000	00250		REINIT.
.	C0032	ENT B2*0	00027	12200	00000		INIT.
.	C0033	ENT A*W(DATAHAHA)	00030	11030	00777		X STORE 0 77777 IN EXPONENT OF PARAMETER
.	C0034	DATA1 STR A*W(TMZERO+B2)	00031	15032	00667		X OUTPUT AREA
.	C0035	ENT B2*1+B2	00032	12202	00001		X
.	C0036	BSK B2*67D	00033	71200	00103		
.	C0037	JP DATA1	00034	61000	00031		
.	C0040	ENT A*1	00035	11000	00001		
.	C0041	STR A*W(TDMODE)	00036	15030	00765		
.	C0042	STR A*W(EQMODE)	00037	15030	00771		
.	C0043	RJP U(INTERCOM)	00040	65020	63426		PRINT OUT INIT. MESSAGE
.	C0044	U-TAG DATAMESA=0	00041	00310	00000		
.	C0045	DATA11 ENT B5*0	00042	12500	00000		PARAMETER TYPE COUNTER
.	C0046	DATA02 ENT B6*0	00043	12600	00000		NUMBER OF PARAMETERS OF TYPE
.	C0047	ENT A*W(DATAUTAG+B5)	00044	11035	00253		INTERCOM CALLING SEQUENCE WORD
.	C0050	STR A*W(DATINU)	00045	15030	00076		X SPECIFYING PARAMETER TYPE
.	C0051	ENT A*W(DATMESS+B5)	00046	11035	00516		
.	C0052	STR A*W(\$+2)	00047	15030	00051		
.	C0053	RJP U(INTERCOM)	00050	65020	63426		
.	C0054	O O	00051	00000	00000		
.	C0055	DATA03 ENT B7*L(DATATYP+B5)	00052	12715	00262		
.	C0056	STR B6*L(\$+1)	00053	16610	00054		X
.	C0057	ENT B7*B7+00	00054	12707	00000		X
.	C0060	ENT A*W(B7)	00055	11037	00000		X
.	C0061	STR A*W(DATALOC)	00056	15030	00260		X

CAROS	L1 IO LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C0C62	ENT A*W(B7+1)	00057	11037	00001	X	
.	C0063	STR A*W(DATALOC+1)	00060	15030	00261	X	
.	C0064	ENT Q*W(0ATAHAHA)	00061	10030	00777	X	TEST IF PARAMETER HAS AN ACCEP
.	C0065	ENT A*W(DATALOC)	00062	11030	00260	X	TABLE
.	C0066	COM MASK*W(DATAHAHA)*ANOT	00063	43530	00777	X	X VALUE
.	C0C67	JP 0ATA031	00064	61000	00072	X	X NO
.	C0070	ENT B2*U(0ATAUTAG+B5)	00065	12225	00253	X	X YES, PRINT OUT PARAMETER NAM
.	C0071	ENT B4*DATAREFD	00066	12400	00300	X	E AND
.	C0072	ENT A*B4	00067	11004	00000	X	X VALUE
.	C0073	STR A*U(B2+1)	00070	15022	00001	X	X
.	C0074	JP DATA032	00071	61000	00075	X	X
.	C0075 0ATA031	ENT B2*U(0ATAUTAG+B5)	00072	12225	00253	X	X NO, PRINT OUT PARAMETER NAM
.	C0076	ENT A*77777	00073	11000	77777	X	E ONLY
.	C0077	STR A*U(B2+1)	00074	15022	00001	X	X
.	C0100 DATA032	RJP U(INTERCOM)	00075	65020	63426		
.	C01C1 DATINU	O O	00076	00000	00000		
.	C0102	ENT Q*W(DATAHAHA)	00077	10030	00777		TEST FOR TERMINATION
.	C0103	ENT A*W(DATALOC)	00100	11030	00260		X OF PATAMETER TYPE
.	C0104	COM MASK*W(DATAHAHA)*ANOT	00101	43530	00777		X SKIP IF NOT TERMINAL
.	C0105	JP 0ATA04	00102	61000	00124		TO PARAMETER TYPE CHANGER
.	C0106	ENT B7*L(0ATATYP+B5)	00103	12715	00262		LOC OF START OF PARAMETER TYPE
.	C0107	STR B6*L(\$+1)	00104	16610	00105		STORAGE
.	C0110	ENT B7*B7+00	00105	12707	00000		
.	C0111	ENT A*W(DATALOC)	00106	11030	00260		VALUE
.	C0112	STR A*W(B7)	00107	15037	00000		
.	C0113	ENT A*W(DATALOC+1)	00110	11030	00261		
.	C0114	STR A*W(1+B7)	00111	15037	00001		
.	C0115	ENT B6*B6+1	00112	12606	00001		
.	C0116	BSK B6*11D	00113	71600	00013		
.	C0117	JP \$+2	00114	61000	00116		
.	C0120	JP 0ATA05	00115	61000	00126		EQUALS
.	C0121	ENT B7*U(0ATINU)	00116	12720	00076		MODIFY OUTPUT PARAMETER NAME
.	C0122	ENT B7*L(B7+1)	00117	12717	00001	X	
.	C0123	ENT A*W(B7)	00120	11037	00000	X	
.	C0124	AOO A*100	00121	20000	00100	X	
.	C0125	STR A*W(B7)	00122	15037	00000	X	
.	C0126	JP DATA03	00123	61000	00052		
.	C0127 0ATA04	BJP B6*0ATA05+1	00124	72600	00127		TEST FOR MUNBER OF PARAMETERS
.	C0130	JP DATA03	00125	61000	00052		EQU O
.	C0131 0ATA05	ENT B6*11D	00126	12600	00013		YES GO BACK TO ASK AGAIN FOR V
.	C0132	ENT B6*B6+1	00127	12606	00001		ALUE
.	C0133	ENT A*B6	00130	11006	00000		
.	C0134	RSH A*1	00131	02000	00001		
.	C0135	STR A*L(RAMCNT+B5)	00132	15015	00772		
.	C0136	BSK B5*4	00133	71500	00004		BUMP AND TEST NUMBER OF PARAME
							TERS

..... SPUPT OUTPUT NO. 210
 SATEL MCQUILKIN*7/1/65

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	CO137	JP DATA02	00134	61000	00043		GO ON
.	CO140	ENT A*W(MCNT)	00135	11030	00776		
.	CO141	COM A*2*YMORE	00136	04700	00002		
.	CO142	JP DATA051	00137	61000	00143		
.	CO143	ENT B5*4	00140	12500	00004		
.	CO144	ENT B6*2	00141	12600	00002		
.	CO145	JP DATA03	00142	61000	00052		
.	CO146 DATA051	ENT A*U(YEARMONTH)	00143	11020	63147		
.	CO147	STR A*W(VYEAR)	00144	15030	01302		X
.	CO150	RJP U(INTERCOM)	00145	65020	63426		X
.	CO151	U-TAG DATOTBASE*DATITBASE	00146	00430	00434		
.	CO152	ENT A*L(YEARMONTH)	00147	11010	63147		PRINT OUT EPOCH MONTH
.	CO153	STR A*W(VMONTH)	00150	15030	01304		X
.	CO154	RJP U(INTERCOM)	00151	65020	63426		X
.	CO155	U-TAG DATOMO*DATIMO	00152	00446	00452		X
.	CO156	ENT Q*W(DATAHAHA)	00153	10030	00777		TEST DAY HAS ACCEPTABLE VALUE
.	CO157	ENT A*W(VDAY)	00154	11030	00767		X
.	CO160	COM MASK*W(DATAHAHA)*ANOT	00155	43530	00777		X
.	CO161	JP DATA054	00156	61000	00162		X NO
.	CO162	ENT A*00000	00157	11000	00000		X YES PRINT PARAMETER NAME AND VALUE
.	CO163	STR A*U(DATODY+1)	00160	15020	00371		X
.	CO164	JP DATA055	00161	61000	00164		X
.	CO165 DATA054	ENT A*77777	00162	11000	77777		X NO PRINT PARAMETER NAME ONLY
.	CO166	STR A*U(DATODY+1)	00163	15020	00371		X
.	CO167 DATA055	RJP U(INTERCOM)	00164	65020	63426		X
.	CO170	U-TAG DATODY*DATIDY	00165	00370	00374		X
.	CO171	ENT A*W(VDAY)	00166	11030	00767		
.	CO172	ENT Q*W(DATAHAHA)	00167	10030	00777		
.	CO173	COM MASK*W(DATAHAHA)*ANOT	00170	43530	00777		
.	CO174	JP DATA055	00171	61000	00164		
.	CO175	ENT Q*W(DATAHAHA)	00172	10030	00777		X
.	CO176	ENT A*W(EQMODE)	00173	11030	00771		TEST EQUINOX HAS ACCEPTABLE VALUE
.	CO177	COM MASK*W(DATAHAHA)*AZERO	00174	43430	00777		
.	CO200	CL A*	00175	11000	00000		YES ,PRINT NAME AND VALUE
.	CO201	STR A*U(DATOEQ+1)	00176	15020	00410		NO,PRINT NAME ONLY
.	CO202	RJP U(INTERCOM)	00177	65020	63426		
.	CO203	U-TAG DATOEQ*DATIEQ	00200	00407	00413		
.	CO204	ENT A*W(TDMODE)	00201	11030	00765		X
.	CO205	COM MASK*W(DATAHAHA)*ANOT	00202	43530	00777		X
.	CO206	JP DATA061	00203	61000	00207		X NO
.	CO207	ENT A*00000	00204	11000	00000		X YES, PRINT PARAMETER NAME AND VALUE
.	CO210	STR A*U(DATOMODE+1)	00205	15020	00500		X
.	CO211	JP DATA062	00206	61000	00211		X
.	CO212 DATA061	ENT A*77777	00207	11000	77777		X NO, PRINT PARAMETER NAME ONLY
.	CO213	STR A*U(DATOMODE+1)	00210	15020	00500		X
.	CO214 DATA062	RJP U(INTERCOM)	00211	65020	63426		
.	CO215	U-TAG DATOMODE*DATIMODE	00212	00477	00503		

..... SPUPT OUTPUT NO. 210
 SATEL MCQUILKIN*7/1/65

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C0216	ENT A*W(TDMODE)	00213	11030	00765		
.	C0217	SUB A*1*ANOT	00214	21500	00001		
.	C0220	JP DATAEXIT	00215	61000	00235		
.	C0221	ENT Q*W(DATAHAHA)	00216	10030	00777		TEST TJMPDELT HAS ACCEPTABLE VALUE
.	C0222	ENT A*W(TJMPDELT)	00217	11030	00763		X
.	C0223	COM MASK*W(DATAHAHA)*ANOT	00220	43530	00777		X
.	C0224	JP DATA071	00221	61000	00225		X NO
.	C0225	ENT A*00000	00222	11000	00000		X YES, PRINT PARAMETER NAME AND VALUE
.	C0226	STR A*U(DATODELT+1)	00223	15020	00465		X
.	C0227	JP DATA072	00224	61000	00227		X
.	C0230 DATA071	ENT A*77777	00225	11000	77777		X NO, PRINT PARAMETER NAME ONLY
.	C0231	STR A*U(DATODELT+1)	00226	15020	00465		
.	C0232 DATA072	RJP U(INTERCOM)	00227	65020	63426		
.	C0233	U-TAG DATODELT*DATIDELT	00230	00464	00470		
.	C0234	ENT A*L(TJMPDELT)	00231	11010	00763		
.	C0235	ENT Q*W(DATAHAHA)	00232	10030	00777		
.	C0236	COM MASK*W(DATAHAHA)*ANOT	00233	43530	00777		
.	C0237	JP \$-5	00234	61000	00227		
.	C0240 DATAEXIT	ENT B5*00	00235	12500	00000		
.	C0241	ENT B6*00	00236	12600	00000		
.	C0242	ENT B3*0	00237	12300	00000		
.	C0243	ENT B4*0	00240	12400	00000		
.	C0244	ENT B2*0	00241	12200	00000		
.	C0245	MOVE 63D*TMZERO*MZERO	00242	12700	00076		
			00243	10037	00667		
			00244	14037	00564		
			00245	72700	00243		
.	C0246 DATAEXB7	ENT B7*0	00246	12700	00000		
.	C0247	EXIT	00247	61010	00002		
.	C0250 DATRE2	RJP U(INTERCOM)	00250	65020	63426		
.	C0251	U-TAG DATAMESB*0	00251	00276	00000		REINITIALIZATION MESSAGE
.	C0252	JP DATINA11	00252	61000	00042		
.	C0253 DATAUTAG	U-TAG DATORAM*DATIRAM	00253	00324	00326		
.	C0254	U-TAG DATOW*DATIW	00254	00312	00314		
.	C0255	U-TAG DATOI*DATII	00255	00336	00340		
.	C0256	U-TAG DATOE*DATIE	00256	00350	00352		
.	C0257	U-TAG DATOM*DATIM	00257	00362	00364		
.	C0260 DATALOC	O 77777	00260	00000	77777		STORAGE FOR INPUT VALUE
.	C0261	O O	00261	00000	00000		X
.	C0262 DATATYP	O TRAMZERO	00262	00000	00747		
.	C0263	O TWZERO	00263	00000	00733		
.	C0264	O TIZEROX	00264	00000	00717		
.	C0265	O TEZERO	00265	00000	00703		
.	C0266	O TMZERO	00266	00000	00667		
.	C0267 DATAMESBB	FD O*SATELLITE REINITIALIZATION	00267	30063	11221		
			00270	21163	11205		
			00271	27121	62316		
			00272	31160	62116		
			00273	37063	11624		
			00274	23050	50505		

..... SPURT OUTPUT NO. 210
 SATEL MCQUIL KIN*7/1/65

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C0270	77777 77777	00275	77777	77777		
.	C0271 DATAMESB	FD 0*A	00276	06050	50505		
.	C0272	77777 DATAMESB8	00277	77777	00267		
.	C0273 DATAREFD	FD 0*F7	00300	13670	50505		
.	C0274	77777 DATALOC	00301	77777	00260		
.	C0275 DATAMESAA	FD 5*SATELLITE INITIALIZATION	00302	30063	11221		
			00303	21163	11205		
			00304	16231	63116		
			00305	06211	63706		
			00306	31162	42305		
			00307	77777	77777		
.	C0276	77777 77777	00310	06050	50505		
.	C0277 DATAMESA	FD 1*A	00311	77777	00302		
.	C0300	77777 DATAMESAA	00312	06050	50505		
.	C0301 DATOW	FD 1*A	00313	77777	00322		
.	C0302	77777 DATAW	00314	13050	50505		
.	C0303 DATIW	FD 1*F	00315	00010	00260		
.	C0304	10 DATALOC	00316	00000	40011		-360
.	C0305	0 40011	00317	64577	77777		
.	C0306	64577 77777	00320	00000	40011		+360
.	C0307	0 40011	00321	13200	00000		
.	C0310	13200 0	00322	05053	46044		W0=
.	C0311 DATAW	05053 46044	00323	77777	77777		
.	C0312	77777 77777	00324	06050	50505		
.	C0313 DATORAM	FD 1*A	00325	77777	00334		
.	C0314	77777 DATARAM	00326	13050	50505		
.	C0315 DATIRAM	FD 1*F	00327	00010	00260		
.	C0316	10 DATALOC	00330	00000	40011		-360
.	C0317	0 40011	00331	64577	77777		
.	C0320	64577 77777	00332	00000	40011		+360
.	C0321	0 40011	00333	13200	00000		
.	C0322	13200 0	00334	05270	66044		RA0
.	C0323 DATARAM	05270 66044	00335	77777	77777		
.	C0324	77777 77777	00336	06050	50505		
.	C0325 DATOI	FD 1*A	00337	77777	00346		
.	C0326	77777 DATAI	00340	13050	50505		
.	C0327 DATII	FD 1*F	00341	00010	00260		
.	C0330	10 DATALOC	00342	00000	40010		-180
.	C0331	0 40010	00343	64577	77777		
.	C0332	64577 77777	00344	00000	40010		+180
.	C0333	0 40010	00345	13200	00000		
.	C0334	13200 0	00346	05051	66044		10=
.	C0335 DATAI	05051 66044	00347	77777	77777		
.	C0336	77777 77777	00350	06050	50505		
.	C0337 DATOE	FD 1*A	00351	77777	00360		
.	C0340	77777 DATAE	00352	13050	50505		
.	C0341 DATIE	FD 1*F	00353	00010	00260		
.	C0342	10 DATALOC	00354	00000	40001		-1
.	C0343	0 40001	00355	67777	77777		
.	C0344	67777 77777	00356	00000	40001		+1
.	C0345	0 40001	00357	10000	00000		
.	C0346	10000 0	00360	05051	26044		E0=
.	C0347 DATAE	05051 26044	00361	77777	77777		
.	C0350	77777 77777					

CARDS	LI	ID	LABEL	TA	STATEMENT	LOC	F	JKB	Y	NOTES
.	C0351		DATOM	FD	1*A	00362	06050	50505		
.	C0352			77777	DATAM	00363	77777	00366		
.	C0353		DATIM	FD	1*F	00364	13050	50505		
.	C0354			00	DATALOC	00365	00000	00260		
.	C0355		DATAM	05052	26044	00366	05052	26044		MO=
.	C0356			77777	77777	00367	77777	77777		
.	C0357		DATODY	FD	1*A	00370	06050	50505		
.	C0360			77777	DATADY	00371	77777	00402		
.	C0361			FD	0*F	00372	13050	50505		
.	C0362			77777	VDAY	00373	77777	00767		
.	C0363		DATIDY	FD	0*F	00374	13050	50505		
.	C0364			10	VDAY	00375	00010	00767		
.	C0365			0	0	00376	00000	00000		
.	C0366			0	0	00377	00000	00000		
.	C0367			0	40006	00400	00000	40006		
.	C0370			10000	0	00401	10000	00000		
.	C0371		DATADY	FD	0*DATE(0.00-31.999)	00402	11063	11251		
						00403	24752	42441		
						00404	63617	57171		
						00405	71400	50505		
.	C0372			77777	77777	00406	77777	77777		
.	C0373		DATOEQ	FD	1*A	00407	06050	50505		
.	C0374			77777	DATAEQ	00410	77777	00417		
.	C0375			FD	0*D	00411	11050	50505		
.	C0376			77777	EQMODE	00412	77777	00771		
.	C0377		DATIEQ	FD	1*0	00413	24050	50505		
.	C0400			10	EQMODE	00414	00010	00771		
.	C0401			0	0	00415	00000	00000		
.	C0402			0	1	00416	00000	00001		
.	C0403		DATAEQ	FD	0*EQUINOX... 1950(0) OR PRESENT DATO	00417	12263	21623		
				E(1)		00420	24357	57575		
						00421	05617	16524		
						00422	51244	00524		
						00423	27052	52712		
						00424	30122	33105		
						00425	11063	11251		
						00426	61400	50505		
.	C0404			77777	77777	00427	77777	77777		
.	C0405		DATOTBASE	FD	1*A	00430	06050	50505		
.	C0406			0	DATATBASE	00431	00000	00442		
.	C0407			FD	0*D	00432	11050	50505		
.	C0410			77777	VYEAR	00433	77777	01302		
.	C0411		DATITBASE	FD	0*D	00434	11050	50505		
.	C0412			10	VYEAR	00435	00010	01302		
.	C0413			0	3644	00436	00000	03644		
.	C0414			0	3662	00437	00000	03662		
.	C0415			0	0	00440	00000	00000		
.	C0416			0	0	00441	00000	00000		
.	C0417		DATATBASE	FD	0*EPOCH YEAR	00442	12252	41015		
						00443	05053	61206		
						00444	27050	50505		
.	C0420			77777	77777	00445	77777	77777		

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 SATEL MCQUILKIN*7/1/65

CARDS	LI ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	CO421 DATOMC	FD 1*A	00446	06050	50505		
.	CO422	O DATAMO	00447	00000	00460		
.	CO423	FD O*D	00450	11050	50505		
.	CO424	77777 VMONTH	00451	77777	01304		
.	CO425 DATIMO	FD O*D	00452	11050	50505		
.	CO426	IO VMONTH	00453	00010	01304		
.	CO427	C O	00454	00000	00000		
.	CO430	O 37	00455	00000	00037		
.	CO431	O O	00456	00000	00000		
.	CO432	O O	00457	00000	00000		
.	CO433 DATAMO	FD O*MONTH(1-12)	00460	22242	33115		
			00461	51614	16162		
			00462	40050	50505		
.	CO434	77777 77777	00463	77777	77777		
.	CO435 DATODELT	FD 1*A	00464	06050	50505		
.	CO436	77777 DATADELT	00465	77777	00472		
.	CO437	FD O*F7	00466	13670	50505		
.	CO440	77777 TJMPDELT	00467	77777	00763		
.	CO441 DATIDELT	FD 1*F	00470	13050	50505		
.	CO442	OO TJMPDELT	00471	00000	00763		
.	CO443 DATADELT	FD O*JUMP INTERVAL (SEC)	00472	17322	22505		
			00473	16233	11227		
			00474	33062	10551		
			00475	30121	04005		
.	CO444	77777 77777	00476	77777	77777		
.	CO445 DATOMODE	FD 1*A	00477	06050	50505		
.	CO446	77777 DATAMODE	00500	77777	00507		
.	CO447	FD O*D	00501	11050	50505		
.	CO450	77777 TOMODE	00502	77777	00765		
.	CO451 DATIMODE	FD 1*O	00503	24050	50505		
.	CO452	IO TOMODE	00504	00010	00765		
.	CO453	O 1	00505	00000	00001		
.	CO454	C 2	00506	00000	00002		
.	CO455 DATAMODE	FD O*MODE... TRACK(1) OR JUMP(2)	00507	22241	11275		
			00510	75750	53127		
			00511	06102	05161		
			00512	40052	42705		
			00513	17322	22551		
			00514	62400	50505		
.	CO456	77777 77777	00515	77777	77777		
.	CO457 DATMESS	U-TAG DATMRAM*O	00516	00523	00000		
.	CO460	U-TAG DATMW*O	00517	00525	00000		
.	CO461	U-TAG DATMI*O	00520	00527	00000		
.	CO462	U-TAG DATME*O	00521	00531	00000		
.	CO463	U-TAG DATMM*O	00522	00533	00000		
.	CO464 DATMRAM	FD 1*A	00523	06050	50505		
.	CO465	77777 DATMESRAM	00524	77777	00535		
.	CO466 DATMW	FD 1*A	00525	06050	50505		
.	CO467	77777 DATMESW	00526	77777	00543		
.	CO470 DATMI	FD 1*A	00527	06050	50505		
.	CO471	77777 DATMESI	00530	77777	00550		
.	CO472 DATME	FD 1*A	00531	06050	50505		
.	CO473	77777 DATMESE	00532	77777	00554		

CAROS	L1 IO LABEL	TA STATEMENT	LOC	F JKB Y	NOTES
.	C0474 OATMM	FD 1*A	00533	06050 50505	
.	C0475	77777 DATMESM	00534	77777 00560	
.	C0476 DATMESRAM	FD 0*RIGHT ASCENSION OF A/N	00535	27161 41531	
			00536	05063 01012	
			00537	23301 62423	
			00540	05241 30506	
			00541	74230 50505	
.	C0477	77777 77777	00542	77777 77777	
.	C0500 OATMESW	FD 0*ARGUMENT OF PERIGEE	00543	06271 43222	
			00544	12233 10524	
			00545	13052 51227	
			00546	16141 21205	
.	C0501	77777 77777	00547	77777 77777	
.	C0502 DATMESI	FD 0*INCLINATION	00550	16231 02116	
			00551	23063 11624	
			00552	23050 50505	
.	C0503	77777 77777	00553	77777 77777	
.	C0504 OATMESE	FD 0*ECCENTRICITY	00554	12101 01223	
			00555	31271 61016	
			00556	31360 50505	
.	C0505	77777 77777	00557	77777 77777	
.	C0506 OATMESM	FD 0*MEAN ANOMALY	00560	22120 62305	
			00561	06232 42206	
			00562	21360 50505	
.	C0507	77777 77777	00563	77777 77777	
.	C0510 MZERO	0 0	00564	00000 00000	
.	C0511	0 0	00565	00000 00000	
.	C0512 MCNE	0 0	00566	00000 00000	
.	C0513	0 0	00567	00000 00000	
.	C0514 MTWO	0 0	00570	00000 00000	
.	C0515	0 0	00571	00000 00000	
.	C0516 MTHREE	0 0	00572	00000 00000	
.	C0517	0 0	00573	00000 00000	
.	C0520 MFOUR	0 0	00574	00000 00000	
.	C0521	0 0	00575	00000 00000	
.	C0522 MFIVE	0 0	00576	00000 00000	
.	C0523	0 0	00577	00000 00000	
.	C0524 EZERO	0 0	00600	00000 00000	
.	C0525	0 0	00601	00000 00000	
.	C0526 ECNE	0 0	00602	00000 00000	
.	C0527	0 0	00603	00000 00000	
.	C0530 ETWO	0 0	00604	00000 00000	
.	C0531	0 0	00605	00000 00000	
.	C0532 ETHREE	0 0	00606	00000 00000	
.	C0533	0 0	00607	00000 00000	
.	C0534 EFOUR	0 0	00610	00000 00000	
.	C0535	0 0	00611	00000 00000	
.	C0536 EFIVE	0 0	00612	00000 00000	
.	C0537	0 0	00613	00000 00000	
.	C0540 IZEROX	0 0	00614	00000 00000	
.	C0541	0 0	00615	00000 00000	
.	C0542 ICNE	0 0	00616	00000 00000	
.	C0543	0 0	00617	00000 00000	

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 SATEL MCQUILKIN*7/1/65

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C0544	ITWO	0	0			
.	C0545		0	0			
.	C0546	ITHREE	0	0			
.	C0547		0	0			
.	C0550	IFOUR	0	0			
.	C0551		0	0			
.	C0552	IFIVE	0	0			
.	C0553		0	0			
.	C0554	WZERO	0	0			
.	C0555		0	0			
.	C0556	WCNE	0	0			
.	C0557		0	0			
.	C0560	WTWO	0	0			
.	C0561		0	0			
.	C0562	WTHREE	0	0			
.	C0563		0	0			
.	C0564	WFOUR	0	0			
.	C0565		0	0			
.	C0566	WFIVE	0	0			
.	C0567		0	0			
.	C0570	RAMZERO	0	0			
.	C0571		0	0			
.	C0572	RAMONE	0	0			
.	C0573		0	0			
.	C0574	RAMTWO	0	0			
.	C0575		0	0			
.	C0576	RAMTHREE	0	0			
.	C0577		0	0			
.	C0600	RAMFOUR	0	0			
.	C0601		0	0			
.	C0602	RAMFIVE	0	0			
.	C0603		0	0			
.	C0604	JMPDELT	0	0			
.	C0605		0	0			
.	C0606	DPCDE	0	0			
.	C0607	TLAST	0	0			
.	C0610		0	0			
.	C0611	TZERO	0	0			
.	C0612		0	0			
.	C0613	TNZERO	0	0			
.	C0614		0	0			
.	C0615	TMCNE	0	0			
.	C0616		0	0			
.	C0617	TMTWO	0	0			
.	C0620		0	0			
.	C0621	TMTTHREE	0	0			
.	C0622		0	0			
.	C0623	TMTFOUR	0	0			
.	C0624		0	0			
.	C0625	TMTFIVE	0	0			
.	C0626		0	0			
.	C0627	TEZERO	0	0			
.	C0630		0	0			
			00620	00000	00000		
			00621	00000	00000		
			00622	00000	00000		
			00623	00000	00000		
			00624	00000	00000		
			00625	00000	00000		
			00626	00000	00000		
			00627	00000	00000		
			00630	00000	00000		
			00631	00000	00000		
			00632	00000	00000		
			00633	00000	00000		
			00634	00000	00000		
			00635	00000	00000		
			00636	00000	00000		
			00637	00000	00000		
			00640	00000	00000		
			00641	00000	00000		
			00642	00000	00000		
			00643	00000	00000		
			00644	00000	00000		
			00645	00000	00000		
			00646	00000	00000		
			00647	00000	00000		
			00650	00000	00000		
			00651	00000	00000		
			00652	00000	00000		
			00653	00000	00000		
			00654	00000	00000		
			00655	00000	00000		
			00656	00000	00000		
			00657	00000	00000		
			00660	00000	00000		
			00661	00000	00000		
			00662	00000	00000		
			00663	00000	00000		
			00664	00000	00000		
			00665	00000	00000		
			00666	00000	00000		
			00667	00000	00000		
			00670	00000	00000		
			00671	00000	00000		
			00672	00000	00000		
			00673	00000	00000		
			00674	00000	00000		
			00675	00000	00000		
			00676	00000	00000		
			00677	00000	00000		
			00700	00000	00000		
			00701	00000	00000		
			00702	00000	00000		
			00703	00000	00000		
			00704	00000	00000		

SPURT OUTPUT NO. 210
MCQUILKIN*7/1/65

SATEL

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F JKB Y	NOTES
.	C0631 TECNE	O O	00705	00000 00000	
.	C0632	C O	00706	00000 00000	
.	C0633 TETWC	C O	00707	00000 00000	
.	C0634	C O	00710	00000 00000	
.	C0635 TETHREE	O O	00711	00000 00000	
.	C0636	O O	00712	00000 00000	
.	C0637 TEFOUR	C O	00713	00000 00000	
.	C0640	C O	00714	00000 00000	
.	C0641 TEFIVE	C O	00715	00000 00000	
.	C0642	O O	00716	00000 00000	
.	C0643 TIZEROX	C O	00717	00000 00000	
.	C0644	C O	00720	00000 00000	
.	C0645 TICNE	O O	00721	00000 00000	
.	C0646	O O	00722	00000 00000	
.	C0647 TITWC	O O	00723	00000 00000	
.	C0650	O O	00724	00000 00000	
.	C0651 TITHREE	O O	00725	00000 00000	
.	C0652	O O	00726	00000 00000	
.	C0653 TIFOUR	O O	00727	00000 00000	
.	C0654	O O	00730	00000 00000	
.	C0655 TIFIVE	O O	00731	00000 00000	
.	C0656	O O	00732	00000 00000	
.	C0657 TWZERO	O O	00733	00000 00000	
.	C0660	C O	00734	00000 00000	
.	C0661 TWONE	O O	00735	00000 00000	
.	C0662	O O	00736	00000 00000	
.	C0663 TWTWO	O O	00737	00000 00000	
.	C0664	O O	00740	00000 00000	
.	C0665 TWTTHREE	O O	00741	00000 00000	
.	C0666	O O	00742	00000 00000	
.	C0667 TWFOUR	O O	00743	00000 00000	
.	C0670	C O	00744	00000 00000	
.	C0671 TWFIVE	O O	00745	00000 00000	
.	C0672	C O	00746	00000 00000	
.	C0673 TRAMZERO	O O	00747	00000 00000	
.	C0674	O O	00750	00000 00000	
.	C0675 TRAMONE	O O	00751	00000 00000	
.	C0676	O O	00752	00000 00000	
.	C0677 TRAMTWO	O O	00753	00000 00000	
.	C0700	C O	00754	00000 00000	
.	C0701 TRAMTHREE	O O	00755	00000 00000	
.	C0702	O O	00756	00000 00000	
.	C0703 TRAMFOUR	O O	00757	00000 00000	
.	C0704	O O	00760	00000 00000	
.	C0705 TRAMFIVE	O O	00761	00000 00000	
.	C0706	O O	00762	00000 00000	
.	C0707 T J M P D E L T	O O	00763	00000 00000	
.	C0710	O O	00764	00000 00000	
.	C0711 TCMODE	O O	00765	00000 00000	
.	C0712	O O	00766	00000 00000	
.	C0713 VCAY	O O	00767	00000 00000	
.	C0714	O O	00770	00000 00000	
.	C0715 E C M O D E	O O	00771	00000 00000	

..... SPUPT OUTPUT NO. 210
 SATEL MCQUIL KIN#7/1/65

CARDS	LI	ID	LABEL	TA	STATEMENT	LOC	F	JKB	Y	NOTES
.	C0716		RAMCNT	0	0	00772	00000	00000		
.	C0717		WCNT	0	0	00773	00000	00000		
.	C0720		ICNT	0	0	00774	00000	00000		
.	C0721		ECNT	0	0	00775	00000	00000		
.	C0722		MCNT	0	0	00776	00000	00000		
.	C0723		DATAHAHA	0	77777	00777	00000	77777		
.	C0724		DATAWRES	05053	46044	01000	05053	46044		
.	C0725		DATARAMRES	05270	66044	01001	05270	66044		
.	C0726		DATAIRES	05051	66044	01002	05051	66044		
.	C0727		DATAERES	05051	26044	01003	05051	26044		
.	C0730		DATAMRES	05052	26044	01004	05052	26044		
.	C0731		UPCALC		ENTRY	01005	61000	00000		
.	C0732			STR	B2*L(UPDATB2)	01006	16210	01157		INITIALIZATION
.	C0733			STR	B3*L(UPDATB3)	01007	16310	01160		
.	C0734			STR	B5*L(UPDATB5)	01010	16510	01161		
.	C0735			STR	B6*L(UPDATB6)	01011	16610	01162		
.	C0736			ENT	A*W(VMONTH)	01012	11030	01304		EPOCH MONTH
.	C0737			SUB	A*1	01013	21000	00001		X
.	C0740			ENT	B7*A	01014	12770	00000		X
.	C0741			ENT	A*W(VYEAR)	01015	11030	01302		
.	C0742			SEL	CL*X77774	01016	52040	77774		
.	C0743			ENT	Q*A	01017	10070	00000		
.	C0744			ENT	A*W(DYPRMO+B7)	01020	11037	01233		
.	C0745			ADD	Q*0*QZERO	01021	26400	00000		
.	C0746			JP	\$+3	01022	61000	01025		
.	C0747			COM	A*59D*YMORE	01023	04700	00073		
.	C0750			ADD	A*1	01024	20000	00001		
.	C0751	UFC001		STR	A*W(BDAY)	01025	15030	01266		
.	C0752			ENT	A*U(YEARMONTH)	01026	11020	63147		
.	C0753			SUB	A*1957D	01027	21000	03645		
.	C0754			ENT	B7*A	01030	12770	00000		
.	C0755			ENT	A*W(DYPRYR+B7)	01031	11037	01247		
.	C0756			ADD	A*L(DAY)	01032	20010	63150		
.	C0757			STR	A*W(BDAYNOW)	01033	15030	01267		
.	C0760			ENT	A*W(VYEAR)	01034	11030	01302		
.	C0761			SUB	A*1957D	01035	21000	03645		
.	C0762			ENT	B7*A	01036	12770	00000		
.	C0763			ENT	A*W(DYPRYR+B7)	01037	11037	01247		
.	C0764			ADD	A*W(BDAY)	01040	20030	01266		
.	C0765			STR	A*W(BDAY1)	01041	15030	01306		
.	C0766			RJP	FF	01042	65000	05323		CONVERT-DAYS UNTIL EPOCH MONTH - TO FLIPT
.	C0767			0	BDAY1	01043	00000	01306		
.	C0770			U-TAG	FLTBDAY*10	01044	01270	00010		X
.	C0771			RJP	FF	01045	65000	05323		ADD EPOCH DAY OF MONTH + EPOCH DAYS
.	C0772			U-TAG	FLTBDAY*VDAY	01046	01270	00767		X
.	C0773			U-TAG	NSTIME*00	01047	01272	00000		X
.	C0774			RJP	FF	01050	65000	05323		CONVERT PYR-EYR+PDAYS TO FLIPT
.	C0775			0	BDAYNOW	01051	00000	01267		X
.	C0776			U-TAG	FLTNDAY*10	01052	01274	00010		X
.	C0777			RJP	FF	01053	65000	05323		PRESENT NO.DAYS)-(EPOCH DAYS)

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C1000	U-TAG FLTNDAY*NSTIME	01054	01274	01272		
.	C1001	U-TAG UPDIFF*01	01055	01227	00001		
.	C1002	ENT B5*0	01056	12500	00000		INDEX FOR WHICH PARAMETER GROUP
.	C1003	ENT B6*0	01057	12600	00000		
.	C1004 UPDAT01	CL W(UPSUM)	01060	16030	01200		
.	C1005	CL W(UPSUM+1)	01061	16030	01201		
.	C1006	MOVE 2*FLTONE*CFTABLE+B6	01062	10030	04016		SET UP TABLE OF COEFFICIENTS
			01063	14036	01206		
			01064	10030	04017		
			01065	14036	01207		
.	C1007	ENT B6*B6+1	01066	12606	00001		
.	C1010	BSK B6*13	01067	71600	00013		
.	C1011	JP UPDAT01	01070	61000	01060		
.	C1012 UPDAT02	CL W(DERCNT)	01071	16030	01204		COUNT FOR WHICH DERIVATIVE
.	C1013	ENT B3*0	01072	12300	00000		B3, INDEX FOR PARAMETERS WITHIN A GROUP
.	C1014 UPDAT03	ENT B2*0	01073	12200	00000		B2, INDEX FOR WHICH PART OF SUM CALC.
.	C1015	CL W(TCNT)	01074	16030	01205		COUNT FOR MULT. BY TIME DIFF
.	C1016 UPDAT04	ENT B7*L(DATATYP1+B5)	01075	12715	01222		
.	C1017	STR B3*L(\$+1)	01076	16310	01077		
.	C1020	ENT B7*B7+00	01077	12707	00000		
.	C1021	STR B7*U(UPDAT05)	01100	16720	01106		
.	C1022	ENT B7*CFTABLE+B3	01101	12703	01206		
.	C1023	STR B7*L(UPDAT05)	01102	16710	01106		
.	C1024	STR B7*L(UPDAT07)	01103	16710	01121		
.	C1025	STR B7*U(UPDAT07+1)	01104	16720	01122		
.	C1026	RJP FF	01105	65000	05323		MULT PARAMETER BY COEFF.
.	C1027 UPDAT05	O 0	01106	00000	00000		
.	C1030	U-TAG UPADD*02	01107	01231	00002		
.	C1031 UPDAT06	ENT A*B2	01110	11002	00000		TEST FINISHED MULT. BY TIME DIFF
.	C1032	SUB A*W(TCNT)*AZERO	01111	21430	01205		
.	C1033	JP UPDAT21	01112	61000	01164		NO
.	C1034	ENT A*W(TCNT)*ANOT	01113	11530	01205		YES, TEST IS TIME CNT ZERO
.	C1035	JP UPDAT10	01114	61000	01123		YES
.	C1036	RJP FF	01115	65000	05323		NO, MULT. CNT BY COEFF. TO GET NEW
.	C1037	O TCNT	01116	00000	01205		COEFF. FOR NEXT DERIVATIVE
.	C1040	U-TAG TCNTFLT*10	01117	01202	00010		
.	C1041	RJP FF	01120	65000	05323		
.	C1042 UPDAT07	U-TAG TCNTFLT*0	01121	01202	00000		
.	C1043	O 02	01122	00000	00002		
.	C1044 UPDAT10	CL W(TCNT)	01123	16030	01205		CLEAR COUNT FOR MULT. BY TIME DIFF.
.	C1045	RJP FF	01124	65000	05323		ACCUMULATE SUM
.	C1046	U-TAG UPADD*UPSUM	01125	01231	01200		
.	C1047	U-TAG UPSUM*0	01126	01200	00000		
.	C1050	ENT B2*B2+1	01127	12202	00001		
.	C1051	ENT B3*B3+2	01130	12303	00002		
.	C1052	ENT A*B3	01131	11003	00000		TEST, LAST PARAMETER OF GROUP B EING USED

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CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C1053	RSH A*1	01132	02000	00001		
.	C1054	SUB A*W(RAMCNT+B5)*AZERO	01133	21435	00772		
.	C1055	JP UPDAT04	01134	61000	01075		NO
.	C1056	ENT A*W(DERCNT)	01135	11030	01204		YES, DIVIDE BY CORRECT FACTORI ALS AND STORE
.	C1057	LSH A*1	01136	06000	00001		
.	C1060	ENT B7*A	01137	12770	00000		
.	C1061	ENT A*CFTABLE+B7	01140	11007	01206		
.	C1062	STR A*L(UPDAT11)	01141	15010	01147		
.	C1063	ENT A*W(DATATYP1+B5)	01142	11035	01222		
.	C1064	STR A*L(\$+1)	01143	15010	01144		
.	C1065	ENT B7*B7+0	01144	12707	00000		
.	C1066	STR B7*U(UPDAT11+1)	01145	16720	01150		
.	C1067	RJP FF	01146	65000	05323		
.	C1070 UPDAT11	U-TAG UPSUM*0	01147	01200	00000		
.	C1071	O 03	01150	00000	00003		
.	C1072	ENT A*1	01151	11000	00001		ADD ONE TO CNT FOR SHICH DERIV ATIVE
.	C1073	RPL A+Y*W(DERCNT)	01152	24030	01204		
.	C1074	SUB A*W(RAMCNT+B5)*AZERO	01153	21435	00772		TEST LAST DERIVATIVE OF GROUP CALC.
.	C1075	JP UPDAT22	01154	61000	01172		NO
.	C1076	BSK B5*4	01155	71500	00004		TEST LAST PARAMETER GROUP
.	C1077	JP UPDAT01	01156	61000	01060		NO
.	C1100 UPDATB2	ENT B2*0	01157	12200	00000		YES,EXIT
.	C1101 UPDATB3	ENT B3*0	01160	12300	00000		
.	C1102 UPDATB5	ENT B5*0	01161	12500	00000		
.	C1103 UPDATB6	ENT B6*0	01162	12600	00000		
.	C1104	EXIT	01163	61010	01005		
.	C1105 UPDAT21	RJP FF	01164	65000	05323		TIME MULT. LOOP
.	C1106	U-TAG UPADD*UPDIFF	01165	01231	01227		
.	C1107	U-TAG UPADD*02	01166	01231	00002		
.	C1110	ENT A*1	01167	11000	00001		
.	C1111	RPL A+Y*W(TCNT)	01170	24030	01205		
.	C1112	JP UPDAT06	01171	61000	01110		
.	C1113 UPDAT22	ENT A*L(DERCNT)	01172	11010	01204		
.	C1114	LSH A*1	01173	06000	00001		
.	C1115	ENT B3*A	01174	12370	00000		
.	C1116	CL W(UPSUM)	01175	16030	01200		
.	C1117	CL W(UPSUM+1)	01176	16030	01201		
.	C1120	JP UPDAT03	01177	61000	01073		
.	C1121 UPSUM	O 0	01200	00000	00000		
.	C1122	O 0	01201	00000	00000		
.	C1123 TCNTFLT	O 0	01202	00000	00000		
.	C1124	O 0	01203	00000	00000		
.	C1125 DERCNT	O 0	01204	00000	00000		
.	C1126 TCNT	O 0	01205	00000	00000		
.	C1127 CFTABLE	O 0	01206	00000	00000		
.	C1130	O 0	01207	00000	00000		
.	C1131	O 0	01210	00000	00000		
.	C1132	O 0	01211	00000	00000		
.	C1133	O 0	01212	00000	00000		
.	C1134	O 0	01213	00000	00000		

CARDS	L1 ID LABEL	TA	STATEMENT	LOC	F	JKB	Y	NOTES
.	C1135	C	0	01214	00000	00000		
.	C1136	C	0	01215	00000	00000		
.	C1137	C	0	01216	00000	00000		
.	C1140	C	0	01217	00000	00000		
.	C1141	C	0	01220	00000	00000		
.	C1142	C	0	01221	00000	00000		
.	C1143 DATATYP1	C	RAMZERO	01222	00000	00644		
.	C1144	C	WZERO	01223	00000	00630		
.	C1145	C	IZEROX	01224	00000	00614		
.	C1146	C	EZERO	01225	00000	00600		
.	C1147	C	MZERO	01226	00000	00564		
.	C1150 UPCIFF	C	0	01227	00000	00000		
.	C1151	C	0	01230	00000	00000		
.	C1152 UFADD	C	0	01231	00000	00000		
.	C1153	C	0	01232	00000	00000		
.	C1154 DYPRMC	C	0	01233	00000	00000		
.	C1155	C	37	01234	00000	00037		
.	C1156	C	73	01235	00000	00073		
.	C1157	C	132	01236	00000	00132		
.	C1160	C	170	01237	00000	00170		
.	C1161	C	227	01240	00000	00227		
.	C1162	C	265	01241	00000	00265		
.	C1163	C	324	01242	00000	00324		
.	C1164	C	363	01243	00000	00363		
.	C1165	C	421	01244	00000	00421		
.	C1166	C	460	01245	00000	00460		
.	C1167	C	516	01246	00000	00516		
.	C1170 DYPRYR	C	556	01247	00000	00556		
.	C1171	C	1333	01250	00000	01333		
.	C1172	C	2110	01251	00000	02110		
.	C1173	C	2665	01252	00000	02665		
.	C1174	C	3443	01253	00000	03443		
.	C1175	C	4220	01254	00000	04220		
.	C1176	C	4775	01255	00000	04775		
.	C1177	C	5552	01256	00000	05552		
.	C1200	C	6330	01257	00000	06330		
.	C1201	C	7105	01260	00000	07105		
.	C1202	C	7662	01261	00000	07662		
.	C1203	C	10437	01262	00000	10437		
.	C1204	C	11214	01263	00000	11214		
.	C1205	C	11771	01264	00000	11771		
.	C1206	C	12546	01265	00000	12546		1970
.	C1207 BCAY	C		01266	00000	00000		
.	C1210 BCAYNCW	C		01267	00000	00000		
.	C1211 FLTBCAY	C		01270	00000	00000		
.	C1212	C		01271	00000	00000		
.	C1213 NSTIME	C		01272	00000	00000		
.	C1214	C		01273	00000	00000		
.	C1215 FLTNDAY	C		01274	00000	00000		
.	C1216	C		01275	00000	00000		
.	C1217 TIMETEMP	C		01276	00000	00000		
.	C1220	C		01277	00000	00000		
.	C1221 NTIME1	C		01300	00000	00000		

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C1222	G	01301	00000	00000		
.	C1223 VYEAR	O O	01302	00000	00000		
.	C1224	O O	01303	00000	00000		
.	C1225 VMCNTH	O O	01304	00000	00000		
.	C1226	O O	01305	00000	00000		
.	C1227 BCAY1	O O	01306	00000	00000		
.	C1230	O O	01307	00000	00000		
.	C1231 MCALC	ENTRY	01310	61000	00000		
.	C1232	CL W(EPRESW)	01311	16030	03705		
.	C1233 MCAL3	STR B1*L(MCAL3B1)	01312	16110	01556		INITIALIZATION FOR CALCULATION OF M E I R
.	C1234	STR B2*L(MCAL3B2)	01313	16210	01557		
.	C1235	STR B3*L(MCAL3B3)	01314	16310	01560		
.	C1236	STR B4*L(MCAL3B4)	01315	16410	01561		
.	C1237	STR B5*L(MCAL3B5)	01316	16510	02666		
.	C1240	ENT B1*0	01317	12100	00000		COUNT FOR EACH NEW TIME
.	C1241	ENT B5*0	01320	12500	00000		INDEX FOR STORING CALL FUNCTIO N
.	C1242 MCAL3A	ENT B2*4	01321	12200	00004		INDEX FOR PARAMETERS COUNTERS
.	C1243	ENT B4*0	01322	12400	00000		INDEX FOR NEW TYPE PARAMETER
.	C1244 MCAL3B	MOVE 12D*MZERO+B4*MCALARGU	01323	10004	00564		MOVE TO NEXT TYPE INPUT PARAME TER
			01324	14010	01326		
			01325	12700	00013		
			01326	10037	00000		
			01327	14037	03547		
			01330	72700	01326		
.	C1245	RJP MCALCAL	01331	65000	01343		XYES
.	C1246	STR B7*L(MCALCALEX+2)	01332	16710	01411		
.	C1247	RJP MCALMOD	01333	65000	05266		
.	C1250	ENT A*B2	01334	11002	00000		TEST FOR LAST TYPE PARAMETER
.	C1251	ADD A*0*ANOT	01335	20500	00000		X
.	C1252	JP MCAL3EX	01336	61000	01340		XYES BRIND IN NEW TIME
.	C1253	ENT B4*B4+12D	01337	12404	00014		X NO CHANGE INPUT INDICES
.	C1254 MCAL3EX	ENT B5*B5+1	01340	12505	00001		CHANGE STORAGE LOCATION
.	C1255	BJP B2*MCAL3B	01341	72200	01323		NEW PARAMETERS
.	C1256	JP MCALCALN	01342	61000	01413		NEW TIME
.	C1257 MCALCAL	ENTRY	01343	61000	00000		
.	C1260	STR B6*L(MCALCALEX+1)	01344	16610	01410		INITIALIZATION
.	C1261	STR B5*L(MCALCALEX)	01345	16510	01407		
.	C1262	ENT B6*0	01346	12600	00000		COUNT FOR WHICH OMEG
.	C1263	ENT B5*0	01347	12500	00000		COUNT FOR MULTIPLICATIONS BY (
							T-T0)
.	C1264	CL W(MCALCNT)	01350	16030	03565		
.	C1265	MOVE 2*MCALARGU*MCALSUM	01351	10030	03547		CALCULATE FUNC(T)
			01352	14030	03563		
			01353	10030	03550		
			01354	14030	03564		
.	C1266 MCAL30D	ENT A*W(MCALCNT)	01355	11030	03565		X COUNT FOR NUMBER OF ARGUMENT
							S
.	C1267	ADD A*1	01356	20000	00001		X
.	C1270	STR A*W(MCALCNT)	01357	15030	03565		X

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C1271	SUB A=W(RAMCNT+B2)*ANOT	01360	21532	00772		
.	C1272	JP MCALCALEX	01361	61000	01407		X
.	C1273	ENT B6*2+B6	01362	12606	00002		X
.	C1274	ENT B7*MCALARGU+B6	01363	12706	03547		X PARANS(T-TO)\$N
.	C1275	STR B7*U(MCALFLT2)	01364	16720	01366		X X
.	C1276	RJP FF	01365	65000	05323		X X
.	C1277 MCALFLT2	O MTIME	01366	00000	03530		X X
.	C1300	U-TAG MTEMP4*O2	01367	03744	00002		X
.	C1301 MCAL3AA	ENT B5*2+B5	01370	12505	00002		X ADD 2 TO CNT FOR MULT BY (T-TO)
.	C1302	ENT A=B5	01371	11005	00000		X TEST B6=B5
.	C1303	ENT Q=A	01372	10070	00000		X X
.	C1304	ENT A=B6	01373	11006	00000		X X
.	C1305	STR A-Q*W(MCALSTORB)*ANOT	01374	33530	03541		X X
.	C1306	JP MCAL3BB	01375	61000	01402		X X YES
.	C1307	RJP FF	01376	65000	05323		X X (T-TO)\$N
.	C1310	U-TAG MTEMP4*MTIME	01377	03744	03530		X
.	C1311	U-TAG MTEMP4*O2	01400	03744	00002		X
.	C1312	JP MCAL3AA	01401	61000	01370		X
.	C1313 MCAL3BB	ENT B5*O	01402	12500	00000		PART OF SUM CALCULATED
.	C1314	RJP FF	01403	65000	05323		X ACCUMULATING THE SUM
.	C1315	U-TAG MCALSUM*MTEMP4	01404	03563	03744		X
.	C1316	U-TAG MCALSUM*OO	01405	03563	00000		X
.	C1317	JP MCAL3DD	01406	61000	01355		
.	C1320 MCALCALEX	ENT B5*O	01407	12500	00000		
.	C1321	ENT B6*O	01410	12600	00000		
.	C1322	ENT B7*O	01411	12700	00000		
.	C1323	EXIT	01412	61010	01343		
.	C1324 MCALCALN	STR B7*L(MCALCALNB7)	01413	16710	01554		CALCULATE N(T(=D(M(T(=
.	C1325	ENT Q=12000	01414	10000	12000		
.	C1326	STR Q*U(MCALNSW)	01415	14020	01526		
.	C1327	STR Q*U(MCALCALN2)	01416	14020	01503		
.	C1330	CL A*	01417	11000	00000		
.	C1331	ADD A=1	01420	20000	00001		
.	C1332	STR A*W(TCNTA)	01421	15030	04000		
.	C1333	ENT B4*O	01422	12400	00000		CNT MULT BY (T-TO)
.	C1334	ENT B6*O	01423	12600	00000		INDEX TO ACCESS INPUT PARAMETER
.	C1335	ENT B3*O	01424	12300	00000		RS
.	C1336 MCALCALN1A	CL A*	01425	11000	00000		
.	C1337	ADD A=1	01426	20000	00001		
.	C1340	STR A*W(MCALCNT)	01427	15030	03565		INDEX WHICH INPUT PARAMETER O-5
.	C1341	ENT B6*2+B6	01430	12606	00002		
.	C1342	MOVE 2*MZERO+B6*MCALSUM	01431	10036	00564		STORE M1,OMEG1,RAM1
.			01432	14030	03563		
.			01433	10036	00565		
.			01434	14030	03564		
.	C1343 MCALCALN1	ENT A*W(MCALCNT)	01435	11030	03565		
.	C1344	ADD A=1	01436	20000	00001		
.	C1345	STR A*W(MCALCNT)	01437	15030	03565		
.	C1346	ENT A*W(MCNT+B3)	01440	11033	00776		
.	C1347	SUB A=1*ANOT	01441	21500	00001		TEST MORE THAN ONE INPUT PARAM

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CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C1350	JP MCALCALN5	01442	61000	01547		NO
.	C1351	ENT A*W(MCNT+B3)	01443	11033	00776		
.	C1352	SUB A*W(MCALCNT)*ANOT	01444	21530	03565		TEST MORE THAN TWO INPUT
.	C1353	JP MCALCALN2D	01445	61000	01477		NO
.	C1354	ENT B6*2+B6	01446	12606	00002		
.	C1355	ENT B7*MZERO+B6	01447	12706	00564		
.	C1356	STR B7*U(MCALFLT3)	01450	16720	01452		
.	C1357	RJP FF	01451	65000	05323		2\$M2
.	C1360 MCALFLT3	O FLTTWO	01452	00000	04012		X
.	C1361	U-TAG MTEMP5*O2	01453	03746	00002		X
.	C1362	RJP FF	01454	65000	05323		2\$M2\$(T-T0) ETC.
.	C1363	U-TAG MTEMP5*MTIME	01455	03746	03530		X
.	C1364	U-TAG MTEMP4*O2	01456	03744	00002		X
.	C1365 MCALCALN3	ENT B4*1+B4	01457	12404	00001		CNT FOR MULT B4(T-T0)
.	C1366	ENT A*B4	01460	11004	00000		
.	C1367	ADD A*1	01461	20000	00001		
.	C1370	SUB A*W(MCALCNT)*ANOT	01462	21530	03565		TEST FINISH MULT BY (T-T0)
.	C1371	JP MCALCALN4	01463	61000	01470		YES
.	C1372	RJP FF	01464	65000	05323		NO
.	C1373	U-TAG MTEMP4*MTIME	01465	03744	03530		
.	C1374	U-TAG MTEMP4*O2	01466	03744	00002		
.	C1375	JP MCALCALN3	01467	61000	01457		
.	C1376 MCALCALN4	RJP FF	01470	65000	05323		ACCUMULATE THE SUM
.	C1377	U-TAG MTEMP4*MCALSUM	01471	03744	03563		X
.	C1400	U-TAG MCALSUM*O0	01472	03563	00000		X
.	C1401	RJP FF	01473	65000	05323		INCREASE CONSTANT TERM
.	C1402	U-TAG FLTTWO*FLTONE	01474	04012	04016		X
.	C1403	U-TAG FLTTWO*O0	01475	04012	00000		X
.	C1404	JP MCALCALN1	01476	61000	01435		
.	C1405 MCALCALN2D	MOVE 2*FLTTWOX*FLTTWO	01477	10030	04014		
			01500	14030	04012		
			01501	10030	04015		
			01502	14030	04013		
.	C1406 MCALCALN2	JP MCALCALN2C	01503	61000	01516		
.	C1407	ENT B7*MM+B5	01504	12705	03626		X
.	C1410	STR B7*U(MCALCALN2A)	01505	16720	01510		X
.	C1411	RJP FF	01506	65000	05323		X
.	C1412	32D MCALSUM	01507	00040	03563		X
.	C1413 MCALCALN2A	C 11	01510	00000	00011		X
.	C1414	MOVE 2*FLTTWOX*FLTTWO	01511	10030	04014		X
			01512	14030	04012		
			01513	10030	04015		
			01514	14030	04013		
.	C1415	JP MCALCAL2B	01515	61000	01523		
.	C1416 MCALCALN2C	ENT B7*MM+B5	01516	12705	03626		
.	C1417	STR B7*U(MCALCALN2E)	01517	16720	01522		
.	C1420	RJP FF*	01520	65000	05323		
.	C1421	41D MCALSUM	01521	00051	03563		
.	C1422 MCALCALN2E	O 11	01522	00000	00011		
.	C1423 MCALCAL2B	ENT A*W(TCNTA)	01523	11030	04000		
.	C1424	SUB A*3*ANOT	01524	21500	00003		
.	C1425	JP MCALCALNB7	01525	61000	01554		

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C1426	MCALNSW JP MCALDRAM	01526	61000	01542		
.	C1427	ENT B4*0	01527	12400	00000		
.	C1430	ENT B6*360	01530	12600	00044		
.	C1431	ENT B5*B5+1	01531	12505	00001		
.	C1432	ENT B3*-3	01532	12300	77774		
.	C1433	ENT Q*61000	01533	10000	61000		
.	C1434	STR Q*U(MCALNSW)	01534	14020	01526		
.	C1435	STR Q*U(MCALCALN2)	01535	14020	01503		
.	C1436	MCALNSW1 ENT A*W(TCNTA)	01536	11030	04000		
.	C1437	ADD A*1	01537	20000	00001		
.	C1440	STR A*W(TCNTA)	01540	15030	04000		
.	C1441	JP MCALCALN1A	01541	61000	01425		
.	C1442	MCALDRAM ENT B4*0	01542	12400	00000		
.	C1443	ENT B6*480	01543	12600	00060		
.	C1444	ENT B5*B5+1	01544	12505	00001		
.	C1445	ENT B3*-4	01545	12300	77773		
.	C1446	JP MCALNSW1	01546	61000	01536		
.	C1447	MCALCALN5 ENT A*W(TCNTA)	01547	11030	04000		
.	C1450	COM A*2*YLESS	01550	04600	00002		
.	C1451	RJP SERROR	01551	65000	04053		
.	C1452	STR B0*W(MM+B5)	01552	16035	03626		
.	C1453	JP MCALCAL2B	01553	61000	01523		
.	C1454	MCALCALNB7 ENT B7*0	01554	12700	00000		
.	C1455	ENT B6*0	01555	12600	00000		X
.	C1456	MCAL3B1 ENT B1*0	01556	12100	00000		
.	C1457	MCAL3B2 ENT B2*0	01557	12200	00000		
.	C1460	MCAL3B3 ENT B3*0	01560	12300	00000		
.	C1461	MCAL3B4 ENT B4*0	01561	12400	00000		
.	C1462	MCALNB6 ENT B6*0	01562	12600	00000		
.	C1463	MCORRECT ENT A*W(EQMODE)*AZERO	01563	11430	00771		
.	C1464	JP MCALPINIT	01564	61000	01613		
.	C1465	STR B6*L(MTABLEB6)	01565	16610	01612		
.	C1466	ENT B6*4	01566	12600	00004		
.	C1467	ENT A*W(DATE)	01567	11030	03532		
.	C1470	LSH A*3	01570	06000	00003		
.	C1471	SUB A*W(DATECON1)	01571	21030	03576		X JD-2,400,000.5=MJD
.	C1472	RSH A*3	01572	02000	00003		X RAM=RAM(T)+3.508\$10\$\$-5(MJD-33281)
.	C1473	SUB A*W(DATECON2)	01573	21030	03577		X
.	C1474	LSH A*100	01574	06000	00012		X MJD-3 281 GAMMA 10
.	C1475	ENT Q*A	01575	10070	00000		X 3.508\$10\$\$-5(MJD-33281)
.	C1476	MUL W(DATECON3)	01576	22030	03600		X GAMMA=43
.	C1477	LSH AQ*180	01577	07000	00022		G 57
.	C1500	RJP ROUND	01600	65000	04060		G 27
.	C1501	ENT Q*A	01601	10070	00000		
.	C1502	MUL W(FXDEGRAD)	01602	22030	03602		G 56 CORRECTION IN DEG
.	C1503	RJP ROUND	01603	65000	04060		CONVER TO RAD G 26
.	C1504	MCORRO1 STR A*W(MRAMCOR)	01604	15030	03527		G 26
.	C1505	MTABLERAMX ENT A*W(MRAMCOR)	01605	11030	03527		CORRECT RAM
.	C1506	ENT Q*W(MM+B6)	01606	10036	03626		
.	C1507	RJP SADD	01607	65000	04073		X
.	C1510	RJP SOVERFLOW	01610	65000	04046		
.	C1511	STR A*W(MM+B6)	01611	15036	03626		

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CARDS	L1 ID LABEL	TA STATEMENT	LOC	F JKB Y	NOTES
.	C1512	MTABLEB6	ENT	B6*0	01612 12600 00000
.	C1513	MCALPINIT	STR	B6*L(MCALXB6)	01613 16610 02665
.	C1514		STR	B4*L(MCALAB4)	01614 16410 02667
.	C1515		ENT	B6*0	01615 12600 00000
.	C1516		ENT	B4*0	01616 12400 00000
.	C1517		RJP	SINII	01617 65000 04136 X
.	C1520		ENT	Q*W(IISIN)	01620 10030 03645 SIN\$\$21
.	C1521		MUL	W(IISIN)	01621 22030 03645 X GAMMA=56
.	C1522		LSH	AQ*2	01622 07000 00002 X GAMMA=58
.	C1523		RJP	ROUND	01623 65000 04060 X GAMMA=28
.	C1524		STR	A*W(MCALCON3)	01624 15030 03545 X
.	C1525	MCALP	NO-OP		01625 12000 00000
.	C1526		RJP	FF	01626 65000 05323
.	C1527		32D	NN	01627 00040 03633
.	C1530		U-TAG	MCALNFLT*10	01630 04031 00010
.	C1531		RJP	FF	01631 65000 05323
.	C1532		U-TAG	MCALNFLT*MCALNFLT	01632 04031 04031
.	C1533		U-TAG	MCALNFLT*02	01633 04031 00002
.	C1534		RJP	FF	01634 65000 05323
.	C1535		35D	MCALGM	01635 00043 03571
.	C1536		U-TAG	GMFLT*10	01636 04033 00010
.	C1537		RJP	FF	01637 65000 05323
.	C1540		U-TAG	GMFLT*MCALNFLT	01640 04033 04031
.	C1541		U-TAG	MCALNFLT*03	01641 04031 00003
.	C1542		RJP	FF	01642 65000 05323
.	C1543		17D	MCALNFLT	01643 00021 04031
.	C1544		U-TAG	MCALGMN2*11	01644 04035 00011
.	C1545		ENT	A*W(MCALGMN2)	01645 11030 04035
.	C1546		ENT	Q*17D	01646 10000 00021
.	C1547		RJP	CBROOT	01647 65000 04645 CUBE ROOT, OF GM/N\$\$2 G 17
.	C1550		LSH	A*6	01650 06000 00006 GAMMA 23
.	C1551		STR	A*W(MCALGM3)	01651 15030 03524 GAMMA 23
.	C1552		ENT	Q*W(EF)	01652 10030 03627 X
.	C1553		MUL	W(EF)	01653 22030 03627 X E\$\$2 GAMMA=58
.	C1554		RJP	ROUND	01654 65000 04060 X
.	C1555		ENT	Q*A	01655 10070 00000 X
.	C1556		ENT	A*W(FIXONE)	01656 11030 03606 X GAMMA=28
.	C1557		RJP	SSUB	01657 65000 04114 X 1-E\$\$2 GAMMA=28
.	C1560		RJP	SOVERFLOW	01660 65000 04046
.	C1561		STR	A*W(MCALCON1)	01661 15030 03543
.	C1562		ENT	Q*A	01662 10070 00000 X
.	C1563		MUL	W(MCALGM3)	01663 22030 03524 GAMMA 51
.	C1564		LSH	AQ*4	01664 07000 00004 GAMMA 55
.	C1565		RJP	ROUND	01665 65000 04060 GAMMA 25
.	C1566		STR	A*W(PP)	01666 15030 03702 X
.	C1567		ENT	Q*A	01667 10070 00000 P\$\$2
.	C1570		MUL	W(PP)	01670 22030 03702 GAMMA 50
.	C1571		LSH	AQ*1	01671 07000 00001 GAMMA 51
.	C1572		RJP	ROUND	01672 65000 04060 GAMMA 21
.	C1573		STR	A*W(MCALP2)	01673 15030 03525
.	C1574		CL	Q*	01674 10000 00000
.	C1575		ENT	A*W(MCALA2)	01675 11030 03621 G 29
.	C1576		RSH	AQ*5	01676 03000 00005 GAMMA 54

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 SATEL MCQUILKIN*7/1/65

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C1577	DIV W(PP)*NOOF	01677	23230	03702		G 29
.	C1600	RJP SOVERFLOW	01700	65000	04046		
.	C1601	LSH A*1	01701	06000	00001		
.	C1602	COM A*W(PP)*YMORE	01702	04730	03702		
.	C1603	ADD Q*1	01703	26000	00001		
.	C1604	STR Q*W(MCALA2P)	01704	14030	04044		G 29
.	C1605 MCALA	ENT Q*W(FIX32)	01705	10030	03572		X 3/2\$SIN\$\$2I GAMMA=56
.	C1606	MUL W(MCALCON3)	01706	22030	03545		
.	C1607	LSH AQ*2	01707	07000	00002		X GAMMA=58
.	C1610	RJP ROUND	01710	65000	04060		X GAMMA=28
.	C1611	ENT Q*A	01711	10070	00000		X
.	C1612	ENT A*W(FIXONE)	01712	11030	03606		X GAMMA=28
.	C1613	RJP SSUB	01713	65000	04114		X 1-3/2\$SIN\$\$2I GAMMA=28
.	C1614	RJP SOVERFLOW	01714	65000	04046		
.	C1615	STR A*W(MCALSTORA)	01715	15030	03540		
.	C1616	ENT A*W(MCALCON1)	01716	11030	03543		
.	C1617	RSH A*2	01717	02000	00002		G=26
.	C1620	RJP SQRT	01720	65000	05504		CALCULATED SQRT(1-E\$\$2)
.	C1621	RJP SERROR	01721	65000	04053		
.	C1622	LSH A*1	01722	06000	00001		G=28
.	C1623	STR A*W(MCALCON4)	01723	15030	03546		
.	C1624	ENT Q*W(MCALSTORA)	01724	10030	03540		
.	C1625	MUL W(MCALCON4)	01725	22030	03546		X(1-3/2\$SIN\$\$2I)SQRT1-E\$\$2 GAMMA=56
.	C1626	LSH AQ*2	01726	07000	00002		X
.	C1627	RJP ROUND	01727	65000	04060		X GAMMA=28
.	C1630	STR A*W(MCALSTOR1)	01730	15030	03533		X
.	C1631	CL Q*	01731	10000	00000		X
.	C1632	ENT A*W(MCALA2)	01732	11030	03621		X GAMMA=29
.	C1633	RSH AQ*6	01733	03000	00006		GAMMA 53
.	C1634	DIV W(MCALP2)*NOOF	01734	23230	03525		GAMMA 32
.	C1635	RJP SOVERFLOW	01735	65000	04046		
.	C1636	LSH A*1	01736	06000	00001		X
.	C1637	COM A*W(MCALP2)*YMORE	01737	04730	03525		X
.	C1640	ADD Q*1	01740	26000	00001		X
.	C1641	STR Q*W(MCALA2P2)	01741	14030	03523		GAMMA 32
.	C1642	MUL W(FIX13)	01742	22030	03575		X GAMMA=57
.	C1643	RJP ROUND	01743	65000	04060		X GAMMA=27
.	C1644	ENT Q*A	01744	10070	00000		X
.	C1645	MUL W(MCALSTOR1)	01745	22030	03533		X GAMMA=55
.	C1646	RSH AQ*1	01746	03000	00001		GAMMA 28
.	C1647	RJP ROUND	01747	65000	04060		X GAMMA=28
.	C1650	ENT Q*A	01750	10070	00000		X
.	C1651	ENT A*W(FIXONE)	01751	11030	03606		X
.	C1652	RJP SSUB	01752	65000	04114		X 1-1/3\$A2/P2(1-3/2\$SIN\$\$2I)SQRT1-E\$\$2 28
.	C1653	RJP SOVERFLOW	01753	65000	04046		
.	C1654	ENT Q*A	01754	10070	00000		X
.	C1655	MUL W(MCALGM3)	01755	22030	03524		X GM/N\$\$2)\$\$1/3(1-E\$\$2)
.	C1656	LSH AQ*4	01756	07000	00004		
.	C1657	RJP ROUND	01757	65000	04060		X GAMMA=25
.	C1660	STR A*W(AA)	01760	15030	03636		X
.	C1661	ENT B5=B5+1	01761	12505	00001		

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C1662	STR A*W(MM+B5)	01762	15035	03626		
.	C1663	RJP PREDICTE	01763	65000	04225		
.	C1664	RJP SINVV	01764	65000	04502		
.	C1665	ENT A*W(VVSIN)	01765	11030	03673		CALCULATE V
.	C1666	RSH A*2	01766	02000	00002		
.	C1667	ENT Q*26D	01767	10000	00032		
.	C1670	RJP ASINX	01770	65000	05657		
.	C1671	RJP SERROR	01771	65000	04053		
.	C1672	RSH A*1	01772	02000	00001		GAMMA=26
.	C1673	STR A*W(VV)	01773	15030	03672		GAMMA=26
.	C1674	ENT A*W(VVCOS)*ANEG	01774	11730	03674		PUT V IN COFRECT QUADRANT
.	C1675	JP MCALCA1	01775	61000	02004		COS POS
.	C1676	ENT A*W(TWP126)	01776	11030	04025		COS NEG 180-V
.	C1677	RSH A*1	01777	02000	00001		X
.	C1700	ENT Q*W(VV)	02000	10030	03672		X
.	C1701	RJP SSUB	02001	65000	04114		X
.	C1702	RJP SOVERFLOW	02002	65000	04046		X
.	C1703	JP MCALCA2	02003	61000	02011		
.	C1704 MCALCA1	ENT A*W(VV)*ANEG	02004	11730	03672		COS POS-IS V NEG
.	C1705	JP MCALCA2	02005	61000	02011		NO
.	C1706	ENT Q*W(TWP126)	02006	10030	04025		YES 360+V
.	C1707	RJP SADD	02007	65000	04073		X
.	C1710	RJP SOVERFLOW	02010	65000	04046		X
.	C1711 MCALCA2	STR A*W(VV)	02011	15030	03672		STORE CORRECT V
.	C1712 MCALR	ENT Q*W(EE)	02012	10030	03627		CALCULATE R A(1-E\$COSE)
.	C1713	MUL W(EVALCOS)	02013	22030	03624		X GAMMA=57 ECOSE
.	C1714	LSH AQ*1	02014	07000	00001		X GAMMA=58
.	C1715	RJP ROUND	02015	65000	04060		X GAMMA=28
.	C1716	ENT Q*A	02016	10070	00000		X
.	C1717	ENT A*W(FIXONE)	02017	11030	03606		X GAMMA=28
.	C1720	RJP SSUB	02020	65000	04114		X 1-ECOE GAMMA=28
.	C1721	RJP SOVERFLOW	02021	65000	04046		
.	C1722	ENT Q*A	02022	10070	00000		X
.	C1723	MUL W(AA)	02023	22030	03636		X A(1-ECOSE) GAMMA=53
.	C1724	LSH AQ*1	02024	07000	00001		X GAMMA=54
.	C1725	RJP ROUND	02025	65000	04060		X GAMMA=24
.	C1726	STR A*W(RR)	02026	15030	03622		X
.	C1727 DELL	ENT Q*W(MCALCON3)	02027	10030	03545		
.	C1730	MUL W(FIX52)	02030	22030	03616		X XSIN\$2I\$5/2 GAMMA=55
.	C1731	LSH AQ*2	02031	07000	00002		X X GAMMA=57
.	C1732	RJP ROUND	02032	65000	04060		X X
.	C1733	ENT Q*A	02033	10070	00000		X X GAMMA=27
.	C1734	ENT A*W(FIXTWO)	02034	11030	03607		X X GAMMA=27
.	C1735	RJP SSUB	02035	65000	04114		X X(2-5/2\$SINI\$2) CALCULATED
.	C1736	RJP SOVERFLOW	02036	65000	04046		
.	C1737	STR A*W(MCALSTORA)	02037	15030	03540		X
.	C1740	ENT Q*W(VVSIN)	02040	10030	03673		X GAMMA=28
.	C1741	MUL W(EE)	02041	22030	03627		X E\$SIN V GAMMA=57
.	C1742	RSH AQ*1	02042	03000	00001		X GAMMA=56
.	C1743	RJP ROUND	02043	65000	04060		X GAMMA=26
.	C1744	ENT Q*W(MM)	02044	10030	03626		X
.	C1745	RJP SSUB	02045	65000	04114		X (E\$SIN V)-M GAMMA=26

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F JK8 Y	NOTES
.	C1746	RJP SOVERFLOW	02046	65000 04046	
.	C1747	ENT Q=W(VV)	02047	10030 03672	X GAMMA=26
.	C1750	RJP SADD	02050	65000 04073	X (E\$SIN V)-M+V GAMMA=26 CAL CULATED
.	C1751	RJP SOVERFLOW	02051	65000 04046	
.	C1752	ENT Q=A	02052	10070 00000	X
.	C1753	MUL W(MCALSTORA)	02053	22030 03540	X (2-5/2\$SINI\$2)(V-M+E\$SINV) CALCULATED
.	C1754	RJP ROUND	02054	65000 04060	X GAMMA=23
.	C1755	STR A=W(MCALSTOR1)	02055	15030 03533	X
.	C1756	ENT A=W(MCALCON1)	02056	11030 03543	2B 2/3\$E(1-E\$2/2-(SQRT1-E\$2)) SINV
.	C1757	RSH A=2	02057	02000 00002	G=26
.	C1760	RJP SQRT	02060	65000 05504	X SQ RT OF 1-E\$2 GAMMA=28
.	C1761	RJP SERROR	02061	65000 04053	
.	C1762	LSH A=1	02062	06000 00001	G=28
.	C1763	STR A=W(MCALCON4)	02063	15030 03546	X STORE SQRT FOR FUTURE USE
.	C1764	ENT Q=W(E)	02064	10030 03627	X
.	C1765	MUL W(E)	02065	22030 03627	X E\$2 GAMMA=58
.	C1766	RSH AQ=1	02066	03000 00001	X E\$2/2 GAMMA=58
.	C1767	RJP ROUND	02067	65000 04060	X
.	C1770	ENT Q=A	02070	10070 00000	X GAMMA=28
.	C1771	ENT A=W(FIXONE)	02071	11030 03606	X GAMMA=28
.	C1772	RJP SSUB	02072	65000 04114	2B 1-E\$2/2 GAMMA=28
.	C1773	RJP SOVERFLOW	02073	65000 04046	
.	C1774	ENT Q=W(MCALCON4)	02074	10030 03546	X GAMMA=28
.	C1775	RJP SSUB	02075	65000 04114	X 1-E\$2/2-(SQRT1-E\$2) GAMM A=28
.	C1776	RJP SOVERFLOW	02076	65000 04046	
.	C1777	ENT Q=A	02077	10070 00000	X
.	C2000	MUL W(VVSIN)	02100	22030 03673	X (1-E\$2/2-(SQRT1-E\$2))SINV GAMMA=56
.	C2001	LSH AQ=1	02101	07000 00001	X 2(1-E\$2/2-(SQRT1-E\$2))SINV GAMMA=56
.	C2002	RJP ROUND	02102	65000 04060	X X
.	C2003	STR A=W(MCALSTOR2)	02103	15030 03534	X X STORED GAMMA=26
.	C2004	ENT Q=W(E)	02104	10030 03627	X X GAMMA=29
.	C2005	MUL W(FIX3)	02105	22030 03610	X X 3\$E GAMMA=56
.	C2006	RJP ROUND	02106	65000 04060	X X GAMMA=26
.	C2007	STR A=W(MCALSTOR3)	02107	15030 03535	X X
.	C2010	CL Q=	02110	10000 00000	X
.	C2011	ENT A=W(MCALSTOR2)	02111	11030 03534	X X
.	C2012	RSH AQ=1	02112	03000 00001	G 55
.	C2013	CIV W(MCALSTOR3)*NOOF	02113	23230 03535	X XDIVIDED BY 3\$E GAMMA=29
.	C2014	RJP SOVERFLOW	02114	65000 04046	
.	C2015	LSH A=1	02115	06000 00001	X X
.	C2016	COM A=W(MCALSTOR3)*YMORE	02116	04730 03535	X X
.	C2017	ADD Q=1	02117	26000 00001	X X
.	C2020	STR Q=W(MCALSTOR2)	02120	14030 03534	X X CALCULATED GAMMA=29
.	C2021	ENT Q=W(VV)	02121	10030 03672	2C(1-(SQRT1-E\$2))SINV/6
.	C2022	MUL W(FIXTWO)	02122	22030 03607	X X2\$V GAMMA=53
.	C2023	RJP ROUND	02123	65000 04060	X X GAMMA=23

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CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C2C24	ENT Q*23D	02124	10000	00027	X X	
.	C2C25	RJP SINX	02125	65000	05357	X X	SIN2V GAMMA=28
.	C2C26	STR A*W(MCALCON5)	02126	15030	03517		
.	C2C27	STR A*W(MCALSTOR3)	02127	15030	03535	X X	
.	C2C30	ENT A*W(FIXONE)	02130	11030	03606	X X	GAMMA=28
.	C2C31	ENT Q*W(MCALCON4)	02131	10030	03546	X X	
.	C2C32	RJP SSUB	02132	65000	04114	X X	1-(SQRT1-E\$\$2) GAMMA=28
.	C2C33	RJP SOVERFLOW	02133	65000	04046		
.	C2C34	ENT Q*A	02134	10070	00000	X X	
.	C2C35	MUL W(MCALSTOR3)	02135	22030	03535	X X	1-(SQRT1-E\$\$2))SIN2V GAMMA=56
.	C2C36	RSH AQ*1	02136	03000	00001	G 55	
.	C2C37	DIV W(FIX6)*NOOF	02137	23230	03611	X X	GAMMA=29
.	C2C40	RJP SOVERFLOW	02140	65000	04046		
.	C2C41	LSH A*1	02141	06000	00001	X X	
.	C2C42	COM A*W(FIX6)*YMORE	02142	04730	03611	X X	
.	C2C43	ADD Q*1	02143	26000	00001	X	1-(SQRT1-E\$\$2))SIN2V/6 CALCULATED
.	C2C44	STR Q*W(MCALSTOR3)	02144	14030	03535	X	
.	C2C45	ENT Q*W(MCALCON3)	02145	10030	03545		2A(1-3/2\$SIN\$\$2I)
.	C2C46	MUL W(FIX3)	02146	22030	03610	X X	3\$SIN\$\$2I GAMMA=55
.	C2C47	DIV W(FIXTWO)*NCOF	02147	23230	03607	X X	3\$SIN\$\$2I/2 GAMMA=28
.	C2C50	RJP SOVERFLOW	02150	65000	04046		
.	C2C51	LSH A*1	02151	06000	00001	X X	
.	C2C52	COM A*W(FIXTWO)*YMORE	02152	04730	03607	X X	
.	C2C53	ADD Q*1	02153	26000	00001	X X	
.	C2C54	ENT A*W(FIXONE)	02154	11030	03606	X X	GAMMA=28
.	C2C55	RJP SSUB	02155	65000	04114	X	1-(3/2\$SIN\$\$2I) GAMMA=28 CALCULATED
.	C2C56	RJP SOVERFLOW	02156	65000	04046		
.	C2C57	STR A*W(MCALSTORA)	02157	15030	03540	X	
.	C2C60	ENT A*W(MCALSTOR2)	02160	11030	03534	X	GAMMA=29
.	C2C61	ENT Q*W(MCALSTOR3)	02161	10030	03535	X	GAMMA=29
.	C2C62	RJP SADD	02162	65000	04073		2B+2C GAMMA=29
.	C2C63	RJP SOVERFLOW	02163	65000	04046		
.	C2C64	ENT Q*A	02164	10070	00000	X	
.	C2C65	MUL W(MCALSTORA)	02165	22030	03540		2A(2B+2C)=2 GAMMA=57
.	C2C66	RJP ROUND	02166	65000	04060	X	GAMMA=27
.	C2C67	STR A*W(MCALSTOR2)	02167	15030	03534	X 2	CALCULATED
.	C2C70	ENT Q*W(MCALCON3)	02170	10030	03545		3 (1/2-5/6\$SIN\$\$2I)E\$SIN(V+20MEG)
.	C2C71	MUL W(FIX56)	02171	22030	03613		3A(1/2-5/6\$SIN\$\$2I) GAMMA=57
.	C2C72	LSH AQ*1	02172	07000	00001	X X	GAMMA=58
.	C2C73	RJP ROUND	02173	65000	04060	X X	GAMMA=28
.	C2C74	ENT Q*A	02174	10070	00000	X X	
.	C2C75	ENT A*W(FIXONE)	02175	11030	03606	X X	GAMMA=28
.	C2C76	RSH A*1	02176	02000	00001	X X	1/2 GAMMA=28
.	C2C77	RJP SSUB	02177	65000	04114	X X	1/2-5/6\$SIN\$\$2I GAMMA=28
.	C21C0	RJP SOVERFLOW	02200	65000	04046		
.	C21C1	STR A*W(MCALSTORA)	02201	15030	03540	X X	

		SPURT OUTPUT NO. 210			
		SATEL		MCQUILKIN*7/1/65	
CARDS	L1 IO LABEL	TA STATEMENT	LOC	F JKB Y	NOTES
. .	C2102	ENT Q*W(ZOMEGA)	02202	10030 03631	X X
. .	C2103	MUL W(FIXTWO)	02203	22030 03607	3B(E\$SIN(V+2OMEG)) GAMMA=53
. .	C2104	RJP ROUND	02204	65000 04060	X X 2OMEG GAMMA=23
. .	C2105	ENT Q*W(VV)	02205	10030 03672	X X
. .	C2106	RSH Q*3	02206	01000 00003	X X GAMMA=23
. .	C2107	RJP SADD	02207	65000 04073	X X V+2OMEG GAMMA=23
. .	C2110	RJP SOVERFLOW	02210	65000 04046	
. .	C2111	ENT Q*230	02211	10000 00027	X X
. .	C2112	RJP SINX	02212	65000 05357	X X SIN(V+2W) GAMMA=28
. .	C2113	STR A*W(MCALCON6)	02213	15030 03520	
. .	C2114	ENT Q*A	02214	10070 00000	X X
. .	C2115	MUL W(EE)	02215	22030 03627	X X E\$SIN(V+2OMEG) GAMMA=57
. .	C2116	LSH AQ*2	02216	07000 00002	X X GAMMA=59
. .	C2117	RJP ROUND	02217	65000 04060	X X GAMMA=29
. .	C2120	ENT Q*A	02220	10070 00000	X X
. .	C2121	MUL W(MCALSTORA)	02221	22030 03540	X 3 CALCULATED GAMMA=57
. .	C2122	RJP ROUND	02222	65000 04060	X GAMMA=27
. .	C2123	STR A*W(MCALSTOR3)	02223	15030 03535	X
. .	C2124	ENT Q*W(MCALCON3)	02224	10030 03545	4 (1/2-7/12\$SIN\$2I)SIN2(V+OMEG)
. .	C2125	MUL W(FIX712)	02225	22030 03614	4A(1/2-7/12\$SIN\$2I)GAMMA-57
. .	C2126	LSH AQ*2	02226	07000 00002	X X GAMMA-59
. .	C2127	RJP ROUND	02227	65000 04060	X X GAMMA=29
. .	C2130	ENT Q*A	02230	10070 00000	X X
. .	C2131	ENT A*W(FIX12)	02231	11030 03615	X X GAMMA=29
. .	C2132	RJP SSUB	02232	65000 04114	X X GAMMA=29
. .	C2133	RJP SOVERFLOW	02233	65000 04046	
. .	C2134	STR A*W(MCALSTORA)	02234	15030 03540	X X
. .	C2135	ENT A*W(VV)	02235	11030 03672	4B(SIN2(V+OMEG)) GAMMA=26
. .	C2136	RSH A*1	02236	02000 00001	X X GAMMA=25
. .	C2137	ENT Q*W(ZOMEGA)	02237	10030 03631	X X GAMMA=26
. .	C2140	RSH Q*1	02240	01000 00001	X X GAMMA=25
. .	C2141	RJP SADD	02241	65000 04073	X X V+OMEG GAMMA=25
. .	C2142	RJP SOVERFLOW	02242	65000 04046	
. .	C2143	ENT Q*A	02243	10070 00000	X X
. .	C2144	MUL W(FIXTWO)	02244	22030 03607	X X 2(V+OMEG) GAMMA=52
. .	C2145	RJP ROUND	02245	65000 04060	X X GAMMA=22
. .	C2146	ENT Q*220	02246	10000 00026	X X

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CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C2147	RJP SINX	02247	65000	05357	X X	SIN2(V+W) GAMMA=28
.	C2150	STR A*W(MCALCON7)	02250	15030	03521	X X	
.	C2151	ENT Q*A	02251	10070	00000	X X	
.	C2152	MUL W(MCALSTORA)	02252	22030	03540	4 A\$4B=4	GAMMA=57
.	C2153	RJP ROUND	02253	65000	04060	X	GAMMA=27
.	C2154	STR A*W(MCALSTOR4)	02254	15030	03536	X	
.	C2155	ENT Q*W(VV)	02255	10030	03672	5	(E/6\$COS\$2I\$SIN(3V+20MEG)
.	C2156	MUL W(FIX3)	02256	22030	03610	5A SIN(3V+20MEG)	GAMMA=53
.	C2157	RJP ROUND	02257	65000	04060	X X 3V	GAMMA=23
.	C2160	STR A*W(MCALSTORA)	02260	15030	03540	X X	
.	C2161	ENT Q*W(ZOMEGA)	02261	10030	03631	X X	
.	C2162	MUL W(FIXTWO)	02262	22030	03607	X X 20MEG	GAMMA=53
.	C2163	RJP ROUND	02263	65000	04060	X X	GAMMA=23
.	C2164	ENT Q*W(MCALSTORA)	02264	10030	03540	X X	
.	C2165	RJP SADD	02265	65000	04073	X X	GAMMA=23
.	C2166	RJP SOVERFLOW	02266	65000	04046		
.	C2167	ENT Q*23D	02267	10000	00027	X X	
.	C2170	RJP SINX	02270	65000	05357	X	SIN(3V+2W) GAMMA=28
.	C2171	STR A*W(MCALCON8)	02271	15030	03522	X	
.	C2172	STR A*W(MCALSTORB)	02272	15030	03541	X	
.	C2173	ENT Q*W(IICOS)	02273	10030	03646	X	GAMMA=28
.	C2174	MUL W(IICOS)	02274	22030	03646	5BCOS\$2I	GAMMA=56
.	C2175	RJP ROUND	02275	65000	04060	X	GAMMA=26
.	C2176	ENT Q*A	02276	10070	00000	X	
.	C2177	MUL W(MCALSTORB)	02277	22030	03541	X COS\$2I\$5A	GAMMA=54
.	C2200	RJP ROUND	02300	65000	04060	X	GAMMA=24
.	C2201	ENT Q*A	02301	10070	00000	X	
.	C2202	MUL W(EE)	02302	22030	03627	X E\$5B\$5A	GAMMA=53
.	C2203	LSH AQ*1	02303	07000	00001	X	GAMMA=54
.	C2204	RJP ROUND	02304	65000	04060	X	GAMMA=23
.	C2205	ENT Q*A	02305	10070	00000	X	
.	C2206	MUL W(FIX16)	02306	22030	03573	1/6\$E\$5B\$5A	GAMMA=53
.	C2207	RJP ROUND	02307	65000	04060	X	GAMMA=23
.	C2210	STR A*W(MCALSTOR5)	02310	15030	03537	X	
.	C2211	ENT A*W(MCALSTOR2)	02311	11030	03534	X1+2+3+4+5	GAMMA=27
.	C2212	RSH A*4	02312	02000	00004	X X	GAMMA=23
.	C2213	ENT Q*W(MCALSTOR1)	02313	10030	03533	X X	
.	C2214	RJP SADD	02314	65000	04073	X X 1+2	GAMMA=23
.	C2215	RJP SOVERFLOW	02315	65000	04046		
.	C2216	ENT Q*W(MCALSTOR3)	02316	10030	03535	X X	GAMMA=27
.	C2217	RSH Q*4	02317	01000	00004	X X	GAMMA=23
.	C2220	RJP SSUB	02320	65000	04114	X X 1+2-3	GAMMA=23
.	C2221	RJP SOVERFLOW	02321	65000	04046		

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JK8	Y	NOTES
.	C2222	ENT Q*W(MCALSTOR4)	02322	10030	03536	X	X GAMMA=27
.	C2223	RSH Q*4	02323	01000	00004	X	X GAMMA=23
.	C2224	RJP SSUB	02324	65000	04114	X	X 1+2-3-4 GAMMA=23
.	C2225	RJP SOVERFLOW	02325	65000	04046		
.	C2226	ENT Q*W(MCALSTOR5)	02326	10030	03537	X	X GAMMA=23
.	C2227	RJP SSUB	02327	65000	04114	X	X 1+2-3-4-5 GAMMA=23
.	C2230	RJP SOVERFLOW	02330	65000	04046		
.	C2231	STR A*W(MCALSTOR1)	02331	15030	03533	X	X
.	C2232	ENT Q*W(MCALA2P2)	02332	10030	03523	X	X(1+2-+-4-5)\$A2P\$2
.	C2233	MUL W(MCALSTOR1)	02333	22030	03533	G	55
.	C2234	LSH AQ*1	02334	07000	00001	G	56
.	C2235	RJP ROUND	02335	65000	04060	X	GAMMA=26
.	C2236	STR A*W(MCALSTOR1)	02336	15030	03533	X	
.	C2237	ENT B5*B5+1	02337	12505	00001		
.	C2240	ENT A*W(MCALSTOR1)	02340	11030	03533	X	
.	C2241	STR A*W(MM+B5)	02341	15035	03626		
.	C2242	ENT Q*W(MCALCON3)	02342	10030	03545		CALCULATE CHANGE IN RANGE
.	C2243	MUL W(FIX32)	02343	22030	03572	1A	1-3/2\$SIN\$2I GAMMA=56
.	C2244	LSH AQ*2	02344	07000	00002	X	3/2\$SIN\$2I GAMMA=58
.	C2245	RJP ROUND	02345	65000	04060	X	
.	C2246	ENT Q*A	02346	10070	00000	X	GAMMA=28
.	C2247	ENT A*W(FIXONE)	02347	11030	03606	X	GAMMA=28
.	C2250	RJP SSUB	02350	65000	04114	X	1-3/2\$SIN\$2I GAMMA=28
.	C2251	RJP SOVERFLOW	02351	65000	04046		
.	C2252	STR A*W(MCALSTORA)	02352	15030	03540	X	
.	C2253	ENT Q*W(MCALCON4)	02353	10030	03546	1B	-1-1/E(1-SQRT(1-E\$2))COSV
.	C2254	ENT A*W(FIXONE)	02354	11030	03606	X	GAMMA=28
.	C2255	RJP SSUB	02355	65000	04114	X	1-SQRT(1-E\$2) GAMMA=28
.	C2256	RJP SOVERFLOW	02356	65000	04046		
.	C2257	ENT Q*A	02357	10070	00000	X	
.	C2260	MUL W(VVCOS)	02360	22030	03674	X	COSV(1-SQRT(1-E\$2)) GAMMA=56
.	C2261	LSH AQ*1	02361	07000	00001	G	57
.	C2262	DIV W(EE)*NOOF	02362	23230	03627	X	COSV(1-SQRT(1-E\$2))/E GAMMA=28
.	C2263	RJP SOVERFLOW	02363	65000	04046		
.	C2264	LSH A*1	02364	06000	00001	X	ROUND
.	C2265	COM A*W(EE)*YMORE	02365	04730	03627	X	
.	C2266	ADD Q*1	02366	26000	00001	X	
.	C2267	ENT A*W(FIXONE)	02367	11030	03606	X	
.	C2270	CP A	02370	15040	00000	X	
.	C2271	RJP SSUB	02371	65000	04114	X	-1-1/E(1-SQRT(1-E\$2))COSV GAMMA=28
.	C2272	RJP SOVERFLOW	02372	65000	04046		
.	C2273	STR A*W(MCALSTORB)	02373	15030	03541	X	
.	C2274	CL Q*	02374	10000	00000	1C	R/A\$1/SQRT(1-E\$2)
.	C2275	ENT A*W(FIXONE)	02375	11030	03606	X	GAMMA=28
.	C2276	RSH AQ*4	02376	03000	00004	G	54

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 SATEL MCQUILKIN*7/1/65

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C2277	DIV W(MCALCON4)*NOOF	02377	23230	03546	X	1/SQRT (1-E\$2) GAMMA=26
.	C2300	RJP SOVERFLOW	02400	65000	04046		
.	C2301	LSH A*1	02401	06000	00001	X	ROUND
.	C2302	COM A*W(MCALCON4)*YMORE	02402	04730	03546	X	
.	C2303	ADD Q*1	02403	26000	00001	X	
.	C2304	STR Q*W(MCALSTORC)	02404	14030	03542	X	
.	C2305	CL Q*	02405	10000	00000	X	
.	C2306	ENT A*W(RR)	02406	11030	03622	X	GAMMA=24
.	C2307	RSH AQ*2	02407	03000	00002	X	GAMMA=22
.	C2310	DIV W(AA)*NOOF	02410	23230	03636	X	GAMMA=27 R/A
.	C2311	RJP SOVERFLOW	02411	65000	04046		
.	C2312	LSH A*1	02412	06000	00001	X	ROUND
.	C2313	COM A*W(AA)*YMORE	02413	04730	03636	X	
.	C2314	ADD Q*1	02414	26000	00001	X	GAMMA=27
.	C2315	MUL W(MCALSTORC)	02415	22030	03542	XR/A\$1//SQRT(1-E\$2) G	GAMMA=53
.	C2316	LSH AQ*4	02416	07000	00004	X	GAMMA=57
.	C2317	RJP ROUND	02417	65000	04060	X	GAMMA=27
.	C2320	ENT Q*W(MCALSTORB)	02420	10030	03541	X	GAMMA=28
.	C2321	RSH Q*1	02421	01000	00001	X	GAMMA=27
.	C2322	RJP SADD	02422	65000	04073		1B+1C
.	C2323	RJP SOVERFLOW	02423	65000	04046		
.	C2324	ENT Q*A	02424	10070	00000		
.	C2325	MUL W(MCALSTORA)	02425	22030	03540	1A(1B+1C)	GAMMA=55
.	C2326	RJP ROUND	02426	65000	04060	X	GAMMA=25
.	C2327	ENT Q*A	02427	10070	00000	X	
.	C2330	MUL W(MCALA2P)	02430	22030	04044	X (A2/P)1A1B+1C	G 54
.	C2331	RJP ROUND	02431	65000	04060	X	G 24
.	C2332	ENT Q*A	02432	10070	00000		
.	C2333	MUL W(FIX13)	02433	22030	03575	X X\$1/3 G 53	
.	C2334	LSH AQ*2	02434	07000	00002	X X	G 25
.	C2335	RJP ROUND	02435	65000	04060	X X	25
.	C2336	STR A*W(MCALSTOR1)	02436	15030	03533	X	
.	C2337	ENT A*W(VV)	02437	11030	03672	2	COS2(V+OMEG)\$SIN\$2I\$A2/P\$1/6
.	C2340	RSH A*1	02440	02000	00001	X	GAMMA=25
.	C2341	ENT Q*W(ZOMEGA)	02441	10030	03631	X	
.	C2342	RSH Q*1	02442	01000	00001	X	GAMMA=25
.	C2343	RJP SADD	02443	65000	04073	X	V+OMEG GAMMA=25
.	C2344	RJP SOVERFLOW	02444	65000	04046		
.	C2345	ENT Q*A	02445	10070	00000	X	
.	C2346	MUL W(FIXTWO)	02446	22030	03607	X 2(V+OMEG)	GAMMA=52
.	C2347	LSH AQ*2	02447	07000	00002	X	GAMMA=54
.	C2350	RJP ROUND	02450	65000	04060	X	GAMMA=24
.	C2351	ENT Q*240	02451	10000	00030	X	
.	C2352	RJP COSX	02452	65000	05345	X	COS2(V+W) GAMMA=28
.	C2353	STR A*W(MCALCON9)	02453	15030	03526		
.	C2354	ENT Q*A	02454	10070	00000	X	
.	C2355	MUL W(MCALCON3)	02455	22030	03545	X	SIN\$2I\$COS2(V+OMEG) GAMMA=26
.	C2356	LSH AQ*2	02456	07000	00002	X	GAMMA=28
.	C2357	ENT Q*A	02457	10070	00000	X	

CAROS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C2360	MUL W(FIX16)	02460	22030	03573		X 1/6\$SIN\$2I\$COS2(V+OMEG) GAM
.	C2361	LSH AQ*2	02461	07000	00002		MA=57 X MA=59 GAM
.	C2362	RJP ROUND	02462	65000	04060		X MA=29 GAM
.	C2363	ENT Q*A	02463	10070	00000		X X\$A2/P\$2
.	C2364	MUL W(MCALA2P)	02464	22030	04044		X G 58
.	C2365	RSH AQ*3	02465	03000	00003		X G 55
.	C2366	RJP ROUND	02466	65000	04060		X GAMMA=25
.	C2367	ENT Q*W(MCALSTOR1)	02467	10030	03533		X GAMMA=25
.	C2370	RJP SAOD	02470	65000	04073		X GAMMA=25
.	C2371	RJP SOVERFLOW	02471	65000	04046		
.	C2372	STR A*W(MCALSTOR1)	02472	15030	03533		X
.	C2373	ENT B5*B5+1	02473	12505	00001		
.	C2374	ENT A*W(MCALSTOR1)	02474	11030	03533		
.	C2375	STR A*W(MM+B5)	02475	15035	03626		
.	C2376	DEL RAM A*W(MCALCON7)	02476	11030	03521		CALCULATE THE CHANGE IN RAM
.	C2377	RSH A*1	02477	02000	00001		XIV-M+E\$SINV-1/2\$SIN2(V+W)
.	C2400	STR A*W(MCALSTORA)	02500	15030	03540		X X 1/2\$SIN2(V+W) GAMMA=28
.	C2401	ENT Q*W(E)	02501	10030	03627		X X GAMMA=29
.	C2402	MUL W(VVSIN)	02502	22030	03673		X X GAMMA=57
.	C2403	LSH AQ*1	02503	07000	00001		X X GAMMA=28
.	C2404	RJP ROUND	02504	65000	04060		X X E\$SINV GAMMA=28
.	C2405	ENT Q*W(MCALSTORA)	02505	10030	03540		X X GAMMA=28
.	C2406	RJP SSUB	02506	65000	04114		X X E\$SINV-1/2\$SIN2(V+W) GAMMA =28
.	C2407	RJP SOVERFLOW	02507	65000	04046		
.	C2410	RSH A*2	02510	02000	00002		X X =26 GAMMA
.	C2411	ENT Q*W(MM)	02511	10030	03626		X X =26 GAMMA
.	C2412	RJP SSUB	02512	65000	04114		X X -M+E\$SINV-1/2\$SIN2(V+W) GA MMA=26
.	C2413	RJP SOVERFLOW	02513	65000	04046		
.	C2414	ENT Q*W(VV)	02514	10030	03672		X X MMA=26 GA
.	C2415	RJP SAOD	02515	65000	04073		X V-M+E\$SINV-1/2\$SIN2(V+W) G AMMA=26
.	C2416	RJP SOVERFLOW	02516	65000	04046		
.	C2417	STR A*W(MCALSTOR1)	02517	15030	03533		X
.	C2420	ENT Q*W(E)	02520	10030	03627		X2 E/2\$SIN(V+2W)
.	C2421	MUL W(MCALCON6)	02521	22030	03520		X X E\$SIN(V+2W) GAMMA=57
.	C2422	LSH AQ*1	02522	07000	00001		X X GAMMA=58
.	C2423	RJP ROUND	02523	65000	04060		X X GAMMA=28
.	C2424	RSH A*1	02524	02000	00001		X E/2\$SIN(V+2W) GAMMA=28
.	C2425	STR A*W(MCALSTOR2)	02525	15030	03534		X
.	C2426	ENT Q*W(E)	02526	10030	03627		X3 E/6\$SIN(3V+2W)
.	C2427	MUL W(MCALCON8)	02527	22030	03522		X X E\$SIN(3V+2W) GAMMA=57
.	C2430	RSH AQ*2	02530	03000	00002		X X G 55
.	C2431	CIV W(FIX6)*NOUF	02531	23230	03611		X X(E\$SIN(3V+W))/6 G 29
.	C2432	RJP SOVERFLOW	02532	65000	04046		
.	C2433	LSH A*1	02533	06000	00001		X

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CARDS	L1 ID LABEL	TA STATEMENT	LOC	F JKB Y	NOTES
.	C2434	COM A*W(FIX6)*YMORE	02534	04730 03611	X
.	C2435	ADD Q=1	02535	26000 00001	X
.	C2436	STR Q*W(MCALSTOR3)	02536	14030 03535	X
.	C2437	ENT A*W(MCALSTOR1)	02537	11030 03533	X 1 GAMMA=26
.	C2440	ENT Q*W(MCALSTOR2)	02540	10030 03534	X 2 GAMMA=28
.	C2441	RSH Q*2	02541	01000 00002	X GAMMA=26
.	C2442	RJP SSUB	02542	65000 04114	X
.	C2443	RJP SOVERFLOW	02543	65000 04046	
.	C2444	ENT Q*W(MCALSTOR3)	02544	10030 03535	X 3 G 29
.	C2445	RSH Q*3	02545	01000 00003	X G 26
.	C2446	RJP SSUB	02546	65000 04114	X 1-2-3 GAMMA=26
.	C2447	RJP SOVERFLOW	02547	65000 04046	
.	C2450	ENT Q*A	02550	10070 00000	X
.	C2451	MUL W(IICOS)	02551	22030 03646	X COSI(1-2-3) GAMMA=54
.	C2452	RJP ROUND	02552	65000 04060	X GAMMA=24
.	C2453	STR A*W(MCALSTOR1)	02553	15030 03533	X
.	C2454	ENT Q*W(MCALA2P2)	02554	10030 03523	X
.	C2455	CP Q	02555	14000 00000	
.	C2456	MUL W(MCALSTOR1)	02556	22030 03533	X G 56
.	C2457	RJP ROUND	02557	65000 04060	
.	C2460	STR A*W(MCALSTOR1)	02560	15030 03533	
.	C2461	ENT B5*B5+1	02561	12505 00001	
.	C2462	ENT A*W(MCALSTOR1)	02562	11030 03533	
.	C2463	STR A*W(MM+B5)	02563	15035 03626	
.	C2464	ENT A*W(ZOMEGA)	02564	11030 03631	CALCULATE CHANGE IN I GAMMA=26
.	C2465	RSH A=1	02565	02000 00001	X G 25 W/2 G 24
.	C2466	ENT Q*W(VV)	02566	10030 03672	X X GAMMA=26
.	C2467	RSH Q*2	02567	01000 00002	X G 24
.	C2470	RJP SADD	02570	65000 04073	X X V+2W GAMMA=26
.	C2471	RJP SOVERFLOW	02571	65000 04046	
.	C2472	ENT Q*24D	02572	10000 00030	X X G 24
.	C2473	RJP COSX	02573	65000 05345	X X COS(V+2W)
.	C2474	ENT Q*A	02574	10070 00000	X X
.	C2475	MUL W(EE)	02575	22030 03627	X X E\$COS(V+2W) GAMMA=57
.	C2476	LSH AQ*2	02576	07000 00002	X X GAMMA=59
.	C2477	RJP ROUND	02577	65000 04060	X X GAMMA=29
.	C2500	STR A*W(MCALSTOR1)	02600	15030 03533	X X
.	C2501	ENT Q*W(ZOMEGA)	02601	10030 03631	X2 E/3\$COS(3V+2W)
.	C2502	MUL W(FIXTWO)	02602	22030 03607	X X 2W GAMMA=53
.	C2503	RJP ROUND	02603	65000 04060	X X GAMMA=23
.	C2504	STR A*W(MCALSTORA)	02604	15030 03540	X X
.	C2505	ENT Q*W(VV)	02605	10030 03672	X X GAMMA=26
.	C2506	MUL W(FIX3)	02606	22030 03610	X X 3V GAMMA=53
.	C2507	RJP ROUND	02607	65000 04060	X X GAMMA=23
.	C2510	ENT Q*W(MCALSTORA)	02610	10030 03540	X X
.	C2511	RJP SADD	02611	65000 04073	X X 3V+2W GAMMA=23
.	C2512	RJP SOVERFLOW	02612	65000 04046	
.	C2513	ENT Q*23D	02613	10000 00027	X X
.	C2514	RJP COSX	02614	65000 05345	X X COS(3V+2W)
.	C2515	ENT Q*A	02615	10070 00000	X X
.	C2516	MUL W(EE)	02616	22030 03627	X X E\$COS(3V+2W) GAMMA=57
.	C2517	RSH AQ*1	02617	03000 00001	X X G 56

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 SATEL MCQUILKIN*7/1/65

CARDS	LI ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C2520	DIV W(FIX3)*NOOF	02620	23230	03610	X	X E\$COS(3V+2W)/3 GAMMA=29
.	C2521	RJP SOVERFLOW	02621	65000	04046		
.	C2522	LSH A*1	02622	06000	00001	X	X
.	C2523	COM A*W(FIX3)*YMORE	02623	04730	03610	X	X
.	C2524	ADD Q*1	02624	26000	00001	X	X
.	C2525	STR Q*W(MCALSTOR2)	02625	14030	03534	X	X
.	C2526	ENT A*W(MCALCON9)	02626	11030	03526	X	GAMMA=28
.	C2527	ENT Q*W(MCALSTOR1)	02627	10030	03533	X	GAMMA=29
.	C2530	RSH Q*1	02630	01000	00001	X	GAMMA=28
.	C2531	RJP SADD	02631	65000	04073	X	COS2(V+W)+1
.	C2532	RJP SOVERFLOW	02632	65000	04046		
.	C2533	ENT Q*W(MCALSTOR2)	02633	10030	03534	X	GAMMA=29
.	C2534	RSH Q*1	02634	01000	00001	X	GAMMA=28
.	C2535	RJP SADD	02635	65000	04073	X	COS2(V+W)+1+2 GAMMA=28
.	C2536	RJP SOVERFLOW	02636	65000	04046		
.	C2537	STR A*W(MCALSTOR1)	02637	15030	03533	X	G 28
.	C2540	ENT A*W(II)	02640	11030	03630	X	G 26
.	C2541	LSH A*1	02641	06000	00001	X	G 26 2\$I
.	C2542	ENT Q*260	02642	10000	00032	X	
.	C2543	RJP SINX	02643	65000	05357	X	SIN2I G 28
.	C2544	ENT Q*A	02644	10070	00000		
.	C2545	MUL W(MCALSTOR1)	02645	22030	03533	X	SIN2I(COS2(V+W)+1+2) G 56
.	C2546	RJP ROUND	02646	65000	04060	X	GAMMA
.	C2547	ENT Q*A	02647	10070	00000	X	=26
.	C2550	MUL W(MCALA2P2)	02650	22030	03523	X	G 58
.	C2551	RSH AQ*3	02651	03000	00003	X	G 55
.	C2552	RJP ROUND	02652	65000	04060	X	=25
.	C2553	ENT Q*A	02653	10070	00000	X	
.	C2554	MUL W(FIX14)	02654	22030	03574		GAMMA=54
.	C2555	RSH AQ*1	02655	03000	00001		GAMMA=55
.	C2556	RJP ROUND	02656	65000	04060		GAMMA=25
.	C2557	STR A*W(MCALSTOR1)	02657	15030	03533		
.	C2560	ENT B5*B5+1	02660	12505	00001		STORE DELTA L
.	C2561	ENT A*W(MCALSTOR1)	02661	11030	03533		
.	C2562	STR A*W(MM+B5)	02662	15035	03626		
.	C2563 MCALEXIT	ENT B5*0	02663	12500	00000		EXIT NORMAL
.	C2564	STR A*W(SATDVSTOR)	02664	15030	03730		
.	C2565 MCALX86	ENT B6*0	02665	12600	00000	X	YES
.	C2566 MCAL3B5	ENT B5*0	02666	12500	00000		
.	C2567 MCALAB4	ENT B4*0	02667	12400	00000		
.	C2570 MCALB7	ENT B7*0	02670	12700	00000		
.	C2571	JP MCALC	02671	61000	01310		
.	C2572 SCALC	ENTRY	02672	61000	00000		
.	C2573	ENT B3*0	02673	12300	00000		
.	C2574	ENT B4*0	02674	12400	00000		
.	C2575	CL W(EPRESW)	02675	16030	03705		
.	C2576	ENT Q*W(EE)	02676	10030	03627		
.	C2577	MUL W(EE)	02677	22030	03627		
.	C2600	RJP ROUND	02700	65000	04060		GAMMA 28
.	C2601	ENT Q*A	02701	10070	00000		
.	C2602	ENT A*W(FIXONE)	02702	11030	03606		

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CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C2603	RJP SSUB	02703	65000	04114		
.	C2604	RJP SOVERFLOW	02704	65000	04046		
.	C2605	RSH A*2	02705	02000	00002		G=26
.	C2606	RJP SQRT	02706	65000	05504		
.	C2607	RJP SERROR	02707	65000	04053		
.	C2610	LSH A*1	02710	06000	00001		G=28
.	C2611	STR A*W(SATDVSTOR)	02711	15030	03730		
.	C2612	COMMENT CALC					SINW,COSW
.	C2613	ENT A*W(ZOMEGA)	02712	11030	03631		W G=26
.	C2614	ENT Q*26D	02713	10000	00032		
.	C2615	RJP SINX	02714	65000	05357		
.	C2616	STR A*W(ZOSIN)	02715	15030	03651		WSIN G=28
.	C2617	ENT A*W(ZOMEGA)	02716	11030	03631		W G=26
.	C2620	ENT Q*26D	02717	10000	00032		
.	C2621	RJP COSX	02720	65000	05345		
.	C2622	STR A*W(ZOCOS)	02721	15030	03652		COSW G=28
.	C2623	COMMENT CALC					SINRF=SINR+DR(COSR)
.	C2624	PUT SADD*L(SINIT5)	02722	10000	04073		
.	C2625	ENT A*W(RAM)	02723	14010	02753		
.	C2626	ENT Q*26D	02724	11030	03632		
.	C2627	RJP SINX	02725	10000	00032		
.	C2630	STR A*W(RAMSIN)	02726	65000	05357		
.	C2631	ENT A*W(RAM)	02727	15030	03653		G=28
.	C2632	ENT Q*26D	02730	11030	03632		
.	C2633	RJP COSX	02731	10000	00032		
.	C2634	STR A*W(RAMCOS)	02732	65000	05345		
.	C2635	ENT B6*0	02733	15030	03654		G=28
.	C2636	ENT B7*0	02734	12600	00000		
.	C2637	ENT Q*W(RAMCOS+B7)	02735	12700	00000		
.	C2640	MUL W(DELTRAM)	02736	10037	03654		
.	C2641	LSH AQ*2	02737	22030	03641		G=26
.	C2642	RJP ROUND	02740	07000	00002		G = 24 MAKE IT 26
.	C2643	STR A*W(SINUM)	02741	65000	04060		NO
.	C2644	ADD A*O*APOS	02742	15030	03704		TEMP
.	C2645	CP A*	02743	20600	00000		
.	C2646	COM A*W(TWO26)*YMORE	02744	15040	00000		
.	C2647	RJP SOVERFLOW	02745	04730	03721		COM =ORGRTR2
.	C2650	ENT A*W(RAMSIN+B6)	02746	65000	04046		
.	C2651	RSH AQ*2	02747	11036	03653		G=28
.	C2652	RJP ROUND	02750	03000	00002		MAKE G=26
.	C2653	ENT Q*W(SINUM)	02751	65000	04060		
.	C2654	RJP SADD	02752	10030	03704		DI(COS(SIN)I) G=26
.	C2655	RJP SOVERFLOW	02753	65000	04073		
.	C2656	ADD A*O*APOS	02754	65000	04046		
.	C2657	JP \$+4	02755	20600	00000		
.	C2660	COM A*W(WONEP26)*YMORE	02756	61000	02762		
.	C2661	ENT A*W(FIXONEX)	02757	04730	03716		SIN GRTR 1
.	C2662	JP SINIT51	02760	11030	03620		
.	C2663	CP A*	02761	61000	02766		
.	C2664	COM A*W(WONEP26)*YMORE	02762	15040	00000		
.	C2665	ENT A*W(FIXONEX)	02763	04730	03716		
.	C2666	CP A*	02764	11030	03620		
.			02765	15040	00000		

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F JKB Y	NOTES
.	C2667 SINI51	LSH A*2	02766	06000 00002	
.	C2670	STR A*W(RAMFSIN+B6)	02767	15036 03655	
.	C2671	COMMENT CALC			COSRF=COSR-DR(SINR)
.	C2672	ENT A*B6*AZERO	02770	11406 00000	
.	C2673	JP SIN52	02771	61000 02777	
.	C2674	ENT B7*-1	02772	12700 77776	
.	C2675	ENT B6*1+B6	02773	12606 00001	
.	C2676	PUT SSUB*L(SINI5)	02774	10000 04114	
.	C2677	JP SINI4	02775	14010 02753	
.	C2700 SIN52	PUT SADD*L(SUBADD)	02776	61000 02736	
.			02777	10000 04073	
.			03000	14010 03020	
.	C2701	COMMENT CALC			SINL=SINWCOSV+COSWSINV
.	C2702	PUT SADD*L(SUBADD)	03001	10000 04073	HAVE SIN AND COS
.			03002	14010 03020	
.	C2703 SINL	ENT B6*0	03003	12600 00000	
.	C2704	ENT B7*0	03004	12700 00000	
.	C2705	ENT Q*W(ZOSIN+B6)	03005	10036 03651	
.	C2706	MUL W(VVCOS)	03006	22030 03674	COSV G=28
.	C2707	LSH AQ*2	03007	07000 00002	G=26 MAKE IT 28
.	C2710	RJP ROUND	03010	65000 04060	
.	C2711	STR A*W(SINUM)	03011	15030 03704	RES IN A
.	C2712	ENT Q*W(ZOCOS+B7)	03012	10037 03652	
.	C2713	MUL W(VVSIN)	03013	22030 03673	SINV G=28
.	C2714	LSH AQ*2	03014	07000 00002	G=26 MAKE IT 28
.	C2715	RJP ROUND	03015	65000 04060	
.	C2716	ENT Q*A	03016	10070 00000	
.	C2717	ENT A*W(SINUM)	03017	11030 03704	
.	C2720 SLBADD	RJP SADD	03020	65000 04073	
.	C2721	RJP SOVERFLOW	03021	65000 04046	
.	C2722	STR A*W(LLSIN+B6)	03022	15036 03666	
.	C2723	COMMENT CALC			COSL=COSWCOSV-SINWSINV
.	C2724	ENT A*B6*AZERO	03023	11406 00000	
.	C2725	JP SUBADDX1	03024	61000 03032	
.	C2726	ENT B6*B6+1	03025	12606 00001	
.	C2727	ENT B7*-1	03026	12700 77776	
.	C2730	PUT SSUB*L(SUBADD)	03027	10000 04114	
.			03030	14010 03020	
.	C2731	JP SINL+2	03031	61000 03005	
.	C2732	COMMENT CALC			SINLF=SINL+COSL
.	C2733 SLBADCX1	ENT B7*0	03032	12700 00000	
.	C2734	ENT B6*0	03033	12600 00000	
.	C2735 SLFBGN	PUT SADD*L(SLFCALL)	03034	10000 04073	
.			03035	14010 03052	
.	C2736	ENT Q*W(DETL)	03036	10030 03637	
.	C2737	MUL W(LLCOS+B7)	03037	22037 03667	
.	C2740	LSH AQ*2	03040	07000 00002	G=24 MAKE G=26
.	C2741	RJP ROUND	03041	65000 04060	
.	C2742	COM A*W(TWO26)*YMORE	03042	04730 03721	
.	C2743	RJP SOVERFLOW	03043	65000 04046	
.	C2744	STR A*W(STEM1)	03044	15030 03711	
.	C2745	ENT A*W(LLSIN+B6)	03045	11036 03666	G=28
.	C2746	CL Q*	03046	10000 00000	

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CARDS	LI	ID	LABEL	TA	STATEMENT	LOC	F	JKB	Y	NOTES
.	C2747			RSH	AQ*2	03047	03000	00002		MAKE G=26
.	C2750			RJP	ROUND	03050	65000	04060		SINL
.	C2751			ENT	Q*W(STEM1)	03051	10030	03711		COSL DL
.	C2752	SLFCALL		RJP	SADD	03052	65000	04073		
.	C2753			RJP	SOVERFLOW	03053	65000	04046		
.	C2754			ADD	A*O*APOS	03054	20600	00000		
.	C2755			JP	SLFCALLX2	03055	61000	03061		
.	C2756			COM	A*W(WONEP26)*YMORE	03056	04730	03716		
.	C2757			ENT	A*W(FIXONEX)	03057	11030	03620		
.	C2760			JP	SLFCALLX3	03060	61000	03065		
.	C2761	SLFCALLX2		CP	A*	03061	15040	00000		
.	C2762			COM	A*W(WONEP26)*YMORE	03062	04730	03716		
.	C2763			ENT	A*W(FIXONEX)	03063	11030	03620		
.	C2764			CP	A*	03064	15040	00000		
.	C2765	SLFCALLX3		LSH	A*2	03065	06000	00002		
.	C2766			STR	A*W(LLFSIN+B6)	03066	15036	03670		
.	C2767			COMMENT	CALC					COSLF=COSL-S INLDL
.	C2770			ENT	A*B6*AZERO	03067	11406	00000		
.	C2771			JP	SLFCALLX1	03070	61000	03100		
.	C2772			ENT	B7*-1	03071	12700	77776		
.	C2773			ENT	B6*1+B6	03072	12606	00001		
.	C2774			PUT	SSUB*L(SLFCALL)	03073	10000	04114		
.	C2775			JP	SLFBGN+1	03074	14010	03052		
.	C2776			PUT	SADD*L(SLFCALL)	03075	61000	03035		
.	C2777			COMMENT	CALC	03076	10000	04073		
.	C3000	SLFCALLX1		ENT	Q*W(SINDEN)	03077	14010	03052		R=A(1-ECOSE)+DR
.	C3001			MUL	W(AA)	03100	10030	03703		
.	C3002			LSH	AQ*2	03101	22030	03636		G=25
.	C3003			RJP	ROUND	03102	07000	00002		G=23 MAKE IT 25
.	C3004			ENT	Q*W(DELTR)	03103	65000	04060		
.	C3005			RJP	SADD	03104	10030	03640		
.	C3006			RJP	SOVERFLOW	03105	65000	04073		
.	C3007			STR	A*W(RANGEX)	03106	65000	04046		
.	C3010			RSH	AQ*3	03107	15030	03664		RANGE G 25
.	C3011			RJP	ROUND	03110	03000	00003		
.	C3012			STR	A*W(RADIUS)	03111	65000	04060		
.	C3013	SATDELTA		ENT	Q*W(IIFSIN)	03112	15030	63006		X RADIUS 22 GAMMA
.	C3014			MUL	W(LLFSIN)	03113	10030	03647		CALCULATE ARCSIN(SINIF X SINLF)=DELTA
.	C3015			LSH	AQ*2	03114	22030	03670		X GAMMA=56
.	C3016			RJP	ROUND	03115	07000	00002		X GAMMA 58
.	C3017			RSH	A*2	03116	65000	04060		X GAMMA=29
.	C3020			ENT	Q*A	03117	02000	00002		
.	C3021			JP	SATD2*QNEG	03120	10070	00000		
.	C3022			SUB	Q*W(FIXONEX)*QNEG	03121	60300	03125		
.	C3023			ENT	A*W(FIXONEX)	03122	27730	03620		
.	C3024			JP	SATD3	03123	11030	03620		
.	C3025	SATD2		ADD	Q*W(FIXONEX)*QPOS	03124	61000	03131		
.	C3026			ENT	A*W(FIXONEX)*SKIP	03125	26630	03620		
.	C3027			JP	SATD3	03126	11130	03620		
.						03127	61000	03131		

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F JKB Y	NOTES
.	C3030	CP A*	03130	15040 00000	
.	C3031 SATD3	ENT Q*26D	03131	10000 00032	
.	C3032	RJP ASINX	03132	65000 05657	X GAMMA=27
.	C3033	RJP SERROR	03133	65000 04053	
.	C3034	RSH A*1	03134	02000 00001	X GAMMA=26
.	C3035	STR A*W(DELTB)	03135	15030 03676	CALCULATION STORED IN DELT
.	C3036	CL Q*	03136	10000 00000	
.	C3037	RSH AQ*2	03137	03000 00002	X GAMMA
.	C3040	DIV W(SAT2PI)*NOOF	03140	23230 04025	X DELTA/2PI GAMMA
.	C3041	RJP SOVERFLOW	03141	65000 04046	X
.	C3042	LSH A*1	03142	06000 00001	X
.	C3043	COM A*W(SAT2PI)*YMORE	03143	04730 04025	X
.	C3044	ADD Q*1	03144	26000 00001	X
.	C3045	RSH Q*1	03145	01000 00001	X
.	C3046	STR Q*W(DEC)	03146	14030 63003	X
.	C3047 SATALPHA	ENT Q*W(IIFCOS)	03147	10030 03650	CALCULATE ALPHA
.	C3050	MUL W(RAMFCOS)	03150	22030 03656	XCALCULATE COSIF X COSRAMF X S
.	C3051	LSH AQ*2	03151	07000 00002	INLF
.	C3052	RJP ROUND	03152	65000 04060	G=28
.	C3053	ENT Q*A	03153	10070 00000	X ROUND GAMMA = 28
.	C3054	MUL W(LLFSIN)	03154	22030 03670	X PUT PROD IN Q REG
.	C3055	LSH AQ*2	03155	07000 00002	X GAMMA=54
.	C3056	RJP ROUND	03156	65000 04060	X GAMMA=58
.	C3057	STR A*W(SSPROD)	03157	15030 03725	X ROUND
.	C3060	ENT Q*W(RAMFSIN)	03160	10030 03655	XSTORE PARTIAL ANS
.	C3061	MUL W(LLFCOS)	03161	22030 03671	XCALCULATE SINRAMF X COSLF
.	C3062	LSH AQ*2	03162	07000 00002	X GAMMA=56
.	C3063	RJP ROUND	03163	65000 04060	X GAMMA=58
.	C3064	ENT Q*W(SSPROD)	03164	10030 03725	X ROUND GAMMA=28
.	C3065	RJP SADD	03165	65000 04073	X GAMMA=28
.	C3066	RJP SOVERFLOW	03166	65000 04046	XADD TWO PARTIAL ANS
.	C3067	STR A*W(SSSUM)	03167	15030 03726	X NUMERATOR CALCULATED
.	C3070	ENT A*W(DELTB)	03170	11030 03676	X
.	C3071	ENT Q*26D	03171	10000 00032	X
.	C3072	RJP COSX	03172	65000 05345	X CALCULATE COSDELTA GAMMA=28
.	C3073	STR A*W(DELTCOS)	03173	15030 03724	X
.	C3074	ADD A*O*AZERO	03174	20400 00000	
.	C3075	JP SATA1	03175	61000 03200	
.	C3076	CL Q*	03176	10000 00000	
.	C3077	JP SATALPH2X	03177	61000 03275	
.	C3100 SATA1	CL Q*	03200	10000 00000	
.	C3101	ENT A*W(SSSUM)	03201	11030 03726	X
.	C3102	RSH AQ*3	03202	03000 00003	
.	C3103	DIV W(DELTCOS)*NOOF	03203	23230 03724	X DIVIDE PARTIAL SUM BY COSDEL
.	C3104	RJP SOVERFLOW	03204	65000 04046	TA
.	C3105	LSH A*1	03205	06000 00001	X NO OVERFLOW GAMMA=27
.	C3106	COM A*W(DELTCOS)*YMORE	03206	04730 03724	
.	C3107	ADD Q*1	03207	26000 00001	

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 SATEL MCQUILKIN*7/1/65

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C3110	RSH Q*1	03210	01000	00001		X GAMMA=26
.	C3111	STR Q*A	03211	14040	00000		
.	C3112	JP SATA2*QNEG	03212	60300	03216		
.	C3113	SUB Q*W(FIXONEX)*QNEG	03213	27730	03620		
.	C3114	ENT A*W(FIXONEX)	03214	11030	03620		
.	C3115	JP SATA3	03215	61000	03222		
.	C3116 SATA2	ADD Q*W(FIXONEX)*QPOS	03216	26630	03620		
.	C3117	ENT A*W(FIXONEX)*SKIP	03217	11130	03620		
.	C3120	JP SATA3	03220	61000	03222		
.	C3121	CP A*	03221	15040	00000		
.	C3122 SATA3	ENT Q*26D	03222	10000	00032		
.	C3123	RJP ASINX	03223	65000	05657		X
.	C3124	RJP SERROR	03224	65000	04053		
.	C3125	RSH A*1	03225	02000	00001		X GAMMA=26
.	C3126	STR A*W(ALPHB)	03226	15030	03677		G=26
.	C3127	ENT Q*W(RAMFCOS)	03227	10030	03656		COSRAM\$COSL-COSI\$SINRAM\$SINL
.	C3130	MUL W(LLFCOS)	03230	22030	03671		G 56
.	C3131	RJP ROUND	03231	65000	04060		G 26
.	C3132	STR A*W(MCALSTORA)	03232	15030	03540		
.	C3133	ENT Q*W(IIFCOS)	03233	10030	03650		G 28
.	C3134	MUL W(RAMFSIN)	03234	22030	03655		G 56
.	C3135	LSH AQ*2	03235	07000	00002		G 58
.	C3136	RJP ROUND	03236	65000	04060		
.	C3137	ENT Q*A	03237	10070	00000		G 28
.	C3140	MUL W(LLFSIN)	03240	22030	03670		G 56
.	C3141	RJP ROUND	03241	65000	04060		G 26
.	C3142	ENT Q*A	03242	10070	00000		
.	C3143	ENT A*W(MCALSTORA)	03243	11030	03540		G 26
.	C3144	RJP SSUB	03244	65000	04114		
.	C3145	RJP SOVERFLOW	03245	65000	04046		
.	C3146	STR A*W(MQUAD)*ANEG	03246	15730	04027		G 26 NEG ADD 180DEG TO ANGLE
.	C3147	JP SATALPH1	03247	61000	03256		
.	C3150	ENT A*W(TWPI26)	03250	11030	04025		G 26 2 PI
.	C3151	RSH A*1	03251	02000	00001		G 26 PI
.	C3152	ENT Q*W(ALPHB)	03252	10030	03677		
.	C3153	RJP SSUB	03253	65000	04114		180DEG-ALPHA
.	C3154	RJP SOVERFLOW	03254	65000	04046		
.	C3155	JP SATALPH2	03255	61000	03264		
.	C3156 SATALPH1	ENT A*W(ALPHB)*ANEG	03256	11730	03677		
.	C3157	JP SATALPH2	03257	61000	03264		
.	C3160	ENT Q*A	03260	10070	00000		
.	C3161	ENT A*W(TWPI26)	03261	11030	04025		G 26
.	C3162	RJP SADD	03262	65000	04073		360DEG + (-ALPHA)
.	C3163	RJP SOVERFLOW	03263	65000	04046		
.	C3164 SATALPH2	RSH A*1	03264	02000	00001		G 25
.	C3165	STR A*W(ALPHB)	03265	15030	03677		
.	C3166	CL Q*	03266	10000	00000		CONVERT RIGHT ASCNE TO REV AND SOTRE
.	C3167	RSH AQ*2	03267	03000	00002		X GAMMA=53
.	C3170	CIV W(SAT2PI)*NCOF	03270	23230	04025		X ALPHA/2PI GAMMA=27
.	C3171	RJP SOVERFLOW	03271	65000	04046		X
.	C3172	LSH A*1	03272	06000	00001		X

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C3173	COM A*W(SAT2PI)*YMORE	03273	04730	04025	X	
.	C3174	ADD Q*1	03274	26000	00001	X	
.	C3175 SATALPH2X	STR Q*W(RA)	03275	14030	63002		
.	C3176 SATDV	ENT Q*W(NN)	03276	10030	03633		DV=N\$A\$2\$SQRT(1-E\$2)/R\$2
.	C3177	MUL W(AA)	03277	22030	03636	G 57	
.	C3200	RJP ROUND	03300	65000	04060	G 27	
.	C3201	ENT Q*A	03301	10070	00000	N\$A\$2	
.	C3202	MUL W(AA)	03302	22030	03636	G 52	
.	C3203	LSH AQ*2	03303	07000	00002	G 54	
.	C3204	RJP ROUND	03304	65000	04060	GAMMA=24	
.	C3205	ENT Q*A	03305	10070	00000	N\$A\$2\$SQRT(1-E\$2)	
.	C3206	MUL W(SATDVSTOR)	03306	22030	03730	GAMMA=52	
.	C3207	LSH AQ*2	03307	07000	00002	G 54	
.	C3210	RJP ROUND	03310	65000	04060	G 24	
.	C3211	STR A*W(MCALSTOR1)	03311	15030	03533	X	
.	C3212	ENT A*W(RANGEX)*ANOT	03312	11530	03664	X IS DEN O	
.	C3213	RJP ERROR	03313	65000	04053	X YES	
.	C3214	ENT Q*A	03314	10070	00000	X NO	
.	C3215	MUL W(RANGEX)	03315	22030	03664	GAMMA 50	
.	C3216	RJP ROUND	03316	65000	04060	GAMMA=20	
.	C3217	STR A*W(MCALSTOR2)	03317	15030	03534	X	
.	C3220	RJP FF	03320	65000	05323		
.	C3221	240 MCALSTOR1	03321	00030	03533		
.	C3222	U-TAG MCALNUM*10	03322	04036	00010		
.	C3223	RJP FF	03323	65000	05323		
.	C3224	200 MCALSTOR2	03324	00024	03534		
.	C3225	U-TAG MCALDEN*10	03325	04040	00010		
.	C3226	RJP FF	03326	65000	05323		
.	C3227	U-TAG MCALNUM*MCALDEN	03327	04036	04040		
.	C3230	U-TAG MCALANS*03	03330	04042	00003		
.	C3231	RJP FF	03331	65000	05323		
.	C3232	370 MCALANS	03332	00045	04042		
.	C3233	U-TAG VDOT*11	03333	03731	00011		
.	C3234	ENT A*W(DEROMEG)	03334	11030	03634		
.	C3235	RSH A*4	03335	02000	00004	G 37	
.	C3236	ENT Q*W(VDOT)	03336	10030	03731	G 37	
.	C3237	RJP SADD	03337	65000	04073		
.	C3240	RJP SOVERFLOW	03340	65000	04046		
.	C3241	STR A*W(UDOT)	03341	15030	04001	G 37	
.	C3242 SATDDEL	ENT Q*W(IIFSIN)	03342	10030	03647	DDELTD/DT (SINI\$COSU/COSDELTA)D U/DT	
.	C3243	MUL W(LLFCOS)	03343	22030	03671	X SINIF\$COSUF G 56	
.	C3244	RSH AQ*8D	03344	03000	00010	X	GAMMA=48
.	C3245	CIV W(DELT COS)*NOOF	03345	23230	03724	X SINI\$COS/COSDELTA 20	
.	C3246	RJP SOVERFLOW	03346	65000	04046	X	
.	C3247	LSH A*1	03347	06000	00001	X	
.	C3250	COM A*W(DELT COS)*YMORE	03350	04730	03724	X	
.	C3251	ADD Q*1	03351	26000	00001	X	
.	C3252	LSH AQ*8D	03352	07000	00010	X	GAMMA=28
.	C3253	MUL W(UDOT)	03353	22030	04001	G 65	
.	C3254	RJP ROUND	03354	65000	04060	G 35	
.	C3255	STR A*W(MCALSTOR1)	03355	15030	03533		
.	C3256	ADD A*O*APDS	03356	20600	00000	X	

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C3257	CP A*	03357	15040	00000		
.	C3260	ENT Q*A	03360	10070	00000	X	
.	C3261	CL A*	03361	11000	00000	X	
.	C3262	LSH AQ*2*AZERO	03362	07400	00002		
.	C3263	RJP SERROR	03363	65000	04053	X	
.	C3264	ENT A*W(MCALSTOR1)*APOS	03364	11630	03533		
.	C3265	CP Q*	03365	14000	00000		
.	C3266	STR Q*W(DECDOT)	03366	14030	63010	X	CHANGE INCECLINATION GAMMA 37
.	C3267 SATDALPH	CL Q*	03367	10000	00000		
.	C3270	ENT A*W(IIFCOS)	03370	11030	03650		
.	C3271	RSH AQ*6	03371	03000	00006	G 22	
.	C3272	DIV W(DELT COS)*NOOF	03372	23230	03724	(COSI/COSD) G 24	
.	C3273	RJP SOVERFLOW	03373	65000	04046	X	
.	C3274	LSH A*1	03374	06000	00001	X	ROUND IF NECESSARY
.	C3275	COM A*W(DELT COS)*YMORE	03375	04730	03724		
.	C3276	ADD Q*1	03376	26000	00001		
.	C3277	MUL W(UDOT)	03377	22030	04001	(COSI-COSD**2)DU/DT G 61	
.	C3300	RJP ROUND	03400	65000	04060	G 31	
.	C3301	STR A*W(MCALSTOR1)	03401	15030	03533	G 31	
.	C3302	ENT Q*W(DERRAM)	03402	10030	03635		
.	C3303	MUL W(DELT COS)	03403	22030	03724	G 69	
.	C3304	RSH AQ*8D	03404	03000	00010	G 61	
.	C3305	RJP ROUND	03405	65000	04060	G 31	
.	C3306	ENT Q*W(MCALSTOR1)	03406	10030	03533		
.	C3307	RJP SADD	03407	65000	04073	X X +DRAM=DALPHA GAMMA 26	
.	C3310	RJP SOVERFLOW	03410	65000	04046	X	
.	C3311	STR A*W(MCALSTOR1)	03411	15030	03533		
.	C3312	ADD A*O*APOS	03412	20600	00000	X	
.	C3313	CP A*	03413	15040	00000	X	
.	C3314	ENT Q*A	03414	10070	00000	X	
.	C3315	CL A*	03415	11000	00000	X	
.	C3316	LSH AQ*6*AZERO	03416	07400	00006	G 37	
.	C3317	RJP SERROR	03417	65000	04053	X	
.	C3320	ENT A*W(MCALSTOR1)*APOS	03420	11630	03533		
.	C3321	CP Q*	03421	14000	00000		
.	C3322	STR Q*W(RADOT)	03422	14030	63007	CHANGE IN ALPHA CALCUALTED	
.	C3323 DRADIUS	ENT Q*W(AA)	03423	10030	03636	CALCULATE DRADIUS/DT	
.	C3324	MUL W(EE)	03424	22030	03627	X (A*\$N\$/SQRT(1-E**2))SINV	
.	C3325	LSH AQ*1	03425	07000	00001	X A*\$ G 55	
.	C3326	RJP ROUND	03426	65000	04060	X G 25	
.	C3327	ENT Q*A	03427	10070	00000	X	
.	C3330	MUL W(NN)	03430	22030	03633	X A*\$N G57	
.	C3331	RJP ROUND	03431	65000	04060	X G 27	
.	C3332	STR A*W(MCALSTORA)	03432	15030	03540	X	
.	C3333	ENT Q*W(EE)	03433	10030	03627		
.	C3334	MUL W(EE)	03434	22030	03627	X E*\$ G 58	
.	C3335	RJP ROUND	03435	65000	04060	X G 28	
.	C3336	ENT Q*A	03436	10070	00000	X	
.	C3337	ENT A*W(FIXONE)	03437	11030	03606	X	
.	C3340	RJP SSUB	03440	65000	04114	X	

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F JKB Y	NOTES
.	C3341	RJP SOVERFLOW	03441	65000 04046	X 1-E\$\$2 G 28
.	C3342	RSH A*2	03442	02000 00002	G=26
.	C3343	RJP SQRT	03443	65000 05504	X SQRT(1-E\$\$2) G 28
.	C3344	RJP SERROR	03444	65000 04053	X
.	C3345	LSH A*1	03445	06000 00001	G=28
.	C3346	STR A*W(MCALSTORB)	03446	15030 03541	X
.	C3347	ENT A*W(MCALSTORA)	03447	11030 03540	X G 27
.	C3350	CL Q*	03450	10000 00000	X
.	C3351	DIV W(MCALSTORB)*NOOF	03451	23230 03541	X A\$E\$N/SQRT(1-E\$\$2) G 29
.	C3352	RJP SOVERFLOW	03452	65000 04046	X
.	C3353	LSH A*1	03453	06000 00001	X
.	C3354	COM A*W(MCALSTORB)*YMORE	03454	04730 03541	X
.	C3355	ADD Q*1	03455	26000 00001	X
.	C3356	MUL W(VVSIN)	03456	22030 03673	X G 57
.	C3357	LSH AQ*10D	03457	07000 00012	G 67
.	C3360	RJP ROUND	03460	65000 04060	G 37 DRADIUS/DT ER. RADII/SEC
.	C3361	ENT Q*A	03461	10070 00000	X CONVERT EARTH RADII TO MAUT .MI.
.	C3362	MUL W(EQUATOR)	03462	22030 63323	G 54
.	C3363	RJP ROUND	03463	65000 04060	G 24
.	C3364	STR A*W(RADIUSDOT)	03464	15030 63011	DRADIUS/DT NAUT.MI/SEC G 24
.	C3365	ENT A*W(ALPHB)	03465	11030 03677	COS CHI=SIN\$COS(ALPHA-RAM)
.	C3366	ENT Q*W(RAM)	03466	10030 03632	X
.	C3367	RJP SSUB	03467	65000 04114	X ALPHA-RAM GAMMA =26
.	C3370	RJP SOVERFLOW	03470	65000 04046	X
.	C3371	ENT Q*26D	03471	10000 00032	X
.	C3372	RJP COSX	03472	65000 05345	X
.	C3373	ENT Q*A	03473	10070 00000	X
.	C3374	MUL W(IIFSIN)	03474	22030 03647	X SINI\$COS(ALPHA-RAM) G 5L
.	C3375	LSH AQ*3	03475	07000 00003	X GAMMA =59
.	C3376	RJP ROUND	03476	65000 04060	X GAMMA =29
.	C3377	STR A*W(COSORIENT)	03477	15030 63065	X
.	C3400	ENT Q*A	03500	10070 00000	SIN CHI=SQRT(1-COSCHI\$\$2)
.	C3401	MUL W(COSORIENT)	03501	22030 63065	X COSCHI\$\$2 GAMMA =58
.	C3402	RJP ROUND	03502	65000 04060	X GAMMA =28
.	C3403	ENT Q*A	03503	10070 00000	X
.	C3404	ENT A*W(FIXONE)	03504	11030 03606	X GAMMA ,28
.	C3405	RJP SSUB	03505	65000 04114	X 1-COSCHI\$\$2 GAMMA 28
.	C3406	RJP SOVERFLOW	03506	65000 04046	X
.	C3407	RSH A*2	03507	02000 00002	G=26
.	C3410	RJP SQRT	03510	65000 05504	XSQRT(1-COSCHI\$\$2) GAMMA 28
.	C3411	RJP SERROR	03511	65000 04053	X
.	C3412	LSH A*2	03512	06000 00002	SIN CHI G=29
.	C3413	STR A*W(SINORIENT)	03513	15030 63064	X

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 SATEL MCQUILKIN*7/1/65

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F JKB Y	NOTES
.	C3414	RPL Y+1*L(SCALC)	03514	36010 02672	
.	C3415	EXIT	03515	61010 02672	
.	C3416 MCALSTOR7	C 0	03516	00000 00000	
.	C3417 MCALCCN5	0 0	03517	00000 00000	
.	C3420 MCALCCN6	C 0	03520	00000 00000	
.	C3421 MCALCCN7	0 0	03521	00000 00000	
.	C3422 MCALCCN8	0 0	03522	00000 00000	
.	C3423 MCALA2P2	0 0	03523	00000 00000	
.	C3424 MCALGM3	0 0	03524	00000 00000	
.	C3425 MCALP2	0 0	03525	00000 00000	
.	C3426 MCALCCN9	C 0	03526	00000 00000	
.	C3427 MRAMCCR	C 0	03527	00000 00000	
.	C3430 MIIME	C 0	03530	00000 00000	
.	C3431	0 0	03531	00000 00000	
.	C3432 DATE	00000 00020	03532	00000 00020	
.	C3433 MCALSTOR1	0 0	03533	00000 00000	
.	C3434 MCALSTOR2	C 0	03534	00000 00000	
.	C3435 MCALSTOR3	0 0	03535	00000 00000	
.	C3436 MCALSTOR4	0 0	03536	00000 00000	
.	C3437 MCALSTOR5	0 0	03537	00000 00000	
.	C3440 MCALSTORA	0 0	03540	00000 00000	
.	C3441 MCALSTORB	0 0	03541	00000 00000	
.	C3442 MCALSTORC	0 0	03542	00000 00000	
.	C3443 MCALCCN1	C 0	03543	00000 00000	
.	C3444 MCALCCN2	0 0	03544	00000 00000	
.	C3445 MCALCCN3	0 0	03545	00000 00000	
.	C3446 MCALCCN4	0 0	03546	00000 00000	
.	C3447 MCALARGU	RESERVE 14	03547	00000 00000	
.	C3450 MCALSUM	0 0	03563	00000 00000	
.	C3451	0 0	03564	00000 00000	
.	C3452 MCALCNT	0 0	03565	00000 00000	
.	C3453 MCALDIFF	C 0	03566	00000 00000	
.	C3454	0 0	03567	00000 00000	
.	C3455 MCALSTORN	0 0	03570	00000 00000	
.	C3456 MCALGM	00001 47057	03571	00001 47057	GM .00000153618 E.RADII(CUBED)/SEC(SQRD BINARY PT 35
.	C3457	COMMENT			
.	C3460 FIX32	06000 00000	03572	06000 00000	
.	C3461 FIX16	05252 52525	03573	05252 52525	
.	C3462 FIX14	10000 00000	03574	10000 00000	
.	C3463 FIX13	12525 25252	03575	12525 25252	
.	C3464 DATECON1	C1111 74004	03576	01111 74004	2,400,000.5 BINARY PT. 3
.	C3465 DATECON2	00001 01001	03577	00001 01001	33281 BINARY PT. 0
.	C3466 DATECCN3	0 50032	03600	00000 50032	.00003508 DEGREES/DAY BINARY PT. 29
.	C3467 FIX864	25060 00000	03601	25060 00000	G=12
.	C3470 FXDEGRAD	00435 75065	03602	00435 75065	G=29 CONVERT DEG.TO RAD.
.	C3471 MCALTWO	0 00002	03603	00000 00002	
.	C3472	0 00003	03604	00000 00003	
.	C3473	0 00004	03605	00000 00004	
.	C3474 FIXONE	20000 00000	03606	20000 00000	GAMMA=28
.	C3475 FIXTWO	20000 00000	03607	20000 00000	X =27
.	C3476 FIX3	30000 00000	03610	30000 00000	X =27

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CARDS	LI ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C3477 FIX6	30000 00000	03611	30000	00000	X	=26
.	C3500 FIX5	24000 00000	03612	24000	00000	X	=26
.	C3501 FIX56	32525 25253	03613	32525	25253	X	=29
.	C3502 FIX712	22525 25253	03614	22525	25253	X	=29
.	C3503 FIX12	20000 00000	03615	20000	00000	X	=29
.	C3504 FIX52	24000 00000	03616	24000	00000	X	=27
.	C3505 FIXTWOX	10000 00000	03617	10000	00000	GAMMA=26	
.	C3506 FIXONEX	04000 00000	03620	04000	00000	GAMMA=26	
.	C3507 MCALA2	C003246317	03621	00032	46317	DEC	+ .00162354829 A
.	C3510 RR	C 0	03622	00000	00000	2	
.	C3511 EE2	0 0	03623	00000	00000		
.	C3512 EVALCOS	C 0	03624	00000	00000		
.	C3513 EVALSIN	0 0	03625	00000	00000		
.	C3514	COMMENT					GENERAL STORAGE LOCATIONS OF
.	C3515	COMMENT					CALCULATED MEAN ELEMENTS
.	C3516 MP	0 0	03626	00000	00000		MEAN ANOMALY B 26 RADIAN
.	C3517 EE	0 0	03627	00000	00000		ECCENTRICITY B 29
.	C3520 II	0 0	03630	00000	00000		INCLINATION B 26
.	C3521 ZCMEGA	0 0	03631	00000	00000		ARGUMENT OF PERIGEE B 26 RADIA NS
.	C3522 RAM	0 0	03632	00000	00000		RIGHT ASCENSION B 26
.	C3523 NN	0 0	03633	00000	00000		ANOMALISTIC PERIOD B 31 RADI ANS/SEC
.	C3524 DEROMEG	0 0	03634	00000	00000		DW/DT B 41
.	C3525 DERRAM	0 0	03635	00000	00000		DRA/DT B 41
.	C3526 AA	0 0	03636	00000	00000		SEMI-MAJOR AXIS B25 EARTH RADII
.	C3527 DELTL	0 0	03637	00000	00000		
.	C3530 DELTR	0 0	03640	00000	00000		
.	C3531 DELTRAM	0 0	03641	00000	00000		
.	C3532 DELTI	0 0	03642	00000	00000		
.	C3533 EGVAL	0 0	03643	00000	00000		
.	C3534 EVAL	C 0	03644	00000	00000		
.	C3535 IISIN	0 0	03645	00000	00000		
.	C3536 IICOS	0 0	03646	00000	00000		
.	C3537 IIFSIN	0 0	03647	00000	00000		
.	C3540 IIFCOS	0 0	03650	00000	00000		
.	C3541 ZCSIN	0 0	03651	00000	00000		
.	C3542 ZCCOS	C 0	03652	00000	00000		
.	C3543 RAMSIN	0 0	03653	00000	00000		
.	C3544 RAMCOS	0 0	03654	00000	00000		
.	C3545 RAMFSIN	0 0	03655	00000	00000		
.	C3546 RAMFCOS	0 0	03656	00000	00000		
.	C3547 MISIN	0 0	03657	00000	00000		
.	C3550 MICOS	0 0	03660	00000	00000		
.	C3551 M3SIN	0 0	03661	00000	00000		
.	C3552 E1LAST	0 0	03662	00000	00000		
.	C3553 E2LAST	0 0	03663	00000	00000		
.	C3554 RANGEX	C 0	03664	00000	00000		
.	C3555 LL	0 0	03665	00000	00000		
.	C3556 LLSIN	0 0	03666	00000	00000		

..... SPURT OUTPUT NO. 210
 SATEL MCQUILKIN*7/1/65

CARDS	L1	ID	LABEL	TA	STATEMENT	LOC	F	JKB	Y	NOTES
.	C3557		LLCOS	0	0	03667	00000	00000		
.	C3560		LLFSIN	0	0	03670	00000	00000		
.	C3561		LLFCOS	0	0	03671	00000	00000		
.	C3562		VV	0	0	03672	00000	00000		
.	C3563		VVSIN	0	0	03673	00000	00000		
.	C3564		VVCOS	0	0	03674	00000	00000		
.	C3565		TCON	0	0	03675	00000	00000		
.	C3566		DELTB	0	0	03676	00000	00000		
.	C3567		ALPHB	0	0	03677	00000	00000		
.	C3570		DELT SIN	0	0	03700	00000	00000		
.	C3571		ALPH SIN	0	0	03701	00000	00000		
.	C3572		PP	0	0	03702	00000	00000		
.	C3573		SINDEN	0	0	03703	00000	00000		
.	C3574		SINUM	0	0	03704	00000	00000		
.	C3575		EPRESW	0	0	03705	00000	00000		
.	C3576		AVAL	0	0	03706	00000	00000		
.	C3577		BVAL	0	0	03707	00000	00000		
.	C3600		CVAL	0	0	03710	00000	00000		
.	C3601		STEM1	0	0	03711	00000	00000		
.	C3602		MECON	0	0	03712	00000	00000		
.	C3603		SINTK	0	0	03713	00000	00000		
.	C3604		GM	0	0	03714	00000	00000		
.	C3605		A2	0	0	03715	00000	00000		
.	C3606		WCNEP26	04000	1	03716	04000	00001		
.	C3607		WCNE28	20000	0	03717	20000	00000		
.	C3610		WCNE29	40000	0	03720	40000	00000		
.	C3611		TWO26	10000	0	03721	10000	00000		
.	C3612		METCON	0	0	03722	00000	00000		
.	C3613		EKODE	0	0	03723	00000	00000		
.	C3614		DELT COS	0	0	03724	00000	00000		
.	C3615		SSPROD	0	0	03725	00000	00000		
.	C3616		SSSUM	0	0	03726	00000	00000		
.	C3617		SSPI	31103	75524	03727	31103	75524		
.	C3620		SATDVSTCR	0	0	03730	00000	00000		
.	C3621		VDOT	0	0	03731	00000	00000		
.	C3622		TINIT	0	0	03732	00000	00000		
.	C3623			0	0	03733	00000	00000		
.	C3624		DELT	00000	00074	03734	00000	00074		60 SEC
.	C3625		KCCN	00000	00074	03735	00000	00074		
.	C3626		MTEMP1	0	0	03736	00000	00000		
.	C3627			0	0	03737	00000	00000		
.	C3630		MTEMP2	0	0	03740	00000	00000		
.	C3631			0	0	03741	00000	00000		
.	C3632		MTEMP3	0	0	03742	00000	00000		
.	C3633			0	0	03743	00000	00000		
.	C3634		MTEMP4	0	0	03744	00000	00000		
.	C3635			0	0	03745	00000	00000		
.	C3636		MTEMP5	0	0	03746	00000	00000		
.	C3637			0	0	03747	00000	00000		
.	C3640		METCON2	0	0	03750	00000	00000		
.	C3641		METCON3	0	0	03751	00000	00000		
.	C3642		DAYX	0	0	03752	00000	00000		
.	C3643			0	0	03753	00000	00000		

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SATEL

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MCQUILKIN*7/1/65

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CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C3644 DAYCCN	0 0	03754	00000	00000		
.	C3645	0 0	03755	00000	00000		
.	C3646 DELTX	0 0	03756	00000	00000		
.	C3647	0 0	03757	00000	00000		
.	C3650 KCCNX	0 0	03760	00000	00000		
.	C3651	0 0	03761	00000	00000		
.	C3652 SINVO	EQUALS SINVV					
.	C3653 MTEMP7	0 0	03762	00000	00000		
.	C3654	0 0	03763	00000	00000		
.	C3655 MTEMP6	0 0	03764	00000	00000		
.	C3656	0 0	03765	00000	00000		
.	C3657 JMPDELT12	0 0	03766	00000	00000		
.	C3660	0 0	03767	00000	00000		
.	C3661 TIME1	0 0	03770	00000	00000		
.	C3662 TIMEF	0 0	03771	00000	00000		
.	C3663 TIMED	0 0	03772	00000	00000		
.	C3664 TIME	0 0	03773	00000	00000		
.	C3665 CELTIMEX	0 0	03774	00000	00000		
.	C3666	0 0	03775	00000	00000		
.	C3667 JPK	0 0	03776	00000	00000		
.	C3670	0 0	03777	00000	00000		
.	C3671 TCNTA	0 0	04000	00000	00000		
.	C3672 UDOT	0 0	04001	00000	00000		
.	C3673 FLT6C	0 40006	04002	00000	40006		
.	C3674	17000 00000	04003	17000	00000		
.	C3675 FLT5000	0 40015	04004	00000	40015		
.	C3676	11610 00000	04005	11610	00000		
.	C3677 FLT864	0 40021	04006	00000	40021		
.	C3700	12430 00000	04007	12430	00000		
.	C3701 FLT423	0 40023	04010	00000	40023		
.	C3702	05205 60000	04011	05205	60000		
.	C3703 FLTTWO	0 40002	04012	00000	40002		
.	C3704	10000 0	04013	10000	00000		
.	C3705 FLTTWOX	0 40002	04014	00000	40002		
.	C3706	10000 0	04015	10000	00000		
.	C3707 FLTONE	0 40001	04016	00000	40001		
.	C3710	10000 0	04017	10000	00000		
.	C3711 FLTTWCXX	0 40002	04020	00000	40002		
.	C3712	10000 0	04021	10000	00000		
.	C3713 TWOP125	14441 76653	04022	14441	76653	2PI+ BINARY PT 25	
.	C3714 FIXTWOXX	10000 00000	04023	10000	00000		
.	C3715 TWPI25	14441 76652	04024	14441	76652	2PI BINARY PT 25	
.	C3716 TWPI26	31103 75524	04025	31103	75524	2PI BINARY PT 26	
.	C3717 SAT2PI	EQUALS TWPI26					
.	C3720 DECON	0 3	04026	00000	00003		
.	C3721 MQUAD	0 0	04027	00000	00000		
.	C3722 ASINXCON	0 0	04030	00000	00000		
.	C3723 MCALNFLT	0 0	04031	00000	00000		
.	C3724	0 0	04032	00000	00000		
.	C3725 GMFLT	0 0	04033	00000	00000		
.	C3726	0 0	04034	00000	00000		
.	C3727 MCALGMN2	0 0	04035	00000	00000		
.	C3730 MCALNUM	0 0	04036	00000	00000		

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F JK8 Y	NOTES
.	C3731	0 0	04037	00000 00000	
.	C3732 MCALDEN	0 0	04040	00000 00000	
.	C3733	0 0	04041	00000 00000	
.	C3734 MCALANS	0 0	04042	00000 00000	
.	C3735	0 0	04043	00000 00000	
.	C3736 MCALA2P	0 0	04044	00000 00000	
.	C3737 ECELT	0 0	04045	00000 00000	
.	C3740 SCVERFLOW	ENTRY	04046	61000 00000	
.	C3741	ENT A=L(SOVERFLOW)	04047	11010 04046	
.	C3742	STR A=L(ERRINST)	04050	15010 05065	
.	C3743	ENT A=0	04051	11000 00000	
.	C3744	JP L(SATWORK)	04052	61010 06040	
.	C3745 SERROR	ENTRY	04053	61000 00000	
.	C3746	ENT A=L(SERROR)	04054	11010 04053	
.	C3747	STR A=L(ERRINST)	04055	15010 05065	
.	C3750	ENT A=0	04056	11000 00000	
.	C3751	JP L(SATWORK)	04057	61010 06040	
.	C3752 RCUND	ENTRY	04060	61000 00000	
.	C3753	ADD A=Q*APOS	04061	20600 00000	
.	C3754	JP \$+4	04062	61000 04066	
.	C3755	ADD Q=Q*QPOS	04063	26600 00000	APOS-ROUND ON QNEG
.	C3756	ADD A=1	04064	20000 00001	
.	C3757	EXIT	04065	61010 04060	
.	C3760	ADD Q=Q*QNEG	04066	26700 00000	ANEG-ROUND ON QPOS
.	C3761	SUB A=1	04067	21000 00001	ANSWER IN A
.	C3762	EXIT	04070	61010 04060	
.	C3763	RESERVE 2	04071	00000 00000	
.	C3764 SADD	ENTRY	04073	61000 00000	
.	C3765	JP SADD1*ANEG	04074	60700 04101	TEST ARG IN A
.	C3766	JP SADD2*QNEG	04075	60300 04105	+A,TEST Q
.	C3767	STR A+Q*W(TEMP)*APOS	04076	32630 04133	+A,+Q ADD AND TEST SIGN
.	C3770	JP L(SADD)	04077	61010 04073	-ANS = ERROR
.	C3771	JP SADXT	04100	61000 04106	NORMAL EXIT
.	C3772 SADD1	JP SADD2*QPOS	04101	60200 04105	-A,TEST Q
.	C3773	STR A+Q*W(TEMP)*ANEG	04102	32730 04133	-A,-Q ADD AND TEST SIGN
.	C3774	JP L(SADD)	04103	61010 04073	+ANS = ERROR
.	C3775	JP SADXT	04104	61000 04106	-ANS = NORMAL OUT
.	C3776 SADD2	STR A+Q*W(TEMP)	04105	32030 04133	A,Q SIGNS DIFF
.	C3777 SADXT	ENT Q=L(SADD)	04106	10010 04073	
.	C4000	ADD Q=1	04107	26000 00001	
.	C4001	STR Q=L(SADD)	04110	14010 04073	
.	C4002	JP L(SADD)	04111	61010 04073	
.	C4003	RESERVE 2	04112	00000 00000	
.	C4004 SSUB	ENTRY	04114	61000 00000	
.	C4005	JP SSUB1*ANEG	04115	60700 04122	ARG1 IN A - TEST SIGN
.	C4006	JP SSUB2*QPOS	04116	60200 04126	+A ARG2 IN Q - TEST SIGN
.	C4007	STR A-Q*W(TEMP)*APOS	04117	33630 04133	+A,-Q SUBTRACT AND TEST ANS
.	C4010	JP L(SSUB)	04120	61010 04114	-ANS IMPLIES ERROR
.	C4011	JP SSBXT	04121	61000 04127	+ANS - EXIT
.	C4012 SSUB1	JP SSUB2*ANEG	04122	60700 04126	-A TEST Q
.	C4013	STR A-Q*W(TEMP)*ANEG	04123	33730 04133	-A,+Q
.	C4014	JP L(SSUB)	04124	61010 04114	+ANS = ERROR
.	C4015	JP SSBXT	04125	61000 04127	-ANS = EXIT

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES	
.	C4016	SSUB2	STR	A-Q*W(TEMP)	04126	33030	04133	A,Q SAME SIGN
.	C4017	SSBXT	ENT	Q*L(SSUB)	04127	10010	04114	NORMAL EXIT
.	C4020		ADD	Q*1	04130	26000	00001	
.	C4021		STR	Q*L(TEMP)	04131	14010	04133	
.	C4022		JP	L(TEMP)	04132	61010	04133	
.	C4023	TEMP	O	O	04133	00000	00000	
.	C4024		RESERVE	2	04134	00000	00000	
.	C4025	SINII	ENTRY		04136	61000	00000	
.	C4026		COMMENT	CALC				SINI=SINIF=SINI+DI(LOSI)
.	C4027		STR	B6*L(SINIB6)	04137	16610	04222	
.	C4030		STR	B7*L(SINIB7)	04140	16710	04223	
.	C4031		PUT	SADD*L(SINIT3)	04141	10000	04073	
					04142	14010	04172	
.	C4032		ENT	A*W(II)	04143	11030	03630	
.	C4033		ENT	Q*26D	04144	10000	00032	
.	C4034		RJP	SINX	04145	65000	05357	
.	C4035		STR	A*W(IISIN)	04146	15030	03645	
.	C4036		ENT	A*W(II)	04147	11030	03630	
.	C4037		ENT	Q*26D	04150	10000	00032	
.	C4040		RJP	COSX	04151	65000	05345	
.	C4041		STR	A*W(IICOS)	04152	15030	03646	COSI G=28
.	C4042		ENT	B6*O	04153	12600	00000	
.	C4043		ENT	B7*O	04154	12700	00000	
.	C4044	SINIT2	ENT	Q*W(IICOS+B7)	04155	10037	03646	
.	C4045		MUL	W(DELT I)	04156	22030	03642	G=26
.	C4046		LSH	AQ*2	04157	07000	00002	G=24 MAKE IT 26
.	C4047		RJP	ROUND	04160	65000	04060	
.	C4050		STR	A*W(SINUM)	04161	15030	03704	NO G=26
.	C4051		ADD	A*O*APOS	04162	20600	00000	
.	C4052		CP	A*	04163	15040	00000	
.	C4053		COM	A*W(TWO26)*YMORE	04164	04730	03721	IS COS(SIN)DI =2 OR MORE
.	C4054		RJP	SOVERFLOW	04165	65000	04046	
.	C4055		ENT	A*W(IISIN+B6)	04166	11036	03645	SIN(COS) G=28
.	C4056		RSH	AQ*2	04167	03000	00002	MAKE IT 26
.	C4057		RJP	ROUND	04170	65000	04060	
.	C4060		ENT	Q*W(SINUM)	04171	10030	03704	
.	C4061	SINIT3	RJP	SADD	04172	65000	04073	SIN(COS)+DI(COS(SIN))
.	C4062		RJP	SOVERFLOW	04173	65000	04046	
.	C4063		ADD	A*O*APOS	04174	20600	00000	
.	C4064		JP	\$+4	04175	61000	04201	
.	C4065		COM	A*W(WONEP26)*YMORE	04176	04730	03716	IS SIN(COS) MORE THAN 1
.	C4066		ENT	A*W(FIXONEX)	04177	11030	03620	
.	C4067		JP	SINIT31	04200	61000	04205	
.	C4070		CP	A*	04201	15040	00000	
.	C4071		COM	A*W(WONEP26)*YMORE	04202	04730	03716	
.	C4072		ENT	A*W(FIXONEX)	04203	11030	03620	
.	C4073		CP	A*	04204	15040	00000	
.	C4074	SINIT31	LSH	A*2	04205	06000	00002	
.	C4075		STR	A*W(IIFSIN+B6)	04206	15036	03647	
.	C4076		COMMENT	CALC				COSIF=COSI-DISINI
.	C4077		ENT	A*B6*AZERO	04207	11406	00000	
.	C4100		JP	SINIT32	04210	61000	04216	
.	C4101		ENT	B6*1+B6	04211	12606	00001	

..... SPUPT OUTPUT NO. 210
 SATEL MCQUILKIN*7/1/65

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C4102	ENT B7*-1	04212	12700	77776		
.	C4103	PUT SSUB*L(SINIT3)	04213	10000	04114		
.	C4104	JP SINIT2	04214	14010	04172		
.	C4105 SINIT32	MOVE 2*IIFSIN*IISIN	04215	61000	04155		
			04216	10030	03647		
			04217	14030	03645		
			04220	10030	03650		
			04221	14030	03646		
.	C4106 SINI86	ENT B6*0	04222	12600	00000		
.	C4107 SINI87	ENT B7*0	04223	12700	00000		
.	C4110	EXIT	04224	61010	04136		
.	C4111 PREDICTE	ENTRY	04225	61000	00000		
.	C4112	COMMENT GUESS					VALUE OF E (1ST TIME)
.	C4113	ENT A*U(EPRESW)*AZERO	04226	11420	03705		
.	C4114	JP PRED2	04227	61000	04345		NO
.	C4115	ENT A*W(EPRESW)	04230	11030	03705		
.	C4116	ADD A*40000	04231	20000	40000		
.	C4117	STR A*W(EPRESW)	04232	15030	03705		
.	C4120	ENT Q*W(EE)	04233	10030	03627		YES G=29
.	C4121	MUL W(EE)	04234	22030	03627		G=29
.	C4122	LSH AQ*1	04235	07000	00001		G=28 MAKE IT 29
.	C4123	RJP ROUND	04236	65000	04060		
.	C4124	STR A*W(EE2)	04237	15030	03623		E2 G=29
.	C4125	ENT Q*A	04240	10070	00000		
.	C4126	MUL W(EE)	04241	22030	03627		E3 G=28
.	C4127	RSH AQ*3	04242	03000	00003		
.	C4130	RJP ROUND	04243	65000	04060		
.	C4131	STR A*W(AVAL)	04244	15030	03706		AVAL=E3/8 G=29
.	C4132	ENT Q*A	04245	10070	00000		
.	C4133	MUL 3	04246	22000	00003		3E3/8 G=0
.	C4134	STR Q*W(CVAL)	04247	14030	03710		CVAL=3E3/8 G=29
.	C4135	ENT A*W(EE)	04250	11030	03627		G=29
.	C4136	ENT Q*W(AVAL)	04251	10030	03706		G=29
.	C4137	LSH Q*1	04252	05000	00001		
.	C4140	RJP SSUB	04253	65000	04114		
.	C4141	RJP SOVERFLOW	04254	65000	04046		
.	C4142	STR A*W(AVAL)	04255	15030	03706		E-E3/8 G=29
.	C4143	ENT A*W(MM)	04256	11030	03626		PREPARE TO CALC SIN
.	C4144	ENT Q*26D	04257	10000	00032		
.	C4145	RJP SINX	04260	65000	05357		
.	C4146	STR A*W(M1SIN)	04261	15030	03657		
.	C4147	ENT A*W(MM)	04262	11030	03626		CALC COS
.	C4150	ENT Q*26D	04263	10000	00032		
.	C4151	RJP COSX	04264	65000	05345		
.	C4152	STR A*W(M1COS)	04265	15030	03660		
.	C4153	ENT Q*W(M1SIN)	04266	10030	03657		(E-E3/8)SINM G=28
.	C4154	MUL W(AVAL)	04267	22030	03706		G=29
.	C4155	RSH AQ*1	04270	03000	00001		G=27 MAKE IT 26
.	C4156	RJP ROUND	04271	65000	04060		
.	C4157	STR A*W(AVAL)	04272	15030	03706		AVAL=(E-E3/8)SINM G=26
.	C4160	ENT Q*W(M1SIN)	04273	10030	03657		SINM(COSM) G=28
.	C4161	MUL W(M1COS)	04274	22030	03660		G=28
.	C4162	LSH AQ*2	04275	07000	00002		G=26 MAKE IT 28

CARDS	LI ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C4163	RJP ROUND	04276	65000	04060		
.	C4164	ENT Q*A	04277	10070	00000		SIN(COS) TOG G=28
.	C4165	MUL W(EE2)	04300	22030	03623		MUL BY E2 G=29
.	C4166	RSR AQ*1	04301	03000	00001		G=27 MAKE IT 26
.	C4167	RJP ROUND	04302	65000	04060		
.	C4170	STR A*W(BVAL)	04303	15030	03707		BVAL=E2SINMCOSH= 1/2E2SIN2M G=26
.	C4171	ENT Q*W(M1SIN)	04304	10030	03657		CALC SIN3M=3SINM-4(SINM)3
.	C4172	MUL 3	04305	22000	00003		G=-2
.	C4173	LSH AQ*280	04306	07000	00034		G=26
.	C4174	RJP ROUND	04307	65000	04060		
.	C4175	STR A*W(M3SIN)	04310	15030	03661		M3SIN=3SINM G=26
.	C4176	ENT Q*W(M1SIN)	04311	10030	03657		G=28
.	C4177	MUL W(M1SIN)	04312	22030	03657		G=28
.	C4200	LSH AQ*2	04313	07000	00002		G=26 MAKE IT 28
.	C4201	RJP ROUND	04314	65000	04060		
.	C4202	ENT Q*A	04315	10070	00000		G=28
.	C4203	MUL W(M1SIN)	04316	22030	03657		G=28
.	C4204	LSH AQ*2	04317	07000	00002		G=26 MUL BY 4 MAKES G=24 MAKE IT 26
.	C4205	RJP ROUND	04320	65000	04060		
.	C4206	ENT Q*A	04321	10070	00000		4(M1SIN3) G=26
.	C4207	ENT A*W(M3SIN)	04322	11030	03661		G=26 3SINM
.	C4210	RJP SSUB	04323	65000	04114		
.	C4211	RJP SOVERFLOW	04324	65000	04046		
.	C4212	ENT Q*A	04325	10070	00000		HAVE SIN3M G=26
.	C4213	MUL W(CVAL)	04326	22030	03710		G=29
.	C4214	LSH AQ*1	04327	07000	00001		3E3/8(SIN3M) G=25 MAKE IT 26
.	C4215	RJP ROUND	04330	65000	04060		
.	C4216	STR A*W(CVAL)	04331	15030	03710		G=26
.	C4217	ENT Q*W(BVAL)	04332	10030	03707		CVAL+BVAL
.	C4220	RJP SADD	04333	65000	04073		
.	C4221	RJP SOVERFLOW	04334	65000	04046		
.	C4222	ENT Q*W(AVAL)	04335	10030	03706		AVAL+BVAL+CVAL
.	C4223	RJP SADD	04336	65000	04073		
.	C4224	RJP SOVERFLOW	04337	65000	04046		
.	C4225	ENT Q*W(MM)	04340	10030	03626		M+A+B+C G=26
.	C4226	RJP SADD	04341	65000	04073		
.	C4227	RJP SOVERFLOW	04342	65000	04046		
.	C4230	STR A*W(EGVAL)	04343	15030	03643		G=26
.	C4231	JP ECALC	04344	61000	04410		READY TO CALC ACTUAL E VAL OF E (E=2E1LAST-E2LAST)
.	C4232	COMMENT GUESS					
.	C4233	PRED2 ENT Q*X77777	04345	10040	77777		
.	C4234	ENT A*W(E1LAST)*APOS	04346	11630	03662		
.	C4235	JP PRED222	04347	61000	04365		
.	C4236	COM MASK*W(TWPI26)*APOS	04350	43630	04025		
.	C4237	JP PRED21	04351	61000	04402		CONTINUE
.	C4240	ENT Q*W(TWPI26)	04352	10030	04025		12E1LAST) GRTR 2PI G=26
.	C4241	ENT A*W(E1LAST)	04353	11030	03662		
.	C4242	RJP SSUB	04354	65000	04114		APOS- SUB 2PI
.	C4243	RJP SOVERFLOW	04355	65000	04046		
.	C4244	STR A*W(E1LAST)	04356	15030	03662		E1LAST=E1LAST+2PI OR -2PI
.	C4245	ENT Q*W(TWPI26)	04357	10030	04025		

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CARDS	L1 ID LABEL	TA STATEMENT	LOC	F JKB Y	NOTES
.	C4246	ENT A*W(E2LAST)	04360	11030 03663	
.	C4247	RJP SSUB	04361	65000 04114	APOS SUB 2PI
.	C4250	RJP SOVERFLOW	04362	65000 04046	
.	C4251	STR A*W(E2LAST)	04363	15030 03663	E2LAST=E2LAST+2PI OR -2PI
.	C4252	JP PRED21	04364	61000 04402	
.	C4253 PRED222	CP A*	04365	15040 00000	
.	C4254	COM MASK*W(TWPI26)*APOS	04366	43630 04025	
.	C4255	JP PRED21	04367	61000 04402	
.	C4256	ENT Q*W(TWPI26)	04370	10030 04025	
.	C4257	ENT A*W(E1LAST)	04371	11030 03662	
.	C4260	RJP SADD	04372	65000 04073	
.	C4261	RJP SOVERFLOW	04373	65000 04046	
.	C4262	STR A*W(E1LAST)	04374	15030 03662	
.	C4263	ENT A*W(TWPI26)	04375	11030 04025	
.	C4264	ENT Q*W(E2LAST)	04376	10030 03663	
.	C4265	RJP SADD	04377	65000 04073	
.	C4266	RJP SOVERFLOW	04400	65000 04046	
.	C4267	STR A*W(E2LAST)	04401	15030 03663	
.	C4270 PRED21	ENT A*W(E1LAST)	04402	11030 03662	G=26
.	C4271	LSH A*1	04403	06000 00001	MUL BY 2 G=26
.	C4272	ENT Q*W(E2LAST)	04404	10030 03663	
.	C4273	RJP SSUB	04405	65000 04114	
.	C4274	RJP SOVERFLOW	04406	65000 04046	
.	C4275	STR A*W(EGVAL)	04407	15030 03643	
.	C4276	COMMENT CALC			ACTUAL VALUE OF E (E=M+ESIN E)
.	C4277	COMMENT 1			X E=M+(E-E3/8)SINM+1/2(E2)SIN2 M X +3E3/8SIN3M
.	C4300	COMMENT			
.	C4301 ECALC	ENT B6*1	04410	12600 00001	
.	C4302	ENT A*W(EGVAL)	04411	11030 03643	
.	C4303	ENT Q*26D	04412	10000 00032	GET ACTUAL E
.	C4304	RJP SINX	04413	65000 05357	
.	C4305	ENT Q*A	04414	10070 00000	Q HAS ESIN G=28
.	C4306	MUL W(EE)	04415	22030 03627	E G=29
.	C4307	RSH AQ*1	04416	03000 00001	
.	C4310	RJP ROUND	04417	65000 04060	E(ESIN)
.	C4311	ENT Q*A	04420	10070 00000	
.	C4312	ENT A*W(EGVAL)	04421	11030 03643	
.	C4313	RJP SSUB	04422	65000 04114	G 26
.	C4314	RJP SOVERFLOW	04423	65000 04046	
.	C4315	ENT Q*A	04424	10070 00000	CALCULATE DELEN,M-MN/1-ECOSIN
.	C4316	ENT A*W(MM)	04425	11030 03626	G 26
.	C4317	RJP SSUB	04426	65000 04114	
.	C4320	RJP SOVERFLOW	04427	65000 04046	
.	C4321	STR A*W(SINUM)	04430	15030 03704	G 26
.	C4322	ENT A*W(EGVAL)	04431	11030 03643	
.	C4323	ENT Q*26D	04432	10000 00032	
.	C4324	RJP COSX	04433	65000 05345	COSE G 28
.	C4325	ENT Q*A	04434	10070 00000	
.	C4326	MUL W(EE)	04435	22030 03627	G 57
.	C4327	RJP ROUND	04436	65000 04060	G 27
.	C4330	ENT Q*A	04437	10070 00000	

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C4331	ENT A*W(WONE28)	04440	11030	03717		
.	C4332	RSH A*1	04441	02000	00001		
.	C4333	RJP SSUB	04442	65000	04114		G 27
.	C4334	RJP SOVERFLOW	04443	65000	04046		
.	C4335	STR A*W(SINDEN)	04444	15030	03703		G 27
.	C4336	CL Q*	04445	10000	00000		
.	C4337	ENT A*W(SINUM)	04446	11030	03704		G 26
.	C4340	RSH AQ*3	04447	03000	00003		G 53
.	C4341	DIV W(SINDEN)*NOOF	04450	23230	03703		
.	C4342	RJP SOVERFLOW	04451	65000	04046		
.	C4343	LSH A*1	04452	06000	00001		
.	C4344	COM A*W(SINDEN)*YMORE	04453	04730	03703		
.	C4345	ADD Q*1	04454	26000	00001		
.	C4346	STR Q*A	04455	14040	00000		G 26
.	C4347	STR A*W(EDEL T)	04456	15030	04045		
.	C4350	ADD A*O*APOS	04457	20600	00000		CHECK DELTA E NEAR 0
.	C4351	CP A*	04460	15040	00000		
.	C4352	COM A*W(DECON)*YMORE	04461	04730	04026		
.	C4353	JP ECALRTN	04462	61000	04472		NO TRY AGAIN
.	C4354 ECAL1	ENT A*B6	04463	11006	00000		
.	C4355	STR A*W(EKODE)	04464	15030	03723		
.	C4356	COMMENT EKODE					HAS NO OF ITERATIONS
.	C4357	COMMENT X					AFTER EACH TIME THROUGH
.	C4360	PUT W(E1LAST)*W(E2LAST)	04465	10030	03662		YES E2LAST=E1LAST
.	C4361	PUT W(EGVAL)*W(E1LAST)	04466	14030	03663		
.	C4362	EXIT	04467	10030	03643		
.	C4363 ECALRTN	ENT A*W(EGVAL)	04471	61010	04225		
.	C4364	ENT Q*W(EDEL T)	04472	11030	03643		G 26
.	C4365	RJP SADD	04473	10030	04045		G 26
.	C4366	RJP SOVERFLOW	04474	65000	04073		
.	C4367	STR A*W(EGVAL)	04475	65000	04046		
.	C4370	BSK B6*100	04476	15030	03643		G 26
.	C4371	JP ECALC+1	04477	71600	00012		AFTER 10 ITERATIONS TAKE LATES T E VALUE
.	C4372	JP ECAL1	04500	61000	04411		
.	C4373	COMMENT END	04501	61000	04463		
.	C4374 SINVV	ENTRY					OF E CALCULATIONS
.	C4375	COMMENT CALC	04502	61000	00000		SINV=SQRT(1-E2)/(1-ECOSE) SIN E
.	C4376	ENT A*W(WONE28)	04503	11030	03717		
.	C4377	ENT Q*W(EE2)	04504	10030	03623		E(E) G=29
.	C4400	RSH Q*1	04505	01000	00001		G=28
.	C4401	RJP SSUB	04506	65000	04114		
.	C4402	RJP SOVERFLOW	04507	65000	04046		
.	C4403	RSH AQ*2	04510	03000	00002		G=26
.	C4404	RJP ROUND	04511	65000	04060		
.	C4405	RJP SQRT	04512	65000	05504		A HAS ARG,G=28
.	C4406	RJP SERROR	04513	65000	04053		
.	C4407	LSH A*1	04514	06000	00001		G=28
.	C4410	STR A*W(SINUM)	04515	15030	03704		G=28 SQRT(1-E2)
.	C4411	ENT A*W(E1LAST)	04516	11030	03662		LAST CALC EVALVE G=26

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CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C4412	ENT Q*26D	04517	10000	00032		
.	C4413	RJP SINX	04520	65000	05357		
.	C4414	STR A*W(EVALSIN)	04521	15030	03625		G=28
.	C4415	ENT A*W(EILAST)	04522	11030	03662		
.	C4416	ENT Q*26D	04523	10000	00032		
.	C4417	RJP COSX	04524	65000	05345		
.	C4420	STR A*W(EVALCOS)	04525	15030	03624		A HAS COSE G=28
.	C4421	ENT Q*A	04526	10070	00000		PREPARE TO MUL
.	C4422	MUL W(EE)	04527	22030	03627		LCOSE G=29
.	C4423	LSH AQ*1	04530	07000	00001		G=27 MAKE IT 28
.	C4424	RJP ROUND	04531	65000	04060		
.	C4425	ENT Q*A	04532	10070	00000		ECOSE G=28 TO Q
.	C4426	ENT A*W(WONE28)	04533	11030	03717		U 1 G=28 TO A,SUB
.	C4427	RJP SSUB	04534	65000	04114		
.	C4430	RJP SOVERFLOW	04535	65000	04046		
.	C4431	STR A*W(SINDEN)	04536	15030	03703		1-ECOSE G=28
.	C4432	ENT Q*W(SINUM)	04537	10030	03704		
.	C4433	MUL W(EVALSIN)	04540	22030	03625		G=28
.	C4434	LSH AQ*2	04541	07000	00002		G=26 MAKE IT 28
.	C4435	RJP ROUND	04542	65000	04060		
.	C4436	STR A*W(SINUM)	04543	15030	03704		G 28
.	C4437	ENT Q*X77777	04544	10040	77777		
.	C4440	ADD A*O*APOS	04545	20600	00000		
.	C4441	JP SINV10	04546	61000	04554		
.	C4442	COM MASK*W(SINDEN)*ANOT	04547	43530	03703		
.	C4443	JP SINV1	04550	61000	04567		YES SINV=1
.	C4444	COM MASK*W(SINDEN)*ANEG	04551	43730	03703		IS DEN LGR NUM
.	C4445	JP SINV1	04552	61000	04567		
.	C4446	JP SINV11	04553	61000	04562		
.	C4447 SINV10	CP A*	04554	15040	00000		
.	C4450	COM MASK*W(SINDEN)*ANOT	04555	43530	03703		
.	C4451	JP SINV1	04556	61000	04567		
.	C4452	COM MASK*W(SINDEN)*ANEG	04557	43730	03703		
.	C4453	JP SINV1	04560	61000	04567		
.	C4454	CP A*	04561	15040	00000		
.	C4455 SINV11	CL Q*	04562	10000	00000		
.	C4456	RSH A*2	04563	02000	00002		
.	C4457	DIV W(SINDEN)*NOOF	04564	23230	03703		
.	C4460	RJP SOVERFLOW	04565	65000	04046		
.	C4461	JP SINVLX+2	04566	61000	04577		
.	C4462 SINV1	ENT Q*W(WONE28)	04567	10030	03717		SIN V 1 CHECK FOR SIGN
.	C4463	ENT A*W(SINUM)*APOS	04570	11630	03704		
.	C4464	JP SINVLX	04571	61000	04575		
.	C4465	ENT A*W(SINDEN)*APOS	04572	11630	03703		
.	C4466	CP Q*	04573	14000	00000		
.	C4467	JP \$+3	04574	61000	04577		
.	C4470 SINVLX	ENT A*W(SINDEN)*ANEG	04575	11730	03703		
.	C4471	CP Q*	04576	14000	00000		
.	C4472	STR Q*W(VVSIN)	04577	14030	03673		
.	C4473	COMMENT CALCULATE					COSE=(COSE-E)/(1-ECOSE)
.	C4474	ENT A*W(EE)	04600	11030	03627		MAKE E G=28 FOR SUB
.	C4475	RSH AQ*1	04601	03000	00001		
.	C4476	RJP ROUND	04602	65000	04060		

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C4477	ENT Q*A	04603	10070	00000		
.	C4500	ENT A*W(EVALCOS)	04604	11030	03624		
.	C4501	RJP SSUB	04605	65000	04114		
.	C4502	RJP SOVERFLOW	04606	65000	04046		
.	C4503	STR A*W(SINUM)	04607	15030	03704		
.	C4504	ENT Q*X77777	04610	10040	77777		
.	C4505	ADD A*O*APOS	04611	20600	00000		
.	C4506	JP COSV10	04612	61000	04620		
.	C4507	COM MASK*W(SINDEN)*ANOT	04613	43530	03703		
.	C4510	JP COSV1	04614	61000	04633		DEN=NUM COSV=1
.	C4511	COM MASK*W(SINDEN)*ANEG	04615	43730	03703		IS DEN LGR NUM
.	C4512	JP COSV1	04616	61000	04633		
.	C4513	JP COSV11	04617	61000	04626		
.	C4514 CCSV10	CP A*	04620	15040	00000		
.	C4515	COM MASK*W(SINDEN)*ANOT	04621	43530	03703		
.	C4516	JP COSV1	04622	61000	04633		
.	C4517	COM MASK*W(SINDEN)*ANEG	04623	43730	03703		
.	C4520	JP COSV1	04624	61000	04633		
.	C4521	CP A*	04625	15040	00000		
.	C4522 CCSV11	CL Q*	04626	10000	00000		
.	C4523	RSH A*2	04627	02000	00002		G 26
.	C4524	DIV W(SINDEN)*NOOF	04630	23230	03703		
.	C4525	RJP SOVERFLOW	04631	65000	04046		
.	C4526	JP COSV1X+2	04632	61000	04643		
.	C4527 CCSV1	ENT Q*W(WONE28)	04633	10030	03717		COSV 1 CHECK FOR SIGN
.	C4530	ENT A*W(SINUM)*APOS	04634	11630	03704		
.	C4531	JP COSV1X	04635	61000	04641		
.	C4532	ENT A*W(SINDEN)*APOS	04636	11630	03703		
.	C4533	CP Q*	04637	14000	00000		
.	C4534	JP \$+3	04640	61000	04643		
.	C4535 CCSV1X	ENT A*W(SINDEN)*ANEG	04641	11730	03703		
.	C4536	CP Q*	04642	14000	00000		
.	C4537	STR Q*W(VVCOS)	04643	14030	03674		
.	C4540	EXIT	04644	61010	04502		
.	C4541 CEROOT	ENTRY	04645	61000	00000		
.	C4542	COMMENT THE					A-REG CONTAINS THE ARG AND THE Q-REG THE BIN PT
.	C4543	COMMENT THE					ANS WILL BE LEFR IN THE A-REG WITH THE ORIG BIN PT
.	C4544	STR B5*L(CBXT)	04646	16510	04772		SAVE IR-S
.	C4545	STR B6*L(CBXT+1)	04647	16610	04773		
.	C4546	CL B5*	04650	12500	00000		
.	C4547	ENT B6*12000	04651	12600	12000		RESTORE DRANCH PTS
.	C4550	STR B6*U(CBFX1)	04652	16620	04741		X
.	C4551	ENT B6*21007	04653	12600	21007		X
.	C4552	STR B6*U(CBFX12+1)	04654	16620	04750		X
.	C4553	STR Q*W(GTEM)	04655	14030	05003		SAVE BIN PT
.	C4554	CP Q*	04656	14000	00000		-BIN PT
.	C4555	ADD Q*29D	04657	26000	00035		29-BIN PT
.	C4556	STR Q*W(CBXO)*ANEG	04660	14730	04776		STORE TEMPORARILY
.	C4557	JP \$+3	04661	61000	04664		ZRG POS
.	C4560	ENT B5*1	04662	12500	00001		ARG NEG B5 IS SWITCH
.	C4561	CP A*	04663	15040	00000		CONTINUE AS FOR +ARG

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CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C4562	JP CBXT*AZERO	04664	60400	04772		
.	C4563	ENT B7*W(CBXO)	04665	12730	04776		29-BIN PT IN 87
.	C4564	CL Q*	04666	10000	00000		
.	C4565 CBAGAIN	LSH AQ*1*APOS	04667	07600	00001		NORMALIZE
.	C4566	JP \$+3	04670	61000	04673		FINISHED
.	C4567	ENT B7*B7-1	04671	12707	77776		KEEP TRACK OF REDUCTION
.	C4570	JP CBAGAIN	04672	61000	04667		
.	C4571	LSH AQ*29D	04673	07000	00035		RESTORE SIGN TO NORAMALIZED WO RD
.	C4572	MUL W(WONETH)	04674	22030	05001		1/3 X ARG G=29XG=29
.	C4573	STR A*W(CBY)	04675	15030	04775		GAMMA 28
.	C4574	ENT Q*W(CBCON)	04676	10030	05002		
.	C4575	ENT B6*4	04677	12600	00004		NO TIMES TO ITERATE
.	C4576 CBSTART	STR Q*W(CBXO)	04700	14030	04776		
.	C4577	MUL W(CBXO)	04701	22030	04776		XX GAMM
.	C4600	LSH AQ*1	04702	07000	00001		A 58
.	C4601	STR A*W(CBXO2)	04703	15030	05000		MAKE G=29 FOR X2
.	C4602	ENT Q*W(CBXO)	04704	10030	04776		GAMMA 29 X GAMMA
.	C4603	MUL W(WONETH)	04705	22030	05001		29 2/3 G=27XG=29
.	C4604	LSH AQ*1	04706	07000	00001		2/3 X G=27XG MAKE IT G=28
.	C4605	STR A*W(CB2XO)	04707	15030	04777		GAMMA 28
.	C4606	CL Q*	04710	10000	00000		
.	C4607	ENT A*W(CBY)	04711	11030	04775		G=28
.	C4610	DIV W(CBXO2)*NOOF	04712	23230	05000		
.	C4611	RJP SOVERFLOW	04713	65000	04046		
.	C4612	ENT A*W(CB2XO)	04714	11030	04777		G=28
.	C4613	LSH A*1	04715	06000	00001		MAKE G=29
.	C4614	STR A+Q*W(CBXO)	04716	32030	04776		NEW XO G=29
.	C4615	ENT Q*A	04717	10070	00000		
.	C4616	BJP B6*CBSTART+1	04720	72600	04701		FINISHED
.	C4617	ENT A*XB7*ANEG	04721	11747	00000		YES RESTORE VALUE
.	C4620	JP CBRESTORE-1	04722	61000	04730		CORRECTION FACTOR + ANS TO BE MULT
.	C4621	ENT Q*61000	04723	10000	61000		FACTON-ANS TO BE DIVIDED
.	C4622	STR Q*U(CBFX1)	04724	14020	04741		SET UP JUMP AT SWITCH PT
.	C4623	ENT Q*20007	04725	10000	20007		
.	C4624	STR Q*U(CBFX12+1)	04726	14020	04750		XOWRK AREA
.	C4625	CP A*	04727	15040	00000		A HAS CORRECTION FACTOR
.	C4626	CL B7*	04730	12700	00000		
.	C4627 CBRESTORE	COM A*3*YLESS	04731	04600	00003		
.	C4630	JP CBFIX	04732	61000	04736		XMUST BE RAISED
.	C4631	SUB A*3	04733	21000	00003		X
.	C4632	ENT B7*1+B7	04734	12707	00001		X
.	C4633	JP CBRESTORE	04735	61000	04731		X
.	C4634 CBFIX	JP CBFIX1*ANOT	04736	60500	04741		MUST ANS BE MULT OR DIV
.	C4635	ENT A*29D	04737	11000	00035		NO PUT PRESENT BIN PT IN A
.	C4636	JP CBFIX12+1	04740	61000	04750		
.	C4637 CBFIX1	ENT B0*CBFIX3	04741	12000	05006		SWITCH CONTAINS JP IF ANS TO BE DIV
.	C4640	COM A*2*YLESS	04742	04600	00002		
.	C4641	MUL W(CB1)*SKIP	04743	22130	05004		ANS IN Q MUL BY 2 TO 1/3 G=28

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CARDS	LI	ID	LABEL	TA	STATEMENT	LOC	F	JKB	Y	NOTES
.	C4642			MUL	W(CB2)	04744	22030	05005		MUL BY 2 TO 2/3 G=28
.	C4643			LSH	AQ*1	04745	07000	00001		MAKE G=28
.	C4644			STR	A*W(CBXO)	04746	15030	04776		
.	C4645	CEFIX12		ENT	A*28D	04747	11000	00034		BIN PT OF ANS
.	C4646			SUB	A*87	04750	21007	00000		BIN PT-PROPER
.	C4647			SUB	A*W(GTEM)	04751	21030	05003		SUB ORIG BIN PT
.	C4650			ENT	B7*A	04752	12770	00000		NO OF SHIFTS NEEDED
.	C4651			JP	CBSMAL*ANEG	04753	60700	04761		SHIFT LEFT OR RIGHT
.	C4652			ENT	A*W(CBXO)	04754	11030	04776		RIGHT
.	C4653			CL	Q*	04755	10000	00000		
.	C4654			RSH	AQ*B7*QPOS	04756	03207	00000		ROUND
.	C4655			ADD	A*1	04757	20000	00001		YES
.	C4656			JP	CBFIX2	04760	61000	04770		NO
.	C4657	CBSMAL		CP	A*	04761	15040	00000		WANT TO LEFT SHIFT
.	C4660			ENT	B7*A	04762	12770	00000		
.	C4661			ENT	A*W(CBXO)	04763	11030	04776		X
.	C4662			CL	Q*	04764	10000	00000		X
.	C4663			LSH	AQ*B7	04765	07007	00000		
.	C4664			JP	\$+1*APOS	04766	60600	04767		
.	C4665			CO		04767	00000	00000		VVERFLOW
.	C4666	CEFIX2		BSK	B5*0	04770	71500	00000		
.	C4667			CP	A*	04771	15040	00000		YES COMPLEMENT ANS
.	C4670	CBXT		ENT	B5*0	04772	12500	00000		RESTORE IR-S
.	C4671			ENT	B6*0	04773	12600	00000		
.	C4672			EXIT		04774	61010	04645		
.	C4673	CRY		O	O	04775	00000	00000		
.	C4674	CBXO		O	O	04776	00000	00000		
.	C4675	CE2XC		O	O	04777	00000	00000		
.	C4676	CBXO2		O	O	05000	00000	00000		
.	C4677	WCNETH		12525	25252	05001	12525	25252		
.	C4700	CECON		37777	77777	05002	37777	77777		G=29
.	C4701	GTEM		C	O	05003	00000	00000		
.	C4702	CB1		24121	21540	05004	24121	21540		
.	C4703	CE2		31313	77220	05005	31313	77220		
.	C4704	CEFIX3		SUB	A*1	05006	21000	00001		BRANCH FOR RESTORE VALVE
.	C4705			ENT	B6*A	05007	12670	00000		
.	C4706			CL	Q*	05010	10000	00000		
.	C4707			ENT	A*W(CBXO)	05011	11030	04776		
.	C4710			RSH	AQ*3	05012	03000	00003		GAMMA 56
.	C4711			CIV	W(CB1+B6)*NOOF	05013	23236	05004		GAMMA 27
.	C4712			RJP	SOVERFLOW	05014	65000	04046		
.	C4713			RSH	A*1	05015	02000	00001		ROUND
.	C4714			COM	A*W(CB1+B6)*YLESS	05016	04636	05004		
.	C4715			ADD	Q*1	05017	26000	00001		YES
.	C4716			STR	Q*W(CBXO)	05020	14030	04776		
.	C4717			JP	CBFIX12	05021	61000	04747		
.	C4720			JP	CBFIX2+1	05022	61000	04771		
.	C4721			JP	CBFIX12+1	05023	61000	04750		
.	C4722	ERRPRT		ENTRY		05024	61000	00000		
.	C4723			SEL	SET*60	05025	50000	00060		
.	C4724			STR	A*W(MESSAGE1)	05026	15030	05057		
.	C4725			ENT	Q*L(ERRINST)	05027	10010	05065		
.	C4726			LSH	Q*15D	05030	05000	00017		

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F JKB Y	NOTES
.	C4727	CL A*	05031	11000 00000	
.	C4730	LSH AQ*3	05032	07000 00003	
.	C4731	LSH A*3	05033	06000 00003	
.	C4732	LSH AQ*3	05034	07000 00003	
.	C4733	LSH A*3	05035	06000 00003	
.	C4734	LSH AQ*3	05036	07000 00003	
.	C4735	LSH A*3	05037	06000 00003	
.	C4736	LSH AQ*3	05040	07000 00003	
.	C4737	LSH A*3	05041	06000 00003	
.	C4740	LSH AQ*3	05042	07000 00003	
.	C4741	SEL SET*W(MASK)	05043	50030 05051	
.	C4742	STR A*W(MESSAGE)	05044	15030 05063	
.	C4743	RJP U(INTERCOM)	05045	65020 63426	
.	C4744	U-TAG THING	05046	05052 00000	
.	C4745	ENT A*0	05047	11000 00000	
.	C4746	JP L(SATWORK)	05050	61010 06040	
.	C4747 MASK	60606 06060	05051	60606 06060	
.	C4750 THING	FD 1*A	05052	06050 50505	
.	C4751	77777 LOC	05053	77777 05054	
.	C4752 LCC	FD 3*ERROR TYPE	05054	12272 72427	
			05055	05313 62512	
			05056	05050 50505	
.	C4753 MESSAGE1	O O	05057	00000 00000	
.	C4754	FD 3*AT LOCATION	05060	06310 52124	
			05061	10063 11624	
			05062	23050 50505	
.	C4755 MESSAGE	O O	05063	00000 00000	
.	C4756	77777 77777	05064	77777 77777	
.	C4757 ERRINST	O O	05065	00000 00000	
.	C4760 BLASTCONV	ENTRY	05066	61000 00000	BLASTOFF CONVERTED TO PARTS OF
.	C4761	RJP FF	05067	65000 05323	CONVERT CELTIME TO SEC GAMMA=
					24
.	C4762	28D CELTIME	05070	00034 63133	X
.	C4763	U-TAG CELTIMEX*10	05071	03774 00010	X CELTIME IN FLTPT
.	C4764	RJP FF	05072	65000 05323	X
.	C4765	U-TAG CELTIMEX*FLT864	05073	03774 04006	X
.	C4766	U-TAG TINIT*02	05074	03732 00002	
.	C4767	EXIT	05075	61010 05066	
.	C4770 INCONVER	ENTRY	05076	61000 00000	CONVERT INPUT TO PROPER UNITS
.	C4771	STR B1*L(INCONVERX)	05077	16110 05222	M REV/DAY TO RADS/SEC
.	C4772	STR B2*L(INCONVERX+1)	05100	16210 05223	
.	C4773	STR B3*L(INCONVERX+2)	05101	16310 05224	I DEG/DAY TO RADS/SEC
.	C4774	STR B4*L(INCONVERX+3)	05102	16410 05225	W X X
.	C4775	STR B7*L(INCONVERX+4)	05103	16710 05226	RAMX X
.	C4776	ENT A*W(MZERO)	05104	11030 00564	MOD THE INTEGER PART OF M TO
.	C4777	SUB A*40000*ANOT	05105	21500 40000	ZERO
.	C5000	JP INC3	05106	61000 05125	
.	C5001	CP A*	05107	15040 00000	
.	C5002	ADD A*28D	05110	20000 00034	
.	C5003	STR A*L(INC1)	05111	15010 05114	
.	C5004	STR A*L(INC2)	05112	15010 05116	

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F JKB Y	NOTES
.	C5005	ENT A*W(MZERO+1)	05113	11030 00565	
.	C5006 INC1	RSH AQ*0	05114	03000 00000	SHIFT OFF FRACTIONAL PART
.	C5007	CL Q*	05115	10000 00000	AND SAVE INTEGER PORTION
.	C5010 INC2	LSH AQ*0	05116	07000 00000	
.	C5011	STR A*W(MTEMP7+1)	05117	15030 03763	
.	C5012	ENT Q*W(MZERO)	05120	10030 00564	
.	C5013	STR Q*W(MTEMP7)	05121	14030 03762	
.	C5014	RJP FF	05122	65000 05323	SUBTRACT INTEGER PART FROM
.	C5015	U-TAG MZERO*MTEMP7	05123	00564 03762	ORIGINAL NUMBER LEAVING
.	C5016	U-TAG MZERO*01	05124	00564 00001	ONLY FRACTIONAL PART
.	C5017 INC3	ENT B1*0	05125	12100 00000	
.	C5020	ENT B2*0	05126	12200 00000	WHICH PARAMETER IN GROUP
.	C5021	ENT B3*0	05127	12300 00000	WHICH PARA. RELATIVE TO MZERO
.	C5022	ENT B4*4	05130	12400 00004	INDEX PARA. COUNTERS
.	C5023	CL A*	05131	11000 00000	
.	C5024	STR A*W(SECCNT)	05132	15030 05230	
.	C5025 INCONVER1	ENT A*B1	05133	11001 00000	
.	C5026	SUB A*60D*ANOT	05134	21500 00074	TEST ALL INPUT CONVERTED
.	C5027	JP INCONVERX	05135	61000 05222	
.	C5030 INCONVER2	ENT A*B2*AZERO	05136	11402 00000	
.	C5031	JP INCONV21	05137	61000 05142	
.	C5032	ENT B3*B1	05140	12301 00000	XYES
.	C5033	JP INCONVER4	05141	61000 05162	
.	C5034 INCONV21	ENT A*B1	05142	11001 00000	
.	C5035	ADD A*B2	05143	20002 00000	
.	C5036	ENT B3*A	05144	12370 00000	
.	C5037 INCONVER3	ENT B7*MZERO+B3	05145	12703 00564	
.	C5040	STR B7*U(INCONVERA)	05146	16720 05151	
.	C5041	STR B7*U(INCONVERA+1)	05147	16720 05152	
.	C5042	RJP FF	05150	65000 05323	
.	C5043 INCONVERA	OO FLT864	05151	00000 04006	
.	C5044	OO 03	05152	00000 00003	
.	C5045	ENT A*W(SECCNT)	05153	11030 05230	COUNT DIV. BY 86400 SEC
.	C5046	ADD A*1	05154	20000 00001	
.	C5047	STR A*W(SECCNT)	05155	15030 05230	
.	C5050	ENT A*B2	05156	11002 00000	
.	C5051	RSH A*1	05157	02000 00001	
.	C5052	SUB A*W(SECCNT)*AZERO	05160	21430 05230	
.	C5053	JP INCONVER3	05161	61000 05145	
.	C5054 INCONVER4	ENT A*B1*AZERO	05162	11401 00000	TEST FOR M
.	C5055	JP INCONVER5	05163	61000 05167	
.	C5056	ENT B7*BEL2PI	05164	12700 06010	
.	C5057	STR B7*L(INCONVERB)	05165	16710 05177	
.	C5060	JP INCONVER6	05166	61000 05173	
.	C5061 INCONVER5	SUB A*12D*ANOT	05167	21500 00014	TEST FOR E
.	C5062	JP INCONVER7	05170	61000 05201	
.	C5063	ENT B7*CONVCON	05171	12700 05231	
.	C5064	STR B7*L(INCONVERB)	05172	16710 05177	
.	C5065 INCONVER6	ENT B7*MZERO+B3	05173	12703 00564	
.	C5066	STR B7*U(INCONVERB)	05174	16720 05177	
.	C5067	STR B7*U(INCONVERB+1)	05175	16720 05200	
.	C5070	RJP FF	05176	65000 05323	CONVERT TO RAD5

..... SPURT OUTPUT NO. 210
SATEL MCQUILKIN*7/1/65

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JK8	Y	NOTES
.	C5071	INCCNVERB	CO	00			
.	C5072		OO	02			
.	C5073	INCONVER7	ENT	Q*W(RAMCNT+84)			TEST LAST PARA. OF GROUP
.	C5074		LSH	Q*1			X
.	C5075		SUB	Q*2			X
.	C5076		ENT	A*82			
.	C5077		SUB	Q*A*QNOT			
.	C5100		JP	INCONVER8			YES
.	C5101		CL	A*			NO GET NEXT PARA. IN GROUP
.	C5102		STR	A*W(SECCNT)			
.	C5103		ENT	B2*B2+2			
.	C5104		JP	INCONVER2			
.	C5105	INCCNVER8	CL	A*			GET NEW GROUP
.	C5106		STR	A*W(SECCNT)			
.	C5107		BJP	B4*\$+1			
.	C5110		ENT	B2*0			
.	C5111		ENT	B3*0			
.	C5112		ENT	B1*B1+120			
.	C5113		JP	INCONVER1			
.	C5114	INCCNVERX	ENT	B1*0			
.	C5115		ENT	B2*0			
.	C5116		ENT	B3*0			
.	C5117		ENT	B4*0			
.	C5120		ENT	B7*0			
.	C5121		EXIT				EXIT
.	C5122	SECCNT	O	0			
.	C5123	CCNVCCN	C	37773			
.	C5124		10737	21521			
.	C5125		COMMENT				THIS ROUTINE IS SET UP TO CONV
.	C5126		COMMENT				ERT
.	C5127		COMMENT				XDAY,MONTH,AND YEAR TO ITS JUL
.	C5130	TCCNVERT	ENTRY				IAN
.	C5131		ENT	A*U(YEARMONTH)			XEQUIVALENT
.	C5132		SUB	A*19620			
.	C5133		ENT	B7*A			
.	C5134		ENT	A*L(DAY)			DAY BEING CONSIDERED
.	C5135		ADD	A*W(JULDAY+B7)			JULIAN EQUIV OF JAN 0,
.	C5136		LSH	AQ*300			A TO Q
.	C5137		EXIT				
.	C5140	DAYTEM	O	0			
.	C5141		O	0			
.	C5142	JULDAY	00112	31041			JULIAN EQUIV OF JAN 0 1962
.	C5143		00112	31616			1963
.	C5144		00112	32373			1964
.	C5145		00112	33151			1965
.	C5146		00112	33726			1966
.	C5147		00112	34503			1967
.	C5150		00112	35260			1968
.	C5151		00112	36036			1969
.	C5152		00112	36613			1970

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C5153 EET	RESERVE 10	05256	00000	00000		
.	C5154 MCALMOD	ENTRY	05266	61000	00000		MOD2PI,S ANGLES WHICH NEED IT
.	C5155	ENT A*B5	05267	11005	00000		AND CONVERTS M,E,I,W,AM,N FRO M
.	C5156	JP MCALMOD1*ANOT	05270	60500	05313		XPARAMETER IS E,I,W,OR RAM
.	C5157 MCALMOD2	ENT A*W(MCALSUM)	05271	11030	03563		X X IS M - MOD2PI THEN CONVERT
.	C5160	ENT Q*W(MCALSUM+1)	05272	10030	03564	X	X
.	C5161	RJP MOD2PI	05273	65000	05722	X	X
.	C5162	STR A*W(MCALSUM)	05274	15030	03563	X	X
.	C5163	STR Q*W(MCALSUM+1)	05275	14030	03564	X	X
.	C5164	ENT A*W(MCALSUM+1)*ANEG	05276	11730	03564		MEASURE M IN + DIRECTION
.	C5165	JP MCALMOD22	05277	61000	05303	X	
.	C5166	RJP FF	05300	65000	05323	X	
.	C5167	U-TAG MCALSUM*BEL2PI	05301	03563	06010	X	
.	C5170	U-TAG MCALSUM*00	05302	03563	00000	X	
.	C5171 MCALMOD22	STR B7*L(MCALMODB7)	05303	16710	05311	X	
.	C5172 MCALMOD3	ENT B7*MM+B5	05304	12705	03626		
.	C5173	STR B7*U(MCALFLT4)	05305	16720	05310	X	X
.	C5174	RJP FF	05306	65000	05323	X	X
.	C5175	26D MCALSUM	05307	00032	03563	X	X
.	C5176 MCALFLT4	C 11	05310	00000	00011	X	X
.	C5177 MCALMODB7	ENT B7*0	05311	12700	00000	X	
.	C5200	EXIT	05312	61010	05266	X	
.	C5201 MCALMOD1	COM A*2*YMORE	05313	04700	00002	X	TEST FOR E
.	C5202	JP MCALMOD2	05314	61000	05271		
.	C5203	ENT B7*MM+B5	05315	12705	03626		
.	C5204	STR B7*U(MCALFLT5)	05316	16720	05321	X	
.	C5205	RJP FF	05317	65000	05323	X	
.	C5206	29D MCALSUM	05320	00035	03563	X	
.	C5207 MCALFLT5	O 11	05321	00000	00011	X	E CONVERTED
.	C5210	JP MCALMODB7	05322	61000	05311	X	
.	C5211 FF	ENTRY	05323	61000	00000		
.	C5212	STR B4*L(FFX)	05324	16410	05336		
.	C5213	STR B5*L(FFX+1)	05325	16510	05337		
.	C5214	STR B6*L(FFX+2)	05326	16610	05340		
.	C5215	STR B7*L(FFX+3)	05327	16710	05341		
.	C5216	ENT B7*L(FF)	05330	12710	05323		
.	C5217	ENT B4*U(B7)	05331	12427	00000		
.	C5220	ENT B5*L(B7)	05332	12517	00000		
.	C5221	ENT B6*U(B7+1)	05333	12627	00001		
.	C5222	ENT B7*L(B7+1)	05334	12717	00001		
.	C5223	RJP FLTPT	05335	65000	06155		
.	C5224 FFX	ENT B4*00	05336	12400	00000		
.	C5225	ENT B5*00	05337	12500	00000		
.	C5226	ENT B6*00	05340	12600	00000		
.	C5227	ENT B7*00	05341	12700	00000		
.	C5230	RPL Y+1*L(FF)	05342	36010	05323		
.	C5231	RPL Y+1*L(FF)	05343	36010	05323		
.	C5232	EXIT	05344	61010	05323		
.	C5233 CCSX	JP COSX	05345	61000	05345		
.	C5234	ENT B7*L(COSX)	05346	12710	05345		

..... SPUPT OUTPUT NO. 210
 SATEL MCQUILKIN*7/1/65

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F JKB Y	NOTES
.	C5235	STR B7*L(SINX)	05347	16710 05357	
.	C5236	ENT B7*1	05350	12700 00001	FLAG
.	C5237	STR B7*L(SINX+42D)	05351	16710 05431	
.	C5240	JP COSX+7*APOS	05352	60600 05354	
.	C5241	CP A*	05353	15040 00000	
.	C5242	JP SINX+2*ANOT	05354	60500 05361	
.	C5243	ENT A*W(SINX+60D)	05355	11030 05453	
.	C5244	JP SINX1	05356	61000 05467	
.	C5245 SINX	JP SINX	05357	61000 05357	
.	C5246	STR B0*L(SINX+42D)	05360	16010 05431	
.	C5247	STR A*W(SINX+68D)*APOS	05361	15630 05463	
.	C5250	CP A*	05362	15040 00000	SET POSITIVE
.	C5251	RPT 29D	05363	70000 00035	
.	C5252	LSH A*1*ANEG	05364	06700 00001	SHIFT UNTIL BIT 29 1
.	C5253	JP SINX1	05365	61000 05467	
.	C5254	LSH A*29D	05366	06000 00035	SHIFT RIGHT 1
.	C5255	SUB Q*B7*QPOS	05367	27607 00000	QNEG IMPLIES X EXCEEDS PI/2
.	C5256	JP SINX+34D	05370	61000 05421	
.	C5257	COM Q*30D*YMORE	05371	04300 00036	PREVENT ILLEGITIMATE SHIFT
.	C5260	ENT Q*30D	05372	10000 00036	MAX SHIFT 3U
.	C5261	STR Q*L(SINX+13D)	05373	14010 05374	STORE SHIFT COUNT
.	C5262	RSH A*0	05374	02000 00000	SCALE ARGUMENT AT 28
.	C5263	COM A*W(SINX+59D)*YMORE	05375	04730 05452	COMPARE WITH PI/2
.	C5264	JP SINX+37D	05376	61000 05424	REDUCE TO 1ST QUADRANT
.	C5265	BSK B0*L(SINX+42D)	05377	71010 05431	SKIP IF SINE
.	C5266	SUB A*W(SINX+59D)*SKIP	05400	21130 05452	PI/2-X TO A
.	C5267	ENT Q*W(SINX+68D)*QPOS	05401	10230 05463	CHECK SIGN
.	C5270	CP A*	05402	15040 00000	A BEARS PROPER SIGN
.	C5271	STR A*W(SINX+68D)	05403	15030 05463	STORE SIGNED ARGUMENT
.	C5272	ENT Q*A	05404	10070 00000	SCALED AT 28
.	C5273	MUL W(SINX+68D)	05405	22030 05463	X 2 AT 28+28 56
.	C5274	RSH AQ*29D	05406	03000 00035	SQUARED AT 27
.	C5275	STR Q*W(SINX+69D)	05407	14030 05464	STORE X 2
.	C5276	ENT Q*W(SINX+64D)	05410	10030 05457	C9
.	C5277	ENT B7*3	05411	12700 00003	LOOP 4 TIMES
.	C5300	MUL W(SINX+69D)	05412	22030 05464	SUM POLYNOMIAL
.	C5301	ENT Q*A	05413	10070 00000	
.	C5302	ADD Q*W(SINX+60D+B7)	05414	26037 05453	
.	C5303	BJP B7*SINX+27D	05415	72700 05412	
.	C5304	MUL W(SINX+68D)	05416	22030 05463	
.	C5305	LSH AQ*2	05417	07000 00002	SCALE AT 28
.	C5306	JP SINX1	05420	61000 05467	
.	C5307	COM Q*X77741*YLESS	05421	04240 77741	CHECK FOR LEGIT SHIFT
.	C5310	ENT Q*X77741	05422	10040 77741	-30
.	C5311	STR Q*CPL(SINX+13D)	05423	14050 05374	
.	C5312	RSH AQ*2	05424	03000 00002	
.	C5313	CIV W(SINX+59D)	05425	23030 05452	FORM X/(PI/2)
.	C5314	ENT A*0	05426	11000 00000	CLEAR A
.	C5315	LSH AQ*L(SINX+13D)	05427	07010 05374	
.	C5316	LSH AQ*2	05430	07000 00002	INTEGER TO A, FRACTION IN Q
.	C5317	ADD A*0	05431	20000 00000	0 FOR SIN, 1 FOR COS
.	C5320	RSH AQ*2	05432	03000 00002	
.	C5321	ENT LP*W(SINX+67D)*ANOT	05433	40530 05462	

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C5322	ENT LP*W(SINX+60D)*ANOT	05434	40530	05453		
.	C5323	JP SINX+51D	05435	61000	05442		
.	C5324	SUB LP*W(SINX+66D)	05436	42030	05461		
.	C5325	ENT Q*W(SINX+68D)*QPOS	05437	10230	05463		ACCORD SIGN
.	C5326	CP A*	05440	15040	00000		
.	C5327	JP SINX1	05441	61000	05467		
.	C5330	ENT LP*W(SINX+65D)*ODD	05442	40330	05460		
.	C5331	JP SINX+56D	05443	61000	05447		
.	C5332	14200 0	05444	14200	00000		CP,Q,QPOS
.	C5333	SUB Q*W(SINX+66D)*SKIP	05445	27130	05461		
.	C5334	ADD Q*W(SINX+66D)	05446	26030	05461		
.	C5335	MUL W(SINX+59D)	05447	22030	05452		
.	C5336	LSH AQ*2	05450	07000	00002		SCALE AT 28
.	C5337	JP SINX+18D	05451	61000	05401		RETURN
.	C5340	31103 75524	05452	31103	75524		PI/2 AT 28
.	C5341	20000 00000	05453	20000	00000		C1 1\$0 AT 28
.	C5342	52525 25600	05454	52525	25600		C3-0\$1666 665669E00831
.	C5343	10420 71732	05455	10420	71732		C5 0.833302518E-2834
.	C5344	76301 15701	05456	76301	15701		C7-.1980741431E-3837
.	C5345	00127 23405	05457	00127	23405		C9 0.2601886909E-5840
.	C5346	60000 00000	05460	60000	00000		
.	C5347	40000 00000	05461	40000	00000		
.	C5350	17777 77777	05462	17777	77777		
.	C5351	0 0	05463	00000	00000		TEMPORARY
.	C5352	0 0	05464	00000	00000		TEMPORARY
.	C5353	RESERVE 2	05465	00000	00000		
.	C5354 SINX1	STR A*W(SINTEST)*APOS	05467	15630	05503		
.	C5355	CP A	05470	15040	00000		
.	C5356	ENT Q*W(SINX+60D)	05471	10030	05453		
.	C5357	SUB Q*A*QPOS	05472	27670	00000		
.	C5360	JP SINX11	05473	61000	05476		
.	C5361	ENT A*W(SINTEST)	05474	11030	05503		
.	C5362	JP L(SINX)	05475	61010	05357		
.	C5363 SINX11	ENT Q*W(SINX+60D)	05476	10030	05453		
.	C5364	ENT A*W(SINTEST)*APOS	05477	11630	05503		
.	C5365	CP Q*	05500	14000	00000		
.	C5366	STR Q*A	05501	14040	00000		
.	C5367	JP L(SINX)	05502	61010	05357		
.	C5370 SINTEST	0 0	05503	00000	00000		
.	C5371 SQRT	JP SQRT	05504	61000	05504		ARBITRARY
.	C5372	CL Q*	05505	10000	00000		CLEAR Q
.	C5373	RPT 14D	05506	70000	00016		NORMALIZE
.	C5374	RSH AQ*2*AZERO	05507	03400	00002		SHIFT UNTIL A 0
.	C5375	JP L(SQRT)*ANOT	05510	60510	05504		ERROR,BIT 28 OR 29 1
.	C5376	LSH AQ*28D	05511	07000	00034		NORMALIZE IN A
.	C5377	STR A*W(SQRT+34D)*ANOT	05512	15530	05546		STORE NORMALIZED RADICAND
.	C5400	JP SQRT+29D	05513	61000	05541		RADICAND 0
.	C5401	RSH A*3	05514	02000	00003		DIVIDE BY 8 FOR LINEAR APPROX
.	C5402	COM A*W(SQRT+31D)*YMORE	05515	04730	05543		SKIP IF BIT 24 0
.	C5403	ADD A*W(SQRT+33D)*SKIP	05516	20130	05545		ADD 7/8
.	C5404	1514C 00000	05517	15140	00000		CP,A,SKIP
.	C5405	ADD A*W(SQRT+34D)*SKIP	05520	20130	05546		ARG/8+7/8+ARG
.	C5406	ADD A*W(SQRT+32D)*SKIP	05521	20130	05544		ADD 9/32

..... SPUPT OUTPUT NO. 210
 SATEL MCQUILKIN*7/1/65

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C5407	RSH A*1*SKIP	05522	02100	00001		DIVIDE BY 2
.	C5410	ADD A*W(SQRT+34D)	05523	20030	05546		ARG/8+9/32+ARG
.	C5411	STR A*W(SQRT+35D)	05524	15030	05547		LINEAR APPROX COMPLETE
.	C5412	ENT A*W(SQRT+34D)	05525	11030	05546		ENTER RADICAND (SCALED AT 28)
.	C5413	RSH AQ*2	05526	03000	00002		SCALE AT 26
.	C5414	DIV W(SQRT+35D)	05527	23030	05547		DIVIDE (SCALED AT 28)
.	C5415	ADD Q*W(SQRT+35D)	05530	26030	05547		
.	C5416	RSH Q*1	05531	01000	00001		
.	C5417	STR Q*W(SQRT+35D)	05532	14030	05547		
.	C5420	ENT A*W(SQRT+34D)	05533	11030	05546		ENTER RADICAND
.	C5421	RSH AQ*2	05534	03000	00002		SCALE 2(ARG) AT 26
.	C5422	DIV W(SQRT+35D)	05535	23030	05547		DIVIDE, RESULT IN Q
.	C5423	ENT Y+Q*W(SQRT+35D)	05536	30030	05547		2(RESULT TO A
.	C5424	RSH AQ*1+B7*QPOS	05537	03207	00001		
.	C5425	ADD A*1	05540	20000	00001		ROUND
.	C5426	ENT B7*L(SQRT)	05541	12710	05504		EXIT ADDRESS TO B7
.	C5427	JP 1+B7	05542	61007	00001		RETURN
.	C5430	01000 00000	05543	01000	00000		
.	C5431	04400 00000	05544	04400	00000		9/32 AT 28
.	C5432	16000 00000	05545	16000	00000		7/8 AT 28
.	C5433	0 0	05546	00000	00000		TEMPORARY
.	C5434	0 0	05547	00000	00000		TEMPORARYATAN
.	C5435	RESERVE 2	05550	00000	00000		
.	C5436 ATANX	JP ATANX	05552	61000	05552		
.	C5437	STR A*W(ATANX+62D)*APOS	05553	15630	05650		
.	C5440	CP A*	05554	15040	00000		SET POSITIVE
.	C5441	STR Q*W(ATANX+63D)*QPOS	05555	14230	05651		
.	C5442	CP Q*	05556	14000	00000		SET POSITIVE
.	C5443	STR A-Q*W(ATANX+64D)	05557	33030	05652		FLAG BEARS SIGN (\$Y\$-\$X\$)
.	C5444	ENT Y+Q*A	05560	30070	00000		RESTORE A
.	C5445	COM Q*A*YLESS	05561	04270	00000		MIN (\$Y\$, \$X\$) TO A
.	C5446	LSH AQ*30D	05562	07000	00036		INTERCHANGE A, Q
.	C5447	STR Q*W(ATANX+65D)	05563	14030	05653		DIVISOR Q MAX (\$Y\$-\$Y\$)
.	C5450	RSH AQ*2	05564	03000	00002		SCALE DIVIDEND AT 28
.	C5451	DIV W(ATANX+65D)*NOOF	05565	23230	05653		DIVISOR AT 0
.	C5452	JP L(ATANX)	05566	61010	05552		
.	C5453	STR Q*W(ATANX+65D)	05567	14030	05653		QUOTIENT AT 28
.	C5454	SUB A*A	05570	21070	00000		CLEAR ACCUMULATOR
.	C5455	LSH AQ*6*QPOS	05571	07200	00006		ROUND TO NEAREST 16TH
.	C5456	ADD A*1	05572	20000	00001		
.	C5457	ENT B7*A	05573	12770	00000		LOAD INDEX REGISTER FOR TABLE
.	C5460	STR Q*W(ATANX+66D)	05574	14030	05654		LOOKUP
.	C5461	ENT Q*A	05575	10070	00000		Y-YR AT 34
.	C5462	MUL W(ATANX+65D)	05576	22030	05653		YR AT 4
.	C5463	ADD A*4	05577	20000	00004		Y YR AT 4+28 32
.	C5464	RSH AQ*4	05600	03000	00004		4 1 AT 2 + 30 32
.	C5465	STR Q*W(ATANX+65D)	05601	14030	05653		SCALE AT 1 + Y YR AT 28 IN Q
.	C5466	ENT A*W(ATANX+66D)	05602	11030	05654		Y YR AT 34
.	C5467	RSH AQ*8D	05603	03000	00010		SCALE DIVIDEND AT 34-8+30
.	C5470	DIV W(ATANX+65D)	05604	23030	05653		(Y-Y)/(1+Y YR)
.	C5471	STR Q*W(ATANX+65D)	05605	14030	05653		2 AT 28
.	C5472	MUL W(ATANX+65D)	05606	22030	05653		Z 2 AT 56

..... SPURT OUTPUT NO. 210
 SATEL MCQUILKIN*7/1/65

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F JKB Y	NOTES
.	C5473	DIV W(ATANX+43D)	05607	23030 05625	-3 AT 26-Q AT 56-26 30
.	C5474	MUL W(ATANX+65D)	05610	22030 05653	-Z 3/3 AT 28
.	C5475	ADD A*W(ATANX+65D)	05611	20030 05653	Z - Z 3/3 AT 23
.	C5476	ADD A*W(ATANX+45D+87)	05612	20037 05627	ADD TABLE ENTRY
.	C5477	ENT Q*W(ATANX+64D)*QNEG	05613	10330 05652	
.	C5500	SUB A*W(ATANX+44D)*SKIP	05614	21130 05626	COMPLEMENT ANGLE
.	C5501	CP A*	05615	15040 00000	SET NEGATIVE
.	C5502	RSH A*1	05616	02000 00001	RESULT AT 27
.	C5503	ENT Q*W(ATANX+63D)*QPOS	05617	10230 05651	SUPPLEMENT IF X NEGATIVE
.	C5504	ADD A*W(ATANX+44D)*SKIP	05620	20130 05626	PI/2 AT 28 PI AT 27
.	C5505	CP A*	05621	15040 00000	SET POSITIVE
.	C5506	ENT Q*W(ATANX+62D)*QPOS	05622	10230 05650	ACCORD PROPER SIGN
.	C5507	CP A*	05623	15040 00000	
.	C5510	JP L(ATANX)	05624	61010 05552	EXIT
.	C5511	63774 42363	05625	63774 42363	3.0016901 AT 26
.	C5512	31103 75524	05626	31103 75524	PI/2 AT 28 PI AT 27
.	C5513	0 0	05627	00000 00000	ARCTAN(00/16) AT 28
.	C5514	00777 25336	05630	00777 25336	1
.	C5515	01772 55652	05631	01772 55652	2
.	C5516	02756 27552	05632	02756 27552	3
.	C5517	03726 67277	05633	03726 67277	4
.	C5520	04661 16716	05634	04661 16716	5
.	C5521	05573 03120	05635	05573 03120	6
.	C5522	06462 35661	05636	06462 35661	7
.	C5523	07326 14701	05637	07326 14701	8
.	C5524	10145 37512	05640	10145 37512	9
.	C5525	10740 02726	05641	10740 02726	10
.	C5526	11505 74016	05642	11505 74016	11
.	C5527	12227 43722	05643	12227 43722	12
.	C5530	12725 42304	05644	12725 42304	13
.	C5531	13400 51742	05645	13400 51742	14
.	C5532	14031 64134	05646	14031 64134	15
.	C5533	14441 76652	05647	14441 76652	16
.	C5534	0 0	05650	00000 00000	TEMPORARIES
.	C5535	0 0	05651	00000 00000	
.	C5536	0 0	05652	00000 00000	
.	C5537	0 0	05653	00000 00000	
.	C5540	0 0	05654	00000 00000	
.	C5541	RESERVE 2	05655	00000 00000	
.	C5542 ASINX	JP ASINX	05657	61000 05657	
.	C5543	STR A*W(ASINX+25D)*APOS	05660	15630 05710	
.	C5544	CP A*	05661	15040 00000	SET ARGUMENT POSITIVE
.	C5545	COM Q*57D*YMORE	05662	04300 00071	
.	C5546	ENT Q*57D	05663	10000 00071	
.	C5547	ADD Q*2	05664	26000 00002	
.	C5550	JP ASINX1	05665	61000 05712	
.	C5551	STR Q*L(ASINX+9D)*QPOS	05666	14210 05670	
.	C5552	JP L(ASINX)	05667	61010 05657	
.	C5553	RSH AQ*0*ANOT	05670	03500 00000	CHECK FOR ARGUMENT GREATER OR 2
.	C5554	STR Q*W(ASINX+26D)*QPOS	05671	14230 05711	
.	C5555	JP L(ASINX)	05672	61010 05657	ERROR RETURN
.	C5556	MUL W(ASINX+26D)	05673	22030 05711	SQUARE ARGUMENT

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 SATEL MCQUILKIN*7/1/65

CARDS	LI ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C5557	RSH AQ=28D	05674	03000	00034		
.	C5560	ENT Y-Q*W(ASINX+24D)	05675	31030	05707		
.	C5561	RJP SQRT	05676	65000	05504		COMPUTE SQRT(1-ARG SQUARED)
.	C5562	JP L(ASINX)	05677	61010	05657		
.	C5563	ENT Q*A	05700	10070	00000		ARCSINEX ARCTAN(X/SQRT(1-XSQUARED))
.	C5564	ENT A*W(ASINX+26D)	05701	11030	05711		
.	C5565	RJP ATANX	05702	65000	05552		COMPUTE ARCSINE (-X)
.	C5566	ENT Q*W(ASINX+25D)*QPOS	05703	10230	05710		
.	C5567	CP A*	05704	15040	00000		
.	C5570	ENT B7*L(ASINX)	05705	12710	05657		
.	C5571	JP 1+B7	05706	61007	00001		EXIT
.	C5572	2000C 00000	05707	20000	00000		1 AT 28
.	C5573	C 0	05710	00000	00000		TEMPORARY
.	C5574	C 0	05711	00000	00000		TEMPORARY
.	C5575 ASINX1	STR A*W(ASINXCON)	05712	15030	04030		TEST VERY NEAR ZERO
.	C5576	RSH A*12D	05713	02000	00014		
.	C5577	JP ASINX11*AZERO	05714	60400	05717		
.	C5600	ENT A*W(ASINXCON)	05715	11030	04030		
.	C5601	JP ASINX+7	05716	61000	05666		
.	C5602 ASINX11	ENT A*W(ASINXCON)	05717	11030	04030		
.	C5603	LSH A*1	05720	06000	00001		
.	C5604	JP ASINX+20D	05721	61000	05703		
.	C5605 MCD2PI	ENTRY	05722	61000	00000		
.	C5606	STR B1*L(MODB1)	05723	16110	05747		
.	C5607	STR B4*L(MODB4)	05724	16410	05750		
.	C5610	STR B5*L(MODB5)	05725	16510	05751		
.	C5611	STR B6*L(MODB6)	05726	16610	05752		
.	C5612	STR B7*L(MODB7)	05727	16710	05753		
.	C5613	STR A*W(MODNUM)	05730	15030	06006		IS EXP LESS THAN OR
.	C5614	STR Q*W(MODNUM+1)	05731	14030	06007		EQUAL TO 40003
.	C5615	ENT Q*61000	05732	10000	61000		INITIALIZATION
.	C5616	STR Q*U(MOD1)	05733	14020	05755		
.	C5617	STR Q*U(MOD2)	05734	14020	05756		
.	C5620 MCD5	COM A*40004*YMORE	05735	04700	40004		
.	C5621	JP MOD1	05736	61000	05755		NO ERROR
.	C5622	SUB A*40003*AZERO	05737	21400	40003		IS EXP 40003
.	C5623	JP MODNORM	05740	61000	05745		NO NUMBER GOOD
.	C5624	ENT A*W(MODNUM+1)*APOS	05741	11630	06007		TEST FRAC POS
.	C5625	CP A	05742	15040	00000		
.	C5626	COM A*W(BEL2PI1+1)*YMORE	05743	04730	06013		
.	C5627	JP MOD1	05744	61000	05755		NO ERROR
.	C5630 MCDNCRM	ENT A*W(MODNUM)	05745	11030	06006		NORMAL EXIT
.	C5631	ENT Q*W(MODNUM+1)	05746	10030	06007		FRAC IN Q
.	C5632 MCDB1	ENT B1*0	05747	12100	00000		
.	C5633 MCDB4	ENT B4*0	05750	12400	00000		
.	C5634 MCDB5	ENT B5*0	05751	12500	00000		
.	C5635 MCDB6	ENT B6*0	05752	12600	00000		
.	C5636 MCDB7	ENT B7*0	05753	12700	00000		
.	C5637	EXIT	05754	61010	05722		EXP IN A
.	C5640 MCD1	JP MOD3	05755	61000	05760		SW BETA JP TO
.	C5641 MCD2	JP MOD4	05756	61000	05764		SW ALPHA
.	C5642	JP MOD6	05757	61000	05774		

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C5643 MCD3	ENT Q*12000	05760	10000	12000		SET BETA TO B
.	C5644	STR Q*U(MOD1)	05761	14020	05755		
.	C5645	ENT A*W(MODNUM+1)*APOS	05762	11630	06007		TEST NUM FOR POS
.	C5646	JP MOD6	05763	61000	05774		NO JP TO NEG ROUT
.	C5647 MOD4	ENT B4*MODNUM	05764	12400	06006		SUB 2PI FROM NUM
.	C5650	ENT B5*BEL2PI	05765	12500	06010		
.	C5651	ENT B6*MODNUM	05766	12600	06006		STORE IN NUMBER
.	C5652	ENT B7*01	05767	12700	00001		
.	C5653	ENT B1*1	05770	12100	00001		
.	C5654	EXECUTE FLTPT	05771	65000	06155		
.	C5655	ENT A*W(MODNUM)	05772	11030	06006		EXP IN A REGISTER
.	C5656	JP MOD5	05773	61000	05735		JP TO TEST FOR LESS THAN OR = 2PI
.	C5657 MCD6	ENT B4*MODNUM	05774	12400	06006		
.	C5660	ENT B5*BEL2PI	05775	12500	06010		
.	C5661	ENT B6*MODNUM	05776	12600	06006		STORE IN NUMBER
.	C5662	ENT B7*00	05777	12700	00000		
.	C5663	ENT B1*1	06000	12100	00001		
.	C5664	EXECUTE FLTPT	06001	65000	06155		ADD 2PI TO NEG NUM
.	C5665	ENT Q*12000	06002	10000	12000		
.	C5666	STR Q*U(MOD2)	06003	14020	05756		
.	C5667	ENT A*W(MODNUM)	06004	11030	06006		EXP IN A
.	C5670	JP MOD5	06005	61000	05735		JP TO TEST FOR LESS THAN OR = 2PI
.	C5671 MCDNUM	O O	06006	00000	00000		
.	C5672	O O	06007	00000	00000		
.	C5673 BEL2PI	00000 40003	06010	00000	40003		
.	C5674	14441 76652	06011	14441	76652		
.	C5675 BEL2PI1	00000 40003	06012	00000	40003		
.	C5676	14441 76653	06013	14441	76653		
.	C5677 SATINIT	ENTRY	06014	61000	00000		
.	C5700	ENT A*1004077777	06015	11030	07623		
.	C5701	STR A*W(FLTPT+134)	06016	15030	06311		
.	C5702	RJP DATAIN	06017	65000	00002		
.	C5703	RJP UPCALC	06020	65000	01005		
.	C5704	RJP BLASTCONV	06021	65000	05066		
.	C5705	RJP INCONVER	06022	65000	05076		
.	C5706	RJP TCONVERT	06023	65000	05233		
.	C5707	STR Q*W(DATE)	06024	14030	03532		
.	C5710	ENT A*W(DMODE)	06025	11030	00662		
.	C5711	SUB A*1*AZERO	06026	21400	00001		
.	C5712	JP MCALCDRJ	06027	61000	06034		
.	C5713	ENT Q*61000	06030	10000	61000		
.	C5714	STR Q*U(JMPCALC)	06031	14020	06047		
.	C5715 SATINITEX	RPL Y+1*L(SATINIT)	06032	36010	06014		
.	C5716	JP L(SATINIT)	06033	61010	06014		
.	C5717 MCALCDRJ	ENT Q*12000	06034	10000	12000		
.	C5720	STR Q*U(JTTESTSW)	06035	14020	06050		
.	C5721	STR Q*U(JMPCALC)	06036	14020	06047		
.	C5722	JP SATINITEX	06037	61000	06032		
.	C5723 SATWORK	ENTRY	06040	61000	00000		
.	C5724	RJP FF	06041	65000	05323		CONVERT CELTIME TO SEC GAMMA= 24

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 SATEL MCQUILKIN*7/1/65

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C5725	28D CELTIME	06042	00034	63133	X	
.	C5726	U-TAG CELTIMEX*10	06043	03774	00010	X	CELTIME IN FLTPT
.	C5727	RJP FF	06044	65000	05323	X	
.	C5730	U-TAG CELTIMEX*FLT864	06045	03774	04006	X	
.	C5731	U-TAG CELTIMEX*02	06046	03774	00002		
.	C5732 J*PCALC	JP SCDR1	06047	61000	06077		
.	C5733 JTTESTSW	JP SCDR2	06050	61000	06111		INITIAL JUMP INTERVAL CALC
.	C5734	ENT Q*61000	06051	10000	61000		
.	C5735	STR Q*U(JTTESTSW)	06052	14020	06050		
.	C5736	ENT Q*W(FRAMESIZE)	06053	10030	63101		TEST,REALTIME OR SIMULATION RU N
.	C5737	ENT A*W(TIMEMODE)*APOS	06054	11630	63103		AND CALCULATE START TIME
.	C5740	LSH Q*2	06055	05000	00002		SIMULATION,CELTIME+4XFRAMESIZE
.	C5741	STR Q*W(MTEMP7)	06056	14030	03762		REALTIME,CELTIME+FRAMESIZE
.	C5742	RJP FF	06057	65000	05323		
.	C5743	Q MTEMP7	06060	00000	03762		
.	C5744	U-TAG SATFRAM*10	06061	06152	00010		
.	C5745	RJP FF	06062	65000	05323		
.	C5746	U-TAG SATFRAM*CELTIMEX	06063	06152	03774		CELTIME + CORRECTED FRAMESIZE
.	C5747	U-TAG CELTIMEX*00	06064	03774	00000		= STARTTIME
.	C5750	RJP FF	06065	65000	05323		CELTIME+JMP INTERVAL
.	C5751	U-TAG CELTIMEX*JMPDELT	06066	03774	00660	X	
.	C5752	U-TAG JMPPTX*00	06067	06150	00000	X	
.	C5753	RJP FF	06070	65000	05323		
.	C5754	U-TAG JMPDELT*FLTTWOX	06071	00660	04014		CALCULATE,JMP INTERVAL/2
.	C5755	U-TAG JMPPT*03	06072	06146	00003	X	
.	C5756	RJP FF	06073	65000	05323	X	
.	C5757	U-TAG CELTIMEX*JMPPT	06074	03774	06146		XXX + CELTIME
.	C5760	U-TAG JMPPT*00	06075	06146	00000		
.	C5761	JP SCDR2	06076	61000	06111		TEST,CELTIME WITHIN TIME
.	C5762 SCDR1	MOVE 2*CELTIMEX*MTIME	06077	10030	03774		
			06100	14030	03530		
			06101	10030	03775		
			06102	14030	03531		
.	C5763 DRXXXX	RJP MCALC	06103	65000	01310		
.	C5764 DRXXX	RJP SCALC	06104	65000	02672		
.	C5765	JP MCALCDRERR	06105	61000	06145		
.	C5766	RPL Y+1*L(SATWORK)	06106	36010	06040		
.	C5767	CL A*	06107	11000	00000		
.	C5770	JP L(SATWORK)	06110	61010	06040		
.	C5771 SCDR2	ENT A*W(JMPPTX)	06111	11030	06150		INTERVAL BEING USED
.	C5772	COM A*W(CELTIMEX)*YLESS	06112	04630	03774		
.	C5773	JP SCDR5	06113	61000	06135		
.	C5774	SUB A*W(CELTIMEX)*AZERO	06114	21430	03774		LESS THAN OR EQUAL
.	C5775	JP SCDR3	06115	61000	06121		LESS,USE SAME POINT
.	C5776	ENT A*W(JMPPTX+1)	06116	11030	06151		MAYBE EQUAL
.	C5777	COM A*W(CELTIMEX+1)*YLESS	06117	04630	03775		
.	C6000	JP SCDR4	06120	61000	06126		
.	C6001 SCDR3	MOVE 2*JMPPT*MTIME	06121	10030	06146		
			06122	14030	03530		
			06123	10030	06147		

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C6002	JP DRXXXX	06124	14030	03531		
.	C6003	RJP FF	06125	61000	06103		
.	C6004	U-TAG JMPPTX*JMPDELT	06126	65000	05323		CALCULATE NEW POINT
.	C6005	U-TAG JMPPTX*00	06127	06150	00660		
.	C6006	RJP FF	06130	06150	00000		
.	C6007	U-TAG JMPPT*JMPDELT	06131	65000	05323		
.	C6010	U-TAG JMPPT*00	06132	06146	00660		
.	C6011	JP SCDR2	06133	06146	00000		
.	C6012	ENT A*W(CELTIMEX+1)*APOS	06134	61000	06111		
.	C6013	JP SCDR3	06135	11630	03775		
.	C6014	JP SCDR4	06136	61000	06121		
.	C6015	TTEST 12314 63146	06137	61000	06126		
.	C6016	CELTIMEXX C 0	06140	12314	63146		GAMMA=28 .65
.	C6017	O O	06141	00000	00000		
.	C6020	DELT12 O O	06142	00000	00000		
.	C6021	O O	06143	00000	00000		
.	C6022	MCALCDRERR O O	06144	00000	00000		
.	C6023	JMPPT O O	06145	00000	00000		
.	C6024	O O	06146	00000	00000		
.	C6025	JMPPTX O O	06147	00000	00000		
.	C6026	O O	06150	00000	00000		
.	C6027	SATFRAM O O	06151	00000	00000		
.	C6030	O O	06152	00000	00000		
.	C6031	NO-OP	06153	00000	00000		
.	C6032	PROGRAM CORR8*16MAR64	06154	12000	00000		DUMMY
.	C6033	IGNORE FLTPT					
.	C6034	PTR MEANS C4					
.	C6035	PCUT MEANS C4					
.	C6036	ENTRY	06155	61000	00000		
.	C6037	STR B1*L(FP1)	06156	16110	06164		
.	C6040	STR B4*L(FP4)	06157	16410	06165		
.	C6041	STR B5*L(FP5)	06160	16510	06166		
.	C6042	STR B6*L(FP6)	06161	16610	06167		
.	C6043	STR B7*L(FP7)	06162	16710	06170		
.	C6044	RJP L(EFP+B7)	06163	65017	06172		
.	C6045	ENT B1*0	06164	12100	00000		
.	C6046	ENT B4*0	06165	12400	00000		
.	C6047	ENT B5*0	06166	12500	00000		
.	C6050	ENT B6*0	06167	12600	00000		
.	C6051	ENT B7*0	06170	12700	00000		
.	C6052	EXIT	06171	61010	06155		
.	C6053	EFP O ADD	06172	00000	06214		ADDITION
.	C6054	O SUB	06173	00000	06253		SUBTRACTION 1
.	C6055	O MPL	06174	00000	06263		MULTIPLICATION
.	C6056	O DIV	06175	00000	06275		DIVISION
.	C6057	O STARTREAD	06176	00000	07055		DATA INPUT
.	C6060	O PUNCH	06177	00000	06420		PUNCH OUTPUT
.	C6061	O TYPE	06200	00000	06416		TYPE OUTPUT
.	C6062	O SET	06201	00000	06361		SET OUTPUT LENGTH
.	C6063	O FXTOFL	06202	00000	06363		FIX TO FLOAT
.	C6064	O FLTOFX	06203	00000	06373		FLOAT TO FIX
.	C6065	O SQR	06204	00000	06444		SQUARE ROOT

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C6066	O SIN	06205	00000	07470		SINE OF ARGUMENT
.	C6067	O COS	06206	00000	07577		COS OF ARGUMENT
.	C6070	O ATAN	06207	00000	06536		ARCTANGENT OF ARGUMENT
.	C6071	O EXP	06210	00000	06616		EXPONENTIAL OF ARGUMENT
.	C6072	O ASIN	06211	00000	07060		
.	C6073	O ACOS	06212	00000	07264		
.	C6074	O LOGE	06213	00000	07307		
.	C6075 ACD	ENTRY	06214	61000	00000		
.	C6076	ENT A*L(B4)	06215	11014	00000		
.	C6077	SUB A*L(B5)*ANEG	06216	21715	00000		C1 MINUS C2
.	C6100	JP POS	06217	61000	06232		
.	C6101	ENT Q*L(B5)	06220	10015	00000		C2 IS THE
.	C6102	STR Q*W(B6)	06221	14036	00000		RESULTANT CHARACTERISTIC
.	C6103	SEL CP*X77777	06222	51040	77777		C2 MINUS C1
.	C6104	COM A*35*YLESS	06223	04600	00035		C2-C1 GREATER THAN 28
.	C6105	STR A*L(SFT1)*SKIP	06224	15110	06243		NO
.	C6106	JP MTR1	06225	61000	06250		YES
.	C6107	ENT A*W(1+B5)	06226	11035	00001		
.	C6110	STR A*W(WS)	06227	15030	06422		STORE LARGER MANTISSA
.	C6111	ENT A*W(1+B4)	06230	11034	00001		
.	C6112	JP SFT	06231	61000	06242		
.	C6113 PCS	ENT Q*L(B4)	06232	10014	00000		C1 IS THE RESULTANT
.	C6114	STR Q*W(B6)	06233	14036	00000		CHARACTERISTIC
.	C6115	COM A*35*YLESS	06234	04600	00035		C1-C2 GREATER THAN 28
.	C6116	STR A*L(SFT1)*SKIP	06235	15110	06243		NO
.	C6117	JP MTR	06236	61000	06247		YES
.	C6120	ENT A*W(1+B4)	06237	11034	00001		
.	C6121	STR A*W(WS)	06240	15030	06422		STORE LARGER MANTISSA
.	C6122	ENT A*W(1+B5)	06241	11035	00001		
.	C6123 SFT	ENT Q*O	06242	10000	00000		
.	C6124 SFT1	RSH AQ*O	06243	03000	00000		SET RADIX POINTS
.	C6125	ADD A*W(WS)	06244	20030	06422		ADD LARGER MANTISSA
.	C6126	RJP SCL	06245	65000	06315		TO SCALE
.	C6127	EXIT	06246	61010	06214		
.	C6130 MTR	ENT A*W(1+B4)*SKIP	06247	11134	00001		M1 RESULTANT MANTISSA
.	C6131 MTR1	ENT A*W(1+B5)	06250	11035	00001		M2 RESULTANT MANTISSA
.	C6132	STR A*W(1+B6)	06251	15036	00001		STORE RESULTANT
.	C6133	EXIT	06252	61010	06214		
.	C6134 SLB	ENTRY	06253	61000	00000		
.	C6135	ENT A*L(B5)	06254	11015	00000		
.	C6136	STR A*L(WS2)	06255	15010	06424		C2
.	C6137	ENT A*W(1+B5)	06256	11035	00001		
.	C6140	STR A*CPW(WS3)	06257	15070	06425		COMPLEMENT M2
.	C6141	ENT B5*WS2	06260	12500	06424		SET B5
.	C6142	RJP ADD	06261	65000	06214		JUMP TO ADD ROUTINE
.	C6143	EXIT	06262	61010	06253		
.	C6144 MFL	ENTRY	06263	61000	00000		
.	C6145	ENT A*L(B4)	06264	11014	00000		
.	C6146	ADD A*L(B5)	06265	20015	00000		C1 + C2
.	C6147	SUB A*40000	06266	21000	40000		RESULTANT C
.	C6150	STR A*W(B6)	06267	15036	00000		
.	C6151	ENT Q*W(1+B4)	06270	10034	00001		
.	C6152	MUL W(1+B5)	06271	22035	00001		(M1)(M2)

..... SATEL SPURT OUTPUT NO. 210
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CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C6153	LSH AQ*2	06272	07000	00002		SHIFT FOR SCALE
.	C6154	RJP SCL	06273	65000	06315		TO SCALE
.	C6155	EXIT	06274	61010	06263		
.	C6156 DIV	ENTRY	06275	61000	00000		
.	C6157	ENT A*W(1+B5)*AZERO	06276	11435	00001		
.	C6160	ENT A*L(B4)*SKIP	06277	11114	00000		
.	C6161	JP ERR	06300	61000	06744		ZERO DIVISOR
.	C6162	SUB A*L(B5)	06301	21015	00000		C1-C2
.	C6163	ADD A*40000	06302	20000	40000		RESULTANT C
.	C6164	STR A*L(B6)	06303	15016	00000		
.	C6165	ENT Q*0	06304	10000	00000		
.	C6166	ENT A*W(1+B4)	06305	11034	00001		M1
.	C6167	RSH AQ*2	06306	03000	00002		PREPARE FOR DIVISION
.	C6170	DIV W(1+B5)	06307	23035	00001		M1 DIVIDED BY M2
.	C6171	STR Q*A*APOS	06310	14640	00000		QUOTIENT TO A. IS IT POS
.	C6172	ENT Q*X-O*SKIP	06311	10140	77777		NO SET NEG
.	C6173	CL Q	06312	10000	00000		YES SO SET TO PLUS ZERO
.	C6174	RJP SCL	06313	65000	06315		TO SCALE
.	C6175	EXIT	06314	61010	06275		
.	C6176 SCL	ENTRY	06315	61000	00000		
.	C6177	JP NEG*ANEG	06316	60700	06330		
.	C6200	RPT 36	06317	70000	00036		
.	C6201	LSH AQ*1*ANEG	06320	07700	00001		
.	C6202	JP ZERO	06321	61000	06352		RESULT ZERO
.	C6203	SEL CL*1	06322	52000	00001		
.	C6204	ADD A*2*APOS	06323	20600	00002		
.	C6205	JP AQR	06324	61000	06337		
.	C6206	RPL Y+1*W(B6)	06325	36036	00000		ADD 1 TO C
.	C6207	ENT A*W(SCL2)	06326	11030	06356		40000 00000 TO A
.	C6210	JP AQR	06327	61000	06337		
.	C6211 NEG	RPT 36	06330	70000	00036		
.	C6212	LSH AQ*1*APOS	06331	07600	00001		
.	C6213	JP ZERO	06332	61000	06352		RESULT ZERO
.	C6214	SUB A*2*ANEG	06333	21700	00002		
.	C6215	JP AQR	06334	61000	06337		NO CHANGE
.	C6216	RPL Y+1*W(B6)	06335	36036	00000		
.	C6217	ENT A*W(SCL2+1)	06336	11030	06357		37777 77777 TO A
.	C6220 ACR	RSH AQ*2	06337	03000	00002		SET RADIX PT
.	C6221	SEL CP*W(SCL2+2)	06340	51030	06360		SET FIRST TWO BITS 0
.	C6222	STR A*W(1+B6)	06341	15036	00001		RESULTANT MANTISSA
.	C6223	STR B7*Q	06342	16700	00000		SHIFTS
.	C6224	ADD Q*W(B6)	06343	26036	00000		CR + SHIFTS
.	C6225	SUB Q*34*QNEG	06344	27700	00034		CR + SHIFTS -28, SKIP IF Q NEG
.	C6226	STR Q*W(B6)*SKIP	06345	14136	00000		STORE RESULTANT CHARACTERISTIC
.	C6227	JP ZERO	06346	61000	06352		RESULT ZERO
.	C6230	SUB Q*77777*QPOS	06347	27600	77777		
.	C6231	EXIT	06350	61010	06315		
.	C6232	JP ERR	06351	61000	06744		OVERFLOW
.	C6233 ZERO	STR B0*W(B6)	06352	16036	00000		
.	C6234	STR B0*W(1+B6)	06353	16036	00001		RESULT IS ZERO
.	C6235	ENT A*0	06354	11000	00000		

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 SATEL MCQUILKIN*7/1/65

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F JKB Y	NOTES
.	C6236 SCL1	EXIT	06355	61010 06315	
.	C6237 SCL2	40000 00000	06356	40000 00000	
.	C6240	37777 77777	06357	37777 77777	
.	C6241	60000 00000	06360	60000 00000	
.	C6242 SET	ENTRY	06361	61000 00000	
.	C6243	EXIT	06362	61010 06361	
.	C6244 FXTOTL	ENTRY	06363	61000 00000	
.	C6245	ENT Q*X(B4)	06364	10044 00000	SCALING POINT TO Q
.	C6246	ENT Y-Q*40034	06365	31000 40034	40034-S
.	C6247	STR A*W(B6)	06366	15036 00000	CHARACTERISTIC
.	C6250	ENT Q*0	06367	10000 00000	
.	C6251	ENT A*W(B5)	06370	11035 00000	FIX NO
.	C6252	RJP SCL	06371	65000 06315	SCALE
.	C6253	EXIT	06372	61010 06363	
.	C6254 FLTOFX	ENTRY	06373	61000 00000	
.	C6255	ENT Q*X(B4)	06374	10044 00000	SCALING PT WITH SIGN
.	C6256	ADD Q*L(B5)	06375	26015 00000	CHARACTERISTIC
.	C6257	SUB Q*40000	06376	27000 40000	
.	C6260	ENT Y-Q*34*APOS	06377	31600 00034	
.	C6261	JP FLTOFX2	06400	61000 06410	TO NEG BRANCH
.	C6262	STR A*L(FLTOFX1)	06401	15010 06405	SETUP SHIFT
.	C6263	SUB A*36*ANEG	06402	21700 00036	TEST FOR S GREATER THAN 29
.	C6264	ENT A*0*SKIP	06403	11100 00000	CLEAR SHIFT GREATER THAN 30
.	C6265	ENT A*W(1+B5)	06404	11035 00001	MANTISSA
.	C6266 FLTOFX1	RSH A*0	06405	02000 00000	SHIFT
.	C6267	STR A*W(B6)	06406	15036 00000	RESULTS
.	C6270	EXIT	06407	61010 06373	
.	C6271 FLTOFX2	COM A*X77776*YLESS	06410	04640 77776	
.	C6272	JP ERR12	06411	61000 06764	LEFT SHIFT GREATER THAN 1
.	C6273	ENT A*W(1+B5)	06412	11035 00001	MANTISSA
.	C6274	LSH A*1	06413	06000 00001	SHIFT
.	C6275	STR A*W(B6)	06414	15036 00000	RESULT
.	C6276	EXIT	06415	61010 06373	
.	C6277 TYPE	ENTRY	06416	61000 00000	
.	C6300	EXIT	06417	61010 06416	
.	C6301 PLNCH	ENTRY	06420	61000 00000	
.	C6302	EXIT	06421	61010 06420	
.	C6303 WS	0 0	06422	00000 00000	
.	C6304 WS1	0 0	06423	00000 00000	
.	C6305 WS2	0 0	06424	00000 00000	
.	C6306 WS3	0 0	06425	00000 00000	
.	C6307 WS4	0 0	06426	00000 00000	
.	C6310 WS5	0 0	06427	00000 00000	
.	C6311 WS6	0 0	06430	00000 00000	
.	C6312 WS7	0 0	06431	00000 00000	
.	C6313 WS10	0 0	06432	00000 00000	
.	C6314 WS11	0 0	06433	00000 00000	
.	C6315 WS12	0 0	06434	00000 00000	
.	C6316 WS13	0 0	06435	00000 00000	
.	C6317 WS14	0 0	06436	00000 00000	
.	C6320 WS15	0 0	06437	00000 00000	
.	C6321 WS16	0 0	06440	00000 00000	
.	C6322 RZERO	STR B0*W(B6)	06441	16036 00000	

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 SATEL MCQUILKIN*7/1/65

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F JKB Y	NOTES
.	C6323	STR B0*W(B6+1)	06442	16036 00001	
.	C6324	JP FP4	06443	61000 06165	
.	C6325 SCR	ENTRY	06444	61000 00000	
.	C6326	ENT A*W(1+B4)*APOS	06445	11634 00001	IS MANTISSA POSITIVE
.	C6327	JP ERR13	06446	61000 06766	NO ERROR EXIT
.	C6330	ENT Q*W(SQR1)*ANOT	06447	10530 06515	MASK FOR 2 EXP(-2), 2 EXP(-3)
.	C6331	STR A*L(B6)*SKIP	06450	15116 00000	RESULT CHARACTERISTIC ZERO
.	C6332	STR LP*A*SKIP	06451	47140 00000	EXTRACT RANGE FACTOR, SCALED 2 5
.	C6333	STR A*W(1+B6)*SKIP	06452	15136 00001	RESULT MANTISSA ZERO
.	C6334	RSH A*250*SKIP	06453	02100 00031	RANGE FACTOR SCALED 0
.	C6335	EXIT	06454	61010 06444	
.	C6336	ENT B5*A	06455	12570 00000	LOAD B5 WITH FACTOR
.	C6337	ENT Q*W(1+B4)	06456	10034 00001	M SCALED 28
.	C6340	MUL W(SQR2+B5)	06457	22035 06522	TIMES K SCALED 2
.	C6341	RSH AQ*2	06460	03000 00002	M(1) SCALED 28
.	C6342	STR Q*W(WS)	06461	14030 06422	SAVE M(1)
.	C6343	RSH Q*3	06462	01000 00003	TIMES 1/8
.	C6344	ADD Q*W(SQR1+1)	06463	26030 06516	MINUS B
.	C6345	MUL W(WS)	06464	22030 06422	
.	C6346	RSH AQ*29D	06465	03000 00035	SCALED 27
.	C6347	ADD Q*W(SQR1+2)	06466	26030 06517	MINUS C
.	C6350	STR Q*W(WS+1)	06467	14030 06423	SAVE -A SCALED 27
.	C6351	CL Q	06470	10000 00000	SET UP
.	C6352	ENT A*W(WS)	06471	11030 06422	M(1)
.	C6353	RSH AQ*4	06472	03000 00004	SCALED 54
.	C6354	OIV W(WS+1)	06473	23030 06423	M(1)/(-A) SCALED 27
.	C6355	ADD Q*W(WS+1)	06474	26030 06423	MINUS A
.	C6356	STR Q*W(WS)	06475	14030 06422	SAVE -2(SQRT M(1))
.	C6357	ENT A*L(B4)	06476	11014 00000	CHARACTERISTIC
.	C6360	ADD A*W(SQR1+3)	06477	20030 06520	PLUS BIAS
.	C6361	LSH A*29D	06500	06000 00035	HALVED
.	C6362	STR A*L(B6)*ANEG	06501	15716 00000	TO RESULT CHECK EVEN/ODD
.	C6363	MUL W(SQR3+B5)*SKIP	06502	22135 06526	EVEN CHAR CORRECTION SCALED 29
.	C6364	MUL W(SQR4+B5)	06503	22035 06532	ODD CHAR
.	C6365	RSH AQ*28D	06504	03000 00034	N SCALED 28
.	C6366	COM Q*W(SQR1+4)*YLESS	06505	04230 06521	IS N NORMALIZED
.	C6367	JP SQR1	06506	61000 06513	YES
.	C6370	ENT A*L(B6)	06507	11016 00000	ADD 1
.	C6371	ADD A*1	06510	20000 00001	TO
.	C6372	STR A*L(B6)	06511	15016 00000	CHAR.
.	C6373	RSH Q*1	06512	01000 00001	NORMALIZE
.	C6374 SQR1	STR Q*W(1+B6)	06513	14036 00001	STORE RESULT
.	C6375	EXIT	06514	61010 06444	
.	C6376 SCR1	0600000000	06515	06000 00000	MASK
.	C6377	6376776144	06516	63767 76144	-B SCALED 28
.	C6400	7500402153	06517	75004 02153	-C SCALED 27
.	C6401	0000C40000	06520	00000 40000	BIAS
.	C6402	2000C00000	06521	20000 00000	1.0 SCALED 28
.	C6403 SCR2	0000C00007	06522	00000 00007	K(3) FOR BITS 00
.	C6404	0000C00006	06523	00000 00006	K(2) 01
.	C6405	0000C00005	06524	00000 00005	K(1) 10

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 SATEL MCQUILKIN*7/1/65

CARDS	LI	ID	LABEL	TA	STATEMENT	LOC	F	JKB	Y	NOTES
.	C6406				0000G00004	06525	00000	000G4		K(0) 11
.	C6407	SCR3			6371733412	06526	63717	33412		7 EXP(-1/2)+2*10 EXP(-9) SCALE
.	C6410				6273720435	06527	62737	20435		0 29
.	C6411				6154066433	06530	61540	66433		6 EXP(-1/2)
.	C6412				5777777776	06531	57777	77776		5 EXP(-1/2)
.	C6413	SCR4			5671230431	06532	56712	30431		4 EXP(-1/2)
.	C6414				5541454270	06533	55414	54270		(2/7) EXP(1/2)
.	C6415				5360566233	06534	53605	66233		(1/3) EXP(1/2)
.	C6416				5127660627	06535	51276	60627		(2/5) EXP(1/2)
.	C6417	ATAN			ENTRY	06536	61000	00000		(1/2) EXP(1/2)
.	C6420				ENT Q*L(B4)	06537	10014	000G0		C
.	C6421				COM Q*40001*YMORE	06540	04300	40001		LESS THAN 40001
.	C6422				JP ERR16	06541	61000	06772		NO-ARGUMENT TOO LARGE
.	C6423				COM Q*37745*YLESS	06542	04200	37745		
.	C6424				JP RZERO	06543	61000	06441		
.	C6425	ATAN1			ENT A*40000	06544	11000	400C0		
.	C6426				STR A-Q*W(WS5)	06545	33030	06427		TO A SET UP SHIFT
.	C6427				ENT Q*W(1+B4)	06546	10034	00001		MANTISSA
.	C6430				RSH Q*A	06547	01070	00000		CONVERT TO FIXED POINT
.	C6431				STR Q*W(WS5)	06550	14030	06427		M
.	C6432				MUL W(WS5)	06551	22030	06427		M2
.	C6433				RSH AQ*33	06552	03000	00033		
.	C6434				STR Q*W(WS6)	06553	14030	06430		M2
.	C6435				ENT B5*0	06554	12500	00000		
.	C6436				ENT Q*W(ATAN5)	06555	10030	06610		
.	C6437	ATAN2			MUL W(WS6)	06556	22030	06430		HASTINGS CONSTANT
.	C6440				RSH AQ*35	06557	03000	00035		TO Q
.	C6441				ADD Q*W(ATAN5+B5+1)	06560	26035	06611		
.	C6442				BSK B5*4	06561	71500	00004		
.	C6443				JP ATAN2	06562	61000	06556		
.	C6444				MUL W(WS5)	06563	22030	06427		M
.	C6445				RSH AQ*34	06564	03000	00034		
.	C6446				JP ATAN3*QNEG	06565	60300	06577		
.	C6447				RPT 36	06566	70000	00036		POS RESULT
.	C6450				LSH Q*1*QNEG	06567	05300	00001		
.	C6451				JP RZERO	06570	61000	06441		
.	C6452				ENT A*37743+B7	06571	11007	37743		
.	C6453				STR A*W(B6)	06572	15036	00000		OF RESULT
.	C6454				ENT A*0	06573	11000	00000		CLEAR
.	C6455				LSH AQ*34	06574	07000	00034		
.	C6456				STR A*W(1+B6)	06575	15036	000C1		MANTISSA OF RESULT
.	C6457				EXIT	06576	61010	06536		
.	C6460	ATAN3			RPT 36	06577	70000	00036		NEG RESULT
.	C6461				LSH Q*1*QPOS	06600	05200	00001		
.	C6462				JP RZERO	06601	61000	06441		
.	C6463				ENT A*37743+B7	06602	11007	37743		
.	C6464				STR A*W(B6)	06603	15036	00000		OF RESULT
.	C6465				ENT A*3	06604	11000	00003		NEG SIGN
.	C6466				LSH AQ*34	06605	07000	00034		
.	C6467				STR A*W(1+B6)	06606	15036	00001		MANTISSA FOR RESULT
.	C6470				EXIT	06607	61010	06536		
.	C6471	ATAN5			77477 75334	06610	77477	75334		K 11

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F JKB Y	NOTES
.	C6472	01536 53004	06611	01536 53004	K9
.	C6473	74214 27222	06612	74214 27222	K7
.	C6474	06143 01016	06613	06143 01016	K5
.	C6475	65266 23005	06614	65266 23005	K3
.	C6476	37777 50120	06615	37777 50120	K1
.	C6477 EXP	ENTRY	06616	61000 00000	
.	C6500	ENT Q*W(1+B4)*QPOS	06617	10234 00001	MANTISSA
.	C6501	JP EXP2	06620	61000 06633	
.	C6502	ENT A=L(B4)	06621	11014 00000	CHARACTERISTIC
.	C6503	COM A=40034*YMORE	06622	04700 40034	C LESS THAN 40034
.	C6504	JP ERR17	06623	61000 06777	NO-OVERFLOW
.	C6505	COM A=37744*YMORE	06624	04700 37744	C LESS THAN 37744
.	C6506	JP EXP4	06625	61000 06640	NO
.	C6507 EXP1	ENT A=40001	06626	11000 40001	
.	C6510	STR A=W(B6)	06627	15036 00000	RESULT IS
.	C6511	ENT A=W(EXP10)	06630	11030 06675	ONE
.	C6512	STR A=W(1+B6)	06631	15036 00001	
.	C6513	EXIT	06632	61010 06616	
.	C6514 EXP2	ENT A=L(B4)	06633	11014 00000	
.	C6515	COM A=40034*YMORE	06634	04700 40034	
.	C6516	JP RZERO	06635	61000 06441	
.	C6517 EXP3	COM A=37744*YLESS	06636	04600 37744	C LESS THAN 37744
.	C6520	JP EXP1	06637	61000 06626	YES
.	C6521 EXP4	MUL W(EXP10+1)	06640	22030 06676	LOGE1/LN10
.	C6522	STR A=W(WS12)	06641	15030 06434	
.	C6523	ENT A=40032	06642	11000 40032	
.	C6524	SUB A=W(B4)	06643	21034 00000	CHARACTERISTIC
.	C6525	STR A=W(WS13)	06644	15030 06435	SET UP SHIFT
.	C6526	ENT A=W(WS12)	06645	11030 06434	
.	C6527	RSH AQ=W(WS13)*APOS	06646	03630 06435	CONVERT TO FIXED POINT
.	C6530	JP EXP7	06647	61000 06672	NEG NUMBER
.	C6531	ADD A=40001	06650	20000 40001	
.	C6532	STR A=W(B6)	06651	15036 00000	
.	C6533 EXP5	ENT A=0	06652	11000 00000	
.	C6534	RSH AQ*1	06653	03000 00001	
.	C6535	MUL W(EXP10+2)	06654	22030 06677	
.	C6536	RSH AQ*35	06655	03000 00035	
.	C6537	STR Q=W(WS14)	06656	14030 06436	
.	C6540	ENT B5*0	06657	12500 00000	CLEAR
.	C6541	ENT Q=W(EXP10+3)	06660	10030 06700	K6
.	C6542 EXP6	MUL W(WS14)	06661	22030 06436	K6X
.	C6543	RSH AQ*34	06662	03000 00034	
.	C6544	ADD Q=W(EXP10+B5+4)	06663	26035 06701	
.	C6545	BSK B5*5	06664	71500 00005	
.	C6546	JP EXP6	06665	61000 06661	
.	C6547	ENT A=0	06666	11000 00000	
.	C6550	LSH AQ*35	06667	07000 00035	
.	C6551	STR A=W(1+B6)	06670	15036 00001	RESULT
.	C6552	EXIT	06671	61010 06616	
.	C6553 EXP7	ADD A=40000	06672	20000 40000	
.	C6554	STR A=W(B6)	06673	15036 00000	
.	C6555	JP EXP5	06674	61000 06652	
.	C6556 EXP10	10000 0	06675	10000 00000	MANTISSA OF 1

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 SATEL MCQUILKIN*7/1/65

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F JKB Y	NOTES
.	C6625	1321050505	06762	13210 50505	
.	C6626 ERR11	ENT A*ERR20*SKIP	06763	11100 07001	
.	C6627 ERR12	ENT A*ERR21	06764	11000 07003	
.	C6630	JP AERR1	06765	61000 06707	
.	C6631 ERR13	ENT A*ERR22*SKIP	06766	11100 07005	
.	C6632 ERR14	ENT A*ERR23	06767	11000 07007	
.	C6633	JP AERR1	06770	61000 06707	
.	C6634 ERR15	ENT A*ERR24*SKIP	06771	11100 07011	
.	C6635 ERR16	ENT A*ERR25	06772	11000 07013	
.	C6636	JP AERR1	06773	61000 06707	
.	C6637 ERR16A	ENT A*ERR40	06774	11000 07021	LOG ERROR
.	C6640	JP AERR1	06775	61000 06707	
.	C6641 ERR10	ENT A*ERR27*SKIP	06776	11100 07017	
.	C6642 ERR17	ENT A*ERR26	06777	11000 07015	
.	C6643	JP AERR1	07000	61000 06707	
.	C6644 ERR20	1621210530	07001	16212 10530	ILL SET NO
.	C6645	1231052324	07002	12310 52324	
.	C6646 ERR21	3010062112	07003	30100 62112	SCALE OFL
.	C6647	0524132105	07004	05241 32105	
.	C6650 ERR22	3026270523	07005	30262 70523	
.	C6651	1214052324	07006	12140 52324	
.	C6652 ERR23	3016230524	07007	30162 30524	
.	C6653	1321050505	07010	13210 50505	
.	C6654 ERR24	10243 00524	07011	10243 00524	
.	C6655	1321050505	07012	13210 50505	
.	C6656 ERR25	0631062305	07013	06310 62305	
.	C6657	2413210505	07014	24132 10505	
.	C6660 ERR26	1235250524	07015	12352 50524	
.	C6661	1321050505	07016	13210 50505	
.	C6662 ERR27	2432312532	07017	24323 12532	
.	C6663	3105241321	07020	31052 41321	
.	C6664 ERR40	2124141205	07021	21241 41205	
.	C6665	1227272427	07022	12272 72427	
.	C6666 LERR	STR A*L(LERR+3)	07023	15010 07026	
.	C6667	RPL Y+1*L(POW14)	07024	36010 07057	
.	C6670	STR A*L(FLTPT)	07025	15010 06155	
.	C6671	ENT A*0	07026	11000 00000	
.	C6672	JP AERR1	07027	61000 06707	
.	C6673 ERR2	ENT A*ERR30*SKIP	07030	11100 07041	
.	C6674 ERR3	ENT A*ERR31	07031	11000 07043	
.	C6675	JP LERR	07032	61000 07023	
.	C6676 ERR4	ENT A*ERR32*SKIP	07033	11100 07045	
.	C6677 ERR5	ENT A*ERR33	07034	11000 07047	
.	C6700	JP LERR	07035	61000 07023	
.	C6701 ERR6	ENT A*ERR34*SKIP	07036	11100 07051	
.	C6702 ERR7	ENT A*ERR35	07037	11000 07053	
.	C6703	JP LERR	07040	61000 07023	
.	C6704 ERR30	2324310524	07041	23243 10524	
.	C6705	1031050505	07042	10310 50505	
.	C6706 ERR31	2324053106	07043	23240 53106	NO TAB
.	C6707	0705050505	07044	07050 50505	
.	C6710 ERR32	2324310511	07045	23243 10511	NOT DEC
.	C6711	1210050505	07046	12100 50505	

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SATEL MCQUILKIN*7/1/65 .....

CARDS  LI ID LABEL  TA STATEMENT  LOC  F JKB Y  NOTES

.  C6557  27052  43542  06676  27052  43542  LOGE1/LN10
.  C6560  11504  04651  06677  11504  04651  PROGRAM CONSTANT
.  C6561  00056  24630  06700  00056  24630  K
.  C6562  00155  74340  06701  00155  74340  K5
.  C6563  01152  16565  06702  01152  16565  K4
.  C6564  04035  41132  06703  04035  41132  K3
.  C6565  12466  00553  06704  12466  00553  K2
.  C6566  22327  26210  06705  22327  26210  K1
.  C6567  20000  0  06706  20000  00000  FIXED POINT 1
.  C6570 AERR1  STR A*L(AERR2+2)  06707  15010  06731
.  C6571  CONSOLE HOLD  06710  64120  00142
.  C6572  TYPET  $CR$$LF$$LF$FP ERROR$CR$ADDR$S 06711  03000  00000
      P$$SP$  06712  61000  06717
      06713  04030  31325
      06714  05122  72724
      06715  27040  61111
      06716  27050  50000
      06717  64120  00142
      06720  00000  00022
      06721  00000  06713
.  C6573  ENT Q*L(FLTPT)  06722  10010  06155
.  C6574  SUB Q*1  06723  27000  00001
.  C6575  TYPEC Q*$SP$*$SP$*$SP$*$SP$  06724  64110  00141
      06725  00000  00000
      06726  77050  50505
.  C6576 AERR2  TYPE 100*AERR2  06727  64120  00142
      06730  00000  00012
      06731  00000  06727
.  C6577  ENT B4*L(FP4)  06732  12410  06165
.  C6600  ENT B5*L(FP5)  06733  12510  06166
.  C6601  ENT B6*L(FP6)  06734  12610  06167
.  C6602  ENT B7*L(FP7)  06735  12710  06170
.  C6603  CL A  06736  11000  00000
.  C6604  CL Q  06737  10000  00000
.  C6605  CONSOLE RELEASE  06740  64120  00142
      06741  04000  00000
.  C6606 FPSTOP  REX STOPRUN  06742  64120  00142
      06743  05000  00000
.  C6607 ERR  ENT B7*L(FP7)  06744  12710  06170
.  C6610  ENT A*L(AERR+B7)  06745  11017  06747
.  C6611  JP AERR1  06746  61000  06707
.  C6612 AERR  O ADOFL  06747  00000  06753
.  C6613  O SBOFL  06750  00000  06755
.  C6614  O MLOFL  06751  00000  06757
.  C6615  O DVOFL  06752  00000  06761
.  C6616 ACOFL  0611110524  06753  06111  10524
.  C6617  1321050505  06754  13210  50505
.  C6620 SEOFL  3032070524  06755  30320  70524
.  C6621  1321050505  06756  13210  50505
.  C6622 MLOFL  2232210524  06757  22322  10524
.  C6623  1321050505  06760  13210  50505
.  C6624 DVCFL  1116330524  06761  11163  30524

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..... SPUPT OUTPUT NO. 210
 SATEL MCQUILKIN=7/1/65

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F JKB Y	NOTES
.	C6712 ERR33	2324051112	07047	23240 51112	NO DEC PT
.	C6713	1005253105	07050	10052 53105	
.	C6714 ERR34	2706231412	07051	27062 31412	RANGE ERR
.	C6715	C512272705	07052	05122 72705	
.	C6716 ERR35	1223110510	07053	12231 10510	END CODE
.	C6717	2411120505	07054	24111 20505	
.	C6720 STARTREAD	ENTRY	07055	61000 00000	
.	C6721	EXIT	07056	61010 07055	
.	C6722 PCW14	NO-OP	07057	12000 00000	
.	C6723 ASIN	ENTRY	07060	61000 00000	
.	C6724	ENT A*40001	07061	11000 40001	BIASED CHAR EQUALS 1
.	C6725	SUB A*L(B4)*APOS	07062	27062 31412	1-C, TEST C GREATER THAN 1
.	C6726	JP ERR16	07063	61000 06772	YES ERROR
.	C6727	ENT B5*A	07064	12570 00000	B5 EQUALS 1-C TEST C EQUALS 1
.	C6730	JP ASIN4*AZERO	07065	60400 07227	
.	C6731	SUB A*1*ANOT	07066	21500 00001	-C TEST C EQUALS 0
.	C6732	JP ASIN3	07067	61000 07150	YES TO TEST ABS(M) EQUALS 1/2
.	C6733	COM A*14D*YMORE	07070	04700 00016	
.	C6734	ENT A*0*SKIP	07071	11100 00000	
.	C6735 HERE	ENT A*W(1+B4)*SKIP	07072	11134 00001	
.	C6736	JP ASIN2	07073	61000 07144	
.	C6737	LSH A*1	07074	06000 00001	SCALED 29
.	C6740	STR A*W(WS)	07075	15030 06422	SAVED
.	C6741	RSH AQ*29D+B5	07076	03005 00035	M*2**C EQUALS Y SCALED 29 EQUA LS X
.	C6742	STR Q*W(WS+1)	07077	14030 06423	
.	C6743	MUL W(WS+1)	07100	22030 06423	
.	C6744	RSH AQ*29D	07101	03000 00035	SCALED 29 0 IN A
.	C6745 ASIN1	STR A*W(WS+1)	07102	15030 06423	STORE P
.	C6746	MUL W(ASINK)	07103	22030 07246	K*X**2
.	C6747	RSH AQ*29D	07104	03000 00035	SCALED 29 EQUALS Z
.	C6750	ENT Y+Q*W(ASINK+3)	07105	30030 07251	Z+C
.	C6751	STR A*W(WS+2)	07106	15030 06424	SAVED
.	C6752	ENT A*W(ASINK+1)	07107	11030 07247	A
.	C6753	STR A+Q*Q	07110	32000 00000	+Z
.	C6754	MUL A	07111	22070 00000	(A+Z)**2
.	C6755	RSH AQ*29D	07112	03000 00035	SCALED 29
.	C6756	ADD Q*W(ASINK+2)	07113	26030 07250	+B EQUALS U
.	C6757	STR Q*W(WS+3)	07114	14030 06425	SAVE U
.	C6760	MUL W(WS+2)	07115	22030 06424	U*(Z+C)
.	C6761	RSH AQ*29D	07116	03000 00035	SCALED 29 EQUALS V
.	C6762	ENT Y+Q*W(ASINK+4)	07117	30030 07252	V+D
.	C6763	SUB Q*W(WS+3)	07120	27030 06425	V-D
.	C6764	ADD Q*W(ASINK+5)	07121	26030 07253	+E
.	C6765	STR A*W(WS+3)	07122	15030 06425	
.	C6766	MUL W(WS+3)	07123	22030 06425	
.	C6767	RSH AQ*29D	07124	03000 00035	SCALED 29
.	C6770	ADD Q*W(ASINK+6)	07125	26030 07254	+F EQUALS ARCSIN X/2X
.	C6771	MUL W(WS)	07126	22030 06422	*M EQUALS (1/2)ARCSIN X SCALED 28+C
.	C6772	RSH AQ*27D+B5	07127	03005 00033	*(4*2**C) EQUALS 2ARCSIN X SC

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
							28
.	C6773	ENT A*W(WS+1)*AZERO	07130	11430	06423		P SCALED 28 SKIP IF P EQUALS 0
.	C6774	STR A+Q*Q*SKIP	07131	32100	00000		P-2*ARCSIN X EQUALS ARCSIN Y
.	C6775	RSH Q*1	07132	01000	00001		ARCSIN Y SCALED 28
.	C6776	STR Q*A*QPOS	07133	14240	00000		TEST M LESS THAN 0
.	C6777	STR A*A	07134	15040	00000		YES FORM ABS(M)
.	C7C00	RPT 29D	07135	70000	00035		NORMALIZE
.	C7C01	LSH A*1*ANEG	07136	06700	00001		SCALED 30
.	C7C02	JP ASIN2+2	07137	61000	07146		M EQUALS 0
.	C7C03	LSH A*29D	07140	06000	00035		PRESERVE SIGN
.	C7C04	RSH A*1*QPOS	07141	02200	00001		M SCALED 28 TEST M LESS THAN 0
.	C7C05	STR A*A	07142	15040	00000		YES -ABS(M)
.	C7C06	ENT Q*37745+B7*SKIP	07143	10107	37745		C EQUALS (27-SF)-27+BIAS
.	C7C07 ASIN2	ENT Q*A	07144	10070	00000		C EQUALS 0
.	C7C10	STR Q*L(B6)	07145	14016	00000		STORE ARCSIN Y
.	C7C11	STR A*W(1+B6)	07146	15036	00001		AS C,M
.	C7C12	EXIT	07147	61010	07060		
.	C7C13 ASIN3	ENT Q*W(1+B4)	07150	10034	00001		M EQUALS Y SCALED 28
.	C7C14	STR Q*A*QNEG	07151	14340	00000		FORM
.	C7C15	STR A*A	07152	15040	00000		-ABS(Y)
.	C7C16	ADD A*W(ASINP+2)*ANOT	07153	20530	07257		1/2-ABS(Y) TEST ZERO
.	C7C17	JP ASIN5	07154	61000	07236		YES USE (PI)/6
.	C7C20	ADD A*W(ASINP+2)*QPOS	07155	20230	07257		(1-ABS(Y))/2 SCALED 29
.	C7C21	STR A*CPW(WS+1)*SKIP	07156	15170	06423		STORE X**2 AND
.	C7C22	STR A*W(WS+1)	07157	15030	06423		SAVE SIGN OF Y
.	C7C23	RPT 29D*	07160	70000	00035		NORMALIZE
.	C7C24	LSH A*1*ANEG	07161	06700	00001		SCALED 30
.	C7C25	JP ASIN5-1	07162	61000	07235		ABS(X) LESS THAN 2*-13 USE (P I)/2
.	C7C26	ENT Q*A	07163	10070	00000		SAVE X**2
.	C7C27	STR B7*A	07164	16740	00000		26-SF
.	C7C30	SUB A*30D	07165	21000	00036		-(2+SF) EQUALS -(2-2C)
.	C7C31	LSH A*29D*ANEG	07166	06700	00035		-(1-C) TEST SF EVEN
.	C7C32	LSH Q*27D*SKIP	07167	05100	00033		NO (1/4)*X**2 SCALED 29 EQUALS T/2
.	C7C33	LSH Q*28D	07170	05000	00034		YES (1/2)*X**2 SCALED 29 EQUAL S T/2
.	C7C34	STR A*A	07171	15040	00000		1-C
.	C7C35	ENT B5*A	07172	12570	00000		TO B5
.	C7C36	STR Q*W(WS+2)	07173	14030	06424		SAVE T/2
.	C7C37	MUL W(ASINQ)	07174	22030	07261		A(T/2)
.	C7C40	RSH AQ*29D	07175	03000	00035		SCALED 29
.	C7C41	ADD Q*W(ASINQ+1)	07176	26030	07262		+(B/2)
.	C7C42	MUL W(WS+2)	07177	22030	06424		*(T/2)
.	C7C43	RSH AQ*29D	07200	03000	00035		SCALED 29 0 IN A-REG
.	C7C44	ADD Q*W(ASINQ+2)	07201	26030	07263		+(C/4)
.	C7C45	STR Q*W(WS)	07202	14030	06422		EQUALS (T**1/2)/4 APPROX EQUA LS R1
.	C7C46	ENT Q*W(WS+2)	07203	10030	06424		T/2
.	C7C47	LSH AQ*26D	07204	07000	00032		*(1/8) EQUALS T/16 SCALED 58
.	C7C50	CIV W(WS)	07205	23030	06422		(T/16)/R1
.	C7C51	ADD Q*W(WS)	07206	26030	06422		+R1

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MCQUILKIN*7/1/65

SATEL

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C7052	RSH Q*1	07207	01000	00001		*(1/2) EQUALS R2
.	C7053	STR Q*W(WS)	07210	14030	06422		SAVE R2
.	C7054	ENT A*W(WS+2)	07211	11030	06424		ONE MORE
.	C7055	CL Q	07212	10000	00000		ITERATION
.	C7056	RSH AQ*4	07213	03000	00004		YIELDS
.	C7057	DIV W(WS)	07214	23030	06422		(T**1/2)/2
.	C7060	ADD Q*W(WS)	07215	26030	06422		*2
.	C7061	LSH AQ*31D	07216	07000	00037		EQUALS T**1/2 SCALED 29 EQUAL S ABS(M)
.	C7062	ENT Q*W(WS+1)*QNEG	07217	10330	06423		X**2 TEST SIGN
.	C7063	STR A*CPW(WS)*SKIP	07220	15170	06422		STORE -M
.	C7064	STR A*W(WS)	07221	15030	06422		STORE -M
.	C7065	ENT A*W(ASINP+1)*QPOS	07222	11230	07256		(PI)/2 SCALED 28
.	C7066	STR Q*Q*SKIP	07223	14100	00000		CHANGE SIGN
.	C7067	JP ASIN1	07224	61000	07102		TO CALC FOR Y GREATER .5
.	C7070	STR A*A	07225	15040	00000		-(PI)/2
.	C7071	JP ASIN1	07226	61000	07102		TO CALC FOR Y LESS THAN -.5
.	C7072 ASIN4	ENT Q*W(1+B4)	07227	10034	00001		M
.	C7073	STR Q*A*QNEG	07230	14340	00000		FORM
.	C7074	STR A*A	07231	15040	00000		-ABS(M)
.	C7075	ADD A*W(ASINP+2)*AZERO	07232	20430	07257		+(1/2) TEST AZERO
.	C7076	JP ERR16	07233	61000	06772		NO ERROR
.	C7077	ENT B5*40001	07234	12500	40001		C FOR (PI)/2
.	C7100	JP ASIN5+1	07235	61000	07237		
.	C7101 ASIN5	ENT B5*40000	07236	12500	40000		C FOR (PI)/6
.	C7102	ENT A*W(ASINP-40000+B5)*QPOS	07237	11235	47254		(PI)/6OR(PI)/2 TEST M LESS
.	C7103	STR A*A	07240	15040	00000		YES -(PI)/6 OR -(PI)/2
.	C7104	RSH A*1	07241	02000	00001		M SCALED 28
.	C7105	STR B5*Q	07242	16500	00000		C
.	C7106	STR Q*L(B6)	07243	14016	00000		STORE ARCSIN Y
.	C7107	STR A*W(1+B6)	07244	15036	00001		AS C,M
.	C7110	EXIT	07245	61010	07060		
.	C7111 ASINK	2041015167	07246	20410	15167		K
.	C7112	1070502075	07247	10705	02075		A
.	C7113	1507662270	07250	15076	62270		B
.	C7114	0125170245	07251	01251	70245		C
.	C7115	0151206634	07252	01512	06634		D
.	C7116	3121124150	07253	31211	24150		E
.	C7117	1720500666	07254	17205	00666		F
.	C7120 ASINP	2060251072	07255	20602	51072		(PI)/6 SCALED 29
.	C7121	3110375526	07256	31103	75526		(PI)/2 SCALED 28
.	C7122	1000000000	07257	10000	00000		1/2 SCALED 28
.	C7123	1444176653	07260	14441	76653		(PI)/2 SCALED 27
.	C7124 ASINQ	6570132340	07261	65701	32340		-A SCALED 29
.	C7125	2065211354	07262	20652	11354		B/2 SCALED 29
.	C7126	0204600545	07263	02046	00545		C/4 SCALED 29
.	C7127 ACOS	ENTRY	07264	61000	00000		
.	C7130	RJP ASIN	07265	65000	07060		GET ARCSIN Y
.	C7131	ENT A*40001	07266	11000	40001		BIASED CHARACTERISTIC
.	C7132	SUB A*L(B6)	07267	21016	00000		1-C
.	C7133	ENT Q*W(1+B6)	07270	10036	00001		M SCALED 28
.	C7134	RSH Q*A	07271	01070	00000		ARCSIN Y SCALED 27

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C7135	SUB Q*W(ASINP+3)*QNEG	07272	27730	07260		-(PI)/2 SCALED 27
.	C7136	JP ACOS1	07273	61000	07303		ARCOS Y EQUALS 0
.	C7137	RPT 29D	07274	70000	00035		NORMALIZE (-ARCOS Y)
.	C7140	LSH Q*1*QPOS	07275	05200	00001		WITH 26+C IN B7
.	C7141	JP ACOS1	07276	61000	07303		(ARCOS Y EQUALS 0)
.	C7142	LSH Q*29D	07277	05000	00035		SAVE SIGN OF -M
.	C7143	RSH Q*1	07300	01000	00001		AND SCALE 28
.	C7144	STR B7*A	07301	16740	00000		26+C
.	C7145	ADD A*37746*SKIP	07302	20100	37746		+BIAS-26 EQUALS C
.	C7146 ACCS1	STR Q*Q	07303	14000	00000		SET FOR C EQUALS 0
.	C7147	STR A*L(B6)	07304	15016	00000		STORE ARCOS Y
.	C7150	STR Q*CPW(1+B6)	07305	14076	00001		AS C,M
.	C7151	EXIT	07306	61010	07264		
.	C7152 LCGE	ENTRY	07307	61000	00000		LN(Y) IN FLOATING PT
.	C7153	ENT Q*W(1+B4)	07310	10034	00001		MANTISSAEQMEQQ
.	C7154	COM Q*W(LOGER)*YMORE	07311	04330	07420		TEST M LESS1
.	C7155	JP ERR16A	07312	61000	06774		
.	C7156	ENT Y-Q*W(LOGER+1)*ANEG	07313	31730	07421		TEST M GREATER 1/2
.	C7157	JP LOGE1	07314	61000	07343		NO,TRY M EQ 1/2
.	C7160	ENT LP*W(LOGER+2)	07315	40030	07422		GET I
.	C7161	RSH A*24D	07316	02000	00030		FOR K(I)
.	C7162	ENT B5*A	07317	12570	00000		IN TABLE
.	C7163	MUL W(LOGEK+B5)	07320	22035	07442		K(I)*Q
.	C7164	RSH AQ*29D	07321	03000	00035		SCALED 27
.	C7165	SUB Q*W(LOGER+1)	07322	27030	07421		-1 EQ X
.	C7166	ENT Y+Q*W(LOGEA+2)	07323	30030	07426		X+C
.	C7167	STR A*W(WS)	07324	15030	06422		SAVED
.	C7170	ENT Y+Q*W(LOGEA)	07325	30030	07424		X+A
.	C7171	STR A*W(WS+1)	07326	15030	06423		
.	C7172	MUL W(WS+1)	07327	22030	06423		
.	C7173	RSH AQ*27D	07330	03000	00033		SCALED 27
.	C7174	STR Q*W(WS+1)	07331	14030	06423		SAVED
.	C7175	ADD Q*W(LOGEA+1)	07332	26030	07425		Z+B
.	C7176	MUL W(WS)	07333	22030	06422		*(X+C)
.	C7177	RSH AQ*27D	07334	03000	00033		SCALED 27 EQ W
.	C7200	ENT Y+Q*W(LOGEA+4)	07335	30030	07430		W+E
.	C7201	ADD Q*W(LOGER+3)	07336	26030	07423		W-3
.	C7202	ADD Q*W(LOGEA+3)	07337	26030	07427		+(D+3)
.	C7203	ADD Q*W(WS+1)	07340	26030	06423		+Z
.	C7204	STR A*W(WS+1)	07341	15030	06423		
.	C7205	MUL W(WS+1)*SKIP	07342	22130	06423		
.	C7206 LCGE1	ENT Q*W(LOGEA+5)*SKIP	07343	10130	07431		LN(2)
.	C7207	DIV W(LOGER+3)*SKIP	07344	23130	07423		(-1/6) EQLN(X)-F*(-1/6)
.	C7210	STR Q*Q*SKIP	07345	14100	00000		-LN(2)
.	C7211	ADD Q*W(LOGEF+B5)*SKIP	07346	26135	07432		+F*(-1/L)-LN(K(I))
.	C7212	JP ERR16A*ANOT	07347	60500	06774		
.	C7213	STR Q*W(WS)	07350	14030	06422		EQ LN(Q) SCALED28
.	C7214	ENT A*L(B4)	07351	11014	00000		CHAR EQ P+2**14
.	C7215	SUB A*40000*ANOT	07352	21500	40000		-BIASEQP,TEST P EQO
.	C7216	JP LOGE2	07353	61000	07400		YES SKIP CALC
.	C7217	ENT Q*A*QPOS	07354	10270	00000		TEST PLESSO
.	C7220	STR Q*Q	07355	14000	00000		USE ABS(P)
.	C7221	RPT 4*ADV	07356	70100	00004		RANGE OF P

CARDS	LI ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C7222	COM Q=L(LOGES)*YMORE	07357	04310	07452		TO DETR MIN SHIFTS
.	C7223	JP LOGEM	07360	61000	07456		
.	C7224	ENT B5*U(LOGES+B7)	07361	12527	07452		FOR SCALING
.	C7225 LCGE1A	MUL W(LOGEA+5)	07362	22030	07431		
.	C7226	LSH AQ*B5	07363	07005	00000		SCALED 45 47 50 53 56
.	C7227	JP LOGEM+2	07364	61000	07460		
.	C7230	RPT L(COUNT)	07365	70010	07467		NORMALIZE
.	C7231	LSH AQ*1*ANEG	07366	07700	00001		PRODUCT
.	C7232	JP ERR16A	07367	61000	06774		
.	C7233	LSH AQ*58D	07370	07000	00072		RETURN SIGN SCALED 28
.	C7234	ENT Q*L(B4)	07371	10014	00000		P
.	C7235	COM Q=40000*YLESS	07372	04200	40000		TEST P LESS 0
.	C7236	STR A=A	07373	15040	00000		YES -ABS(P)*LN(2)
.	C7237	ENT Q*W(WS)	07374	10030	06422		LN(Q)
.	C7240	ENT B5*B7-26D	07375	12507	77745		
.	C7241	BJP B5*LOGE2-1	07376	72500	07377		
.	C7242	RSH Q*B5*SKIP	07377	01105	00000		
.	C7243 LCGE2	ENT B7*27D	07400	12700	00033		SET FOR NO SHIFTS(P EQ 0)
.	C7244	STR A+Q*Q*QPOS	07401	32200	00000		LN(Y)
.	C7245	STR Q*Q	07402	14000	00000		ABS(LN(Y))
.	C7246	JP LOGE3*AZERO	07403	60400	07414		SKIP IF Y EQ 1
.	C7247	STR B7*W(WS)	07404	16730	06422		SAVE FACTOR
.	C7250	RPT 29D	07405	70000	00035		NORMALIZE
.	C7251	LSH Q*1*QNEG	07406	05300	00001		ABS(LN(Y))
.	C7252	JP ERR16A	07407	61000	06774		
.	C7253	LSH Q*28D*APOS	07410	05600	00034		RETURN SIGN SCALED 28
.	C7254	STR Q*Q	07411	14000	00000		AS MANTISSA
.	C7255	ENT A*W(WS)	07412	11030	06422		FORM
.	C7256	ADD A*37712+B7*SKIP	07413	20107	37712		CHARACTERISTIC
.	C7257 LCGE3	CL Q	07414	10000	00000		
.	C7260	STR A*L(B6)	07415	15016	00000		STORE
.	C7261	STR Q*W(1+B6)	07416	14036	00001		RESULT
.	C7262	EXIT	07417	61010	07307		
.	C7263 LCGER	2000000000	07420	20000	00000		1SCALED 28
.	C7264	1000000000	07421	10000	00000		1/2SCALED28
.	C7265	0700000000	07422	07000	00000		MASK FOR I
.	C7266	4777777777	07423	47777	77777		-3 SCALED 27 -6 SCALED26
.	C7267 LCGEA	5770232732	07424	57702	32732		A SCALED 27
.	C7270	3427564132	07425	34275	64132		R
.	C7271	0724376530	07426	07243	76530		C
.	C7272	4341324241	07427	43413	24241		D+3
.	C7273	5712656427	07430	57126	56427		E
.	C7274	1305620600	07431	13056	20600		LN(2) SCALED 28
.	C7275 LCGEF	5366557053	07432	53665	57053		
.	C7276	5557247242	07433	55572	47242		1
.	C7277	5733156444	07434	57331	56444		2
.	C7300	6074650576	07435	60746	50576		3
.	C7301	6225723447	07436	62257	23447		4
.	C7302	6347732466	07437	63477	32466		5
.	C7303	6463606732	07440	64636	06732		6
.	C7304	6572323037	07441	65723	23037		7
.	C7305 LCGEK	3600000000	07442	36000	00000		I EQ 0 IN K(I) EQ15/(B+I) SCAL ED 28

CARDS	LI ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C7306	3252525253	07443	32525	25253	1	
.	C7307	3000000000	07444	30000	00000	2	
.	C7310	2564272135	07445	25642	72135	3	
.	C7311	2400000000	07446	24000	00000	4	
.	C7312	2235423542	07447	22354	23542	5	
.	C7313	2111111111	07450	21111	11111	6	
.	C7314	2000000000	07451	20000	00000	7	
.	C7315 LCGES	0002300014	07452	00023	00014		UPPER HALF
.	C7316	0002600135	07453	00026	00135		SHIFT CONSTANTS
.	C7317	0003101343	07454	00031	01343		LOWER HALF
.	C7320	0003413426	07455	00034	13426		CHAR RANGE
.	C7321 LCGEM	ENT B5*17D	07456	12500	00021		
.	C7322	JP LOGE1A	07457	61000	07362		
.	C7323	STR A*W(SAVE)	07460	15030	07466		
.	C7324	ENT A*59D	07461	11000	00073		
.	C7325	SUB A*B5	07462	21005	00000		
.	C7326	STR A*W(COUNT)	07463	15030	07467		
.	C7327	ENT A*W(SAVE)	07464	11030	07466		
.	C7330	JP LOGE1A+3	07465	61000	07365		
.	C7331 SAVE	RESERVE 1	07466	00000	00000		
.	C7332 CCUNT	RESERVE 1	07467	00000	00000		
.	C7333 SIN	ENTRY	07470	61000	00000		
.	C7334	ENT A*L(B4)	07471	11014	00000		
.	C7335	COM A*37767*YMORE	07472	04700	37767		TEST EXPONENT LES 2EXP-10
.	C7336	JP \$+5	07473	61000	07500		NO
.	C7337	STR A*L(B6)	07474	15016	00000		SET SIN(X) EQ X
.	C7340	ENT A*W(B4+1)	07475	11034	00001		
.	C7341	STR A*W(B6+1)	07476	15036	00001		
.	C7342	EXIT	07477	61010	07470		
.	C7343	COM A*40034*YMORE	07500	04700	40034		
.	C7344	JP \$*STOP	07501	61400	07501		EXPONENT GEQ 2EXP27
.	C7345	CL L(SINCOS2+1)	07502	16010	07515		
.	C7346	ENT A*W(1+B4)	07503	11034	00001		
.	C7347 SINCOS1	STR A*W(SINCOS20)*APOS	07504	15630	07575		ARG IN SINCOS20
.	C7350	CP A*ANOT	07505	15540	00000		
.	C7351	JP SINCOS7+1*AZERO	07506	60400	07563		
.	C7352	ENT Q*40033	07507	10000	40033		
.	C7353	SUB Q*L(B4)	07510	27014	00000		
.	C7354	STR Q*L(SINCOS2)	07511	14010	07514		
.	C7355	ENT Q*A	07512	10070	00000		\$ARG\$ TO Q
.	C7356	MUL W(SINCOS10)	07513	22030	07566		\$ARG\$ TIMES 2/PI IN AQ
.	C7357 SINCOS2	RSH AQ*0	07514	03000	00000		QTREV IN AQ AT B30
.	C7360	ADD A*0	07515	20000	00000		ADD 1 IF COSINE
.	C7361	SEL CL*X77774	07516	52040	77774		
.	C7362	ENT B7*A	07517	12770	00000		QUADRANT TO B7
.	C7363	RSH AQ*1	07520	03000	00001		FRAC IN Q AT B29
.	C7364	JP \$+1+B7	07521	61007	07522		
.	C7365	JP \$+3	07522	61000	07525		QUADRANT I
.	C7366	CP Q*SKIP	07523	14100	00000		QUADRANT II
.	C7367	CP Q	07524	14000	00000		QUADRANT III
.	C7370	ENT A*W(SINCOS20)*APOS	07525	11630	07575		QUADRANT IV, ARG TO A
.	C7371	CP Q	07526	14000	00000		-FRAC IF ARG NEGATIVE
.	C7372	STR Q*W(SINCOS20)	07527	14030	07575		STORE X EQ + OR - FRAC AT B29

..... SPUPT OUTPUT NO. 210
 SATEL MCQUILKIN*7/1/65

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F	JKB	Y	NOTES
.	C7373	MUL W(SINCOS20)	07530	22030	07575		Y EQ X**2 IN AQ AT B58
.	C7374	RSH AQ*290	07531	03000	00035		Y IN Q AT B29
.	C7375	STR Q*W(SINCOS20+1)	07532	14030	07576		
.	C7376	ENT B7*3	07533	12700	00003		
.	C7377	ENT Q*W(SINCOS11+4)	07534	10030	07574		KSUB9 IN Q AT B32
.	C7400	MUL W(SINCOS20+1)	07535	22030	07576		Y TIMES POLY
.	C7401	ENT Q*A	07536	10070	00000		TO Q
.	C7402	ADD Q*W(SINCOS11+B7)	07537	26037	07570		POLY EQ POLY+KSUBI
.	C7403	BJP B7*-3	07540	72700	07535		
.	C7404	MUL W(SINCOS20)	07541	22030	07575		X*POLY IN AQ AT B57
.	C7405	JP SINCOS6*ANEG	07542	60700	07550		
.	C7406	CL L(SINCOS6+6)	07543	16010	07556		
.	C7407	RPT 32D	07544	70000	00040		
.	C7410	LSH AQ*1*ANEG	07545	07700	00001		
.	C7411	JP SINCOS7	07546	61000	07562		SIN(X) EQ 0
.	C7412	JP \$+5	07547	61000	07554		
.	C7413 SINCCS6	CL CPL(\$+6)	07550	16050	07556		
.	C7414	RPT 32D	07551	70000	00040		
.	C7415	LSH AQ*1*APOS	07552	07600	00001		
.	C7416	JP SINCOS7	07553	61000	07562		SIN(X) EQ 0
.	C7417	ENT Q*37743+B7	07554	10007	37743		
.	C7420	STR Q*W(B6)	07555	14036	00000		
.	C7421	ENT Q*0	07556	10000	00000		PUT PROPER SIGN IN Q
.	C7422	LSH AQ*58D	07557	07000	00072		SIN(X) IN A
.	C7423	STR A*W(1+B6)	07560	15036	00001		
.	C7424	EXIT	07561	61010	07470		
.	C7425 SINCCS7	CL A	07562	11000	00000		SIN(X) EQ 0
.	C7426	CL W(B6)	07563	16036	00000		
.	C7427	CL W(1+B6)	07564	16036	00001		
.	C7430	EXIT	07565	61010	07470		
.	C7431 SINCCS1C	2427630155	07566	24276	30155		2/PI AT B29
.	C7432	1000000000	07567	10000	00000		1.0 AT B27
.	C7433 SINCCS11	3110375522	07570	31103	75522		K1 AT B28
.	C7434	5325041750	07571	53250	41750		K3 AT B29
.	C7435	0506321276	07572	05063	21276		K5 AT B30
.	C7436	7731554634	07573	77315	54634		K7 AT B31
.	C7437	0002366574	07574	00023	66574		K9 AT B32
.	C7440 SINCCS2C	0	07575	00000	00000		X HERE AT B29
.	C7441	0	07576	00000	00000		Y EQ X**2 AT B29
.	C7442 CCS	ENTRY	07577	61000	00000		
.	C7443	ENT Q*L(COS)	07600	10010	07577		
.	C7444	STR Q*L(SIN)	07601	14010	07470		SET EXIT ADDRESS
.	C7445	ENT A*L(B4)	07602	11014	00000		
.	C7446	COM A*37764*YLESS	07603	04600	37764		TEST EXPONENT GTR 2EXP-13
.	C7447	JP SINCOS8	07604	61000	07616		NO, SET COS(X) EQ 1.0
.	C7450	COM A*40034*YMORE	07605	04700	40034		TEST EXPONENT TOO LARGE
.	C7451	JP \$*STOP	07606	61400	07606		YES
.	C7452	ENT A*1	07607	11000	00001		
.	C7453	STR A*L(SINCOS2+1)	07610	15010	07515		
.	C7454	ENT A*W(1+B4)*APOS	07611	11634	00001		
.	C7455	CP A*AZERO	07612	15440	00000		\$ARG\$ IN A
.	C7456	JP SINCOS1*ANOT	07613	60500	07504		

CARDS	L1 ID LABEL	TA STATEMENT	LOC	F JK8 Y	NOTES
.	C7457	ENT Q*A	07614	1007C 00000	
.	C7460	JP SINCOS1	07615	61000 07504	
.	C7461 SINCOS8	ENT A*40001	07616	11000 40001	COS(X) EQ 1.0
.	C7462	STR A*W(B6)	07617	15036 00000	
.	C7463	ENT A*W(SINCOS10+1)	07620	11030 07567	
.	C7464	STR A*W(B6+1)	07621	15036 00001	
.	C7465	EXIT	07622	61010 07577	
			07623	10040 77777	

END OF LISTING

SPURT OUTPUT NO. 211

SATEL		MCQUILKIN*7/1/65			
LABEL	LOC	LABEL	LOC	LABEL	LOC
A\$\$\$\$\$1111	00243	A\$\$\$\$\$1112	01326	A\$\$\$\$\$1113	07623
A\$\$\$\$\$1114	06717	A\$\$\$\$\$1115	06713	A2	03715
AA	03636	ACOS	07264	ACOS1	07303
ACQAZIM	63071	ACQELE V	63075	ACQUI	63427
ACTUALTIME	63142	ADOFI	06753	ADD	06214
ADSCN	63416	AERR	06747	AERR1	06707
AERR2	06727	AESCN	63417	ALNGOFFSET	63517
ALPHB	03677	ALPHSIN	03701	AQR	06337
ARCOFAZIM	63524	ARCOFDEC	63526	ARCOFELEV	63522
ARCOFRA	63530	ASIN	07060	ASIN1	07102
ASIN2	07144	ASIN3	07150	ASIN4	07227
ASIN5	07236	ASINK	07246	ASINP	07255
ASINQ	07261	ASINX	05657	ASINX1	05712
ASINX11	05717	ASINXCON	04030	ASTRODEC	63106
ASTRORA	63105	ATAN	06536	ATAN1	06544
ATAN2	06556	ATAN3	06577	ATAN5	06610
ATANX	05552	AUPEREQUAT	63341	AVAL	03706
AZELOTIME	63532	AZELBX SCAN	63500	AZIM	63053
AZIMOFFSET	63512	AZIMOUT	64000	AZIMOVER	63325
AZIMADD	63442	AZIMIN	75000	AZMTHSCAN	63501
BCDYSIZE	63462	BDAV	01266	BDAV1	01306
BDAVNOW	01267	BEL2PI	06010	BEL2PI1	06012
BLASTOFF	63146	BLASTCONV	05066	BVAL	03707
CCCON	63414	CONVCON	05231	CONVERTIME	63135
CCRCT	63420	COS	07577	COSORIENT	63065
CCSAZEL	63070	COSV1	04633	COSV10	04620
COSV11	04626	COSV1X	04641	COSX	05345
CCUNT	07467	CAZIM	63060	CB1	05004
CB2	05005	CB2X0	04777	CBAGAIN	04667
CBCON	05002	CBFIX	04736	CBFIX1	04741
CBFIX12	04747	CBFIX2	04770	CBFIX3	05006
CBRCOT	04645	CBRESTORE	04731	CBMAL	04761
CBSTART	04700	CBX0	04776	CBX02	05000
CBXT	04772	CRY	04775	CELBODY	63113
CELCPMGM	63424	CELEV	63061	CELTIME	63133
CELTIMEX	03774	CELTIMEXX	06141	CFTABLE	01206
CHCCR	63422	CHPAR	63431	CRANGE	63057
CRSSOFFSET	63516	CVAL	03710	DOPPOUT	66000
DOPPADD	63444	DATODELT	00464	DATODY	00370
DATOE	00350	DATOEQ	00407	DATOI	00336
DATCM	00362	DATOMO	00446	DATOMODE	00477
DATORAM	00324	DATOTBASE	00430	DATOW	00312
DATA02	00043	DATA03	00052	DATA031	00072
DATA032	00075	DATA04	00124	DATA05	00126
DATA051	00143	DATA054	00162	DATA055	00164
DATA061	00207	DATA062	00211	DATA071	00225
DATA072	00227	DATADELT	00472	DATADY	00402
DATAE	00360	DATAEQ	00417	DATAERES	01003
DATAEXB7	00246	DATAEXIT	00235	DATAHAHA	00777
DATAI	00346	DATAIN	00002	DATAIRES	01002
DATALOC	00260	DATAM	00366	DATAMO	00460

SPURT OUTPUT NO. 211

SATEL		MCQUILLIN*7/1/65			
LABEL	LOC	LABEL	LOC	LABEL	LOC
DATAMODE	00507	DATAMESA	00310	DATAMESAA	00302
DATAMESB	00276	DATAMESB8	00267	DATAMRES	01004
DATANALYZE	63425	DATARAM	00334	DATARAMRES	01001
DATAREFD	00300	DATATBASE	00442	DATATYP	00262
DATATYP1	01222	DATAUTAG	00253	DATAW	00322
DATAWRES	01000	DATE	03532	DATECON1	03576
DATECON2	03577	DATECON3	03600	DATIDELT	00470
DATIOY	00374	DATIE	00352	DATIEQ	00413
DATII	00340	DATIM	00364	DATIMO	00452
DATIMODE	00503	DATINA1	00031	DATINA11	00042
DATINU	00076	DATIRAM	00326	DATITBASE	00434
DATIW	00314	DATME	00531	DATMESE	00554
DATMESI	00550	DATMESM	00560	DATMESRAM	00535
CATMESS	00516	DATMESW	00543	DATMI	00527
DATMM	00533	DATMRAM	00523	DATMW	00525
DATRE2	00250	DAY	63150	DAYCON	03754
CAYTEM	05243	DAYX	03752	DEC	63003
DECOFFSET	63515	DECON	04026	DECDOT	63010
DECLINSCAN	63505	DELL	02027	DELR	02342
DELRAM	02476	DELT	03734	DELT12	06143
DELTATEE	63316	DELTB	03676	DELTCOS	03724
DELTI	03642	DELTL	03637	DELTR	03640
DELTRAM	03641	DELTSIN	03700	DELTX	03756
DERCMG	03634	DERCNT	01204	DERRAM	03635
DIV	06275	DMODE	00662	DRADIUS	03423
DRXXX	06104	DRXXX	06103	DSECONDS	63141
DUMSECTTG	63154	DVOFL	06761	DYDMP	63421
DYPRMO	01233	DYPRYR	01247	EONE	00602
E1LAST	03662	E2LAST	03663	ECAL1	04463
ECALC	04410	ECALRTN	04472	ECNT	00775
EDEL	04045	EE	03627	EE2	03623
EET	05256	EFOUR	00610	EFIVE	00612
EFP	06172	EGVAL	03643	EKODE	03723
ELEV	63054	ELEVOFSET	63513	ELEVOUT	65000
ELEVADD	63443	ELEVIN	76000	ELVTNSCAN	63502
EPRESW	03705	EQMODE	00771	EQUATOR	63323
ERR	06744	ERR10	06776	ERR11	06763
ERR12	06764	ERR13	06766	ERR14	06767
ERR15	06771	ERR16	06772	ERR16A	06774
ERR17	06777	ERR2	07030	ERR20	07001
ERR21	07003	ERR22	07005	ERR23	07007
ERR24	07011	ERR25	07013	ERR26	07015
ERR27	07017	ERR3	07031	ERR30	07041
ERR31	07043	ERR32	07045	ERR33	07047
ERR34	07051	ERR35	07053	ERR4	07033
ERR40	07021	ERR5	07034	ERR6	07036
ERR7	07037	ERRINST	05065	ERRPRT	05024
ESTSHIFTED	63143	ETHREE	00606	ETWO	00604
EVAL	03644	EVALCOS	03624	EVALSIN	03625
EXP	06616	EXP1	06626	EXP10	06675
EXP2	06633	EXP3	06636	EXP4	06640

..... SPURT OUTPUT NO. 211

SATEL		MCQUILKIN*7/1/65			
LABEL	LOC	LABEL	LOC	LABEL	LOC
EXP5	06652	EXP6	06661	EXP7	06672
EXPNAME	63350	EZERO	00600	FF	05323
FFX	05336	FIRSTELEV	63104	FIRSTHRU	63153
FIXCNE	03606	FIXONE X	03620	FIX12	03615
FIX13	03575	FIX14	03574	FIX16	03573
FIX3	03610	FIX32	03572	FIX5	03612
FIX52	03616	FIX56	03613	FIX6	03611
FIX712	03614	FIX864	03601	FIXTWO	03607
FIXTWOX	03617	FIXTWOXX	04023	FLATTENING	63337
FLTQFX	06373	FLTQFX1	06405	FLTQFX2	06410
FLTCNE	04016	FLT423	04010	FLT5000	04004
FLT60	04002	FLT864	04006	FLTBDAY	01270
FLTNDAY	01274	FLTPT	06155	FLTTWO	04012
FLTTWOX	04014	FLTTWOXX	04020	FP1	06164
FP4	06165	FP5	06166	FP6	06167
FP7	06170	FPSTOP	06742	FRAMESIZE	63101
FREQUENCY	63317	FXDEGRAD	03602	FXTOFL	06363
GEOCENLAT	63322	GEODETLAT	63321	GM	03714
GMFLT	04033	GMTMODU24	63145	GMTSHIFTED	63144
GTEM	05003	HOLDNOHOLD	63511	HOURLMINUTE	63137
HOURLREG	63151	HEIGHT	63326	HERE	07072
ICNE	00616	ICNT	00774	ID1ORADIO	66777
ID11RADIO	67776	ID12RADIO	67777	ID13RADIO	70775
ID14RADIO	70776	ID15RADIO	71776	ID16RADIO	71777
ID17RADIO	72776	ID18RADIO	72777	ID19RADIO	73776
ID1CELCOR	63000	ID1ENTPNT	63410	ID1RADCOR	63050
ID1RADIO	63440	ID1RECRD	63210	ID1SYSENT	77576
ID1SYSNAM	77676	ID1SYSPAR	63310	ID1TIME	63130
ID2ORADIO	73777	ID21RADIO	74776	ID22RADIO	74777
ID23RADIO	75776	ID24RADIO	75777	ID25RADIO	76775
ID26RADIO	76776	ID2CELCOR	63001	ID2ENTPNT	63411
ID2RADCOR	63051	ID2RADIO	63441	ID2RECRD	63211
ID2SYSENT	77577	ID2SYSNAM	77677	ID2SYSPAR	63311
ID2TIME	63131	ID3RADIO	63776	ID4RADIO	63777
ID5RADIO	64776	ID6RADIO	64777	ID7RADIO	65776
ID8RADIO	65777	ID9RADIO	66776	IFOUR	00624
IFIVE	00626	II	03630	IICOS	03646
IIFCOS	03650	IIFSIN	03647	IISIN	03645
INAZIMADD	63446	INCONV21	05142	INCONVER	05076
INCONVER1	05133	INCONVER2	05136	INCONVER3	05145
INCONVER4	05162	INCONVER5	05167	INCONVER6	05173
INCONVER7	05201	INCONVER8	05213	INCONVERA	05151
INCONVER8	05177	INCONVERX	05222	INCL	05114
INC2	05116	INC3	05125	INELEVADD	63447
INTER	63413	INTERAZIM	72000	INTERCOM	63426
INTERDOPP	74000	INTERELEV	73000	INTERLCKSW	63460
INTERRANGE	76777	ITHREE	00622	ITWO	00620
IZEROX	00614	JMPCALC	06047	JMPDEL	00660
JMPDEL12	03766	JMPK	03776	JMPPT	06146
JMPPTX	06150	JTTESTSW	06050	JULDAY	05245
KCON	03735	KCONX	03760	KMPERNM	63342

SPURT OUTPUT NO. 211

SATEL		MCQUILKIN*7/1/65			
LABEL	LOC	LABEL	LOC	LABEL	LOC
KYBRDLEVEL	63110	LOC	05054	LOGE	07307
LCGE1	07343	LOGE1A	07362	LOGE2	07400
LCGE3	07414	LOGEA	07424	LOGEF	07432
LCGEK	07442	LOGEM	07456	LOGGER	07420
LOGES	07452	LONGITUDE	63320	LERR	07023
LL	03665	LLCOS	03667	LLFCOS	03671
LLFSIN	03670	LLSIN	03666	LSPERAU	63336
MCD1	05755	MOD2	05756	MOD2PI	05722
MCD3	05760	MOD4	05764	MOD5	05735
MCD6	05774	MODB1	05747	MODB4	05750
MCD85	05751	MODB6	05752	MODB7	05753
MODNORM	05745	MODNUM	06006	MONE	00566
MICOS	03660	M1SIN	03657	M3SIN	03661
MAINSWITCH	63334	MASK	05051	MCORRO1	01604
M-CORRECT	01563	MCAL3	01312	MCAL3A	01321
MCAL3AA	01370	MCAL3B	01323	MCAL3B1	01556
MCAL3B2	01557	MCAL3B3	01560	MCAL3B4	01561
MCAL3B5	02666	MCAL3B8	01402	MCAL3DD	01355
MCAL3EX	01340	MCALA	01705	MCALA2	03621
MCALA2P	04044	MCALA2P2	03523	MCALAB4	02667
MCALANS	04042	MCALARGU	03547	MCALB7	02670
MCALC	01310	MCALCON1	03543	MCALCON2	03544
MCALCON3	03545	MCALCON4	03546	MCALCON5	03517
MCALCON6	03520	MCALCON7	03521	MCALCON8	03522
MCALCON9	03526	MCALCA1	02004	MCALCA2	02011
MCALCAL	01343	MCALCAL2B	01523	MCALCALEX	01407
MCALCALN	01413	MCALCALN1	01435	MCALCALN1A	01425
MCALCALN2	01503	MCALCALN2A	01510	MCALCALN2C	01516
MCALCALN2D	01477	MCALCALN2E	01522	MCALCALN3	01457
MCALCALN4	01470	MCALCALN5	01547	MCALCALN87	01554
MCALCDRERR	06145	MCALCDRJ	06034	MCALCNT	03565
MCALDEN	04040	MCALDIFF	03566	MCALDRAM	01542
MCALEXIT	02663	MCALFLT2	01366	MCALFLT3	01452
MCALFLT4	05310	MCALFLT5	05321	MCALGM	03571
MCALGM3	03524	MCALGMN2	04035	MCALMOD	05266
MCALMOD1	05313	MCALMOD2	05271	MCALMOD22	05303
MCALMOD3	05304	MCALMODB7	05311	MCALNB6	01562
MCALNFLT	04031	MCALNSW	01526	MCALNSW1	01536
MCALNUM	04036	MCALP	01625	MCALP2	03525
MCALPINIT	01613	MCALR	02012	MCALSTOR1	03533
MCALSTOR2	03534	MCALSTOR3	03535	MCALSTOR4	03536
MCALSTOR5	03537	MCALSTOR7	03516	MCALSTORA	03540
MCALSTORB	03541	MCALSTORC	03542	MCALSTORN	03570
MCALSUM	03563	MCALTWO	03603	MCALXB6	02665
MCNT	00776	MCPFILLER	71000	MCPGM	63412
MECCN	03712	MESSAGE	05063	MESSAGE1	05057
METCON	03722	METCON2	03750	METCON3	03751
MFOUR	00574	MFLIVE	00576	MILLSTNADD	63451
MINREG	63152	MLOFL	06757	MM	03626
MPL	06263	MQUAD	04027	MRAMCOR	03527
MSFREQ	63332	MTABLEB6	01612	MTABLERAMX	01605

SPURT OUTPUT NO. 211

SATEL		MCQUILKIN#7/1/65			
LABEL	LOC	LABEL	LOC	LABEL	LOC
MTEMP1	03736	MTEMP2	03740	MTEMP3	03742
MTEMP4	03744	MTEMP5	03746	MTEMP6	03764
MTEMP7	03762	MTHREE	00572	MTIME	03530
MTR	06247	MTRI	06250	MTWO	00570
MZERO	00564	NEG	06330	NMPERAU	63340
NN	03633	NSTIME	01272	NTIME1	01300
POLE	63324	POS	06232	POW14	07057
PERIODAZIM	63523	PERIODDEC	63525	PERIODELEV	63521
PERIODRA	63527	PLOTP	63436	PLANP	63434
PP	03702	PRED2	04345	PRED21	04402
PRED222	04365	PREDICTE	04225	PREVIOUSMT	63461
PRLOG	63423	PUNCH	06420	ROTATEAEBX	63507
RCTATERACN	63506	ROTATERDBX	63510	ROUND	04060
RA	63002	RAOFFSET	63514	RADOT	63007
RADARMODE	63312	RADCBXSCAN	63503	RADECOTIME	63531
RADIODEC	63541	RADIOMETER	63102	RADIORA	63540
RADIUS	63006	RADIUSDOT	63011	RAM	03632
RAMCNE	00646	RAMCOS	03654	RAMCNT	00772
RAMFOUR	00654	RAMFCOS	03656	RAMFIVE	00656
RAMFSIN	03655	RAMSIN	03653	RAMTHREE	00652
RAMTWO	00650	RAMZERO	00644	RANGE	63052
RANGEOUT	70777	RANGEADD	63445	RANGEDOT	63062
RANGEX	03664	RASCITYSCAN	63504	RDMT	63430
RDXXX	63433	RECORDSIZE	63112	RECAZIM	67000
RECELEV	70000	RECFILE	63212	RECRD	63415
RECRDSWCH	63155	RELEASESW	63156	RR	03622
RZERO	06441	SOVERFLOW	04046	SADD	04073
SADD1	04101	SADD2	04105	SADXT	04106
SAT2PI	04025	SATA1	03200	SATA2	03216
SATA3	03222	SATALPH1	03256	SATALPH2	03264
SATALPH2X	03275	SATALPHA	03147	SATD2	03125
SATC3	03131	SATDALPH	03367	SATDDELT	03342
SATDELTA	03113	SATDV	03276	SATDVSTOR	03730
SATEL	00000	SATFRAM	06152	SATINIT	06014
SATINITEX	06032	SATWORK	06040	SAVE	07466
SAZIM	63055	SBOFL	06755	SCALC	02672
SCCR1	06077	SCDR2	06111	SCDR3	06121
SCDR4	06126	SCDR5	06135	SCELTIME	63134
SCL	06315	SCL1	06355	SCL2	06356
SCEC	63005	SECONDS	63140	SECCNT	05230
SELEV	63056	SERROR	04053	SET	06361
SFT	06242	SFT1	06243	SIDERTIME	63012
SIN	07470	SINORIENT	63064	SIN52	02777
SINAZEL	63066	SINCOS1	07504	SINCOS10	07566
SINCOS11	07570	SINCOS2	07514	SINCOS20	07575
SINCOS6	07550	SINCOS7	07562	SINCOS8	07616
SINDEN	03703	SINIB6	04222	SINIB7	04223
SINII	04136	SINIT2	04155	SINIT3	04172
SINIT31	04205	SINIT32	04216	SINIT4	02736
SINIT5	02753	SINIT51	02766	SINL	03003
SINTEST	05503	SINTK	03713	SINUM	03704

SPURT OUTPUT NO. 211

SATEL		MCQUILKIN*7/1/65			
LABEL	LOC	LABEL	LOC	LABEL	LOC
SINVO	00000	SINV1	04567	SINV10	04554
SINV11	04562	SINV1X	04575	SINVV	04502
SINX	05357	SINX1	05467	SINX11	05476
SKIP	63331	SLFBGV	03034	SLFCALL	03052
SLFCALLX1	03100	SLFCALLX2	03061	SLFCALLX3	03065
SQR	06444	SQR1	06515	SQR2	06522
SQR3	06526	SQR4	06532	SQRT	05504
SQRT1	06513	SRA	63004	SRADTIME	63136
SSBXT	04127	SSPI	03727	SSPROD	03725
SSSUM	03726	SSUB	04114	SSUB1	04122
SSUB2	04126	STARTR EAD	07055	STEM1	03711
SUB	06253	SUBADD	03020	SUBADDX1	03032
SYNCTIMING	63542	SYSCOMREG1	63452	SYSCOMREG2	63453
SYSCOMREG3	63454	SYSCOMREG4	63455	SYSCOMREG5	63456
SYSCOMREG6	63457	SYSENTRIES	77600	SYSNAMES	77700
SYSTAT1	63313	SYSTAT2	63314	SYSTATD	63315
TCON	03675	TCONVERT	05233	TCNT	01205
TCNTA	04000	TCNTFLT	01202	TMODE	00765
TEONE	00705	TEFOUR	00713	TEFIVE	00715
TEMP	04133	TETHREE	00711	TETWO	00707
TEZERO	00703	THING	05052	TIONE	00721
TIFOUR	00727	TIFIVE	00731	TIME	03773
TIME1	03770	TIMECORR	63107	TIMED	03772
TIMEF	03771	TIMEMODE	63103	TIMEP	63435
TIMEHOLD	63520	TIMETEMP	01276	TINIT	03732
TITHREE	00725	TITWO	00723	TIZEROX	00717
TJMPDEL T	00763	TLAST	00663	TMONE	00671
TMFCUR	00677	TMFIVE	00701	TMTHREE	00675
TMTWO	00673	TMZERO	00667	TRAMONE	00751
TRAMFOUR	00757	TRAMFIVE	00761	TRAMTHREE	00755
TRAMTWO	00753	TRAMZERO	00747	TRUERANGE	63063
TRUETIME	63132	TTEST	06140	TTYSTATUS	63111
TWO26	03721	TWONE	00735	TWOPI25	04022
TWOSECDOP	63017	TWFOUR	00743	TWFIVE	00745
TWPI25	04024	TWPI26	04025	TWTHREE	00741
TWTWO	00737	TWZERO	00733	TYPE	06416
TZERO	00665	UDOT	04001	UPADD	01231
UPCCO1	01025	UPCALC	01005	UPDATO1	01060
UPDATO2	01071	UPDATO3	01073	UPDATO4	01075
UPDATO5	01106	UPDATO6	01110	UPDATO7	01121
UPDAT10	01123	UPDAT11	01147	UPDAT21	01164
UPDAT22	01172	UPDATB2	01157	UPDATB3	01160
UPDATB5	01161	UPDATB6	01162	UPDIFF	01227
UPSUM	01200	VDOT	03731	VDAY	00767
VELOFLIGHT	63335	VIZDEC1	63014	VIZDEC2	63016
VIZRA1	63013	VIZRA2	63015	VMONTH	01304
VV	03672	VVCOS	03674	VVSIN	03673
VYEAR	01302	WONE	00632	WONE28	03717
WCNE29	03720	WONEP26	03716	WONETH	05001
WCNT	00773	WFORD	63432	WFOUR	00640
WFADD	63450	WFFREQ	63333	WFIVE	00642

..... SPURT OUTPUT NO. 211

SATEL		MCQUILKIN*7/1/65			
LABEL	LOC	LABEL	LOC	LABEL	LOC
WS	06422	WS1	06423	WS10	06432
WS11	06433	WS12	06434	WS13	06435
WS14	06436	WS15	06437	WS16	06440
WS2	06424	WS3	06425	WS4	06426
WS5	06427	WS6	06430	WS7	06431
WTHREE	00636	WTWO	00634	WZERO	00630
YEARMONTH	63147	YRTRAN	63327	ZOCOS	03652
ZOMEGA	03631	ZOSIN	03651	ZERO	06352
ZRTRAN	63330				

END OF LISTING

SATEL		MCQUILKIN#7/1/65			
LABEL	LOC	LABEL	LOC	LABEL	LOC
SINVO	00000	SATEL	00000	DATAIN	00002
DATINA1	00031	DATINA 11	00042	DATA02	00043
CATA03	00052	DATA03 1	00072	DATA032	00075
DATINU	00076	DATA04	00124	DATA05	00126
DATA051	00143	DATA05 4	00162	DATA055	00164
DATA061	00207	DATA06 2	00211	DATA071	00225
DATA072	00227	DATAEX IT	00235	AS\$\$1111	00243
DATAEX87	00246	DATRE2	00250	DATAUTAG	00253
DATALOC	00260	DATATYP	00262	DATAMES88	00267
DATAMES8	00276	DATAREFD	00300	DATAMESAA	00302
DATAMESA	00310	DATOW	00312	DATIW	00314
DATAW	00322	DATORAM	00324	DATIRAM	00326
DATARAM	00334	DATOI	00336	DATII	00340
DATAI	00346	DATOE	00350	DATIE	00352
CATAE	00360	DATOM	00362	DATIM	00364
DATAM	00366	DATODY	00370	DATIDY	00374
DATADY	00402	DATOEQ	00407	DATIEQ	00413
DATAEQ	00417	DATOTBASE	00430	DATITBASE	00434
DATATBASE	00442	DATOMJ	00446	DATIMO	00452
DATAMO	00460	DATODELT	00464	DATIDELT	00470
CATADELT	00472	DATOMODE	00477	DATIMODE	00503
DATAMODE	00507	DATMES S	00516	DATMRAM	00523
CATMW	00525	DATMI	00527	DATME	00531
DATMM	00533	DATMESRAM	00535	DATMESW	00543
CATMESI	00550	DATMSE	00554	DATMESM	00560
MZERO	00564	MONE	00566	MTWO	00570
MTHREE	00572	MFOUR	00574	MFIVE	00576
EZERO	00600	EONE	00602	ETWO	00604
ETHREE	00606	EFOUR	00610	EFIVE	00612
IZEROX	00614	IONE	00616	ITWO	00620
ITHREE	00622	IFOUR	00624	IFIVE	00626
WZERO	00630	WONE	00632	WTWO	00634
WTHREE	00636	WFOUR	00640	WFIVE	00642
RAMZERO	00644	RAMONE	00646	RAMTWO	00650
RAMTHREE	00652	RAMFOUR	00654	RAMFIVE	00656
JMPDELT	00660	DMODE	00662	TLAST	00663
TZERO	00665	TMZERO	00667	TMONE	00671
TMTWO	00673	TMTHREE	00675	TMFOUR	00677
TMFIVE	00701	TEZERO	00703	TEONE	00705
TETWO	00707	TETHREE	00711	TEFOUR	00713
TEFIVE	00715	TIZEROX	00717	TIONE	00721
TITWO	00723	TITHREE	00725	TIFOUR	00727
TIFIVE	00731	TWZERO	00733	TWONE	00735
TWTWO	00737	TWTHREE	00741	TWFOUR	00743
TWFIVE	00745	TRAMZERO	00747	TRAMONE	00751
TRAMTWO	00753	TRAMTHREE	00755	TRAMFOUR	00757
TRAMFIVE	00761	TJMPDELT	00763	TDMODE	00765
VDAY	00767	EQMODE	00771	RAMCNT	00772
WCNT	00773	ICNT	00774	ECNT	00775
MCNT	00776	DATAHAHA	00777	DATAWRES	01000
CATARAMRES	01001	DATAIRES	01002	DATAERES	01003

..... SPURT OUTPUT NO. 212

SATEL		MCQUILKIN*7/1/65			
LABEL	LOC	LABEL	LOC	LABEL	LOC
DATAMRES	01004	UPCALC	01005	UPC001	01025
UPDAT01	01060	UPDAT02	01071	UPDAT03	01073
UPDAT04	01075	UPDAT05	01106	UPDAT06	01110
UPDAT07	01121	UPDAT10	01123	UPDAT11	01147
UPDATB2	01157	UPDATB3	01160	UPDATB5	01161
UPDATB6	01162	UPDAT21	01164	UPDAT22	01172
UPSUM	01200	TCNTFLT	01202	DERCNT	01204
TCNT	01205	CFTABLE	01206	DATATYP1	01222
UPDIFF	01227	UPADD	01231	DYPRMO	01233
DYPRYR	01247	BDAI	01266	BDAYNOW	01267
FLTBDAY	01270	NSTIME	01272	FLTNDAY	01274
TIMETEMP	01276	NTIME1	01300	VYEAR	01302
VMONTH	01304	BDAI1	01306	MCALC	01310
MCAL3	01312	MCAL3A	01321	MCAL3B	01323
ASSSSS1112	01326	MCAL3EX	01340	MCALCAL	01343
MCAL3DD	01355	MCALFLT2	01366	MCAL3AA	01370
MCAL3BB	01402	MCALCALEX	01407	MCALCALN	01413
MCALCALN1A	01425	MCALCALN1	01435	MCALFLT3	01452
MCALCALN3	01457	MCALCALN4	01470	MCALCALN2D	01477
MCALCALN2	01503	MCALCALN2A	01510	MCALCALN2C	01516
MCALCALN2E	01522	MCALCAL2B	01523	MCALNSW	01526
MCALNSW1	01536	MCALDRAM	01542	MCALCALN5	01547
MCALCALNB7	01554	MCAL3B1	01556	MCAL3B2	01557
MCAL3B3	01560	MCAL3B4	01561	MCALNB6	01562
MCORRECT	01563	MCORRO1	01604	MTABLERAMX	01605
MTABLEB6	01612	MCALPINIT	01613	MCALP	01625
MCALA	01705	MCALCA1	02004	MCALCA2	02011
MCALR	02012	DELL	02027	DELR	02342
DELRA	02476	MCALLEXIT	02663	MCALXB6	02665
MCAL3B5	02666	MCALAB4	02667	MCALB7	02670
SCALC	02672	SINIT4	02736	SINIT5	02753
SINIT51	02766	SIN52	02777	SINL	03003
SUBADD	03020	SUBADDX1	03032	SLFBGN	03034
SLFCALL	03052	SLFCALLX2	03061	SLFCALLX3	03065
SLFCALLX1	03100	SATDELTA	03113	SATD2	03125
SATD3	03131	SATALPHA	03147	SATA1	03200
SATA2	03216	SATA3	03222	SATALPH1	03256
SATALPH2	03264	SATALPH2X	03275	SATDV	03276
SATDELTA	03342	SATDALPH	03367	DRADIUS	03423
MCALSTOR7	03516	MCALCON5	03517	MCALCON6	03520
MCALCON7	03521	MCALCON8	03522	MCALA2P2	03523
MCALGM3	03524	MCALP2	03525	MCALCON9	03526
MRAMCOR	03527	MTIME	03530	DATE	03532
MCALSTOR1	03533	MCALSTOR2	03534	MCALSTOR3	03535
MCALSTOR4	03536	MCALSTOR5	03537	MCALSTORA	03540
MCALSTORB	03541	MCALSTORC	03542	MCALCON1	03543
MCALCON2	03544	MCALCON3	03545	MCALCON4	03546
MCALARGU	03547	MCALSUM	03563	MCALCNT	03565
MCALOIFF	03566	MCALSTORN	03570	MCALGM	03571
FIX32	03572	FIX16	03573	FIX14	03574
FIX13	03575	DATECON1	03576	DATECON2	03577

SATEL

MCQUILKIN=7/1/65

LABEL	LOC	LABEL	LOC	LABEL	LOC
DATECON3	03600	FIX864	03601	FXDEGRAD	03602
MCALTWO	03603	FIXONE	03606	FIXTWO	03607
FIX3	03610	FIX6	03611	FIX5	03612
FIX56	03613	FIX712	03614	FIX12	03615
FIX52	03616	FIXTWOX	03617	FIXONEX	03620
MCALA2	03621	RR	03622	EE2	03623
EVALCOS	03624	EVALSIN	03625	MM	03626
EE	03627	II	03630	ZOMEGA	03631
RAM	03632	NN	03633	DEROMEG	03634
DERRAM	03635	AA	03636	DETL	03637
DELTR	03640	DELTRAM	03641	DELT	03642
EGVAL	03643	EVAL	03644	IISIN	03645
IICOS	03646	IIFSIN	03647	IIFCOS	03650
ZCSIN	03651	ZOCOS	03652	RAMSIN	03653
RAMCOS	03654	RAMFSIN	03655	RAMFCOS	03656
MISIN	03657	MICOS	03660	M3SIN	03661
EILAST	03662	EZLAST	03663	RANGEX	03664
LL	03665	LLSIN	03666	LLCOS	03667
LLFSIN	03670	LLFCOS	03671	VV	03672
VVSIN	03673	VVCOS	03674	TCON	03675
DELTB	03676	ALPHB	03677	DELTSIN	03700
ALPHSIN	03701	PP	03702	SINDEN	03703
SINUM	03704	EPRESW	03705	AVAL	03706
BVAL	03707	CVAL	03710	STEM1	03711
MECCN	03712	SINTK	03713	GM	03714
A2	03715	WONEP26	03716	WONE28	03717
WONE29	03720	TWO26	03721	METCON	03722
EKODE	03723	DELTCOS	03724	SSPROD	03725
SSSUM	03726	SSPI	03727	SATDVSTOR	03730
VDOT	03731	TINIT	03732	DELT	03734
KCON	03735	MTEMP1	03736	MTEMP2	03740
MTEMP3	03742	MTEMP4	03744	MTEMP5	03746
METCON2	03750	METCON3	03751	DAYX	03752
DAYCON	03754	DELTX	03756	KCONX	03760
MTEMP7	03762	MTEMP6	03764	JMPDELT12	03766
TIME1	03770	TIMEF	03771	TIMED	03772
TIME	03773	CELTIMEX	03774	JMPK	03776
TCNTA	04000	UDOT	04001	FLT60	04002
FLT5000	04004	FLT864	04006	FLT423	04010
FLTTWO	04012	FLTTWOX	04014	FLTONE	04016
FLTTWOXX	04020	TWOPI25	04022	FIXTWOXX	04023
TWPI25	04024	TWPI26	04025	SAT2PI	04025
DECCN	04026	MQUAD	04027	ASINXCON	04030
MCALNFLT	04031	GMFLT	04033	MCALGMN2	04035
MCALNUM	04036	MCALDEN	04040	MCALANS	04042
MCALA2P	04044	EDELT	04045	SOVERFLOW	04046
SERROR	04053	ROUND	04060	SADD	04073
SADD1	04101	SADD2	04105	SADXT	04106
SSUB	04114	SSUB1	04122	SSUB2	04126
SSBXT	04127	TEMP	04133	SINII	04136
SINIT2	04155	SINIT3	04172	SINIT31	04205

SPURT OUTPUT NO. 212

SATEL		MCQUILKIN*7/1/65			
LABEL	LOC	LABEL	LOC	LABEL	LOC
SINIT32	04216	SINIB6	04222	SINIB7	04223
PREDICTE	04225	PRED2	04345	PRED222	04365
PRED21	04402	ECALC	04410	ECAL1	04463
ECALRTN	04472	SINVV	04502	SINV10	04554
SINV11	04562	SINV1	04567	SINV1X	04575
CCSV10	04620	COSV11	04626	COSV1	04633
COSV1X	04641	CBROOT	04645	CBAGAIN	04667
CBSTART	04700	CBRESTORE	04731	CBFIX	04736
CBFIX1	04741	CBFIX12	04747	CBSMAL	04761
CBFIX2	04770	CBXT	04772	CBY	04775
CBX0	04776	CB2X0	04777	CBX02	05000
WCNETH	05001	CBCON	05002	GTEM	05003
CB1	05004	CB2	05005	CBFIX3	05006
ERRPRT	05024	MASK	05051	THING	05052
LOC	05054	MESSAGE1	05057	MESSAGE	05063
ERRINST	05065	BLASTCONV	05066	INCONVER	05076
INC1	05114	INC2	05116	INC3	05125
INCONVER1	05133	INCONVER2	05136	INCONV21	05142
INCONVER3	05145	INCONVERA	05151	INCONVER4	05162
INCONVER5	05167	INCONVER6	05173	INCONVER8	05177
INCONVER7	05201	INCONVER8	05213	INCONVERX	05222
SECCNT	05230	CONVCN	05231	TCONVERT	05233
DAYTEM	05243	JULDAY	05245	EET	05256
MCALMOD	05266	MCALMOD2	05271	MCALMOD22	05303
MCALMOD3	05304	MCALFL T4	05310	MCALMOD87	05311
MCALMOD1	05313	MCALFL T5	05321	FF	05323
FFX	05336	COSX	05345	SINX	05357
SINX1	05467	SINX11	05476	SINTEST	05503
SQRT	05504	ATANX	05552	ASINX	05657
ASINX1	05712	ASINX11	05717	MOD2PI	05722
MOD5	05735	MODNORM	05745	MODB1	05747
MODB4	05750	MODB5	05751	MODB6	05752
MODB7	05753	MOD1	05755	MOD2	05756
MCD3	05760	MOD4	05764	MOD6	05774
MODNUM	06006	BEL2PI	06010	BEL2PI1	06012
SATINIT	06014	SATINI TEX	06032	MCALCDRJ	06034
SATWORK	06040	JMPCALC	06047	JTTESTSW	06050
SCDR1	06077	DRXXXX	06103	DRXXX	06104
SCDR2	06111	SCDR3	06121	SCDR4	06126
SCDR5	06135	TTEST	06140	CELTIMEXX	06141
DELT12	06143	MCALCDRERR	06145	JMPPT	06146
JMPPTX	06150	SATFRAM	06152	FLTPT	06155
FP1	06164	FP4	06165	FP5	06166
FP6	06167	FP7	06170	EFPP	06172
ADD	06214	POS	06232	SFT	06242
SFT1	06243	MTR	06247	MTR1	06250
SUB	06253	MPL	06263	DIV	06275
SCL	06315	NEG	06330	AQR	06337
ZERO	06352	SCL1	06355	SCL2	06356
SET	06361	FXTOFL	06363	FLTOFX	06373
FLTOFX1	06405	FLTOFX2	06410	TYPE	06416

SPURT OUTPUT NO. 212

SATEL		MCQUITI KIN=7/1/65			
LABEL	LOC	LABEL	LOC	LABEL	LOC
PUNCH	06420	WS	06422	WS1	06423
WS2	06424	WS3	06425	WS4	06426
WS5	06427	WS6	06430	WS7	06431
WS10	06432	WS11	06433	WS12	06434
WS13	06435	WS14	06436	WS15	06437
WS16	06440	RZERO	06441	SQR	06444
SQRT1	06513	SQR1	06515	SQR2	06522
SQR3	06526	SQR4	06532	ATAN	06536
ATAN1	06544	ATAN2	06556	ATAN3	06577
ATAN5	06610	EXP	06616	EXP1	06626
EXP2	06633	EXP3	06636	EXP4	06640
EXP5	06652	EXP6	06661	EXP7	06672
EXP10	06675	AERR1	06707	A\$\$\$\$\$1115	06713
A\$\$\$\$\$1114	06717	AERR2	06727	FPSTOP	06742
ERR	06744	AERR	06747	ADOFL	06753
SBOFL	06755	MLOFL	06757	DVOFL	06761
ERR11	06763	ERR12	06764	ERR13	06766
ERR14	06767	ERR15	06771	ERR16	06772
ERR16A	06774	ERR10	06776	ERR17	06777
ERR20	07001	ERR21	07003	ERR22	07005
ERR23	07007	ERR24	07011	ERR25	07013
ERR26	07015	ERR27	07017	ERR40	07021
LERR	07023	ERR2	07030	ERR3	07031
ERR4	07033	ERR5	07034	ERR6	07036
ERR7	07037	ERR30	07041	ERR31	07043
ERR32	07045	ERR33	07047	ERR34	07051
ERR35	07053	START READ	07055	POW14	07057
ASIN	07060	HERE	07072	ASIN1	07102
ASIN2	07144	ASIN3	07150	ASIN4	07227
ASIN5	07236	ASINK	07246	ASINP	07255
ASINQ	07261	ACOS	07264	ACOS1	07303
LCGE	07307	LOGE1	07343	LOGE1A	07362
LCGE2	07400	LOGE3	07414	LOGGER	07420
LCGEA	07424	LOGEF	07432	LOGEK	07442
LCGES	07452	LOGEM	07456	SAVE	07466
COUNT	07467	SIN	07470	SINCOS1	07504
SINCOS2	07514	SINCOS6	07550	SINCOS7	07562
SINCOS10	07566	SINCOS11	07570	SINCOS20	07575
COS	07577	SINCOS8	07616	A\$\$\$\$\$1113	07623
ID1CELCCR	63000	ID2CEL COR	63001	RA	63002
DEC	63003	SRA	63004	SDEC	63005
RADIUS	63006	RADOT	63007	DECDOT	63010
RADIUSDOT	63011	SIDERTIME	63012	VIZRA1	63013
VIZDEC1	63014	VIZRA2	63015	VIZDEC2	63016
TWOSECDOP	63017	ID1RADCOR	63050	ID2RADCOR	63051
RANGE	63052	AZIM	63053	ELEV	63054
SAZIM	63055	SELEV	63056	CRANGE	63057
CAZIM	63060	CELEV	63061	RANGEDOT	63062
TRUERANGE	63063	SINORIENT	63064	COSORIENT	63065
SINAZEL	63066	COSAZEL	63070	ACQAZIM	63071
ACQELEV	63075	FRAMESIZE	63101	RADIOMETER	63102

SPURT OUTPUT NO. 212

SATEL		MCQUILKIN*7/1/65			
LABEL	LOC	LABEL	LOC	LABEL	LOC
TIMEMODE	63103	FIRSTELEV	63104	ASTRORA	63105
ASTRODEC	63106	TIMECORR	63107	KYBRDLEVEL	63110
TTSTATUS	63111	RECORD SIZE	63112	CELBODY	63113
ID1TIME	63130	ID2TIME	63131	TRUETIME	63132
CELTIME	63133	SCELTIME	63134	CONVERTIME	63135
SRADTIME	63136	HOURLMINUTE	63137	SECONDS	63140
DSECONDS	63141	ACTUAL TIME	63142	ESTSHIFTED	63143
GMTSHIFTED	63144	GMTMODU24	63145	BLASTOFF	63146
YEARMONTH	63147	DAY	63150	HOUREG	63151
MINREG	63152	FIRSTTHRU	63153	DUMSECTTG	63154
RECROSWTCH	63155	RELEASESW	63156	ID1RECRD	63210
ID2RECRD	63211	RECFILE	63212	ID1SYSPAR	63310
ID2SYSPAR	63311	RADARMODE	63312	SYSTAT1	63313
SYSTAT2	63314	SYSTATD	63315	DELTATEE	63316
FREQUENCY	63317	LONGITUDE	63320	GEODETLAT	63321
GECCENLAT	63322	EQUATOR	63323	POLE	63324
AZIMOVER	63325	HEIGHT	63326	YRTRAN	63327
ZRTRAN	63330	SKIP	63331	MSFREQ	63332
WFFREQ	63333	MAINSWITCH	63334	VELOFLIGHT	63335
LSPERAU	63336	FLATTENING	63337	NMPERAU	63340
AUPEREQUAT	63341	KMPERVM	63342	EXPNAME	63350
ID1ENTPNT	63410	ID2ENTPNT	63411	MCPGM	63412
INTER	63413	COCON	63414	RECRD	63415
ADSCN	63416	AESCN	63417	CORCT	63420
DYDMP	63421	CHCOR	63422	PRLOG	63423
CELCOMPGM	63424	DATANALYZE	63425	INTERCOM	63426
ACQUI	63427	RDMPTR	63430	CHPAR	63431
WFORD	63432	RDXXX	63433	PLANP	63434
TIMEP	63435	PLOTP	63436	ID1RADIO	63440
ID2RADIO	63441	AZIMADD	63442	ELEVADD	63443
DOPPAD	63444	RANGEADD	63445	INAZIMADD	63446
INELEVADD	63447	WFAADD	63450	MILLSTNADD	63451
SYSOMREG1	63452	SYSOMREG2	63453	SYSOMREG3	63454
SYSOMREG4	63455	SYSOMREG5	63456	SYSOMREG6	63457
INTERLCKSW	63460	PREVIOUSTM	63461	BODYSIZE	63462
AZELBXSCAN	63500	AZMTHSCAN	63501	ELVTNSCAN	63502
RADCBXSCAN	63503	RASCAN	63504	DECLINSCAN	63505
ROTATERACN	63506	ROTATEAEBX	63507	ROTATERCBX	63510
HOLDNOHOLD	63511	AZIMOFFSET	63512	ELEVOFFSET	63513
RAOFFSET	63514	DECOFFSET	63515	CRSSOFFSET	63516
ALNGOFFSET	63517	TIMETCHOLD	63520	PERIODELEV	63521
ARCCFELEV	63522	PERIODAZIM	63523	ARCOFAZIM	63524
PERIODDEC	63525	ARCOFDEC	63526	PERIODRA	63527
ARCOFRA	63530	RADECO TIME	63531	AZELOTIME	63532
RADIORA	63540	RADIODEC	63541	SYNCTIMING	63542
ID3RADIO	63776	ID4RADIO	63777	AZIMOUT	64000
ID5RADIO	64776	ID6RADIO	64777	ELEVOUT	65000
ID7RADIO	65776	ID8RADIO	65777	DOPPOUT	66000
ID9RADIO	66776	ID10RADIO	66777	RECAZIM	67000
ID11RADIO	67776	ID12RADIO	67777	RECELEV	70000
ID13RADIO	70775	ID14RADIO	70776	RANGEOUT	70777

..... SPURT OUTPUT NO. 212

SATEL		MCQUILKIN*7/1/65			
LABEL	LOC	LABEL	LOC	LABEL	LOC
MCPFILLER	71000	ID15RADIO	71776	ID16RADIO	71777
INTERAZIM	72000	ID17RADIO	72776	ID18RADIO	72777
INTERELEV	73000	ID19RADIO	73776	ID20RADIO	73777
INTERDOPP	74000	ID21RADIO	74776	ID22RADIO	74777
AZIMIN	75000	ID23RADIO	75776	ID24RADIO	75777
ELEVIN	76000	ID25RADIO	76775	ID26RADIO	76776
INTERRANGE	76777	ID1SYSENT	77576	ID2SYSENT	77577
SYSENTRIES	77600	ID1SYSNAM	77676	ID2SYSNAM	77677
SYSNAMES	77700				

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13. ABSTRACT As one of its options, the Haystack pointing system can track satellites. Given mean orbital parameters of the type used by the Smithsonian Astrophysical Observatory, the Satellite program obtains osculating elements where the perturbations are caused by the ellipsoidal shape of the earth. From these elements, the program computes celestial coordinates and their rates of change which are used by other programs in the pointing system to provide antenna pointing angles, range, and doppler.			
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DEPARTMENT OF THE AIR FORCE
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Pointing System: BELT

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22 November 1965

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