

N71-21463

INSTRUCTION MANUAL AND FINAL REPORT:  
EXPANSION OF INPUT CAPABILITY FOR ELECTRONIC  
SCENE GENERATOR

General Electric  
Syracuse, New York

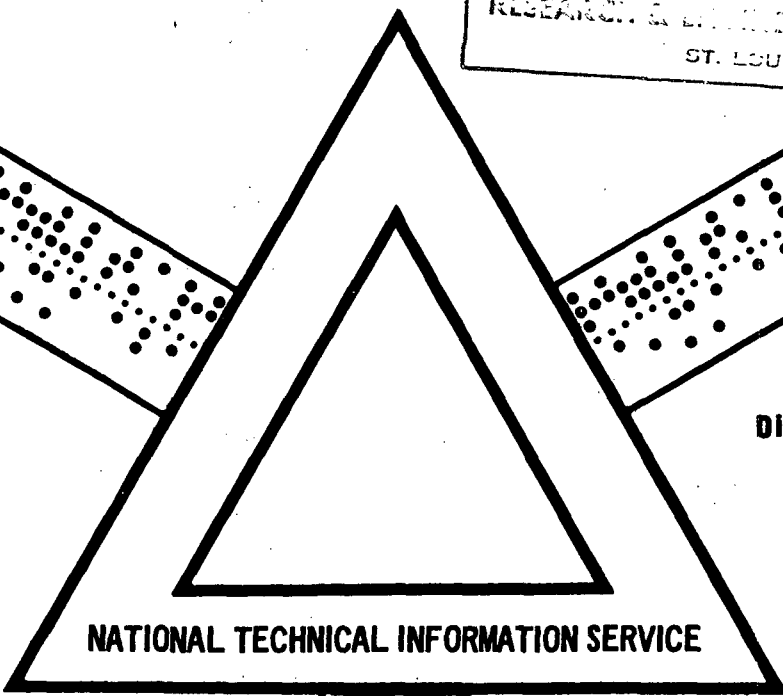
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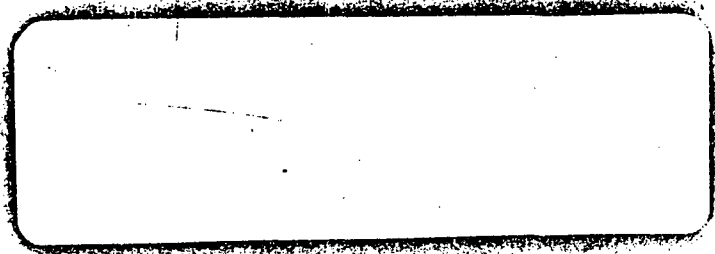


Instruction Manual and Final Report:

**EXPANSION OF INPUT CAPABILITY FOR  
ELECTRONIC SCENE GENERATOR**

January 1971

Contract No. NAS 9-11065



Prepared for

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
MANNED SPACECRAFT CENTER  
HOUSTON, TEXAS

**GENERAL ELECTRIC**

**! N71 - 21463**

(ACCESSION NUMBER)

157

(PAGES)

CR-114993

(NASA CR OR TMX OR AD NUMBER)

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## 1. INTRODUCTION

The Input Expansion Unit is a self-powered, multi-channel digital data buffer designed to expand input capability through the Input Interface Unit (IIU) of the Electronic Scene Generator (ESG), an array of visual simulation hardware delivered under Contracts NAS 9-1375 and NAS 9-3916. This report describes the Input Expansion Unit (IEU) and modifications made to the operating software of the ESG R520 computer in order to adapt the ESG for use with the IEU. Also described herein are certain other modifications made to the operating software at the time of IEU installation.

## 2. INPUT EXPANSION UNIT

### 2.1 GENERAL

When the IEU is connected into the ESG, the IEU accepts blocks of data from four digital source computers and outputs all the collected data to the IIU through the IIU input port previously assigned to the DDP-24 computer. This change is pictured in Figure 2-1. The IEU serves to allow each of the four source computers to input blocks of data under its own control, and asynchronously with respect to the other source computers and the ESG frame rate. At the interface to the IIU, the IEU simulates the DDP-24 previously connected to the IIU. The IEU is designed to be completely compatible with IIU and source computer interface electronics, and the IEU may be removed from the ESG, by interchanging appropriate cable connections, whenever it is desirable to return to the old configuration.

Each source computer provides 16 24-bit words in a block transfer. The format of the block is given in Table 2-1. Each source computer is guaranteed immediate response by the IEU to a service request if the block transfer rate does not exceed 500 Hz. It should be noted that an interrupt is not used here in any of the source computer interfaces.

Each source computer can provide either of two kinds of positional data, incremental (single-word) or absolute (double-word). The IEU provides the capability to accumulate incremental data from any source computer, under control of a bit in the digital control word shown in Figure 2-2, in the event that the block transfer rate of a given source computer is higher than the ESG frame rate.

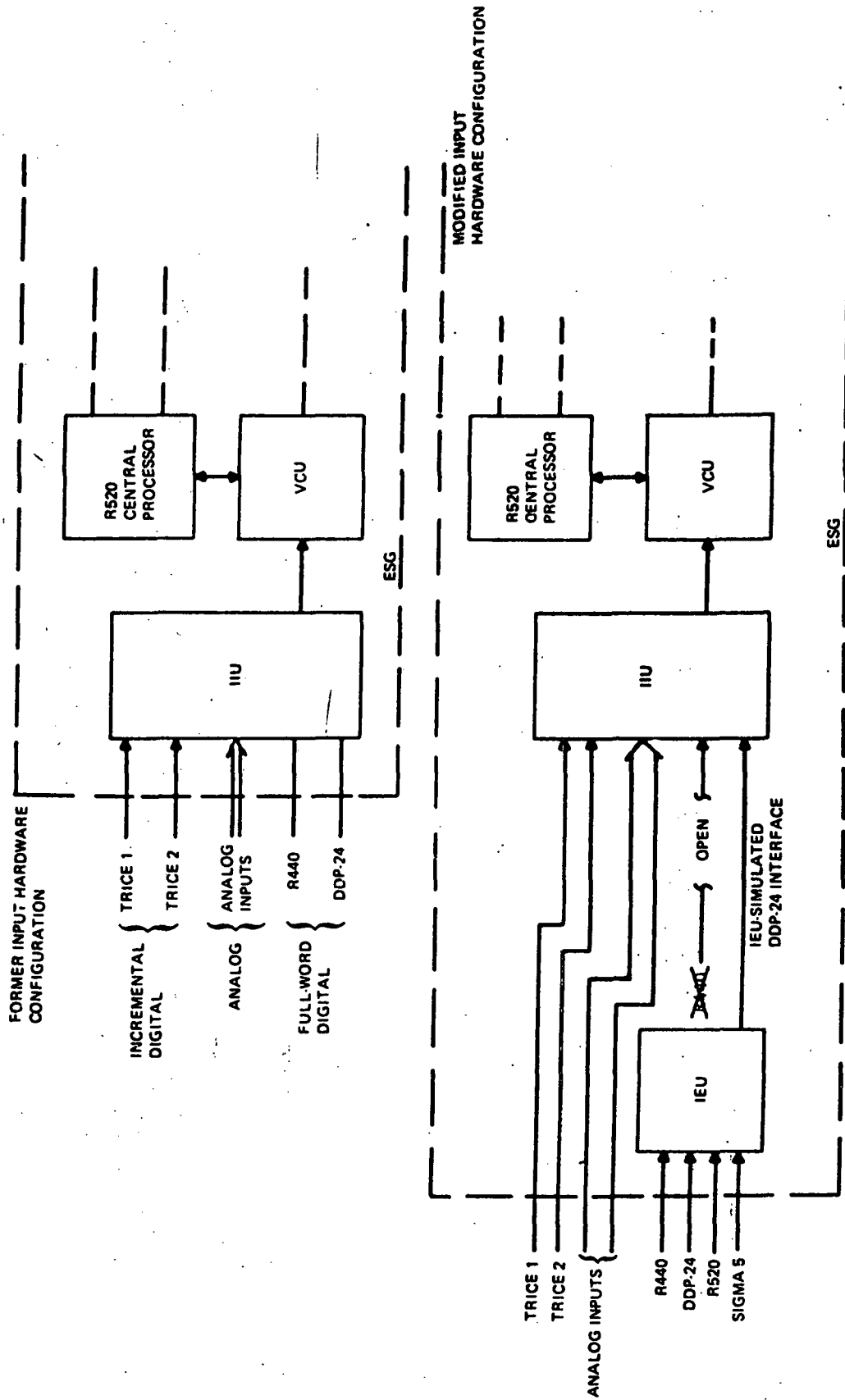
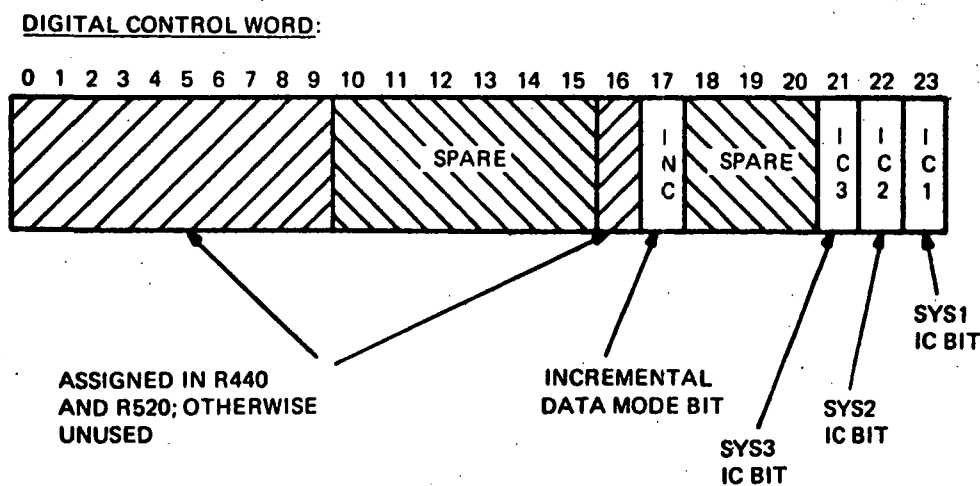


Figure 2-1. Modification to ESG Input Hardware

TABLE 2-1

DIGITAL DATA LOCATION ASSIGNMENT IN IIU

DATA	IIU OCTAL LOCATIONS			
	R440	DDP-24	R520	SIGMA 5
CONTROL WORD	400	420	440	460
XU	401	421	441	461
XL, Δ X	402	422	442	462
YU	403	423	443	463
YL, Δ Y	404	424	444	464
ZU	405	425	445	465
ZL, Δ Z	406	426	446	466
SIN ψ	407	427	447	467
COS ψ	410	430	450	470
SIN θ	411	431	451	471
COS θ	412	432	452	472
SIN φ	413	433	453	473
COS φ	414	434	454	474
SPARE	415	435	455	475
SPARE	416	436	456	476
C.W./SPARE	417	437	457	477



ALL DIGITAL SOURCE COMPUTERS:

- WORD 1, BIT 17 - "1" = INCREMENTAL DATA MODE
- BIT 23 - "1" = SYS1 INITIALIZE
- BIT 22 - "1" = SYS2 INITIALIZE
- BIT 21 - "1" = SYS3 INITIALIZE

Figure 2-2. Digital Control Word

The IEU is interruptable by the IIU, in the same sense that the DDP-24 is in the old configuration. Once interrupted, the IEU will provide to the IIU, on completion of the current IEU internal operation, a 64-word data block (see Table 2-1) consisting of the most recently received and processed data from each of the source computers. Whenever incremental positional data is sent to the IIU, the corresponding locations of the IEU output buffer memory are cleared so that the IIU will not continue to receive non-zero increments on successive transfers and also in order that later accumulation of incremental data in the IEU will begin with zero in the output buffer, where accumulation is performed.

## 2.2 ORGANIZATION

The IEU is organized into two sections corresponding physically to the two circuit boards on which all digital hardware is mounted (see Figure 2-3).

The first section consists of four input channels associated with the four digital source computers. Each input channel contains an interface controller, designed to operate specifically with the source computer assigned to the channel, and an input buffer memory, which stores incoming data temporarily.

The second section consists of an output buffer memory and two interactive controllers, one for transferring data from any input buffer to the corresponding section of the output buffer and the other for interfacing with the IIU. Also included in this section is the logic necessary for performing accumulation of incremental data and the clearing of corresponding locations of the output buffer when incremental data is shipped to the IIU.

## 2.3 OPERATION

(Refer to Figures 2-3, 2-4, and 2-5 and to G. E. Drawings SK56157-E125-9 and SK56157-E125-10.)

### 2.3.1 General Operation

Each of the four digital source computer interface controllers operates independently of the others, inputting a data block each time the source computer requires service. The data is collected temporarily in the Input Buffer Memory. When a particular block transfer is complete an indicator known as the Data Ready Flag is set to alert the Internal Transfer Controller that the corresponding input buffer contains new data requiring processing.

Within two milliseconds, the Internal Transfer Controller will recognize a Data Ready Flag set by any input interface controller and transfer the input buffer data into a section of the output buffer, performing the accumulation of any incremental positional data in the process. The Data Ready Flags are inspected by a commutator mechanism which circulates continuously except when the IIU interface is active or when an internal transfer is progressing.

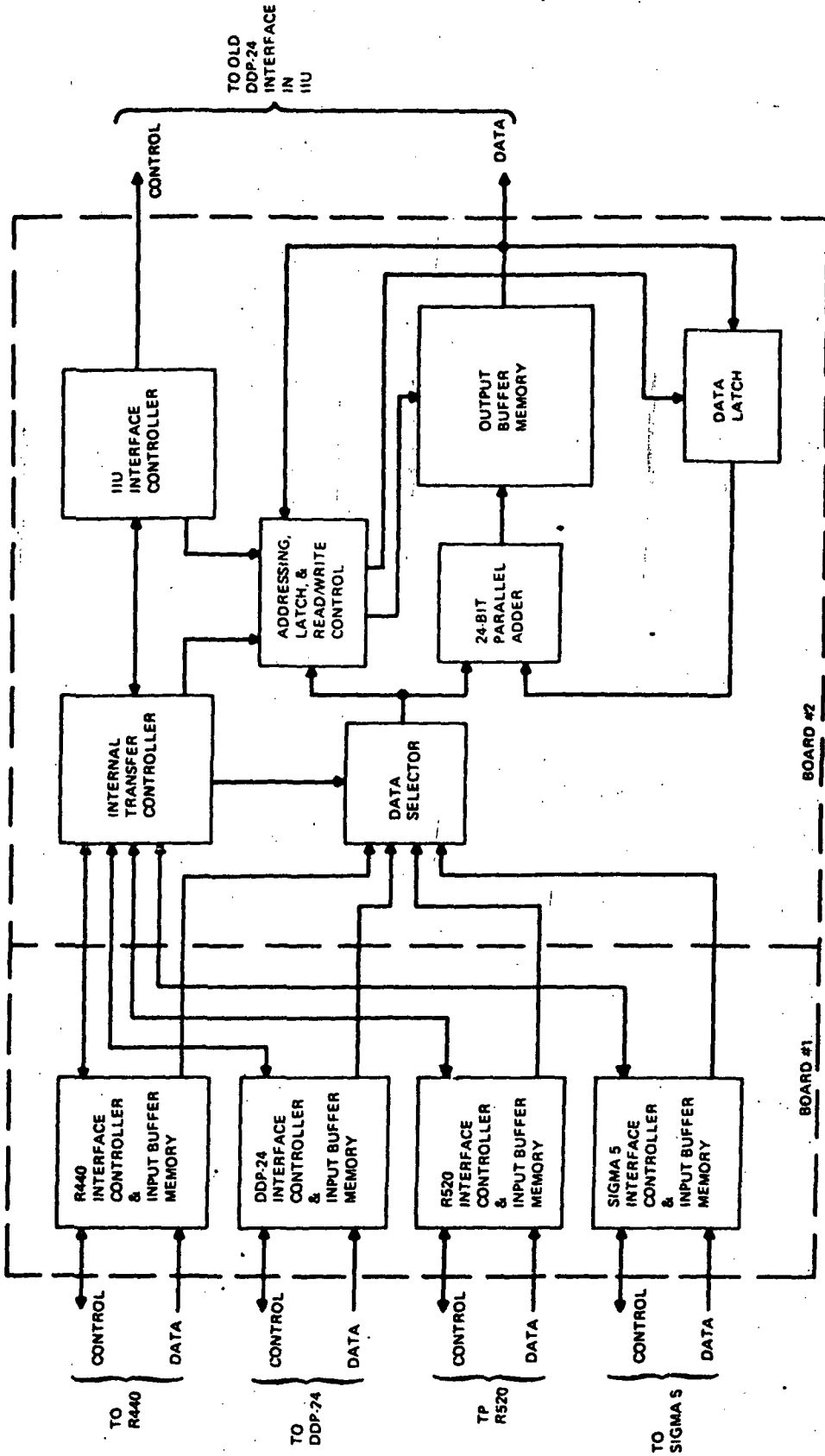


Figure 2-3. IEU Functional Organization

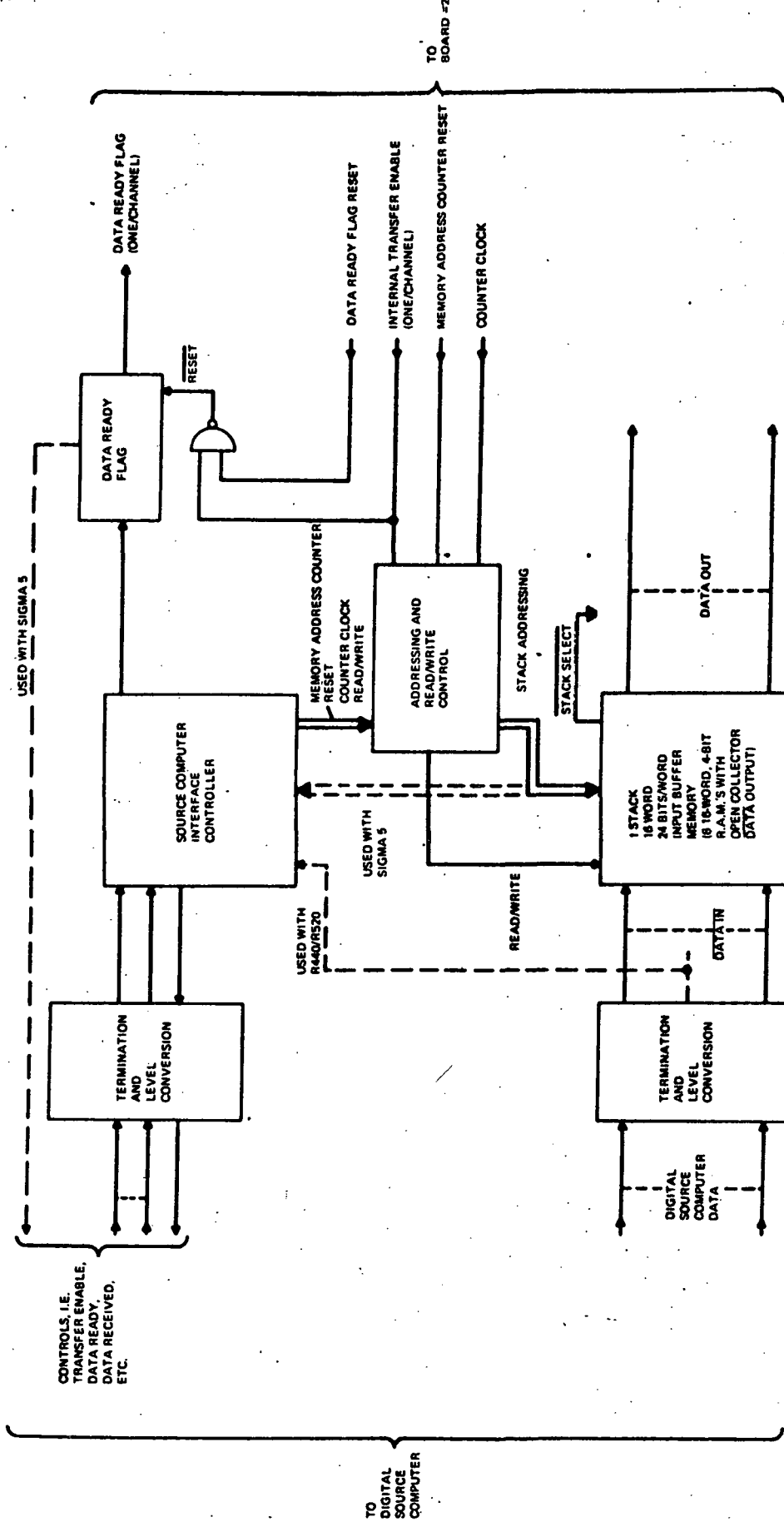
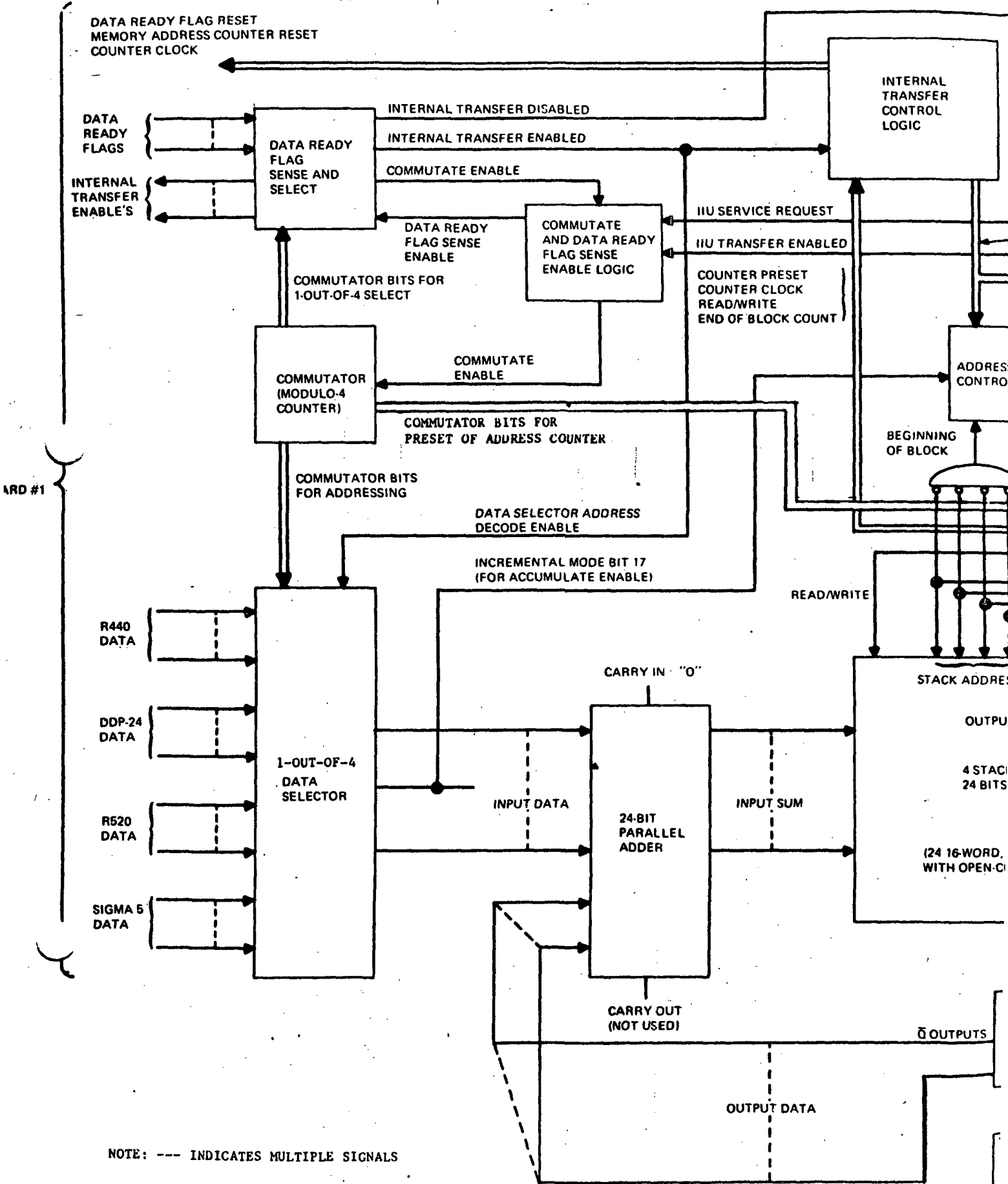


Figure 2-4. Board #1 (Single Channel, Typical) Functional Description



NOTE: --- INDICATES MULTIPLE SIGNALS

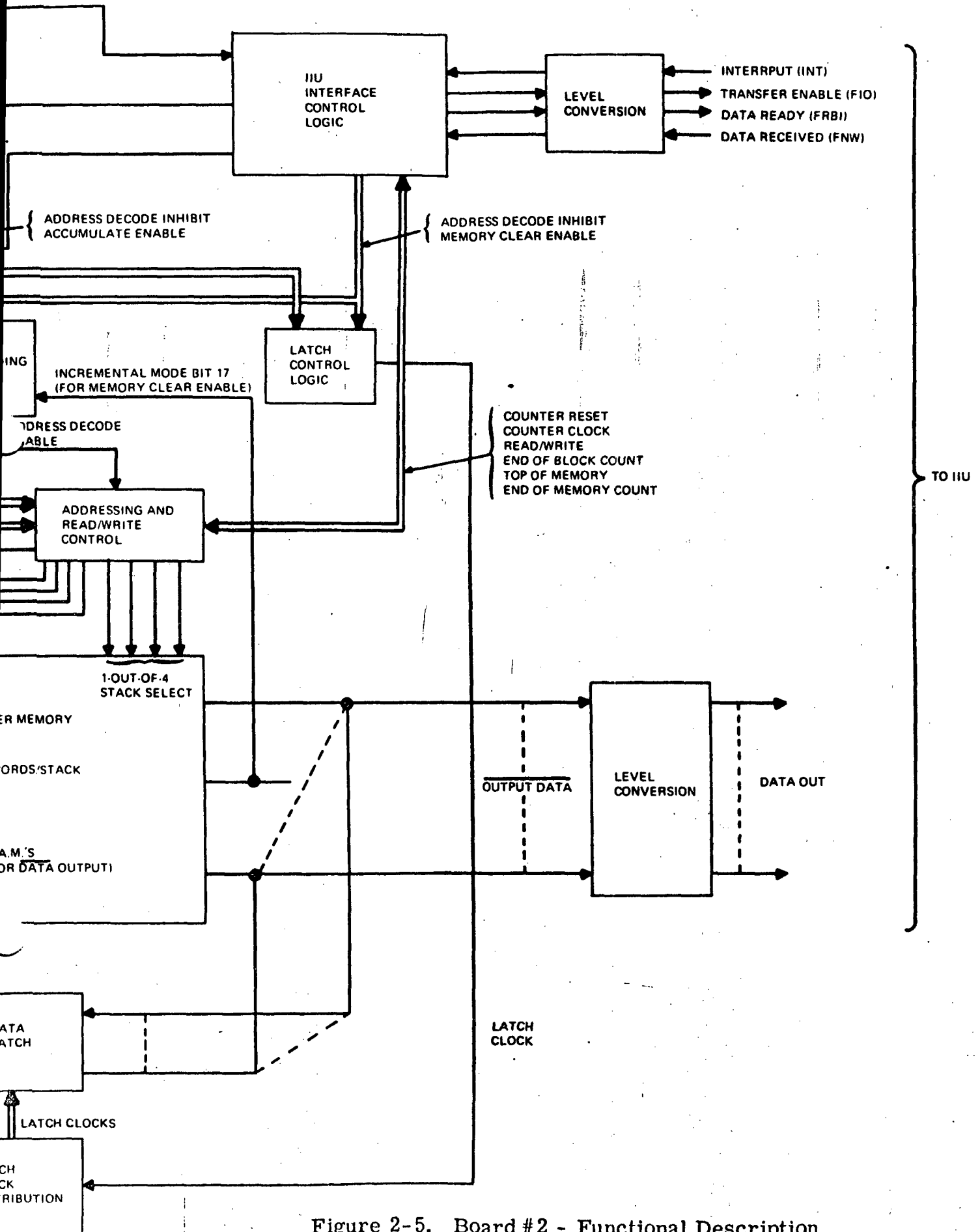


Figure 2-5. Board #2 - Functional Description

The Internal Transfer Controller continues to process Data Ready Flags until an interrupt is received from the IIU. Upon receipt of the interrupt, a current internal transfer will continue to completion but then no new internal transfers will be allowed to begin. As soon as the current internal transfer, if any, is complete, the IIU interrupt is accepted and interface with IIU begun. Sixty-four 24-bit words are transferred to the IIU, one source computer block at a time. As each digital control word is output to the IIU, the incremental mode bit is checked. If the positional data of the given block is incremental, then later, as the positional data is sent to the IIU, the corresponding Output Buffer Memory locations are cleared. Upon completion of the IIU interface, commutator scanning resumes.

It should be noted that data accumulation and memory clearing in the output buffer, as well as all other memory input, are performed by placing old data or all zeros in the Data Latch and controlling the output of the Data Selector (see Figure 2-3) just before the memory is written into. A summary of the inputs to the adder for the various control conditions is given in Table 2-2. It should also be noted that zeros are effectively loaded into the latch by disabling address decoding which drives the memory address lines, thus forcing a constant (all 1's) onto the memory output lines (the latch is also used to invert the 1's-complement of the data which appears on the memory output lines - see Figure 2-5).

**TABLE 2-2**

**ADDER INPUTS FOR DATA TRANSFERS TO/FROM OUTPUT BUFFER MEMORY**

Operating Condition	Data Selector Output	Latch Output
Input, absolute data	Contents of selected input buffer memory location	All zeros
Input, incremental data	Contents of selected input buffer memory location	Old contents of output buffer memory location
Output, absolute data	All zeros	Old contents of output buffer memory location
Output, incremental data	All zeros	All zeros

## 2.3.2 Detailed Operation

### 2.3.2.1 Board #1 Logic

(Refer to Figure 2-4.)

Each of the input channels to the IIU operates in essentially the same manner with respect to source computer interfacing and identically with respect to internal transfers. For purposes of discussion, the input channels can be treated by describing essential features common to all of them, and then pointing out specific differences when necessary. The details of source computer interface requirements may be found in Sec. 2.4, and in Sec. 3.1.4 of Instruction Manual for Modifications to Interim Visual Spaceflight Simulator, Vol. I. (Note that the interrupt signals (GINT, INT) are not used with the IEU.)

Three of the four source computer interfaces (R440, DDP-24, and R520) are self-defining in the sense that beginning- and end-of-transfer indications are provided in some form in each of the interfaces. These indications may be used to generate a reset pulse to the address counter associated with the Input Buffer Memory at the beginning of a block transfer, to insure that the first word sent by the source computer is stored in the first location of memory, and so on. These signals may also be used to set the Data Ready Flag at the end of a block transfer. The Sigma 5, however, provides only one signal, in the form of a series of data ready pulses, and must be handled somewhat differently.

Each Interface Controller contains an External Transfer Enabled flip-flop and a shift register for generating timing signals. When the first data ready pulse is received from a source computer, a memory address counter reset pulse is generated and then the External Transfer Enabled flip-flop is set. At the same time a reclocked version of the data ready pulse starts down the shift register, generating a write pulse to the memory and then a count pulse to the address counter. Some time later, a data received pulse is issued back to the source computer (for R440, DDP-24, and R520 interfaces). As soon as each source computer loads its output register with the next data word, another data ready pulse is issued to the IEU, and the process continues.

The three source computers with self-defining interfaces each provide an end-of-transfer indication on the transmission of the last word. As soon as the last address counter count pulse is generated, the External Transfer Enabled flip-flop is reset and the Data Ready Flag set. It should be noted that all of the interface controllers are designed such that, if any of the source computers attempts to transmit another block of data before the Data Ready Flag is recognized by the internal transfer controller and old data transferred from the input to output buffer, the source computer will be forced to wait. Hence, if the 500 Hz block rate is exceeded, the source computer may have to wait occasionally, but the interface will remain operative.

Since the Sigma 5 provides no end-of-transfer indication, a count-of-15 from the memory address counter is used to indicate end-of-transfer. Hence the Sigma 5 must always send sixteen data words per block for proper IEU operation (the first three source computers may actually send less than sixteen words, if desired). The count-of-15 is used to reset the External Transfer Enabled flip-flop and to set the Data Ready Flag.

The Sigma 5 Interface Controller also contains a delayed pulse generator, which is enabled when the External Transfer Enabled flip-flop is set. The pulse generator issues a reset pulse to the External Transfer Enabled flip-flop, if the flip-flop remains set for more than about two milliseconds. This feature provides start-up initialization and serves as a watchdog timer to insure that the memory address counter receives a reset pulse properly at the beginning of each block transfer.

### 2.3.2.2 Board #2 Logic

(Refer to Figure 2-5.)

The Commutator and Data Ready Flag Sense and Select logic together scan the Data Ready Flags in the order suggested by the physical arrangement of the input channels on Board #1, i. e. R440, DDP-24, R520, Sigma 5. This scanning continues as long as no internal or IIU transfer is begun. When a set Data Ready Flag is encountered, the Commutator is locked and the Internal Transfer Enabled flip-flop associated with the Data Ready Flag is set. The output of this flip-flop is sent back to Board #1 to gate internal transfer control signals into the memory addressing logic of the corresponding input buffer and to lock the memory in the read mode. At this time a general Internal Transfer Enabled signal (ITE) is also generated. ITE is used to start an internal transfer, to lock out an eminent IIU service request until the internal transfer is complete, and to enable data selector output, which exhibits the output of the input buffer memory selected by the commutator code.

An internal transfer begins with a reset pulse to the Input Buffer Memory address counter selected by recognition of the set Data Ready Flag. A preset pulse is also sent to the Output Buffer Memory address counter, which resets to "0" in the lower four bits and sets to the commutator code in the upper two bits, thus beginning at the location the first word in the data block associated with the Input Buffer Memory selected for internal transfer. At the same time these reset and preset pulses are issued, the digital control word of the data block to be transferred appears at the output of the Data Selector. Bit 17, the incremental mode bit, is used to set a flip-flop which remembers the type of data to be encountered when the positional data is being transferred from input to output buffer. At this time also, the Data Latch is effectively loaded with zeros, so that the digital control word will be copied at the adder output and passed on to the input of the Output Buffer Memory.

The write cycle associated with each internal transfer is characterized by four separate operations: (1) the setup of the correct inputs to the parallel adder, as given in Table 2-2, (2) the settling of data at the input to the Output Buffer Memory, (3) the writing of settled data into the memory, and (4) the incrementing of Input and Output Buffer Memory address counters. The timing pulses for carrying out this set of operations repeatedly are obtained by decoding and reclocking the states of a modulo-4 counter whose operation is enabled by the ITE signal. During phase (1), the Data Latch must be loaded with old Output Buffer Memory data or zeros depending on whether data input to the memory is incremental or non-incremental. As mentioned before, the data presented to the latch is controlled by enabling or disabling address decoding logic which drives the memory.

The first write cycle begins with the issue of the reset and preset pulses mentioned above. Fifteen full write cycles are carried out. During transfer of words 2-7, single-word data accumulation is performed, depending on the setting of the accumulate enable flip-flop, which remembers positional data type. On the sixteenth write cycle, an end-of-block indication (all 1's in the four low order bits of the Output Buffer Memory address counter) is logically ANDed with the sixteenth write pulse to provide a signal (EOCAW) for ending the internal transfer. During EOCAW, the originally recognized Data Ready Flag is reset. On the trailing edge of EOCAW the commutator is incremented and the Internal Transfer Enabled flip-flop, associated with the previously recognized Data Ready Flag, is reset. The resetting of this flip-flop disables the general Internal Transfer Enabled signal and again permits recognition of an IIU interrupt by the Commutate and Data Ready Flag Sense Enable logic.

A sample timing diagram for several internal transfers is given in Figure 2-6.

Interface with the IIU begins as soon as an interrupt is received and ITE goes false. Note that ITE false disables Data Selector output. When the interrupt is accepted, the IIU (interface) Enabled flip-flop (IIUE) is set. This action generates an initial reset pulse to the Output Buffer Memory address counter, loads the Data Latch with the first block digital control word, and sets the memory clear enable flip-flop if the incremental mode bit in the control word is set. Then the data ready pulse to the IIU (FRBI-IIU) is generated, and the transfer enabled signal (FIO-IIU) goes true.

Sometime later the IIU answers with a data received pulse (FNW-IIU). At this time the contents of the latch are written into the Output Buffer Memory location currently addressed. Then the memory address counter is incremented and the latch loaded with new data, zero if the data is incremental and old data if the data is non-incremental as dictated by the setting of the memory clear enable flip-flop and by which word within a sixteen word block is being processed. The IIU is sent another data ready pulse and the process continues.

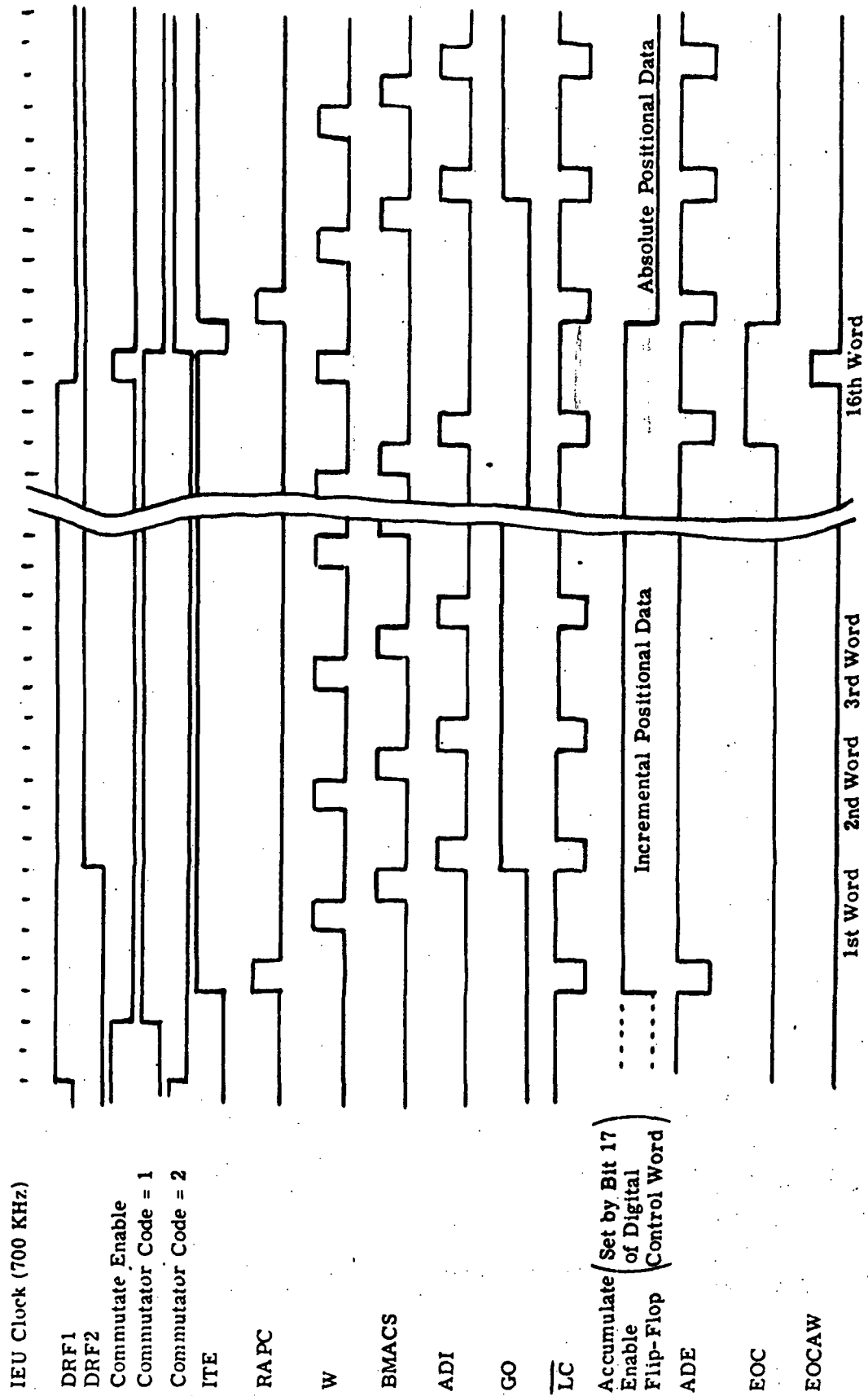


Figure 2-6. Sample Timing Diagram of Internal Data Transfers

Note that, as each digital control word (word 1, 17, 33, or 49) is encountered, the memory clear enable flip-flop must be set again to properly reflect the setting of the incremental mode bit associated with each 16-word block.

The transfer enabled signal (FIO-IIU) terminates with the last data ready pulse to the IIU. The IIUE flip-flop is reset on the last write pulse to the Output Buffer Memory, thus ending interface with the IIU and freeing up the Commutator to resume scanning, if a Data Ready Flag matching the halted Commutator code was not set during the IIU interface operation.

A sample timing diagram for IIU data transfer is given in Figure 2-7.

It should be noted that the mechanism for deciding whether the Internal Transfer or IIU Interface Controller shall be allowed to operate and to use the Output Buffer Memory is embodied in the Commutator and Data Ready Flag Sense Enable logic. The following logical equations for the crucial control signals:

$$\text{Commutate Enable} = \frac{\overline{\text{ITE}} \cdot (\text{INT} + \text{IIUE}) + \overline{\text{CO}} \cdot \overline{\text{C1}} \cdot \text{DRF1} + \overline{\text{CO}} \cdot \overline{\text{C1}} \cdot \text{DRF2} + \overline{\text{CO}} \cdot \overline{\text{C1}} \cdot \text{DRF3} + \overline{\text{CO}} \cdot \overline{\text{C1}} \cdot \text{DRF4}}{\overline{\text{CO}} \cdot \overline{\text{C1}} \cdot \text{DRF3} + \overline{\text{CO}} \cdot \overline{\text{C1}} \cdot \text{DRF4}}$$

$$\text{DRF Sense Enable} = \text{ITE} + \overline{\text{INT}} \cdot \overline{\text{IIUE}}$$

insure that (1) the commutator is always advanced at least one count after any internal transfer, (2) priority is given to servicing the IIU, but only after the completion of an internal transfer progressing at the time the IIU interrupts, and (3) the setting of a Data Ready Flag, which matches the locked Commutator code, during IIU interfacing never interferes with completion of the IIU interface operation.

The longest delay a given Data Ready Flag can experience in being processed is the length of time required to perform four internal transfers and one IIU interface operation. The IEU internal clock rate is selected to limit this delay to just under two milliseconds. Each source computer is thus guaranteed of finding its associated Interface Controller and Input Buffer Memory free for input operations on successive block transfers, if the block transfer rate is maintained at 500 Hz or less.

## 2.4 ADDITIONAL INTERFACES

Requirements for signals in the R440, DDP-24, and R520 computer interfaces may be found in Sec. 3.1.4 of Instruction Manual for Modifications to Interim Visual Spaceflight Simulator, Vol. I. The interrupt signals (GINT, INT) occurring in those specifications should be disregarded. The interface for the R520 is identical to that for the R440.

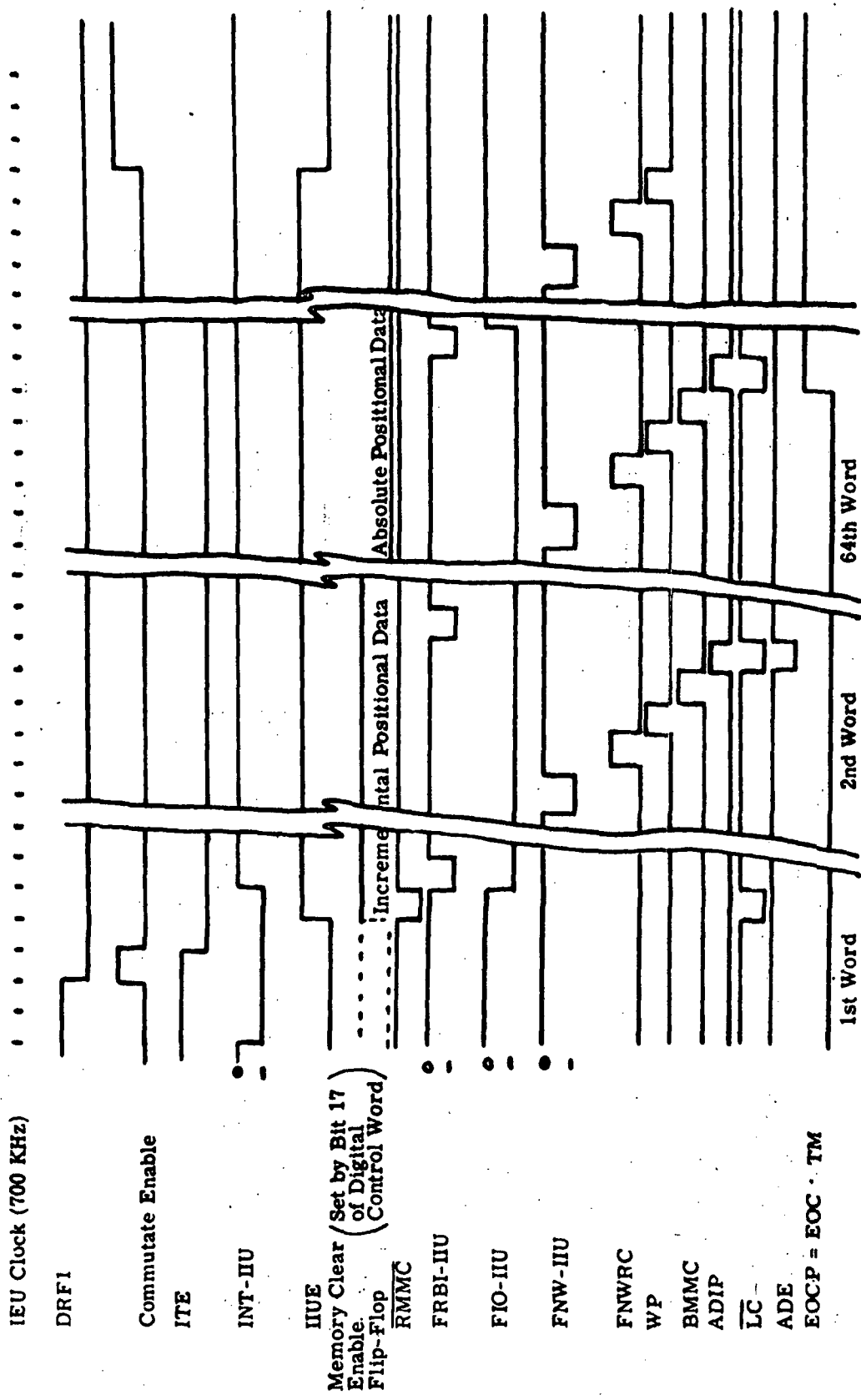


Figure 2-7. Sample Timing Diagram of IIU Data Transfer

## 2.4.1 Sigma 5 Interface

### 2.4.1.1 Operation (see Figure 2-8).

The IEU/Sigma 5 interface is a parallel asynchronous interface capable of transferring sixteen 24-bit words at a maximum rate of about 120 KHz. The Sigma 5 can output data whenever the Ready Input (RI) is true. On the first word, the Sigma 5 updates the contents of the output register in the System Interface Unit (SIU) with a WD instruction. The Data Update Strobe (DUS) goes true at the same time the output register data is changing and remains true until outputs are stabilized. After two microseconds DUS goes false. The IEU must then store the output data within 7.1 microseconds. The Sigma 5 then executes another WD instruction and the cycle continues until sixteen words have been transferred.

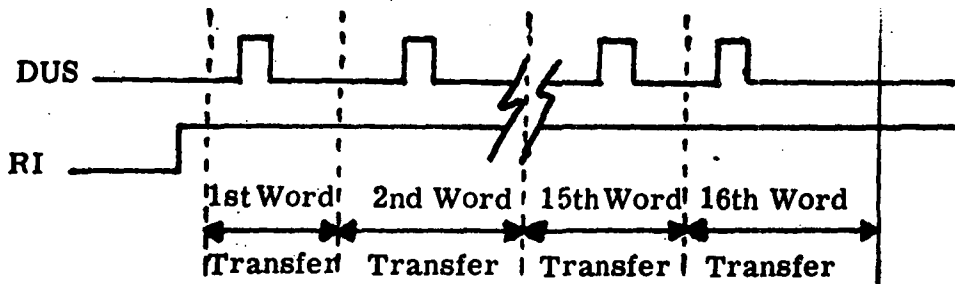


Figure 2-8. IEU/Sigma 5 Interface Timing

### 2.4.1.2 Interface Signals and Connector Information

#### Outputs from Sigma 5

**DUS:** A two-microsecond pulse indicating that data is available on the output lines.

**DB-00-DB-23:** The 24 data bits from the Sigma 5 SIU.

DB-00 = MSB

DB-23 = LSB

#### Inputs to Sigma 5

**RI:** Level indicating the IEU is ready to accept data.

**Connector Type:** One ZT15 Cable Plug Module with pin assignment per wiring pattern "A", Table 2-7, XDS Technical Manual - XDS 98 02 65E.

### 2.4.1.3 Logic Levels and Drive Requirements

"1" = 6.5 ( $\pm 3$ )V

"0" = 0.5 ( $\pm 0.5$ )V

Drivers can sink 20 ma at logic "0"; provide +8V through 300 ohm resistor for logic "1" into RG174U cable terminated in 100 ohms.

## 2.5 MECHANICAL INFORMATION

### 2.5.1 Cabinet Size and Estimated Weight

	<u>Length</u>	<u>Depth</u>	<u>Height</u>	<u>Estimated Weight (lb.)</u>
IEU	23.09	24.00	31.31 (+2.0 to floor)	180

### 2.5.2 Cabinet Configuration

The IEU cabinet is an Electronic Enclosures, Inc. portable cabinet, EES-1-26-1/4 - 24, with steel Unistrut frame. The cabinet has face-mounted doors on front and back and a 3-1/2-inch blower grille on the lower front. The cabinet is rigged with 19-inch standard rack adaptor angles, on which all internal electrical hardware is mounted. A 150-CFM McLean centrifugal blower, with 3-1/2-inch panel height, is mounted in the bottom front of the cabinet, and the connector panel for system cabling is mounted in the lower rear of the cabinet. Augat, Inc., integrated circuit packaging panels and power breakers are mounted in the middle of the cabinet. Lambda power supplies and Filtron line filters are mounted in a Lambda rack adaptor with metered panels at the top of the cabinet. Cabinet views are shown in Figure 2-9.

Cabinet power distribution and connector panel are accessible from the back. Digital integrated circuits, power supply metering, and A.C. and D.C. power breakers are accessible from the front.

Convenience outlets are located on the lower cabinet faces, front and back. Total outlet loading should not exceed 15 amps.

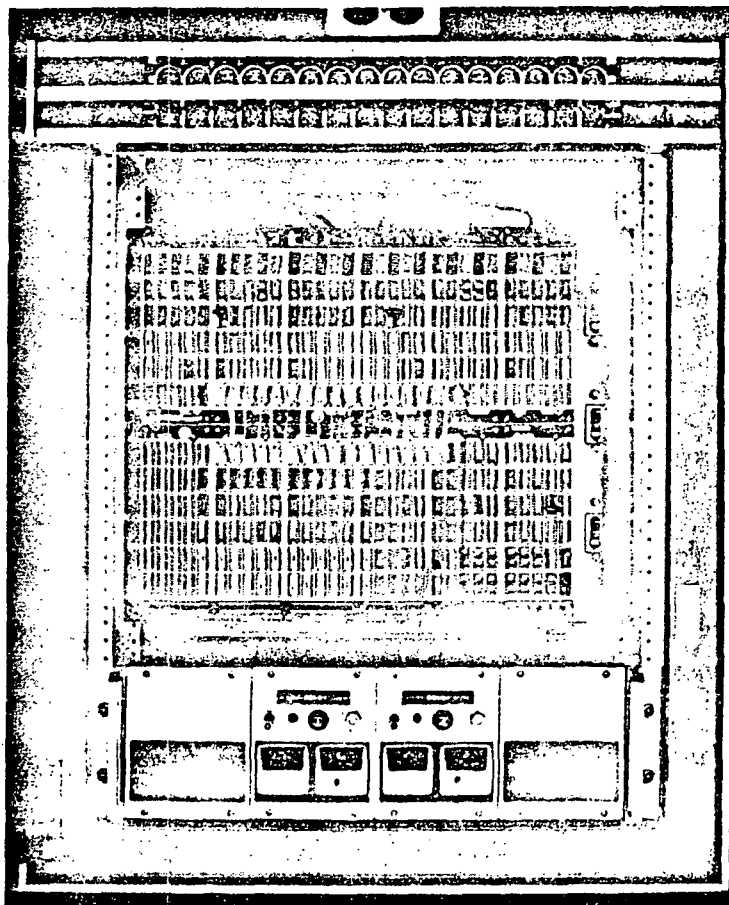
### 2.5.3 Unit Maintenance

The filter element for the blower is of a permanent washable type. Clean filter monthly. If the filter appears dirty prior to normal maintenance, it should be washed then.

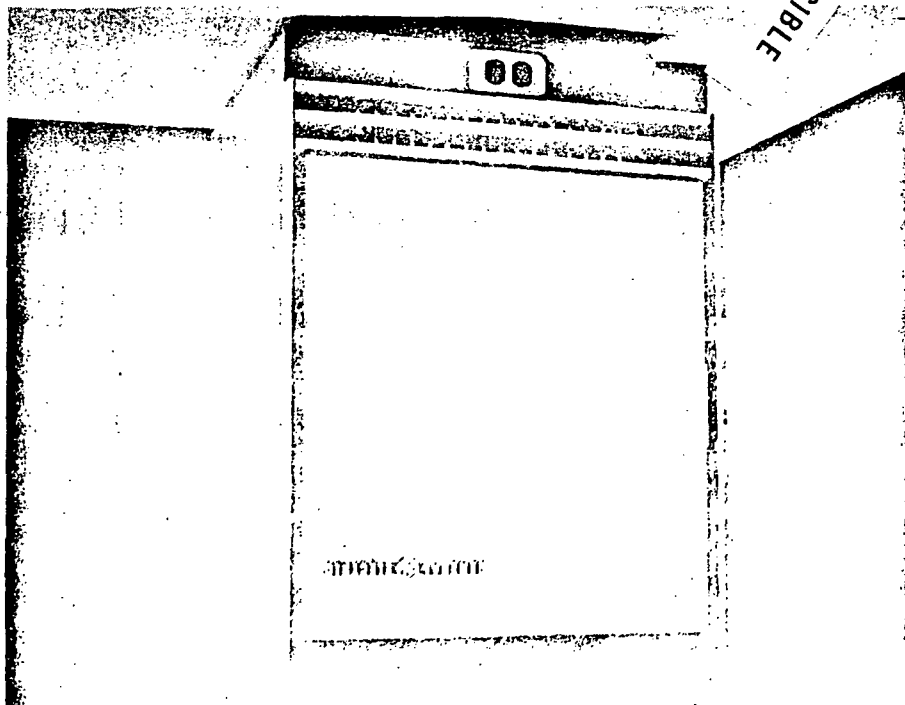
(Photo #'s 120370-45 & 120370-45A F6)

Figure 2-9. IEU Cabinet Views (Continued Next Page)

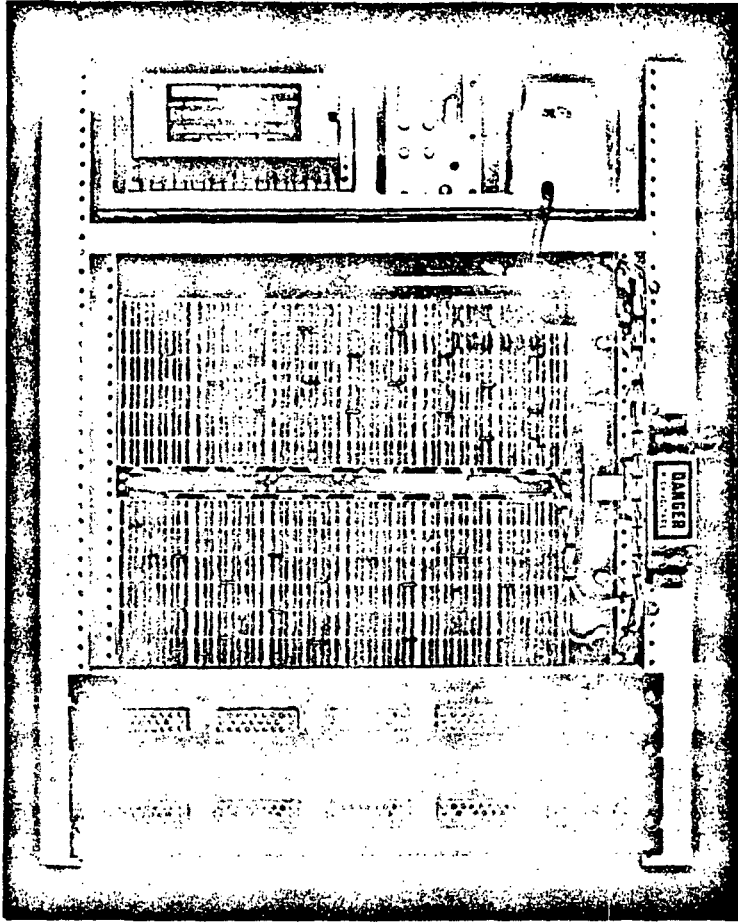
FRONT, OPEN



FRONT



NOT REPRODUCIBLE



**REAR, OPEN**

**Figure 2-9. IEU Cabinet Views (Concluded)**

**(Photo # 120370-45A F2)**

**To clean the filter:**

- 1. Remove louvered grille and decorative grille at lower front of unit.**
- 2. Remove filter and tap gently to remove loose dirt.**
- 3. Wash in hot water, flush out, and allow to dry.**
- 4. Apply Handi-Koter (McLean Engineering Laboratories) filter coat, or equivalent, to both sides of filter.**
- 5. Reinstall filter and grilles.**

Blower bearings are a permanently lubricated type and do not require oiling.

### 3. SOFTWARE MODIFICATIONS

#### 3.1 GENERAL

Introduction of the IEU into the ESG increases the number of available sources of digital data, alters the format of input blocks, and makes two different types of positional, or linear, data available. Modifications have been made to ESG R520 input software to account for these new features. Other desirable software changes, not specifically related to the IEU, have been added to enhance on-line typewriter I/O, to alter the nature of the system Hold, and to permit provision of separate colors to the VPU color memory associated with each view. These changes are discussed below.

##### 3.1.1 IEU-Related Modifications

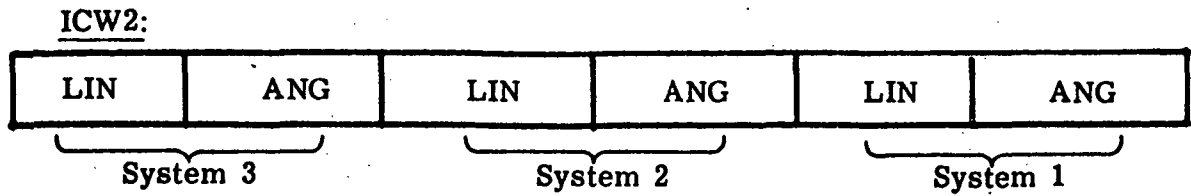
The addition of two more digital source computers, the R520 and Sigma 5, requires more selection capability in the Input Control Word (ICW2) and expanded software to handle the input and processing of data from additional sources. The new format of ICW2, and selection codes, are shown in Figure 3-1. The input of all full-word digital data is now handled by two subroutines, one for trigonometric and one for positional data per system. These subroutines determine which source computer is specified for input (per ICW2), obtain control words and data from the old DDP-24 section of the IIU memory according to the block format given in Table 2-1, and otherwise perform the same control functions as before, i. e., testing for IC and HOLD conditions. Digital source computer specification of scale for positional quantities has been discontinued, and system IC bits relocated in the digital control word per Figure 2-2.

The new data block format allows incremental (single-word) or absolute (double-word) positional data to be provided, as specified by a "1" or "0" respectively in the incremental mode bit of the digital control word. The new input subroutines handling positional quantities update or replace T-vector components correspondingly. All quantities must be in 2's-complement form as before. The format for double-word data is shown in Figure 3-2.

The routine which forces all systems into the local input mode temporarily, under control of Sense Switch 6, is altered to accommodate the changes in format of ICW2 and in the selection codes.

##### 3.1.2 Other Modifications

The Local Input routine is expanded to provide more general, on-line, octal typewriter I/O. The user may input data as before and also obtain address-labelled type-out of the contents of single locations or blocks of R520 core memory.



- SELECT CODES:
- 0000 - TRICE 1
  - 0001 - TRICE 2
  - 0010 - ANALOG
  - 0011 - SIMULATOR
  - 0100 - LOCAL INPUT
  - 1000 - R440
  - 1001 - DDP-24 .
  - 1010 - R520
  - 1011 - SIGMA

Figure 3-1. Input Control Word and Select Codes

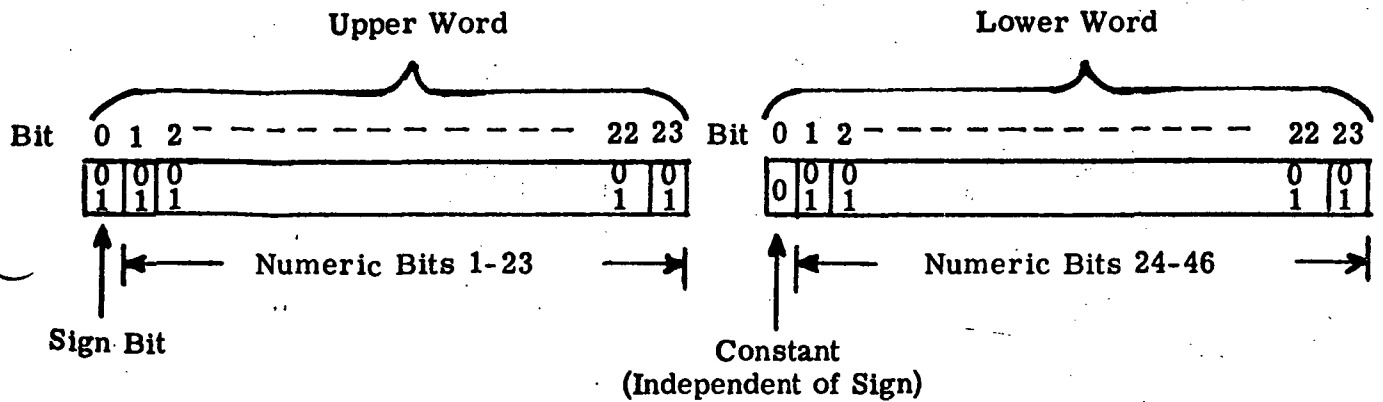


Figure 3-2. Double Word Format for Positional Data

The nature of the system Hold is altered by a reorganization of the Source Input and system subroutine calling sequences. When a Hold is detected, the software now causes T-vector values, rather than T-vector increments, to remain constant, thus effecting a positional Hold, rather than a rate or velocity Hold.

Colors for VPU color memories are now specified separately via the revised color composition table shown in Table 3-1. The relevant portion of the Xmit Control routine is altered to pack and reorganize color composition table data correctly for output to the VCU, when operating software is started at (octal) 6000.

## 3.2 PROGRAM OPERATIONS

(Refer to Section 3.3 for program listings, and to the documents Instruction Manual for Modifications to Interim Visual Spaceflight Simulator, Vol. II, Section 7.2, and ESG On-Line Loader/Conversion Routine, LEC Document No. 643D.11.881, for additional information.)

### 3.2.1 Input Program Operation

(Refer to Figure 3-3 and Figure 3-4.)

Source Input begins at (octal) 10000. It first resets program flags and certain working storage and then connects the IIU. It tests ICW1 to see if SYS1 usage is specified and, if so, sets a flag indicating that at least one system has been used. Control is then transferred to the SYS1 program for input and processing of data and control information associated with that system. If SYS1 usage is not specified, Source Input continues on to check for usage of the remaining systems and behaves in likewise manner when any usage is specified.

After all three systems have been checked for usage and system processing, if any, carried out, Source Input checks the system usage flag and halts if no system was used. Otherwise, it disconnects the IIU and checks Sense Switch 5 to determine whether the on-line loader/conversion routine (SS5 = "1") or on-line octal typewriter I/O routine (SS5 = "0") is desired. Source Input then branches to the specified routine, where required operations for that pass are carried out. On return from whichever of the typewriter I/O routines, Source Input exits to View A calculations.

Each of the system programs (SYS1, SYS2, and SYS3) first attempts to determine the source of angular data (via ICW2) and halts if any non-allowed codes are encountered. Otherwise, control is transferred to the appropriate angular subroutine, which inputs control words from the IIU and/or checks sense switch settings to determine if an IC or Hold condition is specified, as before. The system program next determines the source of linear data, halting if none is specified properly. Then control words, sense switches, and program flags are checked for an IC and/or Hold condition. If neither condition exists, angular and linear data are input and processed as before, except in the digital

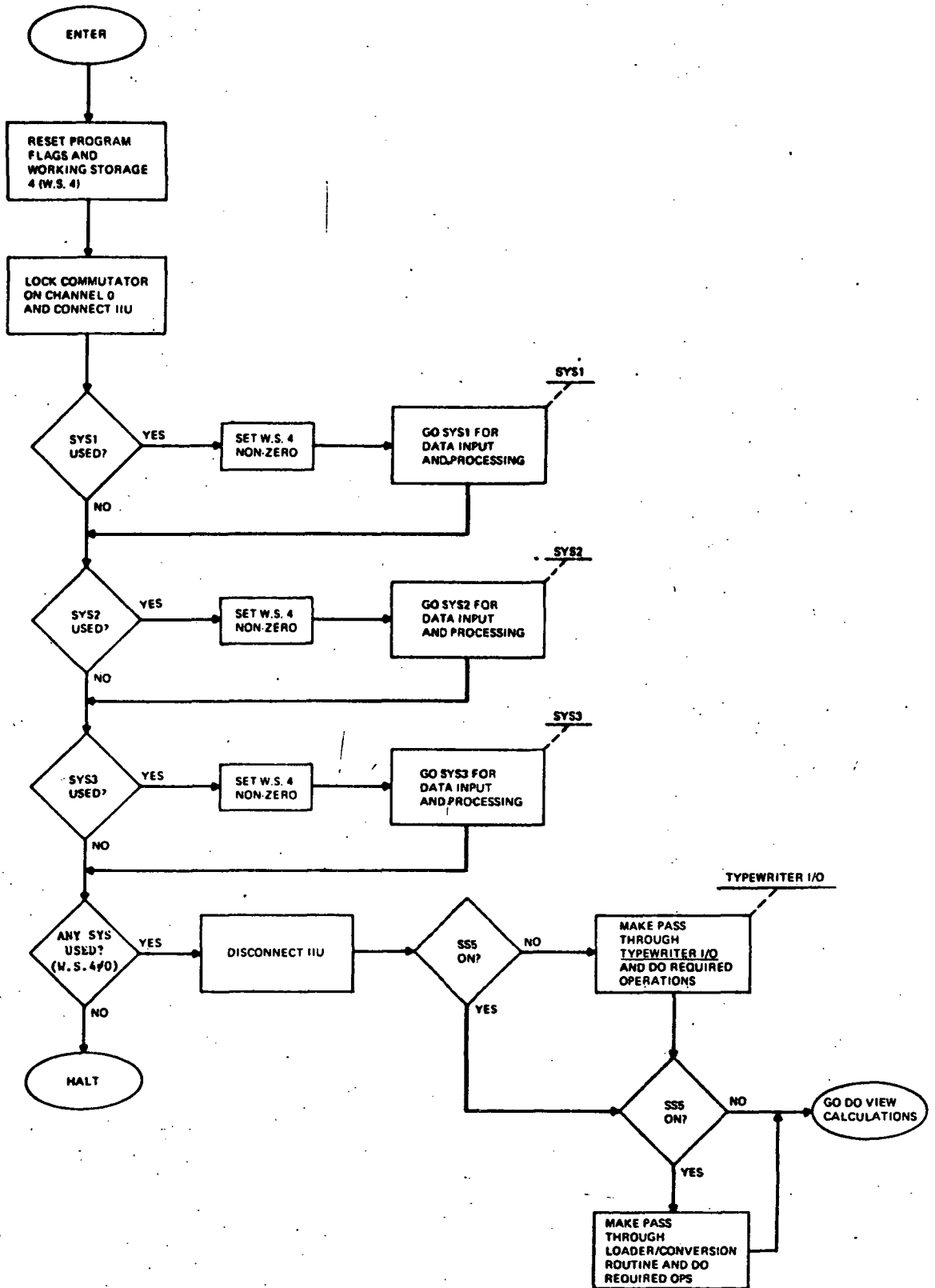
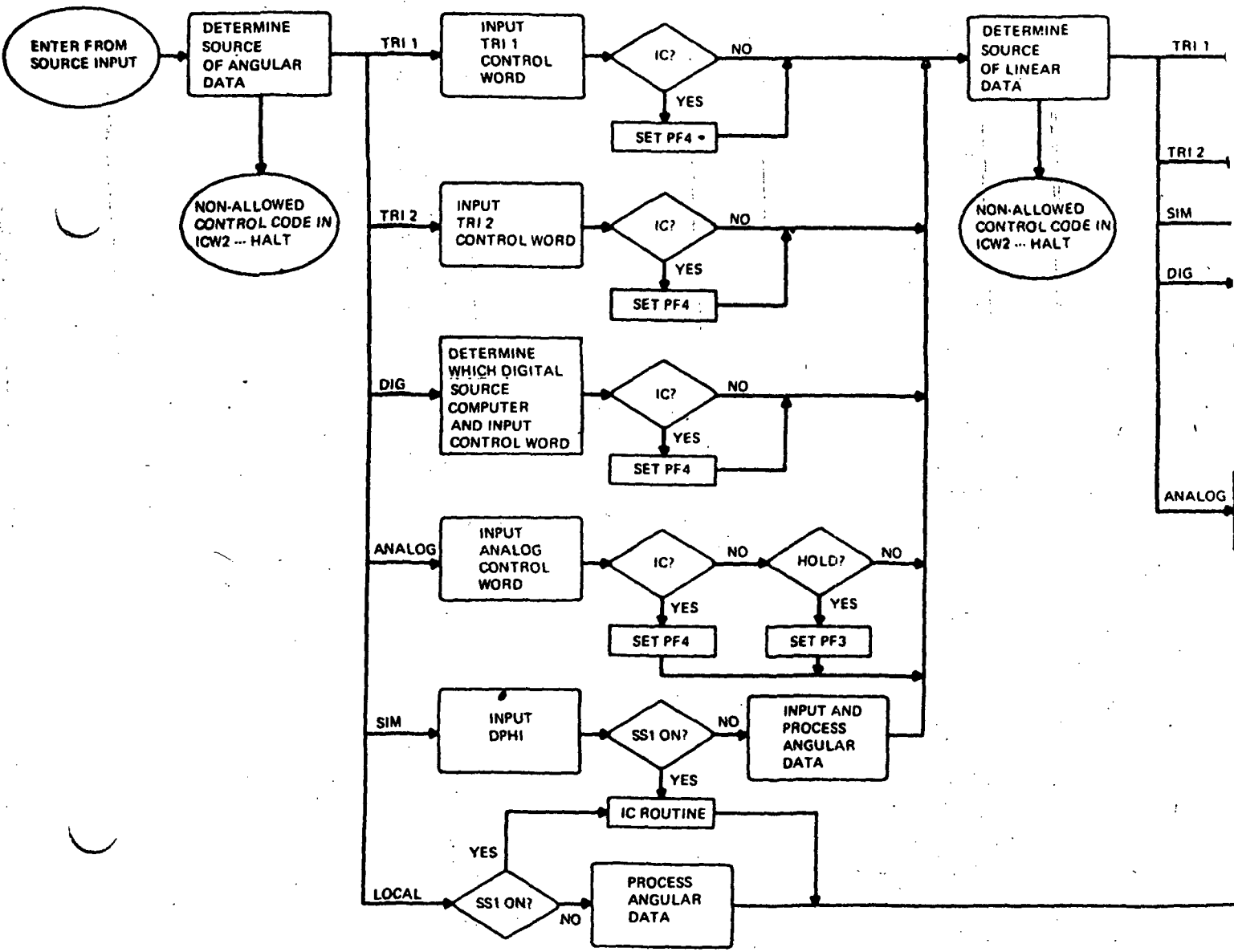


Figure 3-3. Flow Diagram for Source Input Program



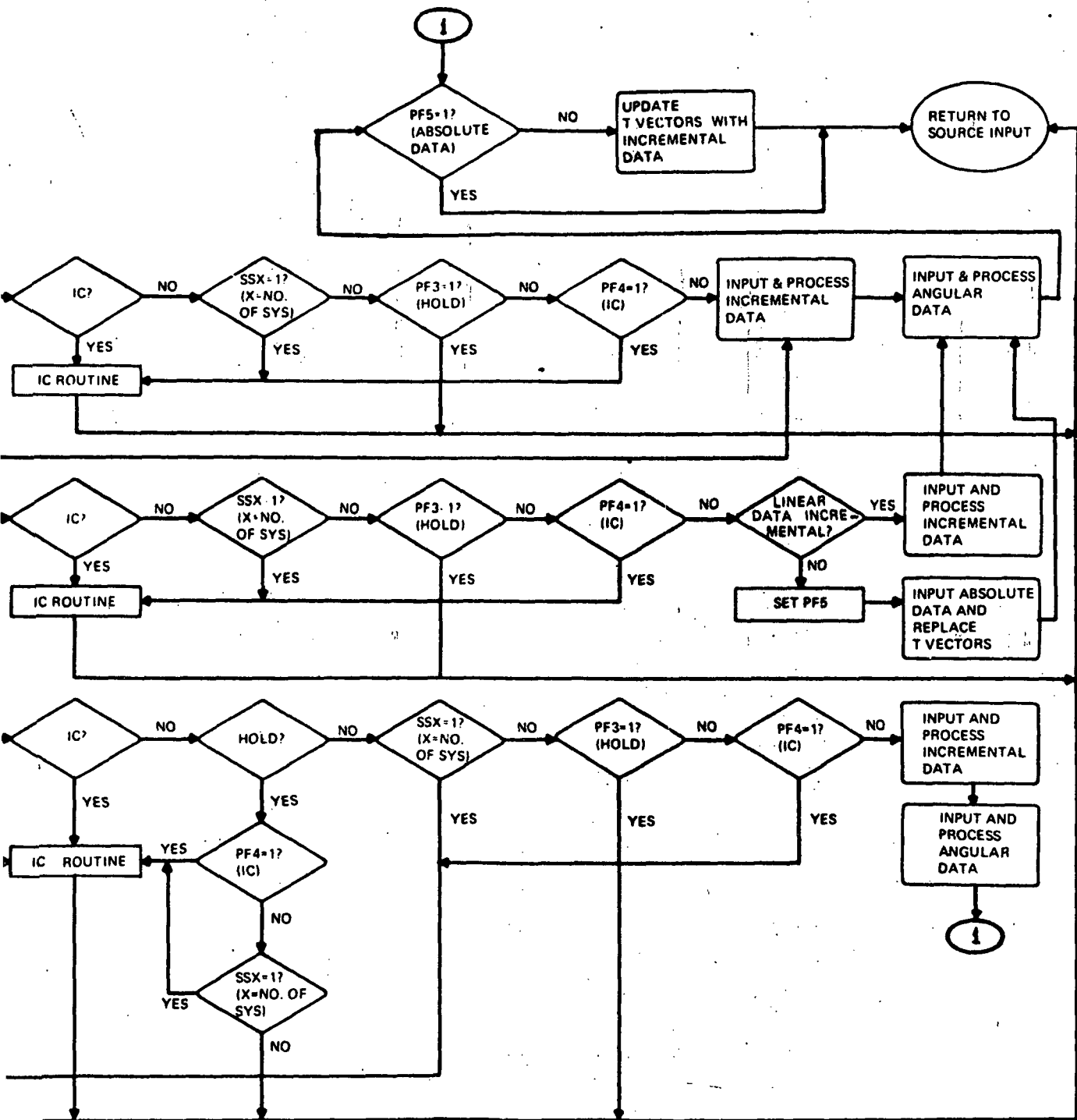


Figure 3-4. Generalized Flow Diagram for SYS1, SYS2, or SYS 3 Programs and Subroutines

linear routines, where input of absolute linear data causes the setting of PF5, which condition is used subsequently to bypass T-vector updating. If an IC condition exists, control is transferred to the appropriate system initialization subroutine. Acknowledgement of the Hold condition results in the bypass of any further system processing.

The only significant change in system program structure is associated with the Hold. When an IC or Hold condition is acknowledged, or when a digital linear routine processes absolute data, the T-vector update associated with the particular system is bypassed.

### 3.2.2 Operation of Program for Local Input by Sense Switch 6

(Refer to Figure 3-5.)

This program continuously saves the contents of ICW2, as long as Sense Switch 6 (SS6) is not set, in anticipation of the destruction of the contents of ICW2 when the local input code for all three systems, "2104 2104", is written into ICW2 as the result of setting SS6. When SS6 is set, the working T-vector increments are zeroed, and the aforementioned code is inserted in ICW2. As SS6 is turned off again, the old contents of ICW2 are restored to it, and the operation of saving ICW2 is restarted.

### 3.2.3 Typewriter I/O Program Operation

(Refer to Figure 3-6.)

The Typewriter I/O Program types or reads one character on a single pass through the program, depending on whether the typewriter has completed typing the previous character while the typewriter is selected for output, or on whether the user has typed a character while the typewriter is selected for input. This one-character-per-pass operation is necessary, since any additional processing delay caused by waiting for the typewriter to input or output the next character could prevent the results of view computations from being available when required by the VCU each display frame.

The program allows the user to input or load data into single locations of R520 memory under the format,

(Address #1) L (Data) (C/R-Carriage Return)

or to output data under the format,

(Address #1) O (Address #2) (C/R)

where "Address #2" may be deleted if single- rather than multiple-address output is desired. The user may type "C" at any time to cancel the effect of just previously typed characters.

In any case, a string of data and control characters must be input to the program to set up the operation which is normally triggered by the "C/R". Thus the program flow exhibits a central path for recognizing data and control characters, along with side paths for carrying out specific operations. These side paths include facilities for accumulating the character strings representing

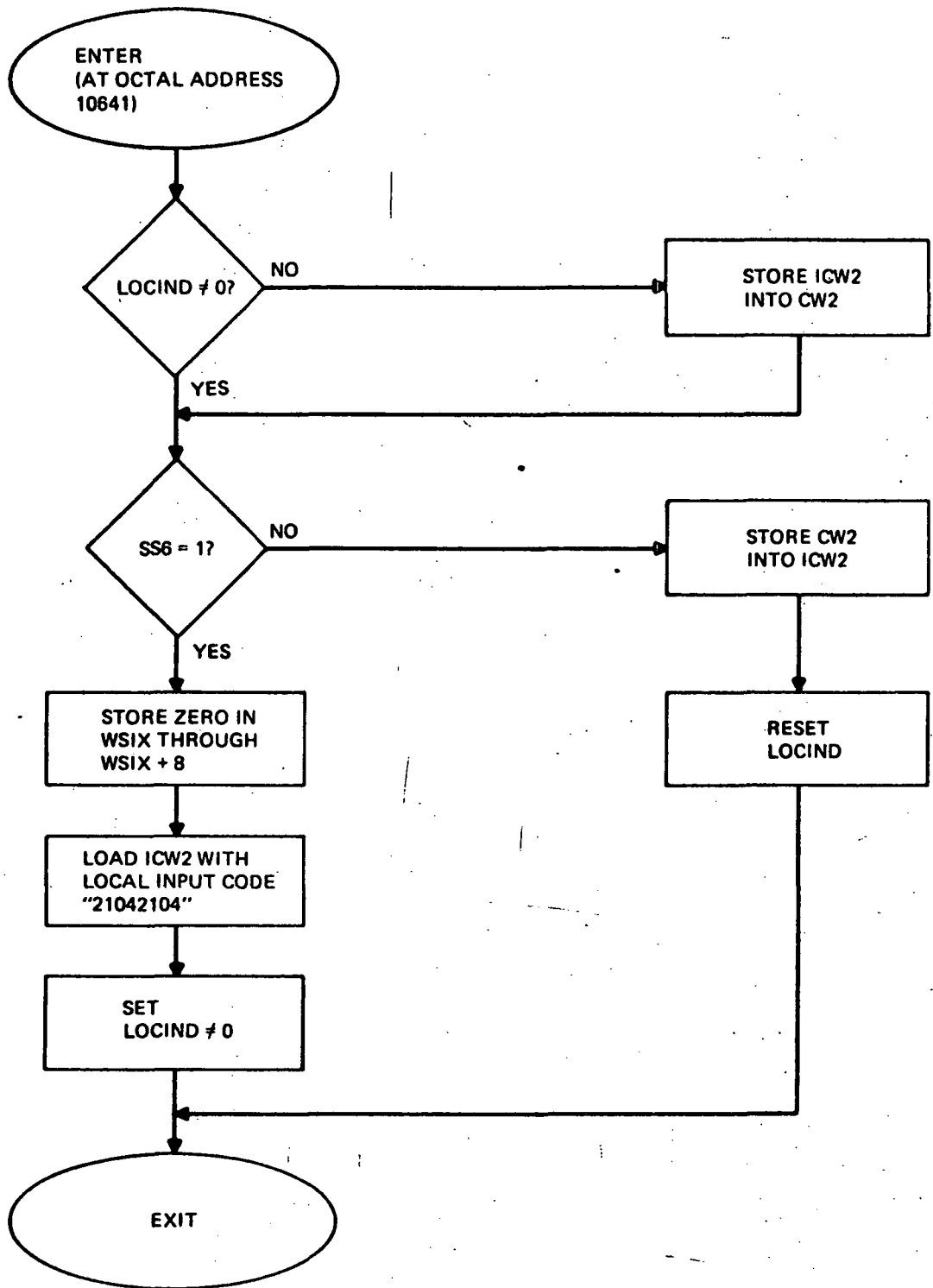
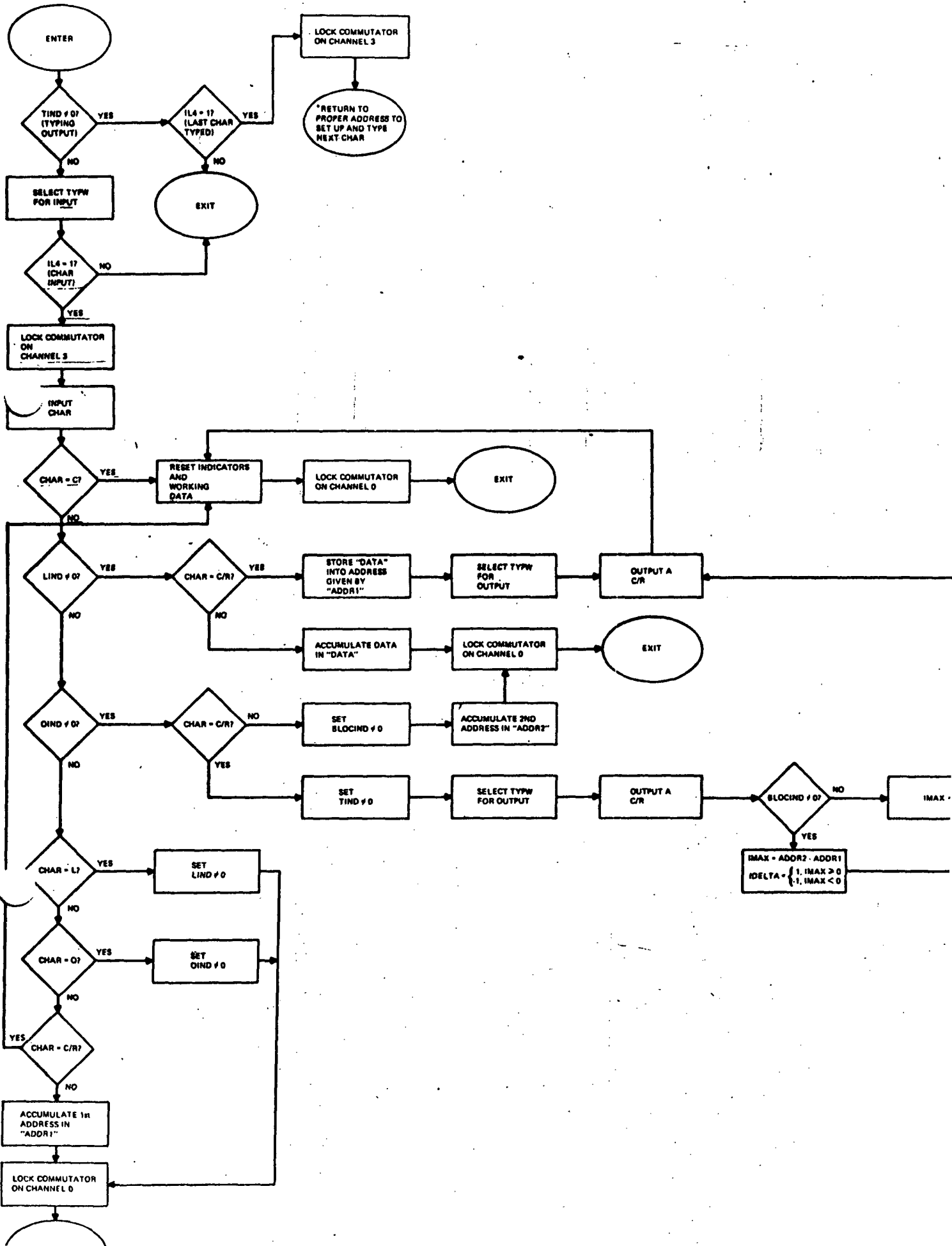


Figure 3-5. Flow Diagram of Program for Local Input by SS6



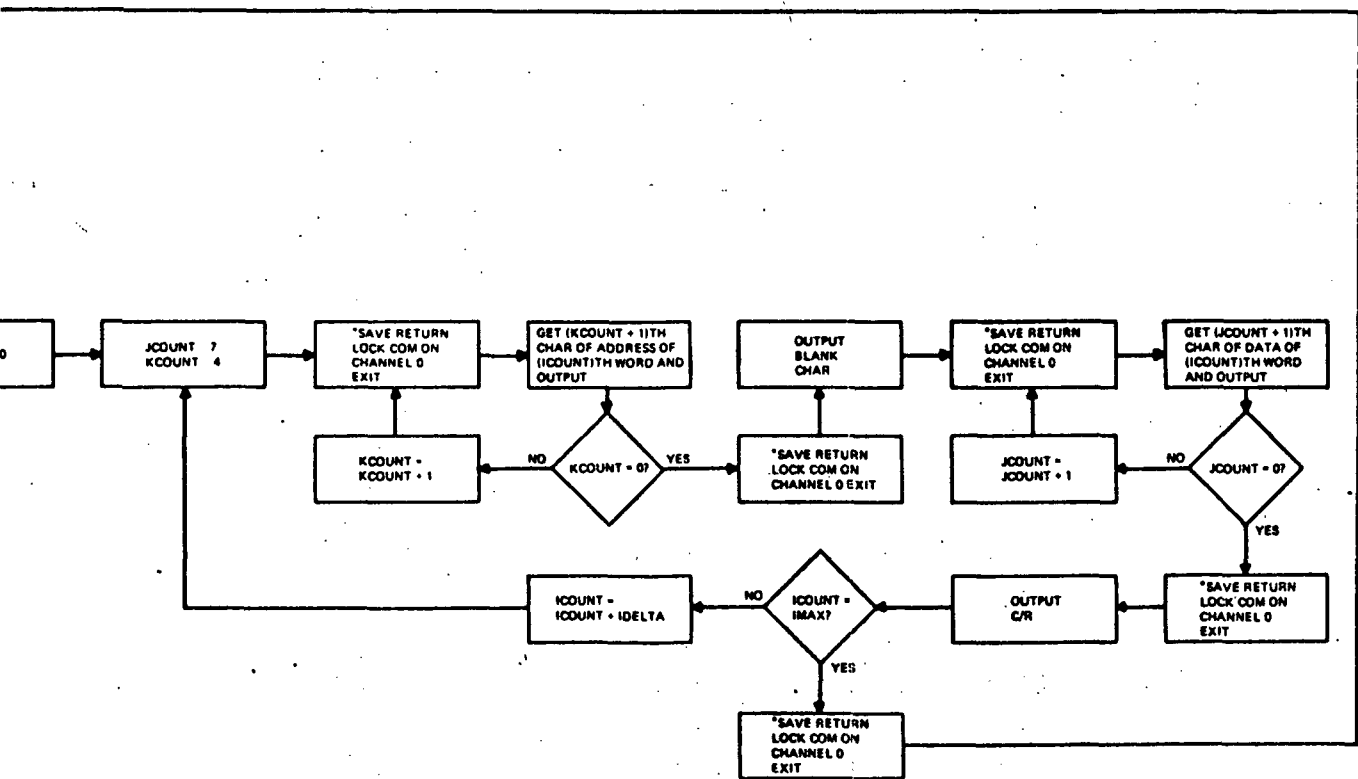


Figure 3-6. Flow Diagram for Typewriter I/O Program

"Address #1", "Data" (after an "L" is typed), and "Address #2" (after an "O" is typed), for storing the contents of "Data" into the address specified by "Address #1", and for setting up and outputting the address-labelled contents of all locations between "Address #1" and "Address #2" inclusive.

On entry to the program, an indicator is checked to determine whether or not the program is in the process of outputting a block of data. If data is being output, then (on the assumption that the typewriter is selected for output and has been issued an instruction for the output of a character) the interrupt line associated with the typewriter is tested to see if the typewriter is yet free to output another character. If not, the program exits; otherwise the program returns to the proper address to begin setting up and outputting of the next character. If data is not being output, the typewriter is selected for input and the same interrupt line tested to see if the user has typed the next character. If not, again the program exits; otherwise the character is input from the typewriter buffer.

Once a character is input, it may be one of four acceptable control characters, but will otherwise be interpreted as an octal character intended for concatenation at the right with the character string presently being constructed. If the character is a "C", certain program indicators and working data are zeroed, thus cancelling the effect of all characters typed by the user since the last "C" was typed, or typewriter I/O operation completed. If the character is not a "C", two program indicators are checked to see if either "L" or "O" was typed previously. If neither character has been typed, the input character is tested to see if it is an "L" or "O". If the character is either, the corresponding program indicator is set, signifying that future characters, if any, are to be added to "Data" or "Address #2", respectively, and an exit is taken. If the input character is neither "L" or "O", it is tested for being a "C/R". If the character is a "C/R", resulting program operation is as if a "C" had been typed. This feature is merely intended to permit line-skipping between I/O operations, without adding garbage characters to the "Address #1" string, to which the input character is added if the character is not a "C/R". After the "Address #1" string is updated, an exit is taken.

If the program indicator signifying that "L" was typed previously is found true in some pass through the central path, then the character whose input initiated the pass could have been a "C/R" or something else. If the character is not a "C/R", it is assumed to be an octal character and is added to "Data". Then an exit is taken. If the character is a "C/R", "Data" is stored in memory location, "Address #1", the typewriter is selected for output, and an additional line is skipped to add clarity and provide the user with an indication of program response. Then indicators and working data are zeroed, and an exit is taken.

If the program indicator signifying that "O" has been typed is tested true, then, if the character input is not a "C/R", the character is interpreted as an octal character and added to "Address #2" and an indicator is set to signify that multiple-address output may occur. Then an exit is taken. If the input character is a "C/R", the indicator to signify that typewriter output is

occurring is set, the typewriter is selected for output, and a line is skipped for clarity. Then certain control parameters are computed, such as the total number of addresses to be output and, if necessary, the number, +1 or -1, which must be added to the initial address to generate successive addresses. Finally block output begins. Each line of output consists of five octal address characters, a space, and eight octal data characters. Before the output of each successive character an exit is taken after saving the return address, for reasons discussed above. As block output is completed, an additional line is skipped for clarity, indicators and working data are zeroed, and an exit taken.

### 3.2.4 Colpac Program Operation

(Refer to Figure 3-7.)

Colpac must convert a table of color composition data, (see Table 3-1), which is organized, for the user's convenience, as an address-by-address list of the contents of each color memory, into a set of packed data words, each of which holds six 4-bit composition values for color numbers 1-6 or 7-12 of a particular view in a particular color. The composition data must be placed in the latter format for output to the VCU.

The program is divided into two sections. The first section effects the conversion of format and stores results temporarily in a set of sequential locations. The second section lifts results out of temporary storage and parcels them out to the required locations of the VCU X-stack and Y-stack output blocks.

The format conversion is brought about by a nesting of four program loops, which keep track of which composition table word, group (color numbers 1-6 or 7-12), color (blue, green, or red), and view (A, B, or C) are under consideration. Packing is brought about by right-justifying each 4-bit composition value within the table word in which it was originally located, and then double-length right shifting the 4 bits into the data word being constructed for output to the VCU. The ordering of the construction is as follows:

1. Blue bits of Word 12 of View A into left end of TEMP,
2. Blue bits of Word 11 of View A into left end of TEMP,
- ...
6. Blue bits of Word 7 of View A into left end of TEMP,
7. Blue bits of Word 6 of View A into left end of TEMP+1,
- ...
12. Blue bits of Word 1 of View A into left end of TEMP+1,
13. Green bits of Word 12 of View A into left end of TEMP+2,
- ...
19. Green bits of Word 6 of View A into left end of TEMP+3,
- ...
25. Red bits of Word 12 of View A into left end of TEMP+4,
- ...
31. Red bits of Word 6 of View A into left end of TEMP+5,
- ...
37. Blue bits of Word 12 of View B into left end of TEMP+6,
- ...
- ETC.

COLOR COMPOSITION TABLE FOR OBJECT COLORS \*

		COLOR COMPOSITION DATA								
Octal Character		7	6	5	4	3	2	1	0	
R520 Octal Address	View	Color Number	Spare		Blue Composition Bits (8-11)	Green Composition Bits (14-17)	Red Composition Bits (20-23)			
7700	A	01			0	1	0	1	0	1
7701	A	02			0	2	0	2	0	2
7702	A	03			0	3	0	3	0	3
7703	A	04			0	4	0	4	0	4
7704	A	05			0	5	0	5	0	5
7705	A	06			0	6	0	6	0	6
7706	A	07			0	7	0	7	0	7
7707	A	10			1	0	1	0	1	0
7710	A	11			1	1	1	1	1	1
7711	A	12			1	2	1	2	1	2
7712	A	13			1	3	1	3	1	3
7713	A	14			1	4	1	4	1	4
7714	B	01			0	1	0	1	0	1
7715	B	02			0	2	0	2	0	2
7716	B	03			0	3	0	3	0	3
7717	B	04			0	4	0	4	0	4
7720	B	05			0	5	0	5	0	5
7721	B	06			0	6	0	6	0	6
7722	B	07			0	7	0	7	0	7
7723	B	10			1	0	1	0	1	0
7724	B	11			1	1	1	1	1	1
7725	B	12			1	2	1	2	1	2
7726	B	13			1	3	1	3	1	3
7727	B	14			1	4	1	4	1	4
7730	C	01			0	1	0	1	0	1
7731	C	02			0	2	0	2	0	2
7732	C	03			0	3	0	3	0	3
7733	C	04			0	4	0	4	0	4
7734	C	05			0	5	0	5	0	5
7735	C	06			0	6	0	6	0	6
7736	C	07			0	7	0	7	0	7
7737	C	10			1	0	1	0	1	0
7740	C	11			1	1	1	1	1	1
7741	C	12			1	2	1	2	1	2
7742	C	13			1	3	1	3	1	3
7743	C	14			1	4	1	4	1	4

\*NOTE: Entries shown represent gray shades. Also, bit numbers are decimal; all others are octal.

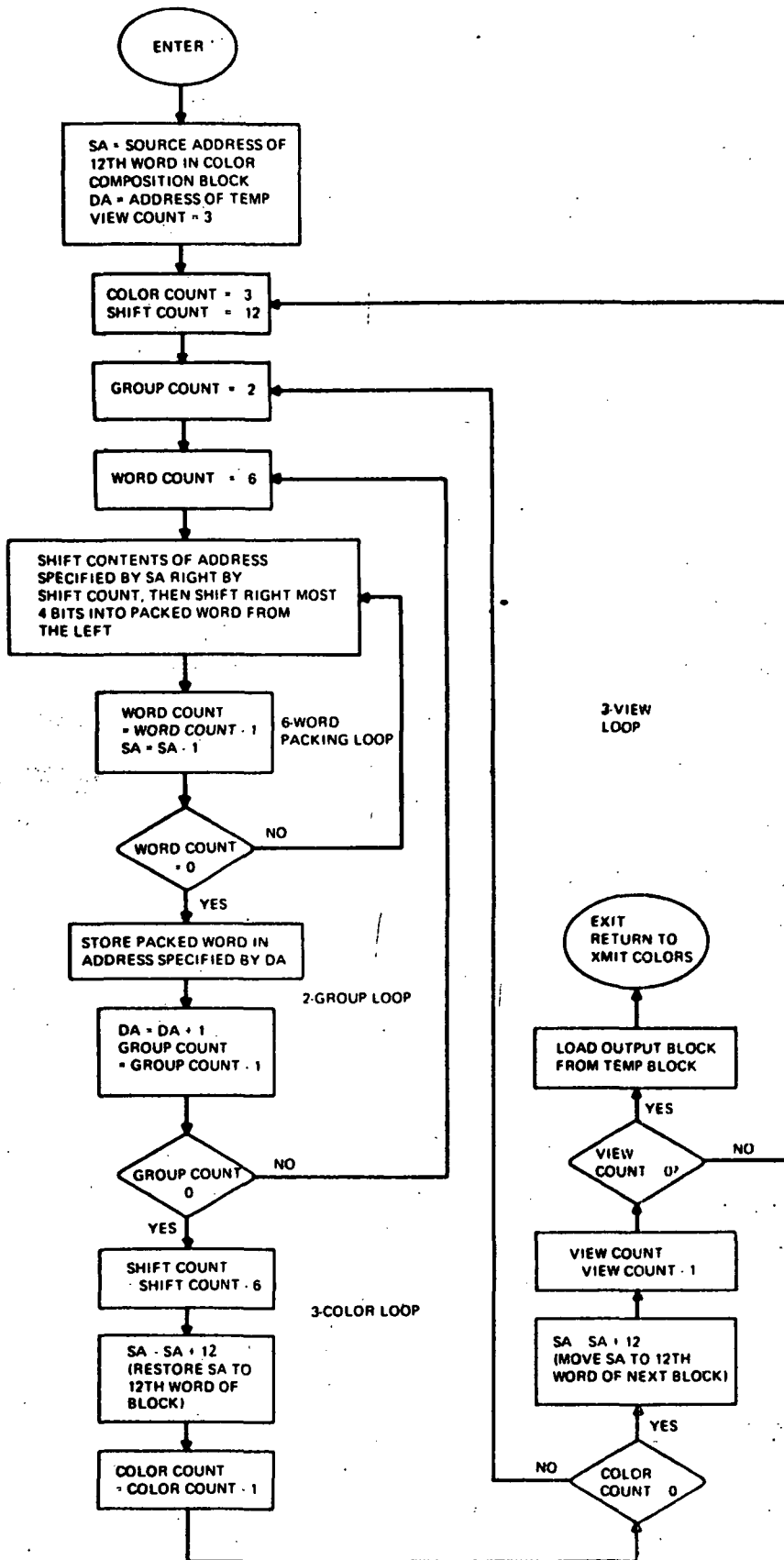


Figure 3-7. Flow Diagram for COLPAC (Color Composition Word Packing) Program

### 3.3 PROGRAM LISTINGS

The program listings that follow consist of two sections, 3.3.1 Operating Programs, and 3.3.2 Transmit Control.

#### 3.3.1 Operating Programs

<u>INITIAL DATA LOCATIONS</u>		TTL	<u>INITIAL DATA LOCATIONS</u>
ISPAX	EQVO	16000	
ISPAY	EQVO	16001	
ISPAZ	EQVO	16002	
ISPBX	EQVO	16003	
ISPBZ	EQVO	16004	
ISPBZ	EQVO	16005	
ISPCX	EQVO	16006	
ISPCY	EQVO	16007	
ISPCZ	EQVO	16010	
IALPHA A	EQVO	16011	
IBETA A	EQVO	16012	
IALPHA B	EQVO	16013	
IBETA B	EQVO	16014	
IALPHA C	EQVO	16015	
IBETA C	EQVO	16016	
IRAD	EQVO	16017	
IBCNX	EQVO	16021	
IBCNZ	EQVO	16022	
IBCNZ	EQVO	16023	
SUNA	EQVO	16024	
SUNE	EQVO	16025	
ISC1X1	EQVO	16030	
ISC1Y1	EQVO	16031	
ISC1Z1	EQVO	16032	
ISC1Y2	EQVO	16033	
ISC1Y2	EQVO	16034	
ISC1Z2	EQVO	16035	
ISC2X1	EQVO	16036	
ISC2Y1	EQVO	16037	
ISC2Z1	EQVO	16040	
ISC2X2	EQVO	16041	
ISC2Y2	EQVO	16042	
ISC2Z2	EQVO	16043	
ISC3X1	EQVO	16044	
ISC3Y1	EQVO	16045	
ISC3Z1	EQVO	16046	
ISC3X2	EQVO	16047	
ISC3Y2	EQVO	16050	
ISC3Z2	EQVO	16051	
IVS1X	EQVO	16054	
IVS1Y	EQVO	16055	
IVS1Z	EQVO	16056	
IVS2X	EQVO	16057	
IVS2Y	EQVO	16060	
IVS2Z	EQVO	16061	
IVS3X	EQVO	16062	
IVS3Y	EQVO	16063	
IVS3Z	EQVO	16064	
IVS4X	EQVO	16065	
IVS4Y	EQVO	16066	
IVS4Z	EQVO	16067	
IT1XU	EQVO	16070	
IT1YL	EQVO	16071	
IT1YU	EQVO	16072	
IT1YL	EQVO	16073	

INITIAL DATA LOCATIONS

IT12U	EQVO	16074
IT12L	EQVO	16075
IT2XU	EQVO	16076
IT2XL	EQVO	16077
IT2YU	EQVO	16100
IT2YL	EQVO	16101
IT22U	EQVO	16102
IT22L	EQVO	16103
IT3XU	EQVO	16104
IT3XL	EQVO	16105
IT3YU	EQVO	16106
IT32L	EQVO	16111
IPCAX	EQVO	16115
IPCAY	EQVO	16116
IPCAF	EQVO	16117
IPLAX	EQVO	16120
IPLAY	EQVO	16121
IPLAF	EQVO	16122
IPFAX	EQVO	16123
IPFAY	EQVO	16124
IPFAF	EQVO	16125
IPC8X	EQVO	16126
IPC8Y	EQVO	16127
IPC8F	EQVO	16130
IPL8Y	EQVO	16131
IPL8Y	EQVO	16132
IPL8Z	EQVO	16133
IPF8Y	EQVO	16134
IPF8Y	EQVO	16135
IPF8Z	EQVO	16136
IPCCX	EQVO	16137
IPCCY	EQVO	16140
IPCCZ	EQVO	16141
IPLCX	EQVO	16142
IPLCY	EQVO	16143
IPLCZ	EQVO	16144
IPECX	EQVO	16145
IPECY	EQVO	16146
IPFCZ	EQVO	16147
IPS1	EQVO	16155
ITM1	EQVO	16156
IPM1	EQVO	16157
IPS2	EQVO	16160
ITM2	EQVO	16161
IPM2	EQVO	16162
IPS3	EQVO	16163
ITM3	EQVO	16164
IPM3	EQVO	16165
ICW1	EQVO	16170
ICW2	EQVO	16171
IUNIT YX	EQVO	16174
IUNIT XY	EQVO	16175
IUNIT XZ	EQVO	16176
IUNIT YX	EQVO	16177
IUNIT YY	EQVO	16200
IUNIT YZ	EQVO	16201

INITIAL DATA LOCATIONS

IUNIT ZX	EOVU	16202	
IUNIT ZY	EOVU	16203	
IUNIT ZZ	EOVU	16204	
DCONA	EOVU	16205	
DCONB	EOVU	16206	
DCONC	EOVU	16207	
ANA LUG	EOVU	16212	
TRI 1	EOVU	16213	
TRI 2	EOVU	16214	
DUP24	EOVU	16215	
R440	EOVU	16216	
SIM	EOVU	16217	
LUCAL	EOVU	16220	
TRI ANG SYS1	EOVU	16221	
TRI ANG SYS2	EOVU	16222	
TRI ANG SYS3	EOVU	16223	
TRI LIN SYS1	EOVU	16224	
TRI LIN SYS2	EOVU	16225	
TRI LIN SYS3	EOVU	16226	
ANA ANG SYS1	EOVU	16227	
ANA ANG SYS2	EOVU	16230	
ANA ANG SYS3	EOVU	16231	
ANA LIN SYS1	EOVU	16232	
ANA LIN SYS2	EOVU	16233	
ANA LIN SYS3	EOVU	16234	
DIG ANG SYS1	EOVU	16235	
DIG ANG SYS2	EOVU	16236	
DIG ANG SYS3	EOVU	16237	
DIG LIN SYS1	EOVU	16240	
DIG LIN SYS2	EOVU	16241	
DIG LIN SYS3	EOVU	16242	
SIM ANG SYS1	EOVU	16251	
SIM ANG SYS2	EOVU	16252	
SIM ANG SYS3	EOVU	16253	
SIM LIN SYS1	EOVU	16254	
SIM LIN SYS2	EOVU	16255	
SIM LIN SYS3	EOVU	16256	
LUCAL ANG SYS1	EOVU	16257	
LUCAL ANG SYS2	EOVU	16260	
LUCAL ANG SYS3	EOVU	16261	
TYPEWRITER IO	EOVU	16262	
DACC	EOVU	16300	BLOCK THRU 16333
LSF1	EOVU	16334	BLOCK THRU 16347
DYNCOLOH	EOVU	06171	
MAC			

COMPUTED QUANTITIES

	TTL	COMPUTED QUANTITIES
T1XU	EQVO	17000
T1XL	EQVO	17001
T1YU	EQVO	17002
T1YL	EQVO	17003
T1ZU	EQVO	17004
T1ZL	EQVO	17005
T2XU	EQVO	17010
T2XL	EQVO	17011
T2YU	EQVO	17012
T2YL	EQVO	17013
T2ZU	EQVO	17014
T2ZL	EQVO	17015
T3XU	EQVO	17020
T3XL	EQVO	17021
T3YU	EQVO	17022
T3YL	EQVO	17023
T3ZU	EQVO	17024
T3ZL	EQVO	17025
SIN PS1	EQVO	70332
COS PS1	EQVO	70333
SIN TM1	EQVO	70334
COS TM1	EQVO	70335
SIN PM1	EQVO	70336
COS PM1	EQVO	70337
SIN PS2	EQVO	70340
COS PS2	EQVO	70341
SIN TM2	EQVO	70342
COS TM2	EQVO	70343
SIN PM2	EQVO	70344
COS PM2	EQVO	70345
SIN PS3	EQVO	70346
COS PS3	EQVO	70347
SIN TM3	EQVO	70350
COS TM3	EQVO	70351
SIN PM3	EQVO	70352
COS PM3	EQVO	70353
SIN AA	EQVO	70354
COS AA	EQVO	70355
SIN BA	EQVO	70356
COS BA	EQVO	70357
SIN AB	EQVO	70360
COS AB	EQVO	70361
SIN BB	EQVO	70362
COS BB	EQVO	70363
SIN AC	EQVO	70364
COS AC	EQVO	70365
SIN BC	EQVO	70366
COS BC	EQVO	70367
SIN DA	EQVO	17075
COS DA	EQVO	17076
SIN DB	EQVO	17077
COS DB	EQVO	17100
SIN DC	EQVO	17101
COS DC	EQVO	17102
DA	EQVO	17103

COMPUTED QUANTITIES

DB	EOVO	17104
DC	EOVO	17105
SIN GA	EOVO	17106
COS GA	EOVO	17107
SIN GB	EOVO	17110
COS GB	EOVO	17111
SIN GC	EOVO	17112
COS GC	EOVO	17113
LARKU	EOVO	17120
LARXL	EOVO	17121
LARYU	EOVO	17122
LARYL	EOVO	17123
LARZU	EOVO	17124
LAREL	EOVO	17125
LA?XU	EOVO	17126
LA2XL	EOVO	17127
LA2YU	EOVO	17130
LA2YL	EOVO	17131
LA2ZU	EOVO	17132
LA2ZL	EOVO	17133
LA3XU	EOVO	17134
LA3XL	EOVO	17135
LA3YU	EOVO	17136
LA3YL	EOVO	17137
LA3ZL	EOVO	17141
LBRXU	EOVO	17142
LBRXL	EOVO	17143
LBRZU	EOVO	17140
LBRYL	EOVO	17144
LBRYL	EOVO	17145
LBRZU	EOVO	17146
LBRZL	EOVO	17147
LB1XU	EOVO	17150
LB1XL	EOVO	17151
LB1YU	EOVO	17152
LB1YL	EOVO	17153
LB1ZU	EOVO	17154
LB1ZL	EOVO	17155
LB3XU	EOVO	17156
LB3XL	EOVO	17157
LB3YU	EOVO	17160
LB3YL	EOVO	17161
LB3ZU	EOVO	17162
LB3ZL	EOVO	17163
LCRXU	EOVO	17164
LCRXL	EOVO	17165
LCRYU	EOVO	17166
LCRYL	EOVO	17167
LCRZU	EOVO	17170
LCRZL	EOVO	17171
LC1XU	EOVO	17172
LC1XL	EOVO	17173
LC1YU	EOVO	17174
LC1YL	EOVO	17175
LC1ZU	EOVO	17176
LC1ZL	EOVO	17177

VCU DATA

COMPUTED QUANTITIES

LC2XU	EOVO	17200
LC2XL	EOVO	17201
LC2YU	EOVO	17202
LC2YL	EOVO	17203
LC2ZU	EOVO	17204
LC2ZL	EOVO	17205
PCARX	EOVO	17206
PCARY	EOVO	17207
PCARZ	EOVO	17210
PLARX	EOVO	17211
PLARY	EOVO	17212
PLARZ	EOVO	17213
PEARX	EOVO	17214
PEARY	EOVO	17215
PEARZ	EOVO	17216
PCA2X	EOVO	17217
PCA2Y	EOVO	17220
PCA2Z	EOVO	17221
PLA2X	EOVO	17222
PLA2Y	EOVO	17223
PLA2Z	EOVO	17224
PEA2X	EOVO	17225
PEA2Y	EOVO	17226
PEA2Z	EOVO	17227
PCA3X	EOVO	17230
PCA3Y	EOVO	17231
PCA3Z	EOVO	17232
PLA3X	EOVO	17233
PLA3Y	EOVO	17234
PLA3Z	EOVO	17235
PEA3X	EOVO	17236
PEA3Y	EOVO	17237
PEA3Z	EOVO	17240
PCRRX	EOVO	17241
PCRRY	EOVO	17242
PCRRZ	EOVO	17243
PLRRX	EOVO	17244
PLRRY	EOVO	17245
PLRRZ	EOVO	17246
PERRX	EOVO	17247
PERRY	EOVO	17250
PERRZ	EOVO	17251
PCR1X	EOVO	17252
PCR1Y	EOVO	17253
PCR1Z	EOVO	17254
PLR1X	EOVO	17255
PLR1Y	EOVO	17256
PLR1Z	EOVO	17257
PER1X	EOVO	17260
PER1Y	EOVO	17261
PEB1Z	EOVO	17262
ITSYL	EOVO	16107
ITSZU	EOVO	16110
PCB3X	EOVO	17263
PCB3Y	EOVO	17264
PCB3Z	EOVO	17265

COMPUTED QUANTITIES

PLR3X	EOVO	17266
PLR3Y	EOVO	17267
PLR3Z	EOVO	17270
PER3X	EOVO	17271
PER3Y	EOVO	17272
PER3Z	EOVO	17273
PCCR1	EOVO	17274
PCCR2	EOVO	17275
PCCR3	EOVO	17276
PLCR1	EOVO	17277
PLCR2	EOVO	17300
PLCR3	EOVO	17301
PECR1	EOVO	17302
PECR2	EOVO	17303
PECR3	EOVO	17304
PCC1X	EOVO	17305
PCC1Y	EOVO	17306
PCC1Z	EOVO	17307
PLC1X	EOVO	17310
PLC1Y	EOVO	17311
PLC1Z	EOVO	17312
PEC1X	EOVO	17313
PEC1Y	EOVO	17314
PEC1Z	EOVO	17315
PCC2X	EOVO	17316
PCC2Y	EOVO	17317
PCC2Z	EOVO	17320
PLC2X	EOVO	17321
PLC2Y	EOVO	17322
PLC2Z	EOVO	17323
PEC2X	EOVO	17324
PEC2Y	EOVO	17325
PEC2Z	EOVO	17326
VS1X	EOVO	17327
VS1Y	EOVO	17330
VS1Z	EOVO	17331
VS2X	EOVO	17332
VS2Y	EOVO	17333
VS2Z	EOVO	17334
VS3X	EOVO	17335
VS3Y	EOVO	17336
VS3Z	EOVO	17337
VS4X	EOVO	17340
VS4Y	EOVO	17341
VS4Z	EOVO	17342
BEACON	EOVO	17343
CW1	EOVO	17344
CSC	EOVO	17345
SSC	EOVO	17346
POS	EOVO	17347
FI	EOVO	17360
DORCA	EOVO	17361
DORCB	EOVO	17362
DORCC	EOVO	17363
SPCARX	EOVO	17364
SPCARY	EOVO	17365

SOS DATA

COMPUTED QUANTITIES

SPCARZ	EOVO	17366
SPLARX	EOVO	17367
SPLARY	EOVO	17370
SPLARZ	EOVO	17371
SPEARX	EOVO	17372
SPEARY	EOVO	17373
SLARXL	EOVO	17374
SLARXU	EOVO	17375
SLARYL	EOVO	17376
SLARYU	EOVO	17377
SLARZL	EOVO	17400
SLARZU	EOVO	17401
SSINGA	EOVO	17402
SCOSGA	EOVO	17403
SPCBRX	EOVO	17404
SPCBRY	EOVO	17405
SPCBRZ	EOVO	17406
SPLBRX	EOVO	17407
SPLBRY	EOVO	17410
SPLBRZ	EOVO	17411
SPEBRX	EOVO	17412
SPEBRY	EOVO	17413
SLRRXL	EOVO	17414
SLRRXU	EOVO	17415
SLRRYL	EOVO	17416
SLRRYU	EOVO	17417
SLRRZL	EOVO	17420
SLRRZU	EOVO	17421
SSINGW	EOVO	17422
SCOSGB	EOVO	17423
SPCCRX	EOVO	17424
SPCCRY	EOVO	17425
SPCCRZ	EOVO	17426
SPLCRX	EOVO	17427
SPLCRY	EOVO	17430
SPLCRZ	EOVO	17431
SPECRX	EOVO	17432
SPECRY	EOVO	17433
SLCRXL	EOVO	17434
SLCRXU	EOVO	17435
SLCRYL	EOVO	17436
SLCRYU	EOVO	17437
SLCRZL	EOVO	17440
SLCRZU	EOVO	17441
SSINGC	EOVO	17442
SCOSGC	EOVO	17443
DAC11	EOVO	17450
DAC12	EOVO	17451
DAC13	EOVO	17452
DAC14	EOVO	17453
DAC15	EOVO	17454
DAC16	EOVO	17455
DAC17	EOVO	17456
DAC18	EOVO	17457
DAC19	EOVO	17460
DAC10	EOVO	17461

DACU SOURCE

COMPUTED QUANTITIES

DAC111	EOVO	17462
DAC112	EOVO	17463
DAC01	EOVO	17464
DAC02	EOVO	17465
DAC03	EOVO	17466
DAC04	EOVO	17467
DAC05	EOVO	17470
DAC06	EOVO	17471
DAC07	EOVO	17472
DAC08	EOVO	17473
DAC09	EOVO	17474
DAC010	EOVO	17475
DAC011	EOVO	17476
DAC012	EOVO	17477
UNITX	EOVO	17510
UNITXY	EOVO	17511
UNITXZ	EOVO	17512
UNITYX	EOVO	17513
UNITYY	EOVO	17514
UNITYZ	EOVO	17515
UNITZX	EOVO	17516
UNITZY	EOVO	17517
UNITZZ	EOVO	17520
WS1X	EOVO	17521
WS1Y	EOVO	17522
WS1Z	EOVO	17523
WS2X	EOVO	17524
WS2Y	EOVO	17525
WS2Z	EOVO	17526
WS3X	EOVO	17527
WS3Y	EOVO	17530
WS3Z	EOVO	17531
SPX	EOVO	17535
SPY	EOVO	17536
SPZ	EOVO	17537
PS1	EOVO	17540
TH1	EOVO	17541
PH1	EOVO	17542
PS2	EOVO	17543
TH2	EOVO	17544
PH2	EOVO	17545
PS3	EOVO	17546
TH3	EOVO	17547
PH3	EOVO	17550
DPS1	EOVO	17556
DTM1	EOVO	17557
DPH1	EOVO	17560
DPS2	EOVO	17561
DTH2	EOVO	17562
DPH2	EOVO	17563
DPS3	EOVO	17564
DTH3	EOVO	17565
DPH3	EOVO	17566
TEMP	EOVO	17700

DACU OUTPUT

SYSTEM ANGLES

ANGULAR RATES

COM TEMP BLOCK IS 64 LOC LONG  
 COM LAST TEMPORARY LOC IS TEMP+63

**COMPUTED QUANTITIES**

MAC



INITIAL CONSTANTS

16064	00120000	DEC	10811	IVS3Z	
16065	00000000	DEC	0811	IVS4X	
16066	77700000	DEC	-8811	IVS4Y	
16067	00120000	DEC	10811	IVS4Z	
16070	77777777	OCT	77777777	IT1XU	
16071	70000000	OCT	70000000	IT1XL	-2009
16072	00000000	OCT	00000000	IT1YU	
16073	00000000	OCT	00000000	IT1YL	
16074	77777777	OCT	77777777	IT1ZU	-20011
16075	00000000	OCT	00000000	IT1ZL	
16076	00000000	OCT	00000000	IT2XU	
16077	00000000	OCT	00000000	IT2XL	
16100	00000000	OCT	00000000	IT2YU	
16101	00000000	OCT	00000000	IT2YL	
16102	77777777	OCT	77777777	IT2ZU	-20011
16103	00000000	OCT	00000000	IT2ZL	
16104	77777777	OCT	77777777	IT3XU	-20011
16105	74000000	OCT	74000000	IT3XL	-2008
16106	00000000	OCT	00000000	IT3YU	
16107	00000000	OCT	00000000	IT3YL	
16110	77777777	OCT	77777777	IT3ZU	-20011
16111	00000000	OCT	00000000	IT3ZL	
16112	00000000	OCT	0		
16113	00000000	OCT	0		
16114	00000000	OCT	0		
16115	06631463	DEC	1.783	IPCAX	60 DEG.
16116	74000000	DEC	-183	IPCAY	
16117	74001507	DEC	-.999283	IPCBE	
16120	00000000	DEC	08-6	IPLAX	
16121	00000000	DEC	0A-6	IPLAY	
16122	15257361	DEC	.0065158-6	IPLAE	4/614
16123	00000000	DEC	0B-6	IPEAX	
16124	62072520	DEC	-.003398-7	IPEAY	2/590
16125	00000000	DEC	0B-6	IPEAZ	
16126	06631463	DEC	1.783	IPC8X	60 DEG.
16127	74000000	DEC	-183	IPC8Y	
16130	74001507	DEC	-.999283	IPC8Z	
16131	00000000	DEC	0B-6	IPL8X	
16132	00000000	DEC	0A-6	IPL8Y	
16133	15257361	DEC	.0065158-6	IPL8Z	
16134	00000000	DEC	0B-7	IPE8X	
16135	62072520	DEC	-.003398-7	IPE8Y	
16136	00000000	DEC	0B-7	IPE8Z	
16137	21534121	DEC	4.4283	IPCCX	25 DEG.
16140	74000000	DEC	-183	IPCCY	
16141	74001507	DEC	-.999283	IPCCZ	
16142	00000000	DEC	0B-6	IPLCX	
16143	00000000	DEC	0A-6	IPLCY	
16144	15257361	DEC	.0065158-6	IPLCZ	
16145	00000000	DEC	0B-7	IPECX	
16146	62072520	DEC	-.003398-7	IPECY	
16147	00000000	DEC	0B-7	IPECZ	
16150	00000000	OCT	0		
16151	00000000	OCT	0		
16152	00000000	OCT	0		
16153	00000000	OCT	0		

INITIAL CONSTANTS

16154	00000000	OCT	0	
16155	00000000	OCT	0	IPS1
16156	00000000	OCT	0	ITM1
16157	00000000	OCT	0	IPM1
16160	00000000	OCT	0	IPS2
16161	00000000	OCT	0	ITM2
16162	00000000	OCT	0	IPM2
16163	00000000	OCT	0	IPS3
16164	00000000	OCT	0	ITM3
16165	00000000	OCT	0	IPM3
16166	00000000	OCT	0	
16167	00000000	OCT	0	
16170	00777737	OCT	777737	ICW1
16171	21042104	OCT	21042104	ICW2
16172	00000000	OCT	0	
16173	00000000	OCT	0	
16174	37777777	OCT	37777777	IUNIT XX
16175	00000000	OCT	0	IUNIT XY
16176	00000000	OCT	0	IUNIT XZ
16177	00000000	OCT	0	IUNIT YX
16200	37777777	OCT	37777777	IUNIT YY
16201	00000000	OCT	0	IUNIT YZ
16202	00000000	OCT	0	IUNIT ZX
16203	00000000	OCT	0	IUNIT ZY
16204	37777777	OCT	37777777	IUNIT FZ
16205	10114000	DEC	1043812	DCONA
16206	10114000	DEC	1043812	DCONB
16207	25150000	DEC	2714812	DCONC
16210	00000000	OCT	0	
16211	00000000	OCT	0	
16212	20240237	OCT	20240237	ANA LOG
16213	20240011	OCT	20240011	TRI 1
16214	20240111	OCT	20240111	TRI 2
16215	20240400	OCT	20240400	DDP 24
16216	20240300	OCT	20240300	R440
16217	00000000	OCT	0	
16220	00000000	OCT	0	
		COM		
		COM		SUBROUTINE ADDRESSES
16221	00011334	OCT	11334	TRI ANG SYS1
16222	00011377	OCT	11377	TRI ANG SYS2
16223	00011442	OCT	11442	TRI ANG SYS3
16224	00011714	OCT	11714	TRI LIN SYS1
16225	00011762	OCT	11762	TRI LIN SYS2
16226	00012030	OCT	12030	TRI LIN SYS3
16227	00012137	OCT	12137	ANA ANG SYS1
16230	00012172	OCT	12172	ANA ANG SYS2
16231	00012225	OCT	12225	ANA ANG SYS3
16232	00012257	OCT	12257	ANA LIN SYS1
16233	00012342	OCT	12342	ANA LIN SYS2
16234	00012425	OCT	12425	ANA LIN SYS3
16235	00012507	OCT	12507	DIG ANG SYS1
16236	00012552	OCT	12552	DIG ANG SYS2
16237	00012615	OCT	12615	DIG ANG SYS3
16240	00012660	OCT	12660	DIG LIN SYS1
16241	00012732	OCT	12732	DIG LIN SYS2

INITIAL CONSTANTS

16242	00013004	OCT	13004	DIG LIN SYS3
16243	00000000	OCT	0	
16244	00000000	OCT	0	
16245	00000000	OCT	0	
16246	00000000	OCT	0	
16247	00000000	OCT	0	
16250	00000000	OCT	0	
16251	00013056	OCT	13056	SIM ANG SYS1
16252	00013142	OCT	13142	SIM ANG SYS2
16253	00013227	OCT	13227	SIM ANG SYS3
16254	00013313	OCT	13313	SIM LIN SYS1
16255	00013376	OCT	13376	SIM LIN SYS2
16256	00013461	OCT	13461	SIM LIN SYS3
16257	00013544	OCT	13544	LOCAL ANG SYS1
16260	00013604	OCT	13604	LOCAL ANG SYS2
16261	00013644	OCT	13644	LOCAL ANG SYS3
16262	00013704	OCT	13704	TYPENRITER I/O
16263	00000000	OCT	0	
16264	00000000	OCT	0	
16265	00000000	OCT	0	
16266	00000000	OCT	0	
16267	00000000	OCT	0	
16270	00000000	OCT	0	
16271	00000000	OCT	0	
16272	00000000	OCT	0	
16273	00000000	OCT	0	
16274	00000000	OCT	0	
16275	00000000	OCT	0	
16276	00000000	OCT	0	
16277	00000000	OCT	0	
		COM		
		COM		DACU CONSTANTS
16300	24364369	DEC	81.9187	DACC
16301	40000000	OCT	40000000	
16302	00000000	OCT	0	
16303	00000000	OCT	0	
16304	06646645	DEC	27.303387	
16305	37775320	OCT	37775320	
16306	00040000	DEC	189	
16307	00000000	OCT	0	
16310	02030345	DEC	8.19187	
16311	37775320	OCT	37775320	
16312	00100000	DEC	289	
16313	00000000	OCT	0	
16314	00535366	DEC	2.7303387	
16315	37775320	OCT	37775320	
16316	00140000	DEC	389	
16317	00000000	OCT	0	
16320	00150660	DEC	.819187	
16321	37775320	OCT	37775320	
16322	00200000	DEC	489	
16323	00000000	DEC	0	
16324	00042745	DEC	.2730387	
16325	37775320	OCT	37775320	
16326	00240000	DEC	589	
16327	00000000	DEC	0	

INITIAL CONSTANTS

16330	00012370	DEC	.0019187	
16331	37775320	OCI	37775320	
16332	00300000	DEC	085	
16333	00000000	OCI	U	
		COM		END DACU CONSTANTS
		COM		LAST SCALE FACTORS
16334	00000000	OCI	U	LSF1
		COM		LSF BLOCK THRU 16347
		COM	*****	
		COM	*****	
		COM	SUBROUTINE ADDRESSES	
		LOCU	16500	
16500	00070102	OCI	70102	SINE
16501	00070100	OCI	70100	COSINE
16502	00070125	OCI	70125	SQRT
16503	00016400	OCI	16400	DACU
16504	00070226	OCI	70226	NOTU
16505	00015000	OCI	15000	NOT1
16506	00015044	OCI	15044	NOT2
16507	00015110	OCI	15110	NOT3
16510	00015154	OCI	15154	NOT4
16511	00015220	OCI	15220	NOT8
16512	00015264	OCI	15264	NOTC
16513	00015330	OCI	15330	MUNIT
16514	00015340	OCI	15340	DADD
16515	00070254	OCI	70254	MDS
16516	00015354	OCI	15354	M3D1
16517	00070305	OCI	70305	CSV
16520	00070264	OCI	70264	SDS
16521	00015500	OCI	15500	SCG
16522	00015610	OCI	15610	ROTPIR
16523	00015624	OCI	15624	ROTPIR
16524	00015640	OCI	15640	ROTPIR
16525	00070170	OCI	70170	NOTX
16526	00070206	OCI	70206	NOTY
16527	00070314	OCI	70314	NOTZ
16530	00014460	OCI	14460	REL SGS
16531	00014555	OCI	14555	UACUAT
16532	00014445	OCI	14445	XMTU
16533	00010740	OCI	10740	NDV
16534	00016600	OCI	16600	HBV
16535	00016720	OCI	16720	DORC
16536	00015653	OCI	15653	EOF
16537	00014670	OCI	14670	XMTLP
16540	00014427	OCI	14427	XMTS
16541	00011043	OCI	11043	SYS1
16542	00011140	OCI	11140	SYS2
16543	00011236	OCI	11236	SYS3
16544	00016352	OCI	16352	SUN
16545	00011000	OCI	11000	SHAOWN
16546	00006205	OCI	06205	COC PAC
16547	00011505	OCI	11505	SYS1IC
16550	00011562	OCI	11562	SYS2IC
16551	00011637	OCI	11637	SYS3IC
16552	00006264	OCI	06264	XMITCOL
16553	00000000	OCI	U	

INITIAL CONSTANTS

16554	00000000	OCT	0	
16555	00012076	OCT	12076	T VECT SYS1
16556	00012111	OCT	12111	T VECT SYS2
16557	00012124	OCT	12124	T VECT SYS3
		LOCO	17556	
17556	00000000	OCT	0	DPS1
17557	00000000	OCT	0	DTM1
17560	00000000	OCT	0	DPN1
17561	00000000	OCT	0	DPS2
17562	00000000	OCT	0	DTM2
17563	00000000	OCT	0	DPN2
17564	00000000	OCT	0	DPS3
17565	00000000	OCT	0	DTM3
17566	00000000	OCT	0	DPN3

XXXX

MAC

SOURCE INPUT

		TTL	SOURCE INPUT	
		LOCO	10000	
		MIC		USES WORKING STORAGE 2,4
		MIC		
10000	34072140	STF 07	STW 40	RESET PF'IS, WS4
10001	65600000	COM 60	NOP	
10002	26711201	LDI PA	SEL 0A	SELECT IJU
10003	20260000	OCT	20260000	
10004	74 1 16170	LDD A	ICW1	LOAD ICW1
10005	07015641	CLD 1	AND DA	SYS1 USED
10006	32111602	TZO A1	FTR 2	NO, BRANCH
10007	21440000	STW 4D	NOP	SET WS4 TO NON-ZERO
10010	21270441	STW 2P	CLP 041	SAVE RETURN, GO SYS1
10011	74 1 16170	LDD A	ICW1	LOAD ICW1
10012	07025641	CLD 2	AND DA	SYS2 USED
10013	32111602	TZO A1	FTR 2	NO, BRANCH
10014	21443407	STW 4D	STF 07	SET WS4 NON-ZERO, RESET PF'IS
10015	21270442	STW 2P	CLP 042	SAVE RETURN, GO SYS2
10016	74 1 16170	LDD A	ICW1	LOAD ICW1
10017	07045641	CLD 4	AND DA	SYS3 USED
10020	32111602	TZO A1	FTR 2	NO, BRANCH
10021	21443407	STW 4D	STF 07	SET WS4 NON-ZERO, RESET PF'IS
10022	21270443	STW 2P	CLP 043	SAVE RETURN, GO SYS3
10023	23413211	LDW 4A	TZO A1	WAS ANY SYS USED
10024	01000000	HLT	NOP	NO, HALT
10025	26711201	LDI PA	SEL 0A	DISCONNECT IJU
10026	20250600	OCT	20250600	
10027	70753535	CPF PL	TCF 35	(RETURN ADDR-1) IN L, SSW5=1
10030	74 7 16262	LDD P	TYPEWRITER IO	NO, GO TYPEWRITER I/O
10031	37351602	TCT 35	FTR 2	IF SSW5=1, BRANCH
10032	27773407	LDM PP	STF 07	• GO TO MAIN PROG
10033	00 0 10051	ADR	000VACALC	• AND RESET PF'IS
10034	26752755	LDI PL	LDM LL	• GO INDIRECT TO SELECT
10035	00003357	OCT	03357	• FOR LDR/CONV ROUTINE
10036	45755455	EXC PL	CDL LL	• AND PUT (RETURN ADDR-1) IN L
10037	14720000	BTR 5	NOP	GO BACK TO MAIN PROG BRANCH
		MAC		

MAIN PGM. VIEW A

10051 74 4 16170 VACALC  
 10052 33111602  
 10053 27770000  
 10054 00 0 10244  
 10055 26712673 RESV  
 10056 00 0 16000  
 10057 00 0 17535  
 10060 36010000  
 10061 70750417  
 10062 36040000  
 10063 70750405  
  
 10064 26712672  
 10065 00 0 17535  
 10066 00 0 17000  
 10067 26730000  
 10070 00 0 17120  
 10071 70750420  
  
 10072 07023406  
 10073 70750404  
 10074 26712672  
 10075 00 0 17120  
 10076 00 0 17010  
 10077 26730000  
 10100 00 0 17126  
 10101 70750414  
 10102 26740000  
 10103 00 0 17126  
 10104 70750416  
  
 10105 74 1 16170  
 10106 05076661  
 10107 37521603  
 10110 63047204  
 10111 75 4 17361  
 10112 16020000  
 10113 36010000  
 10114 70750435

TTL MAIN PGM. VIEW A  
 MIC  
 MIC MAIN CALLING SEQUENCE FOR  
 MIC VIEW A CALCULATIONS  
 MIC  
 MIC RESOLVE STATIONS POINT.SPA  
 MIC  
 LOC 10051  
 LDD D ICM1  
 TMT 11 FTR 02  
 LDM PP NOP  
 ADR 000VBT TO VIEW B TEST  
 LDI PA LDI PC  
 ADR 0001SPAX  
 ADR 000SPX  
 STT PF1 NOP  
 CPF PL CLP 017 CSV  
 STT PF6 NOP  
 CPF PL CLP 05 ROT1  
 MIC  
 MIC CALCULATE LAN  
 LDI PA LDI PB  
 ADR 000SPX  
 ADR 000T1XU  
 LDI PC NOP  
 ADR 000LARXU  
 CPF PL CLPO 20 SDS  
 MIC  
 MIC CALCULATE LA2  
 MIC  
 CLD 02 STF PF6  
 CPF PL CLP 04 ROTU  
 LDI PA LDI PB  
 ADR 000LARXU LARXU-->A  
 ADR 000T2XU T2XU-->B  
 LDI PC NOP  
 ADR 000LA2XU LA2XU-->C  
 CPF PL CLPO 14 DADD  
 LDI PD NOP  
 ADR 000LA2XU LA2XU-->D  
 CPF PL CLPO 16 MSD1  
 DORC  
 MIC  
 MIC  
 LDD A ICM1 TEST CONTROL WORD  
 LRC 07 SSL ROMA FOR CURVATURE  
 TCT 52 FTR 03 TEST A23  
 CCL 00 CPS 00 37777777-->D  
 STD D DORCA  
 FTR 02 NOP  
 STT PF1-NOP  
 CPF PL CLPO 35 DORC ROUTINE  
 MIC  
 MIC  
 MIC  
 MIC CALCULATE Z01---ROLL ANGLE  
 MIC RESULT IN UNIT 2  
 MIC

MAIN PGM, VIEW A

10115	70750413	CPF PL	CLPO 13	RUNIT
10116	26733406	LDI PC	STF PF6	
10117	00 0 17516	ADR	000UNITX	UNITX-->C
10120	70750405	CPF PL	CLP 05	ROT 1
10121	75 0 17106	STD 0	SINGA	0-->SIN GA
10122	24710000	LDI PA	NOP	
10123	37777777	OCT	37777777	
10124	75 1 17107	STD A	COSGA	1-->COS GA
10125	70750410	CPF PL	CLPO 10	ROT A
		MIC		
		MIC		
		MIC		DELETE ROLL IF SOS NOT USED
		MIC		
10126	74 4 16170	LDD D	ICW1	
10127	05036664	LRC 03	SSL ROMD	
10130	33111602	TMT 11	FTR 02	
10131	75 0 17517	STD 0	UNIT 2Y	
10132	75 0 17520	STD 0	UNIT 2Z	
		MIC		
10133	07010000	CLD 01	NOP	
10134	70750421	CPF PL	CLPO 21	SCG
10135	74 1 16170	LDD A	ICW1	CURV-DIP TEST
10136	05076641	LRC 07	SSL RCMA	
10137	35521602	TCF 52	FTR 02	NO CURVATURE
10140	05016601	LRC 01	SSL LCMA	
10141	37521601	TCT 52	FTR 01	DO DIP
10142	75 0 17103	STD 0	DA	
		MIC		
		MIC		
		MIC		DIP ANGLE SIN AND COS
		MIC		CALCULATION
		MIC		
10143	74 2 17103	LDD 0	DA	$1/((2PI(0)*.5))-->D$
10144	74 3 17777	LDD C	TEMP+63	R-->C
10145	76542111	MCS 12	STW 1A	
10146	70750400	CPF PL	CLP 00	SIN ROUTINE
10147	75 1 17075	STD A	SIN DA	STORE SIN DA
10150	23110000	LDD 1A	NOP	
10151	70750401	CPF PL	CLP 01	COS ROUTINE
10152	75 1 17076	STD A	COS DA	STORE COS DA
		MIC		BEACON
		MIC		
10153	74 1 16170	LDD A	ICW1	
10154	05046661	LRC 04	SSL ROMA	
10155	37521602	TCT 52	FTR 02	
10156	75 0 17343	STD 0	BEACON	
10157	16010000	FTR 01	NOP	
10160	70750434	CPF PL	CLPO 34	BEACON ROUTINE
		MIC		SHADOW
		MIC		
10161	74 1 16170	LDD A	ICW1	
10162	05036661	LRC 03	SSL ROMA	
10163	35521601	TCF 52	FTR 01	
10164	70750445	CPF PL	CLPO 45	SHADOW
		MIC		

MAIN POM, VIEW A

			MIC		RESOLVE PCAR
			MIC		
10165	26712673		LDI PA	LDI PC	
10166	00 0 16115		ADR	0001PCAX	IPCAX-->A
10167	00 0 17206		ADR	000PCARX	PCARX-->C
10170	70750417		CPF PL	CLPO 17	CSV
10171	70750422		CPF PL	CLPO 22	ROTP1R
			MIC		
			MIC		RESOLVE PEAR
			MIC		
10172	26712673		LDI PA	LDI PC	
10173	00 0 16123		ADR	0001PEAX	
10174	00 0 17214		ADR	000PEARX	
10175	70750417		CPF PL	CLP 017	CSV
10176	36060000		STT PF6	NOP	
10177	70750410		CPF PL	CLP 010	-ROTA
10200	36060000		STT PF6	NOP	
10201	70750405		CPF PL	CLP 005	-ROT1
			MIC		
			MIC		RESOLVE PLARX
			MIC		
10202	26712673		LDI PA	LDI PC	
10203	00 0 16120		ADR	0001PLAX	
10204	00 0 17211		ADR	000PLARX	
10205	70750417		CPF PL	CLP 017	CSV
10206	70750422		CPF PL	CLP 022	ROTP1R
			MIC		
			MIC		RESOLVE PCA2
			MIC		
10207	26712673		LDI PA	LDI PC	
10210	00 0 16115		ADR	0001PCAX	
10211	00 0 17217		ADR	000PCA2X	
10212	70750417		CPF PL	CLP 017	CSV
10213	36060000		STT PF6	NOP	
10214	70750410		CPF PL	CLP 010	-ROTA
10215	36060000		STT PF6	NOP	
10216	70750405		CPF PL	CLP 005	-ROT1
10217	70750406		CPF PL	CLP 006	ROT2
			MIC		
			MIC		RESOLVE PLA2
			MIC		
10220	26712673		LDI PA	LDI PC	
10221	00 0 16120		ADR	0001PLAX	
10222	00 0 17222		ADR	000PLA2X	
10223	70750417		CPF PL	CLP 017	CSV
10224	36060000		STT PF6	NOP	
10225	70750410		CPF PL	CLP 010	-ROTA
10226	36060000		STT PF6	NOP	
10227	70750405		CPF PL	CLP 005	-ROT1
10230	70750406		CPF PL	CLP 006	ROT2
			MIC		
			MIC		RESOLVE PEAR2
			MIC		
10231	26712673		LDI PA	LDI PC	
10232	00 0 17214		ADR	000PEARX	

MAIN PGM, VIEW A

10233 00 0 17225  
10234 70750417  
10235 7075040A

10236 27770000  
10237 00 0 10244  
10240 00000000  
10241 00000000  
10242 00000000  
10243 00000000

ADR 000PEA2X  
CPF PL CLP 017 CSV  
CPF PL CLP 006 ROT2  
MIC  
MIC EXIT  
MIC  
LDM PP NOP  
ADR 000VBT  
OCT 0  
OCT 0  
OCT 0  
OCT 0  
MAC

MAIN PGM, VIEW B

MAIN PGM, VIEW B				MAIN CALLING SEQUENCE FOR VIEW B CALCULATIONS			
MAIN PGM, VIEW B				RESOLVE STATION POINT, SPB			
10244	74 4	16170	VBT	LDD D	ICW1		
10245	33221602			TMT 22	FTR 02		
10246	27770000			LDM PP	NOP		
10247	00 0	10425		ADR	000VCT	TO VIEW C TEST	
10250	26712673			LDI PA	LDI PC		
10251	00 0	16003		ADR	0001SPBX		
10252	00 0	17535		ADR	000SPX		
10253	02603601			CTS 60	STT PF1		
10254	70750417			CPF PL	CLP 017	CSV	
10255	36060000			STT PF6	NOP		
10256	70750408			CPF PL	CLP 06	ROT2	
				MIC		CALCULATE LBR	
10257	26712672			LDI PA	LDI PB		
10260	00 0	17535		ADR	000SPX		
10261	00 0	17010		ADR	000T2XU		
10262	26730000			LDI PC	NOP		
10263	00 0	17142		ADR	000LBRXU		
10264	70750420			CPF PL	CLPO 20	SDS	
				MIC		CALCULATE LB1	
10265	07013406			CLD 01	STT PF6		
10266	70750404			CPF PL	CLP 04	ROTU	
10267	26712672			LDI PA	LDI PB		
10270	00 0	17142		ADR	000LBRXU	LBRXU-->A	
10271	00 0	17000		ADR	000T1XU	T1XU-->B	
10272	26730000			LDI PC	NOP		
10273	00 0	17150		ADR	000LB1XU	LB1XU-->C	
10274	70750414			CPF PL	CLPO 14	DADD	
10275	26740000			LDI PD	NOP		
10276	00 0	17150		ADR	000LB1XU	LB1XU-->D	
10277	70750416			CPF PL	CLPO 16	M3D1	
				MIC		DORC	
10300	74 1	16170		LDD A	ICW1	TEST CONTROL WORD	
10301	05116661			LRC 09	SSL ROMA	FOR CURVATURE	
10302	37521603			TCT 52	FTR 03	TEST A23	
10303	63047204			CCL 0D	CPS 0D	37777777-->D	
10304	75 4	17362		STD 0	DORCB		
10305	16020000			FTR 02	NOP		
10306	36020000			STT PF2	NOP		
10307	70750435			CPF PL	CLPO 35	DORC ROUTINE	
				MIC		CALCULATE ZOR--ROLL ANGLE	
				MIC		RESULT IN UNIT 2	
				MIC			
				MIC			

MAIN PGM. VIEW 8

10310	70750413	CPF PL	CLPO 13	RUNIT
10311	26733406	LDI PC	STF PF6	
10312	00 0 17516	ADR	000UNITEX	UNITEX-->C
10313	70750406	CPF PL	CLP 06	ROT 2
10314	75 0 17110	STD 0	SINGB	0-->SIN 08
10315	26710000	LDI PA	NOP	
10316	37777777	OCT	37777777	
10317	75 1 17111	STD A	COS88	1-->COS 08
10320	70750411	CPF PL	CLPO 11	ROT 8
		MIC		
		MIC		DELETE ROLL IF SGS NOT USED
		MIC		
10321	74 4 16170	LDD D	ICH1	
10322	05036664	LRC 03	SSL ROND	
10323	33221602	TMT 22	FTR 02	
10324	75 0 17517	STD 0	UNIT 2Y	
10325	75 0 17520	STD 0	UNIT 2Z	
		MIC		
10326	07020000	CLD 02	NOP	
10327	70750421	CPF PL	CLPO 21	SCG
10330	74 1 16170	LDD A	ICH1	CURV-DIP TEST
10331	05116641	LRC 09	SSL RCHA	
10332	33521602	TCF 52	FTR 02	NO CURVATURE
10333	05016601	LRC 01	SSL LCHA	
10334	33521601	TCT 52	FTR 01	DO DIP
10335	75 0 17104	STD 0	DB	
		MIC		
		MIC		
		MIC		DIP ANGLE SIN AND COS
		MIC		CALCULATION
		MIC		
10336	74 2 17104	LDD B	DB	1/[(2PU(B)+.5)]-->B
10337	74 3 17777	LDD C	TEMP+63	R-->C
10340	76542111	MCS 12	STM 1A	
10341	70750400	CPF PL	CLP 00	SIN ROUTINE
10342	75 1 17077	STD A	SIN 08	STORE SIN DB
10343	23110000	LDM 1A	NOP	
10344	70750401	CPF PL	CLP 01	COS ROUTINE
10345	75 1 17100	STD A	COS 08	
		MIC		
		MIC		RESOLVE PCBR
		MIC		
10346	26712673	LDI PA	LDI PC	
10347	00 0 16126	ADR	000PCBX	
10350	00 0 17241	ADR	000PCRX	
10351	70750417	CPF PL	CLPO 17	CSV
10352	70750423	CPF PL	CLPO 23	
		MIC		
		MIC		RESOLVE PEAR
		MIC		
10353	26712673	LDI PA	LDI PC	
10354	00 0 16134	ADR	000PEBX	
10355	00 0 17247	ADR	000PEBX	
10356	70750417	CPF PL	CLP 017	CSV
10357	36060000	STT PF6	NOP	

MAIN PGM, VIEW B

10360	70750411	CPF PL	CLPO 11	-ROT 8
10361	36060000	STT PF6	NOP	
10362	70750406	CPF PL	CLPO 06	-ROT 2
		MIC		
		MIC		RESOLVE PL8R
		MIC		
10363	26712673	LDI PA	LDI PC	
10364	00 0 16131	ADR	000IPL8X	
10365	00 0 17244	ADR	000PL8RX	
10366	70750417	CPF PL	CLP 017	CSV
10367	70750423	CPF PL	CLPO 23	ROTP2R
		MIC		
		MIC		RESOLVE PCB1
		MIC		
10370	26712673	LDI PA	LDI PC	
10371	00 0 16126	ADR	000IPC8X	
10372	00 0 17252	ADR	000PCR1X	
10373	70750417	CPF PL	CLP 017	CSV
10374	36060000	STT PF6	NOP	
10375	70750411	CPF PL	CLPO 11	-ROT 8
10376	36060000	STT PF6	NOP	
10377	70750406	CPF PL	CLPO 06	-ROT 2
10400	70750405	CPF PL	CLPO 05	ROT 1
		MIC		
		MIC		RESOLVE
		MIC		PLB1
		MIC		
10401	26712673	LDI PA	LDI PC	
10402	00 0 16131	ADR	000IPL8X	
10403	00 0 17255	ADR	000PL81X	
10404	70750417	CPF PL	CLP 017	CSV
10405	36060000	STT PF6	NOP	
10406	70750411	CPF PL	CLPO 11	-ROT 8
10407	36060000	STT PF6	NOP	
10410	70750406	CPF PL	CLPO 06	-ROT 2
10411	70750405	CPF PL	CLPO 05	ROT 1
		MIC		
		MIC		RESOLVE PCB1
		MIC		
10412	26712673	LDI PA	LDI PC	
10413	00 0 17247	ADR	000P8RX	
10414	00 0 17260	ADR	000P81X	
10415	70750417	CPF PL	CLP 017	CSV
10416	70750405	CPF PL	CLPO 05	ROT 1
		MIC		
10417	27770000	LDH PP	NOP	
10420	00 0 10425	ADR	000VCT	
10421	00000000	OCT	0	
10422	00000000	OCT	0	
10423	00000000	OCT	0	
10424	00000000	OCT	0	
		MAC		

MAIN POM, VIEW C

MAIN POM, VIEW C			MAIN CALLING SEQUENCE FOR VIEW C CALCULATIONS		
VCT			RESOLVE STATION POINT, SPC		
10425	74 4	16170	TTL		
10426	33441602		MIC		
10427	27770000		MIC		
10430	00 0	10673	MIC		
10431	26712673		MIC		
10432	00 0	16006	MIC		
10433	00 0	17535	MIC		
10434	02603601		MIC		
10435	70750417		MIC		
10436	36060000		MIC		
10437	70750407		MIC		
10440	26712672		MIC		
10441	00 0	17535	MIC		
10442	00 0	17020	MIC		
10443	26730000		MIC		
10444	00 0	17164	MIC		
10445	70750420		MIC		
10446	07013406		MIC		
10447	70750404		MIC		
10450	26712672		MIC		
10451	00 0	17164	MIC		
10452	00 0	17000	MIC		
10453	26730000		MIC		
10454	00 0	17172	MIC		
10455	70750414		MIC		
10456	26740000		MIC		
10457	00 0	17172	MIC		
10460	70750416		MIC		
10461	07023406		MIC		
10462	70750404		MIC		
10463	26712672		MIC		
10464	00 0	17164	MIC		
10465	00 0	17020	MIC		
10466	26730000		MIC		
10467	00 0	17200	MIC		
10470	70750414		MIC		
10471	26740000		MIC		
10472	00 0	17200	MIC		
10473	70750416		MIC		
10474	00000000		MIC		
10475	00000000		MIC		

MAJN PGM, VIEW C

10476	00000000	OCT	0	
10477	00000000	OCT	0	
		MIC		
		MIC		DORC
		MIC		
10500	74 1 16170	LDD A	ICW1	TEST CONTROL WORD
10501	05136661	LRC 11	SSL ROMA	FOR CURVATURE
10502	37521603	TCT 52	FTR 03	TEST A23
10503	63047204	CCL 0D	CPS 0D	37777777-->D
10504	75 4 17363	STD D	DORCC	
10505	16020000	FTR 02	NOP	
10506	36030000	STT PF3	NOP	
10507	70750435	CPF PL	CLPO 35	DORC ROUTINE
		MIC		
		MIC		
		MIC		CALCULATE 20C--ROLL ANGLE
		MIC		RESULT IN UNIT 2
		MIC		
10510	70750413	CPF PL	CLPO 13	RUNIT
10511	26733406	LDI PC	STF PF6	
10512	00 0 17516	ADR	000UNITZX	UNITZX-->C
10513	70750407	CPF PL	CLPO 07	ROT 3
10514	75 0 17112	STD 0	SINOC	
10515	26710000	LDI PA	NOP	
10516	37777777	OCT	37777777	
10517	75 1 17113	STD A	COSOC	1-->COS GC
10520	70750412	CPF PL	CLPO 12	ROT C
		MIC		
		MIC		DELETE ROLL IF SGS NOT USED
		MIC		
10521	74 4 16170	LDD D	ICW1	
10522	05036664	LRC 03	SSL ROMD	
10523	33441602	TMT 44	FTR 02	
10524	75 0 17517	STD 0	UNIT 2Y	
10525	75 0 17520	STD 0	UNIT 2Z	
		MIC		
10526	07030000	CLD 03	NOP	
10527	70750421	CPF PL	CLPO 21	SCG
10530	74 1 16170	LDD A	ICW1	CURV-DIP TEST
10531	05136641	LRC 11	SSL RCMA	
10532	35521602	TCF 52	FTR 02	NO CURVATURE
10533	05016601	LRC 01	SSL LCMA	
10534	37521601	TCT 52	FTR 01	DO DIP
10535	75 0 17105	STD 0	DC	
		MIC		
		MIC		
		MIC		DIP ANGLE SIN AND COS
		MIC		CALCULATION
		MIC		
10536	74 2 17105	LDD B	DC	1/[(2PI(8)**.5)]-->B
10537	74 3 17777	LDD C	TEMP*63	R-->C
10540	76542111	HCS 12	STM 1A	
10541	70750400	CPF PL	CLP 00	SIN ROUTINE
10542	75 1 17101	STD A	SIN DC	
10543	23110000	LDN 1A	NOP	

MAIN PGM. VIEW C

10544	70750401	CPF PL	CLP 01	COS ROUTINE
10545	75 1 17102	STD A	COS DC	
		NIC		
		NIC		RESOLVE PCCR
		NIC		
10546	26712673	LDI PA	LDI PC	
10547	00 0 16137	ADR	0001PCCX	
10550	00 0 17274	ADR	000PCCR	PCCR-->C
10551	70750417	CPF PL	CLPO 17	CSV
10552	70750424	CPF PL	CLPO 24	ROTP3R
		NIC		
		NIC		RESOLVE PLCR
		NIC		
10553	26712673	LDI PA	LDI PC	
10554	00 0 16142	ADR	0001PLCX	
10555	00 0 17277	ADR	000PLCR	
10556	70750417	CPF PL	CLP 017	CSV
10557	70750424	CPF PL	CLPO 24	ROTP3R
		NIC		
		NIC		FORM PCC1 AND PCC2
		NIC		
10560	26712673	LDI PA	LDI PC	
10561	00 0 16137	ADR	0001PCCX	
10562	00 0 17305	ADR	000PCC1X	
10563	70750417	CPF PL	CLPO 17	CSV
10564	36060000	STT PF6	NOP	
10565	70750412	CPF PL	CLPO 12	-ROT C
10566	36060000	STT PF6	NOP	
10567	70750407	CPF PL	CLPO 07	- ROT 3
10570	26714513	LDI PA	EXC AC	
10571	00 0 17316	ADR	000PCC2X	
10572	70750417	CPF PL	CLPO 17	CSV
10573	70750406	CPF PL	CLPO 06	
10574	26730000	LDI PC	NOP	
10575	00 0 17305	ADR	000PCC1X	
10576	70750405	CPF PL	CLPO 05	ROT 1
		NIC		
		NIC		FORM PLC1 AND PLC2
		NIC		
10577	26712673	LDI PA	LDI PC	
10600	00 0 16142	ADR	0001PLCX	
10601	00 0 17310	ADR	000PLC1X	
10602	70750417	CPF PL	CLPO 17	CSV
10603	36060000	STT PF6	NOP	
10604	70750412	CPF PL	CLPO 12	-ROT C
10605	36060000	STT PF6	NOP	
10606	70750407	CPF PL	CLPO 07	-ROT 3
10607	26714513	LDI PA	EXC AC	
10610	00 0 17321	ADR	000PLC2X	
10611	70750417	CPF PL	CLPO 17	CSV
10612	70750406	CPF PL	CLPO 06	ROT 2
10613	26730000	LDI PC	NOP	
10614	00 0 17310	ADR	000PLC1X	
10615	70750405	CPF PL	CLPO 05	ROT 1
		NIC		
		NIC		RESOLVE PECC, PEC1, PEC2

MAIN PGM, VIEW C

10616	26712673		MIC		
10617	00 0 16145		LDI PA	LDI PC	
10620	00 0 17302		ADR	0001PECX	
10621	70750417		ADR	000PECRX	
10622	36060000		CPF PL	CLPO 17	CSV
10623	70750412		STT PF6	NOP	
10624	36060000		CPF PL	CLPO 12	-ROT C
10625	70750407		STT PF6	NOP	
10626	26714513		CPF PL	CLPO 07	-ROT 3
10627	00 0 17313		LDI PA	EXC AC	
10630	70750417		ADR	000PEC1X	
10631	26712673		CPF PL	CLPO 17	CSV
10632	00 0 17302		LDI PA	LDI PC	
10633	00 0 17324		ADR	000PECRX	
10634	70750417		ADR	000PEC2X	
10635	70750406		CPF PL	CLPO 17	CSV
10636	26730000		CPF PL	CLPO 06	ROT 2
10637	00 0 17313		LDI PC	NOP	
10640	70750405		ADR	000PEC1X	
			CPF PL	CLPO 05	ROT 1
			MIC		
			MIC		
10641	26752751		LDI PL	LDM LA	SW 6 ON FOR HOLD
10642	00 0 16171		ADR	0001CW2	
10643	26722673		LDI PB	LDI PC	
10644	00 0 10663		ADR	000CW2	
10645	00 0 10664		ADR	000LOCIND	
10646	27343041		LDM CD	TN2 D1	
10647	16010000		FTR 1	NOP	
10650	25210000		STM BA	NOP	
10651	37361602		TCT 36	FTR 2	
10652	27242930		LDM BD	STM CO	
10653	16060000		FTR 6	NOP	
10654	26740911		LDI PD	LRC 9	
10655	00 0 17521		ADR	000MS1X	
10656	24409466		STI DO	CDL NN	
10657	30621476		TN2 N2	BTR 1	
10660	26742937		LDI PD	STM CP	
10661	21042104		OCT	21042104	
10662	25541602		STM LD	FTR 2	
10663	21042104	CW2	OCT	21042104	
10664	00000000	LOCIND	OCT	0	
10665	27770000		LDM PP	NOP	
10666	00 0 10673		ADR	000DUT	
			MIC		
10667	00000000		OCT	0	
10670	00000000		OCT	0	
10671	00000000		OCT	0	
10672	00000000		OCT	0	
			MIC		
			MIC		
			MIC		
10673	70750436	OUT	CPF PL	CLPO 36	EOF
10674	70750444		CPF PL	CLPO 44	SUN CONSTANTS
10675	70750430		CPF PL	CLPO 30	RELSGS

MAIN PGM. VIEW C

10676	00000000	NOP	NOP	SLACK FOR SPCL INBT.
10677	00000000	NOP	NOP	
10700	00000000	NOP	NOP	
10701	00000000	NOP	NOP	
10702	00000000	NOP	NOP	
10703	00000000	NOP	NOP	
10704	00000000	NOP	NOP	
10705	00000000	NOP	NOP	
10706	00000000	NOP	NOP	
10707	00000000	NOP	NOP	
10710	00000000	NOP	NOP	
10711	00000000	NOP	NOP	
10712	00000000	NOP	NOP	
10713	00000000	NOP	NOP	
10714	00000000	NOP	NOP	
10715	00000000	NOP	NOP	
10716	00000000	NOP	NOP	
10717	74 1 16170	LDD A	ICW1	
10720	75 1 17344	STD A	CW1	
10721	70750431	CPF PL	CLPD 31	DACDAT
10722	70750403	CPF PL	CLPD 03	DACU
10723	70750437	CPF PL	CLPD 37	XMYLP
10724	70750440	CPF PL	CLPD 40	XMYL
10725	70750432	CPF PL	CLPD 32	XMYD
10726	37341602	TCT SW4	FTR 02	
10727	27770000	LDM PP	NOP	TRANSFER TO SOURCE INPUT
10730	00010000	OCT	10000	
10731	02702777	CTS 70	LDM PP	TRANSFER TO R520 OUP
10732	00000500	OCT	500	
		MAC		



SHADOW

	TYL	SHADOW		
	NIC		SHADOW RESOLUTION	
	NIC		VIEW A DYNAMIC SYSTEM 1	
	NIC			
	NIC		USES WORKING 2.3.6.7	
	NIC		CALLI CPF PL CLP 045	
	NIC			
	LOCO	11000		
11000	07142135	CLD 12	STM 3L	INITIALIZE VS1.2.3.4
11001	26712672	LDI PA	LDI P9	
11002	00 0 16054	ADR	0001VS1X	
11003	00 0 17327	ADR	000VS1X	
11004	26132423	LDI AC	STI 9C	
11005	54440000	CDL DD	NOP	
11006	30471475	TN2 D7	BTR 02	
11007	07042673	CLD 04	LDI PC	
11010	00 0 17327	ADR	000VS1X	VECTOR ADDRESS-->C
11011	75 4 17700	STD D	TEMP	LOAD LOOP COUNT
11012	74 4 70356	LDD D	SIN 8A	
11013	63444444	CCL DD	CIL DD	
11014	74 1 70357	LDD A	COS 8A	
11015	70750426	CPF PL	CLP 026	-ROTY
11016	74 4 70354	LDD D	SIN AA	
11017	63444444	CCL DD	CIL DD	
11020	74 1 70355	LDD A	COS AA	
11021	70750427	CPF PL	CLP 027	-ROTE
11022	36060000	STT PF6	NOP	
11023	70750405	CPF PL	CLP 05	-ROT 1
11024	74 1 17700	LDD A	TEMP	LOOP COUNTER-->4
11025	54110703	CDL AA	CLD 03	DECREMENT LOOP COUNT
11026	41434614	ADF DC	CPL AD	UPDATE VECTOR ADDRESS
11027	30171461	TN2 A7	BTR 14	
11030	23370000	LDM 3P	NOP	EXIT
		MAC		

SYS1

Address	Op Code	Op Name	Comments
11043	74 1 16171	LDD A ICH2	GET ICH2
11044	07175641	CLD 15 AND DA	MASK BITS 20-23
11045	21171605	STW 1P FTR 5	SAVE RETURN
11046	74 1 16171	LDD A ICH2	GET ICH2
11047	05046671	LRC 4 SSL 7A	SHIFT RIGHT 4
11050	07175641	CLD 15 AND DA	MASK BITS 20-23
11051	21171625	STW 1P FTR 21	SAVE RETURN
11052	23370000	LDW 3P NOP -	PICK UP BRANCH
11053	07105614	CLD 8 AND AD	MASK BIT 20
11054	30411617	TN2 D1 FTR 15	IF SET, GO TO DIG ANG
11055	07034114	CLD 3 AND AD	• EXCLUDE
11056	45340710	EXC CD CLD 8	• NON-ALLOWED
11057	56343041	AND CD TN2 D1	• NON-DIGITAL
11060	01000000	HLT NOP	• CODES
11061	07065614	CLD 6 AND AD	CHECK MIDDLE 2 BITS
11062	30411604	TN2 D1 FTR 4	GO BRANCH TO NON-TRICE ROUTIS
11063	30111601	TN2 A1 FTR 1	WHICH TRICES
11064	07001601	CLD 0 FTR 1	• SET
11065	07010000	CLD 1 NOP	• INDICATOR
11066	74 7 16221	LDD P TRI ANG SYS1	
11067	41175477	ADF AP CDL PP	SET UP P FOR BRANCH
11070	01000000	HLT NOP	
11071	74 7 16227	LDD P ANA ANG SYS1	
11072	74 7 16251	LDD P SIM ANG SYS1	
11073	74 7 16257	LDD P LOCAL ANG SYS1	
11074	07045614	CLD 4 AND AD	• EXCLUDE NON-ALLOWED
11075	30410100	TN2 D1 HLT	• DIGITAL CODES
11076	74 7 16235	LDD P DIG ANG SYS1	
11077	07105614	CLD 8 AND AD	MASK BIT 20
11100	30411614	TN2 D1 FTR 12	IF SET, GO TO DIG LIN
11101	07045614	CLD 4 AND AD	• EXCLUDE NON-ALLOWED
11102	30410100	TN2 D1 HLT	• NON-DIGITAL CODES
11103	07025614	CLD 2 AND AD	CHECK BIT 22
11104	30411604	TN2 D1 FTR 4	GO BRANCH TO NON-TRICE ROUTIS
11105	30111601	TN2 A1 FTR 1	WHICH TRICES
11106	07001601	CLD 0 FTR 1	• SET
11107	07010000	CLD 1 NOP	• INDICATOR
11110	74 7 16224	LDD P TRI LIN SYS1	
11111	41175477	ADF AP CDL PP	SET UP P FOR BRANCH
11112	01000000	HLT NOP	
11113	74 7 16232	LDD P ANA LIN SYS1	
11114	74 7 16234	LDD P SIM LIN SYS1	
11115	07045614	CLD 4 AND AD	• EXCLUDE NON-ALLOWED
11116	30410100	TN2 D1 HLT	• DIGITAL CODES
11117	74 7 16240	LDD P DIG LIN SYS1	
		MAC	

SYS2

11140	74 1	16171	TYL	SYS2
11141	05106671		LOCO	11140
11142	07175641		MIC	USES- WORKING STORAGE 1,3
11143	21171605		MIC	
11144	74 1	16171	LDD A	ICW2
11145	05146671		LRC 8	SSL 7A
11146	07175641		CLD 15	AND DA
11147	21171625		STW 1P	FTR 5
11150	23370000		LDD A	ICW2
11151	07105614		LRC 12	SSL 7A
11152	30411617		CLD 15	AND DA
11153	07034114		STW 1P	FTR 21
11154	45340710		LDD A	NOP
11155	56343041		CLD 8	AND AD
11156	01000000		TN2 D1	FTR 15
11157	07065614		CLD 3	ADF AD
11160	30411604		EXC CD	CLD 8
11161	30111601		AND CD	TN2 D1
11162	07001601		HLT	NOP
11163	07010000		CLD 6	AND AD
11164	74 7	16222	TN2 D1	FTR 4
11165	41175477		TN2 A1	FTR 1
11166	01000000		CLD 0	FTR 1
11167	74 7	16230	CLD 1	NOP
11170	74 7	16252	LDD P	TRI ANG SYS2
11171	74 7	16260	ADF AP	CDL PP
11172	07045614		HLT	NOP
11173	30410100		LDD P	ANA ANG SYS2
11174	74 7	16236	LDD P	SIM ANG SYS2
11175	07105614		LDD P	LOCAL ANG SYS2
11176	30411614		CLD 4	AND AD
11177	07045614		TN2 D1	HLT
11200	30410100		LDD P	DIG ANG SYS2
11201	07025614		CLD 8	AND AD
11202	30411604		TN2 D1	FTR 12
11203	30111601		CLD 4	AND AD
11204	07001601		TN2 D1	HLT
11205	07010000		CLD 2	AND AD
11206	74 7	16225	TN2 D1	FTR 4
11207	41175477		TN2 A1	FTR 1
11210	01000000		CLD 0	FTR 1
11211	74 7	16233	CLD 1	NOP
11212	74 7	16255	LDD P	TRI LIN SYS2
11213	07045614		ADF AP	CDL PP
11214	30410100		HLT	NOP
11215	74 7	16241	LDD P	ANA LIN SYS2
			LDD P	SIM LIN SYS2
			CLD 4	AND AD
			TN2 D1	HLT
			LDD P	DIG LIN SYS2
			MAC	

SYS3

			TTL	SYS3
			LOCO	11236
			MIC	
			MIC	
11236	74 1 16171		LDD A	ICW2
11237	05206671		LRC 16	SSL 7A
11240	07175641		CLD 15	AND DA
11241	21171605		STW 1P	FTR 5
11242	74 1 16171		LDD A	ICW2
11243	05246671		LRC 20	SSL 7A
11244	07175641		CLD 15	AND DA
11245	21171625		STW 1P	FTR 21
11246	23370000		LDW 3P	NOP
11247	07105614		CLD 8	AND AD
11250	30411617		TN2 D1	FTR 15
11251	07034114		CLD 3	ADF AD
11252	45340710		EXC CD	CLD 8
11253	56343041		AND CD	TN2 D1
11254	01000000		HLT	NOP
11255	07065614		CLD 6	AND AD
11256	30411604		TN2 D1	FTR 4
11257	30111601		TN2 A1	FTR 1
11260	07001801		CLD 0	FTR 1
11261	07010000		CLD 1	NOP
11262	74 7 16223		LDD P	TRI ANG SYS3
11263	41175477		ADF AP	CDL PP
11264	01000000		HLT	NOP
11265	74 7 16231		LDD P	ANA ANG SYS3
11266	74 7 16253		LDD P	SIM ANG SYS3
11267	74 7 16261		LDD P	LOCAL ANG SYS3
11270	07045614		CLD 4	AND AD
11271	30410100		TN2 D1	HLT
11272	74 7 16237		LDD P	DIG ANG SYS3
11273	07105614		CLD 8	AND AD
11274	30411614		TN2 D1	FTR 12
11275	07045614		CLD 4	AND AD
11276	30410100		TN2 D1	HLT
11277	07025614		CLD 2	AND AD
11300	30411604		TN2 D1	FTR 4
11301	30111601		TN2 A1	FTR 1
11302	07001801		CLD 0	FTR 1
11303	07010000		CLD 1	NOP
11304	74 7 16226		LDD P	TRI LIN SYS3
11305	41175477		ADF AP	CDL PP
11306	01000000		HLT	NOP
11307	74 7 16234		LDD P	ANA LIN SYS3
11310	74 7 16256		LDD P	SIM LIN SYS3
11311	07045614		CLD 4	AND AD
11312	30410100		TN2 D1	HLT
11313	74 7 16242		LDD P	DIG LIN SYS3
			MAC	

USES WORKING STORAGE 1,3

GO DETERMINE ANG INPUT

GO DETERMINE LIN INPUT  
RETURN TO ANG SUB TO INP TRIG FNYS

TRI AND SYS1

		TTL	TRI AND SYS1	
		LOC0	11334	
		MIC		USES PF4
		MIC		WORKING STORAGE 1,3
		MIC		
		MIC		
11334	30471606	TN2 D7	FTR 6	
11335	74 1 16213	LDD A	TR1 1	
11336	12213224	SEL BA	T20 B4	TEST IC
11337	16010000	FTR 1	NOP	
11340	36040000	STT 04	NOP	SYS 1 IC TRUE
11341	21372317	STW 3P	LDM 1P	
11342	16060000	FTR 6	NOP	
11343	74 1 16214	LDD A	TR1 2	
11344	12213224	SEL BA	T20 B4	TEST IC
11345	16010000	FTR 1	NOP	
11346	36040000	STT 04	NOP	SYS 1 IC TRUE
11347	21372317	STW 3P	LDM 1P	
11350	16160000	FTR 14	NOP	
11351	26742673	LDI PD	LDI PC	
11352	00 0 70332	ADR	000SIN PS1	
11353	20240010	OCT	20240010	I IU SEL WD
11354	26750000	LDI PL	NOP	
11355	00000006	OCT	6	LOOP COUNT
11356	12130000	SEL AC	NOP	A-->A
11357	26720000	LDI PB	NOP	
11360	77777400	OCT	77777400	MASK
11361	56210510	AND BA	LRC8	
11362	13672742	SDL 67	LDM DB	WORK DATA -->B
11363	54335921	CDL CC	ADL RA	ADD--> WORK
11364	24415455	STI DA	CDL LL	STORE WORK
11365	30571470	TN2 L7	BTR 7	
11366	04550000	CLP 055	NOP	GO T VECT SYS1
11367	26742673	LDI PD	LDI PC	
11370	00 0 70332	ADR	000SIN PS1	
11371	20240110	OCT	20240110	
11372	14610000	BTR 14	NOP	
		MAC		

TRI ANG SYS2

		YTL	TRI ANG SYS2
		LOCO	11377
		MIC	
		MIC	USES PF4
		MIC	WORKING STORAGE 1.3
		MIC	
		MIC	
11377	30471606	TNZ D7	FTR 6
11400	74 1 16213	LDD A	TRI 1
11401	12213224	SEL BA	TZO 84
11402	16010000	FTR 1	NOP
11403	36040000	STT 04	NOP
11404	21372317	STW 3P	LW 1P
11405	16060000	FTR 6	NOP
11406	74 1 16214	LDD A	TRI 2
11407	12213224	SEL BA	TZO 84
11410	16010000	FTR 1	NOP
11411	36040000	STT 04	NOP
11412	21372317	STW 3P	LW 1P
11413	16160000	FTR 14	NOP
11414	26742673	LDI PD	LDI PC
11415	00 0 70340	ADR	000 SIN PS2
11416	20240010	OCT	20240010
11417	26750000	LDI PL	NOP
11420	00000006	OCT	6
11421	12130000	SEL AC	NOP
11422	26720000	LDI PB	NOP
11423	77777400	OCT	77777400
11424	5A210510	AND BA	LRC 8
11425	13672742	SDL 67	LDM DB
11426	54335521	CDL CC	ADL BA
11427	24415455	STI DA	CDL LL
11430	30571470	TNZ L7	BTR 7
11431	04560000	CLP 056	NOP
11432	26742673	LDI PD	LDI PC
11433	00 0 70340	ADR	000 SIN PS2
11434	20240110	OCT	20240110
11435	14610000	BTR 14	NOP
		MAC	

GO T VECT SYS2

TRI ANG SYS3

YTL	LOC	TRI ANG SYS3
	11442	USES PF4
		WORKING STORAGE 143
11442	30471606	TNZ 07 FTR 6
11443	74 1 16213	LDD A TRI 1
11444	12213224	SEL BA TZO B4
11445	16010000	FTR 1 NOP
11446	36040000	STT 04 NOP
11447	21372317	STW 3P LDW 1P
11450	16060000	FTR 6 NOP
11451	74 1 16214	LDD A TRI 2
11452	12213224	SEL BA TZO B4
11453	16010000	FTR 1 NOP
11454	36040000	STT 04 NOP
11455	21372317	STW 3P LDW 1P
11456	16160000	FTR 14 NOP
11457	26742673	LDI PD LDI PC
11460	00 0 70346	ADR 000SIN PS3
11461	20240010	OCT 20240010
11462	26750000	LDI PL NOP
11463	00000006	OCT 6
11464	12130000	SEL AC NOP
11465	26720000	LDI PB NOP
11466	77777400	OCT 77777400
11467	56210510	AND BA LRC 8
11470	13672742	SDL 67 LDM DB
11471	54335521	COL CC ANL BA
11472	24415455	STI DA CNL LL
11473	30571470	TNZ L7 BTR 7
11474	04570000	CLP 057 NOP
11475	26742673	LDI PD LDI PC
11476	00 0 70346	ADR 000SIN PS3
11477	20240110	OCT 20240110
11500	14610000	BTR 14 NOP
		MAC

OO T VECT SYS3

SYS1IC

			TTL	SYS1IC	
			LOCO	11509	
			MIC		USES WORKING STORAGE 2
			MIC		
			MIC		
			MIC		
11505	74 1	16155	LDD A	IPS1	
11506	75 1	17540	STD A	PS1	
11507	70750400		CPF PL	CLP 00	SIN ROUTINE
11510	75 1	70332	STD A	SIN PS1	STORE SIN PS1
11511	74 1	16155	LDD A	IPS1	
11512	70750401		CPF PL	CLP 01	COS ROUTINE
11513	75 1	70333	STD A	COS PS1	
11514	74 1	16156	LDD A	ITM1	
11515	75 1	17541	STD A	TM1	
11516	70750400		CPF PL	CLP 00	SIN ROUTINE
11517	75 1	70334	STD A	SIN TM1	
11520	74 1	16156	LDD A	ITM1	
11521	70750401		CPF PL	CLP 01	COS ROUTINE
11522	75 1	70335	STD A	COS TM1	
11523	74 1	16157	LDD A	IPM1	
11524	75 1	17542	STD A	PM1	
11525	70750400		CPF PL	CLP 00	SIN ROUTINE
11526	75 1	70336	STD A	SIN PM1	
11527	74 1	16157	LDD A	IPM1	
11530	70750401		CPF PL	CLP 01	COS ROUTINE
11531	75 1	70337	STD A	COS PM1	
11532	24742673		LDI PD	LDI PC	
11533	00 0	16070	ADR	000IT1XU	
11534	00 0	17000	ADR	000T1XU	
11535	05060000		LRC6	NOP	
11536	26412431		LDI DA	STICA	IT1-->T1
11537	54660000		CDL NN	NOP	
11540	30671475		TNE N7	BTR 2	
11541	74 1	16011	LDD A	I ALPHA A	
11542	70750400		CPF PL	CLP 00	SIN ROUTINE
11543	75 1	70354	STD A	SIN AA	
11544	74 1	16011	LDD A	I ALPHA A	
11545	70750401		CPF PL	CLP 01	COS ROUTINE
11546	75 1	70355	STD A	COS AA	
11547	74 1	16012	LDD A	I BETA A	
11550	70750400		CPF PL	CLP 00	SIN ROUTINE
11551	75 1	70356	STD A	SIN BA	
11552	74 1	16012	LDD A	I BETA A	
11553	70750401		CPF PL	CLP 01	COS ROUTINE
11554	75 1	70357	STD A	COS BA	
11555	23270000		LDW 2P	NOP	
			MAC		

SYS21C

			TYL	SYS21C	
			LOCO	11562	
			MIC		USES- WORKING STORAGE 2
			MIC		
			MIC		
			MIC		
11562	74 1	16160	LDD A	IPS2	
11563	75 1	17543	STD A	PS 2	
11564	70750400		CPF PL	CLP 00	SIN ROUTINE
11565	75 1	70340	STD A	SIN PS2	STORE SIN PS2
11566	74 1	16160	LDD A	IPS2	
11567	70750401		CPF PL	CLP 01	COS ROUTINE
11570	75 1	70341	STD A	COS PS2	
11571	74 1	16161	LDD A	ITM2	
11572	75 1	17544	STD A	TM 2	
11573	70750400		CPF PL	CLP 00	SIN ROUTINE
11574	75 1	70342	STD A	SIN TM2	
11575	74 1	16161	LDD A	ITM2	
11576	70750401		CPF PL	CLP 01	COS ROUTINE
11577	75 1	70343	STD A	COS TM2	
11600	74 1	16162	LDD A	IPH 2	
11601	75 1	17545	STD A	PM 2	
11602	70750400		CPF PL	CLP 00	SIN ROUTINE
11603	75 1	70344	STD A	SIN PM2	
11604	74 1	16162	LDD A	IPH2	
11605	70750401		CPF PL	CLP 01	COS ROUTINE
11606	75 1	70345	STD A	COS PM2	
11607	26742673		LDI PD	LDI PC	
11610	00 0	16076	ADR	000IT2XU	
11611	00 0	17010	ADR	000T2XU	
11612	05060000		LRC 6	NOP	
11613	26412431		LDI DA	SYI CA	IT2-->T2
11614	54660000		CDL NN	NOP	
11615	30671475		TNZ N7	BTR 2	
11616	74 1	16013	LDD A	I ALPHA B	
11617	70750400		CPF PL	CLP 00	SIN ROUTINE
11620	75 1	70360	STD A	SIN AB	
11621	74 1	16013	LDD A	I ALPHA B	
11622	70750401		CPF PL	CLP 01	COS ROUTINE
11623	75 1	70361	STD A	COS AB	
11624	74 1	16014	LDD A	I BETA B	
11625	70750400		CPF PL	CLP 00	SIN ROUTINE
11626	75 1	70362	STD A	SIN BB	
11627	74 1	16014	LDD A	I BETA B	
11630	70750401		CPF PL	CLP 01	COS ROUTINE
11631	75 1	70363	STD A	COS BB	
11632	23270000		LDW 2P	NOP	
			HAC		

SYSSIC

			YTL	SYSSIC	
			LOCO	11637	
			MIC		USES- WORKING STORAGE 2
			MIC		
			MIC		
11637	74 1	16163	LDD A	IPSS	IPSS
11640	75 1	17546	STD A	PS 3	
11641	70750400		CPF PL	CLP 00	SIN ROUTINE
11642	75 1	70346	STD A	SIN PSS	STORE SIN PSS
11643	74 1	16163	LDD A	IPS 3	
11644	70750401		CPF PL	CLP 01	COS ROUTINE
11645	75 1	70347	STD A	COS PSS	
11646	74 1	16164	LDD A	ITMS	ITMS
11647	75 1	17547	STD A	TMS	
11650	70750400		CPF PL	CLP 00	SIN ROUTINE
11651	75 1	70350	STD A	SIN TMS	
11652	74 1	16164	LDD A	ITM 3	
11653	70750401		CPF PL	CLP 01	COS ROUTINE
11654	75 1	70351	STD A	COS TMS	
11655	74 1	16165	LDD A	IPM 3	IPM 3
11656	75 1	17550	STD A	PM 3	
11657	70750400		CPF PL	CLP 00	SIN ROUTINE
11660	75 1	70352	STD A	SIN PMS	
11661	74 1	16165	LDD A	IPM 3	
11662	70750401		CPF PL	CLP 01	COS ROUTINE
11663	75 1	70353	STD A	COS PMS	
11664	26742673		LDI PD	LDI PC	
11665	00 0	16104	ADR	00013XU	
11666	00 0	17020	ADR	00013XU	
11667	05060000		LRC 6	NOP	
11670	26412431		LDI DA	STI CA	ITS-->TS
11671	54660000		CDL NN	NOP	
11672	30671475		TNE N7	BTR 2	
11673	74 1	16015	LDD A	I ALPHA C	
11674	70750400		CPF PL	CLP 00	SIN ROUTINE
11675	75 1	70364	STD A	SIN AC	
11676	74 1	16015	LDD A	I ALPHA C	
11677	70750401		CPF PL	CLP 01	COS ROUTINE
11700	75 1	70365	STD A	COS AC	
11701	74 1	16016	LDD A	I BETA C	
11702	70750400		CPF PL	CLP 00	SIN ROUTINE
11703	75 1	70366	STD A	SIN BC	
11704	74 1	16016	LDD A	I BETA C	
11705	70750401		CPF PL	CLP 01	COS ROUTINE
11706	75 1	70367	STD A	COS BC	
11707	23270000		LDW 2P	NOP	
			MAC		

TRI LIN SYS1

	TYL	TRI LIN SYS1	
	LDGO	11714	USES- WORKING STORAGE 1,2
	MIC		PF 3,4
	MIC		
	MIC		
	MIC		
11714	TNE D7	FTR 4	
11715	LDD A	TRI 1	
11716	SEL BA	TZO B4	TEST IC
11717	FTR 5	NOP	
11720	CLPO 47	NOP	SYS 1 IC
11721	LDD A	TRI 2	
11722	SEL BA	TZO B4	TEST IC
11723	FTR 17	NOP	
11724	CLPO 47	NOP	SYS 1 IC
11725	TCT 31	CLPO 47	SYS 1 IC
11726	TCT 03	LDW 2P	IF HOLD, GO TO S.I.
11727	TCT 04	CLPO 47	SYS 1 IC
11730	LDI PD	LDI PC	
11731	ADR	000MS1X	
11732	OCT	20240002	IJU DATA ADR.
11733	LDI PL	NOP	
11734	OCT	J	LOOP COUNT
11735	SEL AC	NOP	
11736	LDI PB	NOP	
11737	OCT	77777400	MASK
11740	AND BA	LRC 8	
11741	SBL 67	STI DA	STORE DT
11742	CDL LL	CDL CC	
11743	TNE L7	BTR 6	
11744	LDW 1P	NOP	
11745	TCT 31	CLPO 47	SYS 1 IC
11746	TCT 03	LDW 2P	IF HOLD, GO TO S.I.
11747	TCT 04	CLPO 47	SYS 1 IC
11750	LDI PD	LDI PC	
11751	ADR	000MS1X	
11752	OCT	20240102	IJU DATA ADR
11753	BTR 16	NOP	
	MAC		

TRI LIN SYS2

11762 30471604  
11763 74 1 16213  
11764 12213224  
11765 16050000  
11766 04500000  
11767 74 1 16214  
11770 12213224  
11771 16210000  
11772 04500000  
11773 37320450  
11774 37032327  
11775 37040450  
11776 26742673  
11777 00 0 17524  
12000 20240002  
12001 26750000  
12002 00000003  
12003 12130000  
12004 26720000  
12005 77777400  
12006 56210510  
12007 13672441  
12010 54555433  
12011 30571471  
12012 23170000  
12013 37320450  
12014 37032327  
12015 37040450  
12016 26742673  
12017 00 0 17524  
12020 20240102  
12021 14570000

TRI LIN SYS2  
11762  
USES- WORKING STORAGE 1,2  
PF 3,4  
TTL  
LOC  
MIC  
MIC  
MIC  
MIC  
MIC  
TNE D7 FTR 4  
LDD A TRI 1  
SEL BA T20 04  
FTR 5 NOP  
CLPO 50 NOP SYS 2 IC  
LDD A TRI 2  
SEL BA T20 04  
FTR 17 NOP  
CLPO 50 NOP SYS 2 IC  
TCT 32 CLPO 50 SYS 2 IC  
TCT 03 LDW 2P  
TCT 04 CLP 050 SYS2 IC  
LDI PD LDI PC  
ADR 000WS2X  
OCT 20240002  
LDI PL NOP  
OCT J  
SEL AC NOP  
LDI PB NOP  
OCT 77777400  
AND BA LRC 8  
SDL 67 STI DA  
CDL LL CDL CC  
TNE L7 0TR 6  
LDW 1P NOP  
TCT 32 CLPO 50 SYS 2 IC  
TCT 03 LDW 2P  
TCT 04 CLP 050 SYS2 IC  
LDI PD LDI PC  
ADR 000WS2X  
OCT 20240102  
BTR 16 NOP  
MAC

12  
11  
10  
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5  
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3  
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TRI LIN SYS 3

		YTL	TRI LIN SYS 3
		LOCO	12030
		MIC	USES- WORKING STORAGE 1,2
		MIC	PF 3,4
		MIC	
		MIC	
		MIC	
12030	30471604	TNZ D7	FTR 4
12031	74 1 16213	LDD A	TRI 1
12032	12213224	SEL BA	TZO B4
12033	16050000	FTR 5	NOP
12034	04510000	CLPO 51	NOP
12035	74 1 16214	LDD A	TRI 2
12036	12213224	SEL BA	TZO B4
12037	16210000	FTR 17	NOP
12040	04510000	CLPO 51	NOP
12041	37330451	TCT 33	CLPO 51
12042	37032327	TCT 03	LDW 2P
12043	37040451	TCT 04	CLP 051
12044	26742673	LDI PD	LDI PC
12045	00 0 17527	ADR	000NS3X
12046	20240002	OCT	20240002
12047	26750000	LDI PL	NOP
12050	00000003	OCT	J
12051	12130000	SEL AC	NOP
12052	26720000	LDI PB	NOP
12053	77777400	OCT	77777400
12054	56210510	AND BA	LRC 8
12055	13672441	SDL 67	STI DA
12056	54555433	CDL LL	CDL CC
12057	30571471	TNZ L7	BTR 6
12060	23170000	LDW 1P	NOP
12061	37330451	TCT 33	CLPO 51
12062	37032327	TCT 03	LDW 2P
12063	37040451	TCT 04	CLP 051
12064	26742673	LDI PD	LDI PC
12065	00 0 17527	ADR	000NS3X
12066	20240102	OCT	20240102
12067	14570000	BTR 16	NOP
		MAC	

FORM T VECTORS

12076 37051605  
 12077 26712672  
 12100 00 0 17521  
 12101 00 0 17000  
 12102 46233606  
 12103 70750420  
 12104 23270000

12111 37051605  
 12112 26712672  
 12113 00 0 17524  
 12114 00 0 17010  
 12115 46233606  
 12116 70750420  
 12117 23270000

12124 37051605  
 12125 26712672  
 12126 00 0 17527  
 12127 00 0 17020  
 12130 46233606  
 12131 70750420  
 12132 23270000

TTL  
 LOCO FORM T VECTORS  
 MIC 12076

T VECT SYS1  
 USES WORKING STORAGE 2  
 PFG

MIC  
 MIC  
 MIC  
 MIC  
 MIC  
 TCT 05 FTR 5  
 LDI PA LDI PB  
 ADR 000WS1X  
 ADR 000T1XU  
 CPL BC STT 06  
 CPF PL CLPO 20  
 LDW 2P NOP

IF ABS DATA, SKIP  
 SINGLE A UPPER B

SDS

LOCO 12111

T VECT SYS2

MIC  
 MIC  
 MIC  
 TCT 05 FTR 5  
 LDI PA LDI PB  
 ADR 000WS2X  
 ADR 000T2XU  
 CPL BC STT 06  
 CPF PL CLPO 20  
 LDW 2P NOP

IF ABS DATA, SKIP

SDS

LOCO 12124

T VECT SYS3

MIC  
 MIC  
 TCT 05 FTR 5  
 LDI PA LDI PB  
 ADR 000WS3X  
 ADR 000T3XU  
 CPL BC STT 06  
 CPF PL CLPO 20  
 LDW 2P NOP  
 MAC

IF ABS DATA, SKIP

SDS

ANA ANG SYS1

Address	Code	Label	Description
	TTL	ANA ANG SYS1	
	LOCU	12137	
	NIC		USES WORKING STORAGE 1,3
	NIC		PT 3,4
	NIC		
	NIC		
12137	LDU A	ANA L06	
12140	SEL BA	LRC 4	READ CONTROL WORD
12141	SSL 7B	CLD03	SHIFT RIGHT 4
12142	AND DB	ADP BP	USE LAST 2 BITS FOR TRANSFER
12143	FTM 3	NOP	SYS 1 OPERATE
12144	STT U4	FTM 2	SYS 1 IC TRUE
12145	FTM 13	NOP	SYS 1 HOLD TRUE
12146	STT U4	NOP	SYS 1 IC TRUE
12147	STW 3P	LDW 1P	SAVE RETURN, GO TO SYS1
12150	LDI PD	LDI PC	
12151	ADW	UOUSIN PS1	
12152	OCT	20240237	ITU DATA ADR
12153	LDI PL	LDI PB	
12154	UCI	0	LOOP COUNT
12155	OCI	77776000	MASK
12156	SEL AC	NOP	READ ANGLE FROM ITU
12157	AND BA	STI DA	STONE HIGH 14 BITS
12160	CDL LL	CDL CC	
12161	TN2 L7	STN 3	FINISHED NO GO BACK
12162	CLP U55	NOP	YES, GO TO T VECT SYS1
12163	STI O3	LDW 1P	SET HOLD FLAG, GO TO SYS1
	MAC		

NOT REPRODUCIBLE

ANA ANG SYS2

			TYL	ANA ANG SYS2	
			LOCU	12172	
			MIC		USES- WORKING STORAGE 1,3
			MIC		Pt 3,4
			MIC		
			MIC		
12172	74 1	16212	LDU A	ANA LDU	
12173	12210502		SEL BA	LRC 2	HEAD CONTROL WORD
12174	66720703		SSL 7B	CLU 03	SHIFT RIGHT 2
12175	56424127		AND DB	ADP BP	USE LAST 2 BITS FOR TRANSFER
12176	16030000		FTH J	NOP	SYS 2 OPERATE
12177	36041602		STI U4	FTH 2	SYS 2 IC TRUE
12200	16150000		FTH 13	NOP	SYS 2 HOLD TRUE
12201	36040000		STI U4	NOP	SYS 2 IC TRUE
12202	21372317		STW 3P	LDW 1P	SAVE RETURN, GO TO SYS2
12203	26742673		LDI PD	LDI PC	
12204	00 0	70340	ADM	UOUSIN PS2	
12205	20240231		OCI	20240231	IIU DATA ADDRESS
12206	26752672		LDI PL	LDI PB	
12207	00000006		OCI	06	LOOP COUNT
12210	77776000		OCI	77776000	MASK
12211	12130000		SEL AC	NOP	HEAD ANGLES FROM IIU
12212	56412441		AND BA	STI DA	STORE HIGH 14 BITS
12213	54555433		CDL LL	CDL CC	
12214	30571474		TNE L7	BTM 3	FINISHED NO, GO BACK
12215	0456000J		CLP 056	NOP	YES, GO TO I VECT SYS2
12216	36032317		STI U3	LDW 1P	SET HOLD FLAG, GO TO SYS2
			HAC		

ANA ANG SYS3

LOC	ANA ANG SYS3	12225	USES WORKING STORAGE 1,3 P 3,4
12225	74 1 10212	LDU A ANA LOG	
12226	12210703	SEL BA CLD 03	READ CONTROL WORD FROM IIU
12227	56424127	AND UB ADF 0P	USE LAST 2 BITS FOR TRANSFER
12230	10030000	FTR 3 NOP	SYS 3 OPERATE
12231	36041602	STI 04 ITH 2	SYS 3 IC TRUE
12232	16130000	FTR 13 NOP	SYS 3 HOLD TRUE
12233	36040000	STI 04 NOP	SYS 3 IC TRUE
12234	21372317	STM 3P LDW 1P	SAVE RETURN 700 TO SYS3
12235	26742673	LDI PD LDI PC	
12236	00 0 70346	ADR 00051H PSS	
12237	20240223	JCI 20240223	IIU DATA ADDRESS
12240	26752672	LDI PL LDI PH	
12241	00000006	OCI 0	LOOP COUNT
12242	77776000	OCI 77776000	MASK
12243	12130000	SEL AC NOP	HEAD ANGLES FROM IIU
12244	56212441	AND BA STI 0A	STORE HIGH 14 BITS
12245	54555433	CDL LL CDL CC	
12246	30571474	TRN L7 BTR 03	FINISHED NO; GO BACK
12247	04570000	CLP 09/ NOP	YES, GO TO IVECI SYS3
12250	36032317	STI 03 LDW 1P	SET HOLD FLAG; GO TO SYS3
		HAC	

NOT REPRODUCIBLE

ANA LIN SYS1

ANA LIN SYS1			TTL	ANA LIN SYS1	
			LOCO	12257	
			NIC		USES WORKING STORAGE 1.2
			NIC		PF 3,4
			NIC		
			NIC		
12257	74 1	16212	LDD A	ANA LOG	IJU CHD ADR
12260	12210504		SEL BA	LRC 4	
12261	66720703		SSL 7B	CLD 03	
12262	56424127		AND DB	ADF 0P	
12263	16030000		FTR 3	NOP	
12264	36040447		STT 04	CLPO 47	SYS 1 IC
12265	16430000		FTR 35	NOP	SYS1 HOLD
12266	36040447		STT 04	CLPO 47	SYS 1 IC
12267	37310447		TCT 31	CLPO 47	SYS 1 IC
12270	37032327		TCT 03	LDM 2P	
12271	37040447		TCT 04	CLPO 47	SYS 1 IC
12272	26742673		LDI PD	LDI PC	
12273	00 0	17521	ADR	000WS1X	LIN WORKING 1
12274	20240215		OCT	20240215	IJU DATA ADR
12275	26750000		LDI PL	NOP	
12276	00000003		OCT	3	LOOP COUNT
12277	26720000		LDI PB	NOP	
12300	77776000		OCT	77776000	MASK
12301	12135621		SEL AC	AND 8A	
12302	05001367		LRC 0	SDL 67	SCALE ANALOG LINEAR
12303	24415455		STI DA	CDL LL	
12304	54333057		CDL CC	TN2 L7	
12305	14710000		BTR 6	NOP	
12306	26740000		LDI PD	NOP	
12307	00 0	17521	ADR	000WS1X	
12310	74 2	16170	LDD B	ICW 1	CONTROL WORD 1
12311	05136632		LRC 11	SSL 3R	SHIFT LEFT 11
12312	30241603		TN2 04	FTR 3	
12313	26750000		LDI PL	NOP	
12314	00 0	16030	ADR	000ISC1X1	SCALE CONST 1 ADR
12315	16020000		FTR 2	NOP	
12316	26750000		LDI PL	NOP	
12317	00 0	16033	ADR	000ISC1X2	
12320	27432752		LDM DC	LDM LB	
12321	76542441		MCS 12	STI DA	
12322	44550000		CIL LL	NOP	
12323	27432752		LDM DC	LDM LB	
12324	76542441		MCS 12	STI DA	
12325	44550000		CIL LL	NOP	
12326	27432752		LDM DC	LDM LB	
12327	76542441		MCS 12	STI DA	
12330	23170000		LDM 1P	NOP	
12331	37040447		TCT 04	CLPO 47	SYS 1 IC
12332	37310447		TCT 31	CLPO 47	SYS 1 IC
12333	23270000		LDM 2P	NOP	
			MAC		

ANA LIN SYS2

	TTL	ANA LIN SYS2	
	LOCO	12342	
	MIC		USES- WORKING STORAGE 1.2
	MIC		PF 3,4
	MIC		
	MIC		
12342	74 1	16212	
12343	12210502		
12344	66720703		
12345	56424127		
12346	16030000		
12347	36040450		
12350	16430000		
12351	36040450		
12352	37320450		SYS 2 IC
12353	37032327		
12354	37040450		SYS2 IC
12355	26742673		
12356	00 0	17524	
12357	20240212		
12360	26750000		
12361	00000003		
12362	26720000		
12363	77776000		
12364	12135621		
12365	05001367		
12366	24415455		SCALE ANALOG LINEAR
12367	54333037		
12370	14710000		
12371	26740000		
12372	00 0	17524	
12373	74 2	16170	
12374	05126632		
12375	30241603		
12376	26750000		
12377	00 0	16036	
12400	16020000		
12401	26750000		
12402	00 0	16041	
12403	27432752		
12404	76542441		
12405	44550000		
12406	27432752		
12407	76542441		
12410	44550000		
12411	27432752		
12412	76542441		
12413	23170000		
12414	37040450		SYS2 IC
12415	37320450		SYS 2 IC
12416	23270000		
	LDD A	ANA LOG	
	SEL BA	LRC 2	
	SSL 7B	CLD 03	
	AND DB	ADF 8P	
	FTR 3	NOP	
	STT 04	CLP 050	
	FTR 35	NOP	
	STT 04	CLP 050	
	TCT 32	CLPO 50	
	TCT 03	LDM 2P	
	TCT 04	CLP 050	
	LDI PD	LDI PC	
	ADR	000NS2X	
	OCT	20240212	
	LDI PL	NOP	
	OCT	3	
	LDI PB	NOP	
	OCT	77776000	
	SEL AC	AND BA	
	LRC 0	SDL 67	
	STI DA	CDL LL	
	CDL CC	TNE L7	
	BTR 6	NOP	
	LDI PD	NOP	
	ADR	000NS2X	
	LDD B	ICW 1	
	LRC 10	SSL 3B	
	TNE 84	FTR 3	
	LDI PL	NOP	
	ADR	000ISC2X1	
	FTR 2	NOP	
	LDI PL	NOP	
	ADR	000ISC2X2	
	LDM DC	LDM LB	
	MCS 12	STI DA	
	CIL LL	NOP	
	LDM DC	LDM LB	
	MCS 12	STI DA	
	CIL LL	NOP	
	LDM DC	LDM LB	
	MCS 12	STI DA	
	LDM 1P	NOP	
	TCT 04	CLP 050	
	TCT 32	CLPO 50	
	LDM 2P	NOP	
	MAC		

ANA LIN SYS 3

12425 74 1 16212  
12426 12210703  
12427 56424127  
12430 16030000  
12431 36040451  
12432 14430000  
12433 36040451  
12434 37330451  
12435 37032327  
12436 37040451  
12437 26742673  
12440 00 0 17527  
12441 20240207  
12442 26750000  
12443 00000003  
12444 26720000  
12445 77776000  
12446 12135621  
12447 09001367  
12450 24415455  
12451 54333057  
12452 14710000  
12453 26740000  
12454 00 0 17527  
12455 74 2 16170  
12456 05116632  
12457 30241603  
12460 26750000  
12461 00 0 16044  
12462 16020000  
12463 26750000  
12464 00 0 16047  
12465 27432752  
12466 76542441  
12467 44550000  
12470 27432752  
12471 76542441  
12472 44550000  
12473 27432752  
12474 76542441  
12475 23170000  
12476 37040451  
12477 37330451  
12500 23270000

TTL ANA LIN SYS 3

LOCO 12425

USES- WORKING STORAGE 1,2  
PF 3,4

MIC  
MIC  
MIC  
MIC  
MIC

LDD A ANA LOB  
SEL BA CLD 03  
AND DB ADF 8P  
FTR 3 NOP  
STY 04 CLP 051  
FTR 35 NOP  
STY 04 CLP 051  
TCT 33 CLPD 51  
TCT 03 LDW 2P  
TCT 04 CLP 051  
LDI PD LDI PC  
ADR 000WS3X  
OCT 20240207  
LDI PL NOP  
OCT 3  
LDI PB NOP  
OCT 77776000  
SEL AC AND BA  
LRC 0 SDL 67  
STI DA CDL LL  
CDL CC TNE L7  
BYR 6 NOP  
LDI PD NOP  
ADR 000WS3X  
LDD B ICW1  
LRC 9 SSL 3B  
TNE 84 FTR 3  
LDI PL NOP  
ADR 0001SC3X1  
FTR 2 NOP  
LDI PL NOP  
ADR 0001SC3X2  
LDM DC LDM LB  
HCS 12 STI DA  
CIL LL NOP  
LDM DC LDM LB  
HCS 12 STI DA  
CIL LL NOP  
LDM DC LDM LB  
HCS 12 STI DA  
LDW 1P NOP  
TCT 04 CLP 051  
TCT 33 CLPD 51  
LDW 2P NOP  
MAC

SYS 3 IC

SYS3 IC

SCALE ANALOG LINEAR

SYS3 IC

SYS 3 IC

DIG ANG SYS1

		YTL	DIG ANG SYS1	
		LOC0	12507	USES- WORKING STORAGE 1,3
		MIC		PF 4
		MIC		
		MIC		
12507	07035641	CLD 3	AND DA	MASK BITS 22-23
12510	74 2 16215	LDD B	DDP 24	GET DDP 24 COM WORD
12511	05046631	LRC 4	SSL 3A	SHIFT A LEFT 4
12512	24710000	STI PA	NOP	SAVE DIG ANG SEL CODE
12513	00000000	OCT	0	
12514	55121222	ADL AB	SEL BR	ADD INCR TO COM WORD, SEL
12515	07015624	CLD 1	AND BD	MASK SYS1 IC BIT
12516	30413604	TNZ D1	STY 04	IF SYS1 IC, SET PF4>1
12517	21372317	STW 3P	LDW 1P	SAVE BRANCH, GET BRANCH
12520	74 1 12513	LDD A	DASC1	LOAD A WITH DIG ANG SEL CODE
12521	07075541	CLD 7	ADL DA	COMPUTE INCR RFL TO 400
12522	74 2 16215	LDD B	DDP 24	GET DDP 24 COM WORD
12523	55122671	ADL AB	LDI PA	ADD INCR, LOAD A WITH ANG ADDR
12524	00 0 70332	ADR	0005IN PS1	
12525	05060000	LRC 6	NOP	INITIALIZE LOOP COUNT
12526	12322413	SEL CB	STI AC	INPUT TRIG FUNCT, STORE
12527	54664422	CDL NN	CIL 80	DECR N, INCR 0
12530	30621479	TNZ N2	BTR 2	IF COUNT NOT >0, GO AGAIN
12531	04550000	CLP 055	NOP	GO T VECT SYS1
		MAC		

DIG ANG SYS2

			TTL	DIG ANG SYS2	
			LOC0	12552	
			NIC		USES WORKING STORAGE 1,3
			NIC		PF 4
12552	07035641		CLD 3	AND DA	
12553	74 2 16215		LDD 8	DDP 24	
12554	05046631		LRC 4	SSL 3A	
12555	24710000		STI PA	NOP	
12556	00000000	DASC2	OCT	0	
12557	55121222		ADL AB	SEL BR	INPUT DIG CONTROL WORD
12560	07025624		CLD 2	AND BD	SYS2 ICR
12561	30413604		TN2 D1	STT 04	YES, SET PF4
12562	21372317		STM 3P	LDM 1P	SAVE RETURN, GO TO SYS2
12563	74 1 12556		LDD A	DASC2	
12564	07075541		CLD 7	ADL DA	
12565	74 2 16215		LDD B	DDP 24	
12566	55122671		ADL AB	LDI PA	
12567	00 0 70340		ADR	000SIN PS2	
12570	05060000		LRC 6	NOP	
12571	12322413		SEL CB	STI AC	INPUT TRIG FNCT6
12572	54664422		CDL NN	CIL 0B	
12573	30621475		TN2 N2	BTR 2	
12574	04560000		CLP 056	NOP	GO T VECT SYS2
			MAC		

DIG AND SY83

Address	Hex	Label	Instruction	Comments
12615	07039641		YTL	DIG AND SY83
12616	74 2 16215		LOCO	12615
12617	09046631		MIC	USES- WORKING STORAGE 1,3
12620	24710000		MIC	PF 4
12621	00000000	DASCS	MIC	
12622	55121222		CLD 3	AND DA
12623	07049624		LDD 8	DDP 24
12624	30413604		LRC 4	SSL 3A
12625	21372317		STI PA	NOP
12626	74 1 12621		OCT	0
12627	07075941		ADL AB	SEL 8B
12630	74 2 16215		CLD 4	AND 8D
12631	55122671		TNE D1	STT 04
12632	00 0 70346		STM 3P	LDW 1P
12633	09060000		LDD A	DASCS
12634	17322413		CLD 7	ADL DA
12635	54664422		LDD B	DDP 24
12636	30621475		ADL AB	LDI PA
12637	04570000		ADR	000SIN PS3
			LRC 6	NOP
			SEL CB	STI AC
			CDL NN	CIL 8B
			TNE N2	WTR 2
			CLP 057	NOP
			MAC	GO TO VECT SY83

DIG LIN SYS1

	TTL	DIG LIN SYS1		
	LOCO	12660		
	MIC		USES WORKING STORAGE 1,2	
	MIC		PF 3,4	
	MIC			
12660	07035641	CLD 3	AND DA	MASK BITS 22-23 INTO A
12661	74 2 16219	LDD 8	DDP 24	GET DDP 24 COM WORD
12662	05046631	LRC 4	SSL 3A	SHIFT A LEFT 4
12663	95211221	ADL BA	SEL BA	ADD INCR TO COM WORD, SEL
12664	07015624	CLD 1	AND 8D	MASK SYS1 IC BIT
12665	30410447	TNZ D1	CLP 047	IF SYS1 IC, GO TO IC ROUT
12666	37310447	TCT 31	CLP 047	IF SSM1, GO TO IC ROUT
12667	37032327	TCT 03	LDW 2P	IF IN HOLD, BRANCH TO S.I.
12670	37040447	TCT 04	CLP 047	IF PF4>1, GO TO IC ROUT
12671	05066672	LRC 6	SSL 2R	SHIFT B RIGHT 6
12672	07015624	CLD 1	AND 8D	MASK BIT 23
12673	30411607	TNZ D1	FTR 7	IF INCR DATA, BRANCH
12674	26724411	LDI PB	CIL AA	LOAD T1XU IN B, IIU DATA ADDR IN A
12675	00 0 17000	ADR	000T1XU	
12676	05063605	LRC 6	STT 05	SET LOOP COUNT, PF5>1
12677	12312423	SEL CA	STI 8C	INPUT, STORE DATA, BUMP STORE ADDR
12700	44115466	CIL AA	CDL NN	INCR COM WORD, DECR COUNT
12701	30621475	TNZ N2	BTR 2	IF COUNT NOT>0, BRANCH
12702	23170000	LDW 1P	NOP	RETURN TO SYS1
12703	07025541	CLD 2	ADL DA	IIU DATA ADDR IN A
12704	26720503	LDI PB	LRC 3	LOAD WSIX IN B, SET LOOP COUNT
12705	00 0 17521	ADR	000WSIX	
12706	12312423	SEL CA	STI 8C	INPUT, STORE DATA, BUMP STORE ADDR
12707	55415466	ADL DA	CDL NN	ADD 2 TO COM WORD, DECR COUNT
12710	30621475	TNZ N2	BTR 2	IF COUNT NOT>0, BRANCH
12711	23170000	LDW 1P	NOP	RETURN TO SYS1
	MAC			

DIG LIN SYS2

		TTL	DIG LIN SYS2	
		LOCO	12732	
		NIC		USES- WORKING STORAGE 1,2
		NIC		PF 3,4
12732	07035641	CLD 3	AND DA	
12733	74 2 16219	LDD 8	DDP 24	
12734	05046631	LRC 4	SSL 3A	
12735	55211221	ADL 8A	SEL 8A	INPUT DIG CONTROL WORD
12736	07025624	CLD 2	AND 8D	
12737	30410450	TNZ D1	CLP 050	IF SYS2 IC, GO IC ROUT
12740	37320450	TCT 32	CLPO 50	IF SSM2, GO TO IC ROUTE
12741	37032327	TCT 03	LDM 2P	IF HOLD, GO TO S.1.
12742	37040450	TCT 04	CLP 050	IF PF4>1, GO IC ROUT
12743	05066672	LRC 6	SSL 7B	
12744	07015624	CLD 1	AND 8D	
12745	30411607	TNZ D1	FTR 7	IF INCR DATA, BRANCH
12746	26724411	LOI P8	CIL AA	
12747	00 0 17010	ADR	000T2XU	
12750	05063605	LRC 6	STT 05	SET ABSOLUTE DATA FLAG
12751	12312423	SEL CA	STI 8C	INPUT DATA, REPLACE T VECTORS
12752	44115466	CIL AA	CDL NN	
12753	30621475	TNZ N2	BTR 2	
12754	23170000	LDM 1P	NOP	
12755	07025541	CLD 2	ADL DA	
12756	26720503	LOI P8	LRC 3	
12757	00 0 17524	ADR	000NS2X	
12760	12312423	SEL CA	STI 8C	INPUT DATA, REPLACE WORKING INCR
12761	55415466	ADL DA	CDL NN	
12762	30621475	TNZ N2	BTR 2	
12763	23170000	LDM 1P	NOP	
		MAC		

DIG LIN SYSS

	YYL	DIG LIN SYSS	
	LOCO	13004	
	MIC		USES- WORKING STORAGE 1,2
	MIC		PF 3,4
	MIC		
13004	07039641	CLD 3	AND DA
13005	74 2 16219	LDD B	DDP 24
13006	05046631	LRC 4	SSL JA
13007	59211221	ADL BA	SEL BA
13010	07045624	CLD 4	AND BD
13011	30410491	TNZ D1	CLP 051
13012	37330491	TCT 33	CLP 051
13013	37032327	TCT 03	LDM 2P
13014	37040491	TCT 04	CLP 051
13015	05066672	LRC 6	SSL 78
13016	07015624	CLD 1	AND BD
13017	30411607	TNZ D1	FTR 7
13020	26724411	LDI PB	CIL AA
13021	00 0 17020	ADR	000T3XU
13022	05063605	LRC 6	STI 05
13023	12312423	SEL CA	STI 8C
13024	44115466	CIL AA	CDL NN
13025	30621475	TNZ N2	BTR 2
13026	23170000	LDM 1P	NOP
13027	07025541	CLD 2	ADL DA
13030	26720503	LDI PB	LRC 3
13031	00 0 17527	ADR	000WS3X
13032	12312423	SEL CA	STI 8C
13033	55415466	ADL DA	CDL NN
13034	30621475	TNZ N2	BTR 2
13035	23170000	LDM 1P	NOP
	MAC		

INPUT DIG CONTROL WORD

IF SYSS IC, GO IC ROUT  
 IF SSH3, GO IC ROUT  
 IF WOLD, GO TO S.1.  
 IF PF4>1, GO IC ROUT

IF INCR DATA, BRANCH

SET ABSOLUTE DATA FLAG  
 INPUT DATA, REPLACE Y VECTORS

INPUT DATA, REPLACE WORKING INCR

SIM ANG SYS1

		TTL	SIM ANG SYS1	
		LOCO	13096	
		MIC		USES- WORKING STORAGE 1.3
		MIC		
		MIC		
		MIC		
13056	26732675	LDI PC	LDI PL	
13057	20240202	OCT	20240202	IIU DATA ADDRESS
13060	00 0 17542	ADR	000PM1	
13061	12130000	SEL AC	NOP	PROCESS DPH1 1
13062	37310447	TCT 31	CLP 047	SYS 1 IC
13063	26733214	LDI PC	T20 AS	
13064	00100000	OCT	100000	GUARD BAND CONSTANT
13065	63334433	CCL CC	CIL CC	
13066	55135713	ADL AC	XOR AC	
13067	30341604	TNE CS	FTR 04	DPH1 1 NEAR ZERO
13070	63114411	CCL AA	CIL AA	
13071	05031367	LRC 03	SDL 67	10 DEG/SEC MAX
13072	27545541	LDM LD	ADL DA	
13073	25510000	STM LA	NOP	
13074	26731213	LDI PC	SEL AC	PROCESS DTNETA 1
13075	20240201	OCT	20240201	
13076	26733214	LDI PC	T20 AS	
13077	00100000	OCT	100000	
13100	63334433	CCL CC	CIL CC	
13101	55135713	ADL AC	XOR AC	
13102	30341603	TNE CS	FTR 03	DTNETA 1 NEAR ZERO
13103	05031367	LRC 03	SDL 67	10 DEG/SEC MAX
13104	54552754	COL LL	LDM LD	
13105	55412551	ADL DA	STM LA	
13106	74 1 17542	LDD A	PM 1	FORM DPH1 1
13107	05071367	LRC 07	SDL 67	
13110	74 4 17540	LDD D	PS 1	
13111	55410000	ADL DA	NOP	
13112	75 1 17540	STD A	PS 1	
13113	70750400	CPF PL	CLP 00	SIN ROUTINE
13114	75 1 70332	STD A	SIN PS 1	
13115	74 1 17540	LDD A	PS 1	
13116	70750401	CPF PL	CLP 01	COS ROUTINE
13117	75 1 70333	STD A	COS PS1	
13120	74 1 17541	LDD A	TM1	
13121	70750400	CPF PL	CLP 00	SIN ROUTINE
13122	75 1 70334	STD A	SIN TM1	
13123	74 1 17541	LDD A	TM 1	
13124	70750401	CPF PL	CLP 01	COS ROUTINE
13125	75 1 70335	STD A	COS TM1	
13126	74 1 17542	LDD A	PM 1	
13127	70750400	CPF PL	CLP 00	SIN ROUTINE
13130	75 1 70336	STD A	SIN PM1	
13131	74 1 17542	LDD A	PM 1	
13132	70750401	CPF PL	CLP 01	COS ROUTINE
13133	75 1 70337	STD A	COS PM1	
13134	21372317	STM 3P	LDM 1P	
13135	04550000	CLP 055	NOP	GD. T. VECT SYS1
		MAC		

SIM AND SYS2

Address	Hex	Instruction	Comments
		YTL	SIM AND SYS2
		LOCO	13142
		MIC	USES- WORKING STORAGE 1.3
		MIC	
		MIC	
		MIC	
13142	26732675	LDI PC	L01 PL
13143	20240205	OCT	20240205
13144	00 0 17545	ADR	000PH2
13145	12130000	SEL AC	NOP
13146	37320450	TCT 32	CLP 050
13147	26733214	LDI PC	T20 AS
13150	00100000	OCT	100000
13151	63334433	CCL CC	CIL CC
13152	55135713	ADL AC	XOR AC
13153	30341604	TNE CS	FTR 04
13154	63114411	CCL AA	CIL AA
13155	05031367	LRC 03	SDL 67
13156	27545541	LDM LD	ADL DA
13157	25510000	STM LA	NOP
13160	26731213	LDI PC	SEL AC
13161	20240204	OCT	20240204
13162	26733214	LDI PC	T20 AS
13163	00100000	OCT	100000
13164	63334433	CCL CC	CIL CC
13165	55135713	ADL AC	XOR AC
13166	30341604	TNE CS	FTR 04
13167	63114411	CCL AA	CIL AA
13170	05031367	LRC 03	SDL 67
13171	54552754	CDL LL	LDM LD
13172	55412551	ADL DA	STM LA
13173	74 1 17545	LDD A	PH 2
13174	05071367	LRC 7	SDL 67
13175	74 4 17543	LDD D	PS 2
13176	55410000	ADL DA	NOP
13177	75 1 17543	STD A	PS 2
13200	70750400	CPF PL	CLP 00
13201	75 1 70340	STD A	SIN PS2
13202	74 1 17543	LDD A	PS 2
13203	70750401	CPF PL	CLP 01
13204	75 1 70341	STD A	COS PS 2
13205	74 1 17544	LDD A	TH 2
13206	70750400	CPF PL	CLP 00
13207	75 1 70342	STD A	SIN TH2
13210	74 1 17544	LDD A	TH 2
13211	70750401	CPF PL	CLP 01
13212	75 1 70343	STD A	COS TH2
13213	74 1 17545	LDD A	PH 2
13214	70750400	CPF PL	CLP 00
13215	75 1 70344	STD A	SIN PH2
13216	74 1 17545	LDD A	PH 2
13217	70750401	CPF PL	CLP 01
13220	75 1 70345	STD A	COS PH2
13221	21372317	STM 3P	LDM 1P
13222	04560000	CLP 056	NOP
		MAC	GO T VECT SYS2

SIM ANG SYS3

13227 26732675  
 13230 20240202  
 13231 00 0 17550  
 13232 12130000  
 13233 37330451  
 13234 24733214  
 13235 00100000  
 13236 63334433  
 13237 55135713  
 13240 30341604  
 13241 63114411  
 13242 05031367  
 13243 27545541  
 13244 25510000  
 13245 26731213  
 13246 20240201  
 13247 26733214  
 13250 00100000  
 13251 63334433  
 13252 55135713  
 13253 30341603  
 13254 05031367  
 13255 54552754  
 13256 55412551  
 13257 74 1 17550  
 13260 05071367  
 13261 74 4 17546  
 13262 55410000  
 13263 75 1 17546  
 13264 70750400  
 13265 75 1 70346  
 13266 74 1 17546  
 13267 70750401  
 13270 75 1 70347  
 13271 74 1 17547  
 13272 70750400  
 13273 75 1 70350  
 13274 74 1 17547  
 13275 70750401  
 13276 75 1 70351  
 13277 74 1 17550  
 13300 70750400  
 13301 75 1 70352  
 13302 74 1 17550  
 13303 70750401  
 13304 75 1 70353  
 13305 21372317  
 13306 04570000

TTL SIM ANG SYS3  
 LOCO 13227  
 MIC  
 MIC  
 MIC  
 MIC  
 LDI PC LDI PL  
 OCT 20240202  
 ADR 000PH3  
 SEL AC NOP  
 TCT 33 CLP 051  
 LDI PC TZO AS  
 OCT 100000  
 CCL CC CIL CC  
 ADL AC XOR AC  
 TNZ CS FYR 04  
 CCL AA CIL AA  
 LRC 03 SDL 67  
 LDM LD ADL DA  
 STM LA NOP  
 LDI PC SFL AC  
 OCT 20240201  
 LDI PC TZO AS  
 OCT 100000  
 CCL CC CIL CC  
 ADL AC XOR AC  
 TNZ CS FYR 03  
 LRC 03 SDL 67  
 CDL LL LDM LD  
 ADL DA STM LA  
 LDD A PH 3  
 LRC 7 SDL 67  
 LDD D PS 3  
 ADL DA NOP  
 STD A PS 3  
 CPF PL CLP 00  
 STD A SIN PS3  
 LDD A PS 3  
 CPF PL CLP 01  
 STD A COS PS3  
 LDD A TH 3  
 CPF PL CLP 00  
 STD A SIN TH3  
 LDD A TH 3  
 CPF PL CLP 01  
 STD A COS TH3  
 LDD A PH 3  
 CPF PL CLP 00  
 STD A SIN PH3  
 LDD A PH 3  
 CPF PL CLP 01  
 STD A COS PH3  
 STM 3P LDM 1P  
 CLP 057 NOP  
 MAC

USES-WORKING STORAGE 1,3

PROCESS DPHI3  
SYS 3 IC

GUARD BAND CONSTANT

DPHI 3 NEAR ZERO

10 DEG/SEC MAX

PROCESS DTHETA 3

DTHETA 3 NEAR ZERO  
10 DEG/SEC MAX

00 I VECT SYS3

SIM LIN SYS1

LOC	ADD	TYL	OP	SYMBOL	COMMENT
		TYL		SIM LIN SYS1	
		LOC		13313	
		MIC			USES WORKING STORAGE 1
		MIC			TEMP STORAGE 0-10 OCTAL
		MIC			PF 6
		MIC			NOTE: WORKING STORAGE AND PF ARE
		MIC			STORED IN TEMP FOR EXIT TO
		MIC			ROT 1
13313	26712672	LDI	PA	LDI PB	
13314	00000170	OCT		170	
13315	00 0 17700	ADR		000TEMP	
13316	05100000	LRC	B	NOP	
13317	26132423	LDI	AC	STI BC	WORKING TO TEMP
13320	54660000	CDL	NN	NOP	
13321	30671475	TN2	N7	BTR 2	
13322	77612421	CFS	6A	STI BA	PF TO TEMP
13323	26720000	LDI	PB	NOP	
13324	20240200	OCT		20240200	IIU ADR
13325	12122674	SEL	AB	LDI PD	
13326	74460000	OCT		74460000	HALF MAX CONST
13327	55413606	ADL	DA	STT 06	
13330	26733214	LDI	PC	T30 AS	
13331	00100000	OCT		100000	GUARD RAND CONSTANT
13332	63334433	CCL	CC	CIL CC	
13333	55135713	ADL	AC	XOR AC	
13334	30345711	TN2	CS	XOR AA	IF VEL NEAR ZERO
13335	05031367	LRC	03	SDL 67	220 FPS MAX
13336	26732431	LDI	PC	STI CA	
13337	00 0 17521	ADR		000MS1X	
13340	24302530	STI	CO	STM CO	
13341	54335433	CDL	CC	CDL CC	
13342	70750405	CPF	PL	CLP 005	-ROT 1
13343	16150000	FTR	13	NOP	
13344	74 1 17004	LDD	A	T12U	
13345	74 2 17005	LDD	B	T12L	
13346	72124433	CPS	AB	CIL CC	
13347	30146311	TN2	AS	CCL AA	
13350	30171610	TN2	A7	FTR 08	
13351	26715512	LDI	PA	ADL AB	
13352	00300000	OCT		300000	LIMIT ALT TO 24 FT.
13353	30241605	TN2	BS	FTR 05	
13354	44332732	CIL	CC	LDM CB	
13355	32242530	T20	BS	STM CO	
13356	63027202	CCL	08	CPS 08	
13357	75 0 70336	STD	0	SIN PH1	
13360	75 2 70337	STD	B	COS PH1	
13361	26712672	LDI	PA	LDI PB	
13362	00000170	OCT		170	
13363	00 0 17700	ADR		000TEMP	
13364	05100000	LRC	B	NOP	
13365	26232413	LDI	BC	STI AC	
13366	54660000	CDL	NN	NOP	
13367	30671475	TN2	N7	BTR 2	

SIM LIN SYS1

13370 27230263  
13371 23170000

LDM BC CYS 6C  
LDW 1P NOP  
MAC

EXIT



SIM LIN 8Y82

13453 27230263  
13454 23170000

LDM BC CTS 6C  
LDM 1P NOP  
MAC

EXIT

SIM LIN SVSS

		TYL	SIM LIN SVSS	
		LOCO	13461	
		MIC		USES WORKING STORAGE 1
		MIC		TEMP STORAGE 0-10 OCTAL
		MIC		PF 6
		MIC		NOTE: WORKING STORAGE AND PF ARE
		MIC		STORED IN TEMP FOR EXIT TO
		MIC		ROT 3
		MIC		
		MIC		
		MIC		
		MIC		
		MIC		
13461	26712672	LDI PA	LDI PB	
13462	00000170	OCT	170	
13463	00 0 17700	ADR	000TEMP	
13464	05100000	LRC 8	NOP	
13465	26132423	LDI AC	STI BC	WORKING TO TEMP
13466	54660000	CDL NN	NOP	
13467	30671475	TNZ N7	BTR 2	
13470	77612421	CFS 6A	STI BA	PF TO TEMP
13471	26720000	LDI PB	NOP	
13472	20240200	OCT	20240200	
13473	12122674	SEL AB	LDI PD	
13474	76460000	OCT	76460000	HALF MAX CONST
13475	55413606	ADL DA	STI 06	
13476	26733214	LDI PC	T20 AS	
13477	00100000	OCT	100000	GUARD BAND CONSTANT
13500	63334433	CCL CC	CIL CC	
13501	55135713	ADL AC	XOR AC	
13502	30345711	TNZ CS	XOR AA	IF VEL NEAR ZERO
13503	05031367	LRC 03	SDL 67	220 FPS MAX
13504	26732481	LDI PC	STI CA	
13505	00 0 17527	ADR	000WSX	
13506	24302530	STI CQ	STM CQ	
13507	54335433	CDL CC	CDL CC	
13510	70750407	CPF PL	CLP 007	-ROT 3
13511	16150000	FTR 13	NOP	
13512	74 1 17024	LDD A	T32U	
13513	74 2 17025	LDD B	T32L	
13514	72124433	CPS AB	CIL CC	
13515	30146311	TNZ AS	CCL AA	
13516	30171610	TNZ A7	FTR 08	
13517	26715512	LDI PA	ADL AB	
13520	00300000	OCT	300000	LIMIT ALT TO 24 FT.
13521	30241605	TNZ BS	FTR 05	
13522	44332732	CIL CC	LDM CB	
13523	32242530	T20 BS	STM CO	
13524	63027202	CCL 08	CPS 08	
13525	75 0 70352	STD 0	SIN PH3	
13526	75 2 70353	STD 8	COS PH3	
13527	26712672	LDI PA	LDI PB	
13530	00000170	OCT	170	
13531	00 0 17700	ADR	000TEMP	
13532	05100000	LRC 8	NOP	
13533	26232413	LDI BC	STI AC	
13534	54660000	CDL NN	NOP	
13535	30671475	TNZ N7	BTR 2	

SIM LIN 8Y53

13536 27230263  
13537 23170000

LDN BC CTS 6C  
LDN 1P NOP  
MAC

EXIT

12  
11  
10  
9  
8  
7  
6  
5  
4  
3  
2  
1

LOCAL AND SYS1

		TTL	LOCAL AND SYS1	
		LOCO	13544	
		MIC		USES- WORKING STORAGE 2
		MIC		
		MIC		
		MIC		
13544	37310447	TCT 31	CLP 047	SYS 1 IC
13545	26742673	LDI PD	LDI PC	
13546	00 0 17556	ADR	000DPS1	
13547	00 0 17540	ADR	000PS1	
13550	05030000	LRC 3	NOP	
13551	27412732	LDM DA	LDM CB	
13552	55212431	ADL BA	STI CA	
13553	44445466	CTL DD	CDL NN	
13554	30671474	TNZ N7	BTR 3	
13555	74 1 17540	LDD A	PS 1	
13556	70750400	CPF PL	CLP 00	SIN ROUTINE
13557	75 1 70332	STD A	SIN PS1	
13560	74 1 17540	LDD A	PS1	
13561	70750401	CPF PL	CLP 01	COS ROUTINE
13562	75 1 70333	STD A	COS PS1	
13563	74 1 17541	LDD A	TM 1	
13564	70750400	CPF PL	CLP 00	SIN ROUTINE
13565	75 1 70334	STD A	SIN TM1	
13566	74 1 17541	LDD A	TM 1	
13567	70750401	CPF PL	CLP 01	COS ROUTINE
13570	75 1 70335	STD A	COS TM1	
13571	74 1 17542	LDD A	PM 1	
13572	70750400	CPF PL	CLP 00	SIN ROUTINE
13573	75 1 70336	STD A	SIN PM1	
13574	74 1 17542	LDD A	PM 1	
13575	70750401	CPF PL	CLP 01	COS ROUTINE
13576	75 1 70337	STD A	COS PM1	
13577	23270000	LDM 2P	NOP	
		HAC		

LOCAL ANG SYS2

		TTL	LOCAL ANG SYS2	
		LOCO	13604	
		NIC		USES-WORKING STORAGE 2
		NIC		
		NIC		
		NIC		
13604	37320450	TCT 32	CLP 050	SYS 2 1C
13605	26742673	LDI PD	LDI PC	
13606	00 0 17561	ADR	000DPS2	
13607	00 0 17543	ADR	000PS2	
13610	05030000	LRC 3	NOP	
13611	27412732	LDM DA	LDM CB	
13612	55212431	ADL BA	STI CA	
13613	44445466	CIL DD	CDL NN	
13614	30671474	TN2 N7	BTR 3	
13615	74 1 17543	LDD A	PS 2	
13616	70750400	CPF PL	CLP 000	
13617	75 1 70340	STD A	SIN PS2	
13620	74 1 17543	LDD A	PS 2	
13621	70750401	CPF PL	CLP 01	
13622	75 1 70341	STD A	COS PS2	
13623	74 1 17544	LDD A	TH 2	
13624	70750400	CPF PL	CLP 00	
13625	75 1 70342	STD A	SIN TH2	
13626	74 1 17544	LDD A	TH 2	
13627	70750401	CPF PL	CLP 01	
13630	75 1 70343	STD A	COS TH2	
13631	74 1 17545	LDD A	PH 2	
13632	70750400	CPF PL	CLP 00	
13633	75 1 70344	STD A	SIN PH2	
13634	74 1 17545	LDD A	PH 2	
13635	70750401	CPF PL	CLP 01	
13636	75 1 70345	STD A	COS PH2	
13637	23270000	LDM 2P	NOP	
		MAC		

LOCAL ANG SYS3

LOCAL ANG SYS3		YTL	LOCAL ANG SYS3	
		LOCO	13644	
		MIC		USES- WORKING STORAGE 2
		MIC		
		MIC		
13644	37330451	TCT 33	CLP 051	SYS 3 IC
13645	26742673	LDI PD	LOI PC	
13646	00 0 17564	ADR	000DPS3	
13647	00 0 17546	ADR	000PS3	
13650	05030000	LRC 3	NOP	
13651	27412732	LDM DA	LDM CB	
13652	55212431	ADL 8A	STI CA	
13653	44445466	CIL DD	CDL NN	
13654	30671474	TNE N7	BTR 3	
13655	74 1 17546	LDD A	PS 3	
13656	70750400	CPF PL	CLP 00	
13657	75 1 70346	STD A	SIN PSS	
13660	74 1 17546	LDD A	PS 3	
13661	70750401	CPF PL	CLP 01	
13662	75 1 70347	STD A	COS PSS	
13663	74 1 17547	LDD A	TH 3	
13664	70750400	CPF PL	CLP 00	
13665	75 1 70350	STD A	SIN TH3	
13666	74 1 17547	LDD A	TH 3	
13667	70750401	CPF PL	CLP 01	
13670	75 1 70351	STD A	COS TH3	
13671	74 1 17550	LDD A	PH 3	
13672	70750400	CPF PL	CLP 00	
13673	75 1 70352	STD A	SIN PH3	
13674	74 1 17550	LDD A	PH 3	
13675	70750401	CPF PL	CLP 01	
13676	75 1 70353	STD A	COS PH3	
13677	23270000	LDW 2P	NOP	
		MAC		



TYPEWRITER I/O

13736	07465714	CLD 046	XOR AD	CHAR AN 0
13737	30411602	TN2 D1	FTR 2	NO, GO ON
13740	75 7 14122	STD P	OIND	SET OIND
13741	23076560	LDW OP	COM 60	EXIT
13742	07525714	CLD 052	XOR AD	CHAR A C/R
13743	30411601	TN2 D1	FTR 1	NO, GO ON
13744	14540000	BTR 19	NOP	GO BACK TO RESET
13745	07075641	CLD 7	AND DA	MASK OCTAL CHAR
13746	74 5 14126	LDD L	ADDR1	• ADD
13747	05036635	LRC 3	SSL 3L	• OCTAL
13750	64150000	LOR AL	NOP	• CHAR
13751	75 5 14126	STD L	ADDR1	• TO ADDR1
13752	23076560	LDW OP	COM 60	EXIT
13753	07525714	CLD 052	XOR AD	CHAR A C/R
13754	32411606	TZO D1	FTR 6	YES, GO STORE DATA
13755	07075641	CLD 7	AND DA	MASK OCTAL DATA
13756	74 2 14125	LDU B	DATA	• ADD
13757	05036632	LRC 3	SSL 3R	• OCTAL
13760	64120000	LOR AB	NOP	• CHAR
13761	75 2 14125	STD B	DATA	• TO DATA
13762	23076560	LDW OP	COM 60	EXIT
13763	74 1 14126	LDD A	ADDR1	• STORE (DATA)
13764	74 2 14125	LDD B	DATA	• INTO ((ADDR1))
13765	25122671	STM AB	LDI PA	•
13766	02006040	OCT	02006040	
13767	12010752	SEL QA	CLD 052	SEL TYPM FOR OUTPUT
13770	10240000	DTM 2D	NOP	• OUTPUT C/R
13771	14270000	BTR 40	NOP	• AND GO RESET IND'S
13772	07525714	CLD 052	XOR AD	CHAR A C/R
13773	32411607	TZO D1	FTR 7	YES, GO TYPE WORD(S)
13774	75 7 14123	STD P	BLOCIND	
13775	07075641	CLD 7	AND DA	MASK OCTAL CHAR
13776	74 5 14127	LDD L	ADDR2	• ADD
13777	05036635	LRC 3	SSL 3L	• OCTAL
14000	64150000	LOR AL	NOP	• CHAR
14001	75 5 14127	STD L	ADDR2	• TO ADDR2
14002	23076560	LDW OP	COM 60	EXIT
14003	75 7 14124	STD P	TIND	
14004	26711201	LDI PA	SEL QA	SEL TYPM FOR OUTPUT
14005	02006040	OCT	02006040	
14006	07520000	CLD 052	NOP	• OUTPUT
14007	10240000	DTR 2D	NOP	• C/R
14010	74 1 14123	LDD A	BLOCIND	
14011	30111602	TN2 A1	FTR 2	IF BLOC OUT, GO FIND DELTA AND MAX
14012	75 0 14132	STD 0	IMAX	
14013	16100000	FTR 8	NOP	
14014	74 1 14127	LDD A	ADDR2	
14015	74 2 14126	LDD B	ADDR1	
14016	63224422	CCL BB	CIL BB	
14017	55213014	ADL BA	TN2 A4	
14020	63031601	CCL OC	FTR 1	
14021	44030000	CIL OC	NOP	
14022	75 3 14131	STD C	IDELTA	
14023	75 1 14132	STD A	IMAX	
14024	75 0 14133	STD 0	ICOUNT	INITIALIZE WORD COUNT
14025	07070000	CLD 7	NOP	

TYPEWRITER I/O

14026 75 4 14134  
 14027 07040000  
 14030 75 4 14135  
 14031 07024174  
 14032 75 4 14130  
 14033 23076560  
 14034 74 3 14135  
 14035 07064642  
 14036 76454626  
 14037 74 1 14126  
 14040 74 2 14133  
 14041 41126672  
 14042 07075642  
 14043 10220000  
 14044 74 1 14135  
 14045 32111603  
 14046 63025521  
 14047 75 1 14135  
 14050 14600000  
 14051 07024174  
 14052 75 4 14130  
 14053 23076560  
 14054 07600000  
 14055 10240000  
 14056 07024174  
 14057 75 4 14130  
 14060 23076560  
 14061 74 3 14134  
 14062 07064642  
 14063 76454626  
 14064 74 1 14126  
 14065 74 2 14133  
 14066 41212712  
 14067 66720707  
 14070 56420000  
 14071 10220000  
 14072 74 1 14134  
 14073 32111603  
 14074 63025521  
 14075 75 1 14134  
 14076 14570000  
 14077 07024174  
 14100 75 4 14130  
 14101 23076560  
 14102 07520000  
 14103 10240000  
 14104 74 1 14133  
 14105 74 2 14132  
 14106 57120000  
 14107 32211604  
 14110 74 2 14131  
 14111 41210000  
 14112 75 1 14133  
 14113 14110000  
 14114 07024174  
 14115 75 4 14130

STD D JCOUNT  
 CLD 4 NOP  
 STD D KCOUNT  
 CLD 2 ADF PD  
 STD D RETADDR  
 LDW OP COM 60  
 LDD C KCOUNT  
 CLD 6 CPL DB  
 MCS 5 CPL BN  
 LDD A ADDR1  
 LDD B ICOUNT  
 ADF AB SSL 78  
 CLD 7 AND DR  
 DTR 28 NOP  
 LDD A KCOUNT  
 TZO A1 FTR 3  
 CCL QB ADL BA  
 STD A KCOUNT  
 BTR 15 NOP  
 CLD 2 ADF PD  
 STD D RETADDR  
 LDW OP COM 60  
 CLD 060 NOP  
 DTR 20 NOP  
 CLD 2 ADF PD  
 STD D RETADDR  
 LDW OP COM 60  
 LDD C JCOUNT  
 CLD 6 CPL DB  
 MCS 5 CPL BN  
 LDD A ADDR1  
 LDD B ICOUNT  
 ADF BA LDM AB  
 SSL 78 CLD 7  
 AND DB NOP  
 DTR 28 NOP  
 LDD A JCOUNT  
 TZO A1 FTR 3  
 CCL QB ADL BA  
 STD A JCOUNT  
 BTR 16 NOP  
 CLD 2 ADF PD  
 STD D RETADDR  
 LDW OP COM 60  
 CLD 052 NOP  
 DTR 20 NOP  
 LDD A ICOUNT  
 LDD B IMAX  
 XOR AB NOP  
 TZO B1 FTR 4  
 LDD B IDELTA  
 ADF BA NOP  
 STD A ICOUNT  
 BTR 54 NOP  
 CLD 2 ADF PD  
 STD D RETADDR

INITIALIZE DATA CHAR COUNT

INITIALIZE ADDR CHAR COUNT

- SAVE
- RETURN AND
- EXIT

SHIFT NO. IN N

IF LAST ADDR CHAR, GO BLANK

- SAVE
- RETURN AND
- EXIT

- SAVE
- RETURN AND
- EXIT

SHIFT NO. IN N

IF LAST DATA CHAR, GO NEW LINE

- SAVE
- RETURN AND
- EXIT

IF LAST WORD, GO NEW LINE

- SAVE
- RETURN AND

TYPEWRITER I/O

14116	23076560		LDW	OP	COM	60	• EXIT
14117	07520000		CLD	052	NOP		
14120	14001447		BTR	63	BTR	24	
14121	00000000	LIND	OCT		0		
14122	00000000	OJND	OCT		0		
14123	00000000	BLOCIND	OCT		0		
14124	00000000	TIND	OCT		0		
14125	00000000	DATA	OCT		0		
14126	00000000	ADDR1	OCT		0		
14127	00000000	ADDR2	OCT		0		
14130	00000000	RETADDR	OCT		0		
14131	00000000	IDELTA	OCT		0		
14132	00000000	IMAX	OCT		0		
14133	00000000	ICOUNT	OCT		0		
14134	00000000	JCOUNT	OCT		0		
14135	00000000	KCOUNT	OCT		0		
			HAC				

SGS OUT PUT

			TTL	SGS OUT PUT
			LOCO	14427
			MIC	
			MIC	
			MIC	
14427	26711201	XHTS	LDI PA	SEL 0A
14430	20000000		OCT	20000000
14431	65600000		COM 60	NOP
14432	27711021		LDM PA	DTR 2A
14433	00000714		OCT	714
14434	26742472		LDI PD	LDI PR
14435	00017360		UCT	17360
14436	00000064		OCT	64
14437	24410000		LDI DA	NOP
14440	10210000		DTR 2A	NOP
14441	54223027		CDL 8B	TN2 87
14442	14740000		BTM 3	NOP
14443	10600000		DTR 60	NOP
14444	70570000		CPF LP	NOP
			MAC	

CALL CPFPL CLPD40

SELECT SGS  
CMD WORD

SEND ADR TO VCU  
SGS ADR

SGS DATA TABLE  
NO OF WORDS

XFER TO SGS

DISCONNECT  
EXIT

DACU OUTPUT

		TTL	DACU OUTPUT	
		LOCO	14445	
		MIC		CALL CPFPL CLP032
		MIC		
		MIC		
14445	26720000	LDI PB	NOP	DACU DATA TABLE
14446	00 0 17477	ADR	000DAC012	
14447	07146560	CLD 12	COM 60	
14450	26711201	LDI PA	SFL 0A	SELECT DACU
14451	20100000	OCT	20100000	CMD WORD
14452	27215444	LDM BA	CDL DD	
14453	10210100	DTR 2A	HLT	XFER TO DACU
14454	54220000	CDL BB	NOP	
14455	30411474	TNE DF	BTR 03	
14456	10600100	DTR 60	HLT	DISCONNECT
14457	70570000	CPF LP	NOP	EXIT
		MAC		

RELOCATE SGS DATA

RELSGS			TTL	RELOCATE SGS DATA	
14460	05100000		LOC0	14460	
14461	26732674		MIC		
14462	00 0 17206		MIC		
14463	00 0 17364		MIC		CALL CPF PL CLPD 30
14464	26312441		MIC		
14465	54663067		LRC 08	NOP	PAR
14466	14750000		LDI PC	LDI PD	
14467	05100000		ADH	000PCARX	
14470	26732674		ADR	000SPCARX	
14471	00 0 17241		LDI CA	STI DA	
14472	00 0 17404		CDL NN	TNZ N7	
14473	26312441		BTH 02	NOP	
14474	54663067		LRC 08	NOP	PBR
14475	14750000		LDI PC	LDI PD	
14476	05100000		ADR	000PCBRX	
14477	26732674		ADR	000SPCBRX	
14500	00 0 17274		LDI CA	STI DA	
14501	00 0 17424		CDL NN	TNZ N7	
14502	26312441		BTH 02	NOP	
14503	54663067		LRC 08	NOP	PCR
14504	14750000		LDI PC	LDI PD	
14505	05030000		ADR	000PCCR	
14506	26732674		ADR	000SPCCR	
14507	00 0 17120		LDI CA	STI DA	
14510	00 0 17374		CDL NN	TNZ N7	
14511	26312632		BTH 02	NOP	
14512	24422441		LRC 03	NOP	LAR
14513	54663067		LDI PC	LDI PD	
14514	14740000		ADR	000LARXU	
14515	05030000		ADR	000SLARXL	
14516	26732674		LDI CA	LDI CB	
14517	00 0 17142		STI DB	STI DA	
14520	00 0 17414		CDL NN	TNZ N7	
14521	26312632		BTR 03	NOP	
14522	24422441		LRC 03	NOP	LBR
14523	54663067		LDI PC	LDI PD	
14524	14740000		ADR	000LBRXU	
14525	05030000		ADR	000SLBRXL	
14526	26732674		LDI CA	LDI CB	
14527	00 0 17164		STI DB	STI DA	
14530	00 0 17434		CDL NN	TNZ N7	
14531	26312632		BTH 03	NOP	
14532	24422441		LRC 03	NOP	LCR
14533	54663067		LDI PC	LDI PD	
14534	14740000		ADR	000LCRXU	
14535	74 1 17106		ADR	000SLCRXL	
14536	75 1 17402		LDI CA	LDI CB	
14537	74 1 17107		STI DB	STI DA	
14540	75 1 17403		CDL NN	TNZ N7	
14541	74 1 17110		BTH 03	NOP	
			LDD A	SIN GA	
			STD A	SSIN GA	
			LDD A	COS GA	
			STD A	SCOS GA	
			LDD A	SIN GB	

RELOCATE SGS DATA

14542 75 1 17422  
14543 74 1 17111  
14544 75 1 17423  
14545 74 1 17112  
14546 75 1 17442  
14547 74 1 17113  
14550 75 1 17443  
14551 46570000

STD A SSIN GB  
LDD A COS GB  
STD A SCOS GB  
LDD A SIN GC  
STD A SSIN GC  
LDD A COS GC  
STD A SCOS GC  
CPL LP NOP  
MAC

EXIT

DACU DATA

14555 21450000  
 14556 74 1 17126  
 14557 74 2 17127  
 14560 05161320  
 14561 75 1 17450  
 14562 74 1 17130  
 14563 74 2 17131  
 14564 05161320  
 14565 75 1 17451  
 14566 74 1 17132  
 14567 74 2 17133  
 14570 05161320  
 14571 75 1 17452  
 14572 74 1 17000  
 14573 74 2 17001  
 14574 05161320  
 14575 75 1 17453  
 14576 74 1 17002  
 14577 74 2 17003  
 14600 05161320  
 14601 75 1 17454  
 14602 74 1 17004  
 14603 74 2 17005  
 14604 05161320  
 14605 75 1 17455  
 14606 74 1 17020  
 14607 74 2 17021  
 14610 05161320  
 14611 75 1 17456  
 14612 74 1 17022  
 14613 74 2 17023  
 14614 05161320  
 14615 75 1 17457  
 14616 74 1 17024  
 14617 74 2 17025  
 14620 05161320  
 14621 75 1 17460  
 14622 74 2 17450  
 14623 46237654  
 14624 21014624  
 14625 74 2 17451  
 14626 46237654  
 14627 23035531  
 14630 55243722  
 14631 44110000  
 14632 21010000  
 14633 74 2 17452  
 14634 46237654  
 14635 23035531  
 14636 55423722

DACDAT

TTL DACU DATA  
 LOCO 14555  
 MIC

CALL CPF PL CLPO 31  
 USES WORKING 0.1.2.3.4

STW 4L NOP  
 LDD A LA2 XU  
 LDD B LA2 XL  
 LRC 14 SDL LOM  
 STD A DAC11  
 LDD A LA2 YU  
 LDD B LA2 YL  
 LRC 14 SDL LOM  
 STD A DAC12  
 LDD A LA2 ZU  
 LDD B LA2ZL  
 LRC 14 SDL LOM  
 STD A DAC13  
 LDD A T1XU  
 LDD B T1XL  
 LRC 14 SDL LOM  
 STD A DAC14  
 LDD A T1YU  
 LDD B T1YL  
 LRC 14 SDL LOM  
 STD A DAC15  
 LDD A T1ZU  
 LDD B T1ZL  
 LRC 14 SDL LOM  
 STD A DAC16  
 LDD A T3XU  
 LDD B T3XL  
 LRC 14 SDL LOM  
 STD A DAC17  
 LDD A T3YU  
 LDD B T3YL  
 LRC 14 SDL LOM  
 STD A DAC18  
 LDD A T3ZU  
 LDD B T3ZL  
 LRC 14 SDL LOM  
 STD A DAC19  
 LDD B DAC11  
 CPL BC MCS 12  
 STW 0A CPL BD  
 LDD B UAC12  
 CPL BC MCS 12  
 LDW 0C ADL CA  
 ADL BD TCT CY1  
 CIL AA NOP  
 STW 0A NOP  
 LDD B DAC13  
 CPL BC MCS 12  
 LDW 0C ADL CA  
 ADL DB TCT CY1

CH1  
 B34-->B20  
 CH2  
 CH3  
 CH4  
 CH5  
 CH6  
 CH7  
 CH8  
 CH9  
 CH 10

DACU DATA

14637	44110000	CIL AA	NOP	
14640	70750402	CPF PL	CLPO 02	SORT
14641	75 1 17461	STD A	DAC10	
14642	74 2 17523	LDD B	WS12	CH11
14643	26737654	LDI PC	MCS 12	
14644	76600000	DEC	-2089	
14645	75 1 17462	STD A	DAC11	FT/SEC
14646	74 2 17542	LDD B	PM1	CH12
14647	26730000	LDI PC	NOP	
14650	00002640	DEC	360821	
14651	76540000	MCS 12	NOP	
14652	75 1 17463	STD A	DAC12	DEGREES
14653	23470000	LDW 4P	NOP	EXIT
		MAC		

TRANSMIT L.P. AND VS VECTORS

		TTL	TRANSMIT L.P. AND VS VECTORS	
		COM	CALL: CPF PL CLP 037	
		LOCO	14670	
		MIC		
14670	65600511	COM 60	LRC 09	LOOP COUNTER
14671	35411477	TCF IL1	BTR 00	WAIT FOR INTERRUPT FROM VCU
14672	26711201	LDI PA	SEL 0A	SELECT VCU
14673	20300000	OCT	20300000	
14674	27711021	LDM PA	DTR 2A	
14675	00023000	OCT	23000	X STACK LOC. 3000
14676	26732672	LDI PC	LDI PB	
14677	00 0 17120	ADR	000LARXU	
14700	00000004	DEC	4	SKIP CONSTANT
14701	26315466	LDI CA	CDL NN	
14702	10210000	DTR 2A	NOP	XMIT X UPPER
14703	26317201	LDI CA	CPS 0A	MAKE SURE LOWER SIGN IS ZERO
14704	10210000	DTR 2A	NOP	XMIT X LOWER
14705	55233067	ADL BC	TN2 N7	SKIP AROUND Y+Z
14706	07021472	CLD 02	BTR 05	
		MIC		X OF L VECTORS DONE
14707	46420737	CPL DB	CLD 31	
14710	26311021	LDI CA	UTR 2A	
14711	00000000	NOP	NOP	
14712	55235444	ADL BC	CDL DD	
14713	30471474	TN2 D7	BTR 03	
		MIC		ALL X VALUES XMITTED
		MIC		
14714	65600511	COM 60	LRC 09	
14715	26711201	LDI PA	SEL 0A	SELECT VCU
14716	20300000	OCT	20300000	
14717	27711021	LDM PA	DTR 2A	
14720	00043000	OCT	43000	Y STACK LOC. 3000
14721	26732672	LDI PC	LDI PB	
14722	00 0 17122	ADR	000LARXU+2	
14723	00000004	DEC	4	SKIP CONSTANT
14724	26315466	LDI CA	CDL NN	
14725	10210000	DTR 2A	NOP	XMIT Y UPPER
14726	26317201	LDI CA	CPS 0A	MAKE SURE LOWER SIGN IS ZERO
14727	10210000	DTR 2A	NOP	XMIT Y LOWER
14730	55233067	ADL BC	TN2 N7	SKIP AROUND Z+X
14731	07021472	CLD 02	BTR 05	
		MIC		Y OF L VECTORS DONE
14732	54330000	CDL CC	NOP	
14733	46420737	CPL DB	CLD 31	
14734	26311021	LDI CA	UTR 2A	
14735	00000000	NOP	NOP	
14736	55235444	ADL BC	CDL DD	
14737	30471474	TN2 D7	BTR 03	
		MIC		ALL Y VALUES XMITTED
		MIC		
14740	65600511	COM 60	LRC 09	
14741	26711201	LDI PA	SEL 0A	SELECT VCU
14742	20300000	OCT	20300000	
14743	27711021	LDM PA	DTR 2A	

TRANSMIT L.P. AND VS VECTORS

14744	00103000	OCT	103000	Z STACK LOC. 3600
14745	26732672	LDI PC	LDI PB	
14746	00 0 17124	ADR	000LARXU+4	
14747	00000004	DEC	4	SKIP CONSTANT
14750	26315466	LDI CA	CDL NN	
14751	10210000	DTR 2A	NOP	XMIT Z UPPER
14752	26317201	LDI CA	CPS 0A	MAKE SURE LOWER SIGN IS ZERO
14753	10210000	DTR 2A	NOP	XMIT Z LOWER
14754	55233067	ADL BC	TNZ N7	SKIP AROUND X+Y
14755	07021472	CLD 02	BTR 05	
		MIC		Z OF L VECTORS DONE
14756	54335433	CDL CC	CDL CC	
14757	44420737	CPL 08	CLD 31	
14760	26311021	LDI CA	DTR 2A	
14761	00000000	NOP	NOP	
14762	55235444	ADL BC	CDL DD	
14763	30471474	TNZ 07	BTR 03	
		MIC		ALL Z VALUES XMITTED
14764	26711201	LDI PA	SEL 0A	SELECT VCU
14765	20300000	OCT	20300000	
14766	27711021	LDM PA	DTR 2A	
14767	00023061	OCT	23061	X STACK
14770	26730714	LDI PC	CLD 12	XMIT 12 WORDS
14771	00 0 17343	ADR	000BEACON	
14772	26315444	LDI CA	CDL DD	
14773	10210000	DTR 2A	NOP	
14774	30411475	TNZ DF	BTR 02	
14775	10600000	DTR 60	NOP	DISCONNECT FROM VCU
14776	70570000	CPF LP	NOP	RETURN TO CALLING PROGRAM
		MAC		

ROT1

			TTL	ROT1	
			LOCO	15000	
			NIC		CALL:
			NIC		VECTOR ADDRESS TO C
			NIC		PF8=1 FOR -ROT1
			NIC		CPF PL CLP 005
			NIC		USES WORKING 2.6.7
			NIC		C IS UNALTERED
			NIC		
			NIC		
15000	21250000	ROT1	STM 2L	NOP	
15001	35081815		TCF PF8	FTR 13	
15002	74 4 70336		LDD D	SIN PM1	
15003	63444444		CCL DD	CIL DD	
15004	74 1 70337		LDD A	COS PM1	
15005	70750425		CPF PL	CLP 025	ROTX
15006	74 4 70334		LDD D	SIN TM1	
15007	63444444		CCL DD	CIL DD	
15010	74 1 70335		LDD A	COS TM1	
15011	70750426		CPF PL	CLP 026	ROTY
15012	74 4 70332		LDD D	SIN PS1	
15013	63444444		CCL DD	CIL DD	
15014	74 1 70333		LDD A	COS PS1	
15015	70750427		CPF PL	CLP 027	ROYE
15016	23270260		LDM 2P	CTS 60	EXIT
15017	74 4 70332		LDD D	SIN PS1	
15020	74 1 70333		LDD A	COS PS1	
15021	70750427		CPF PL	CLP 027	ROYE
15022	74 4 70334		LDD D	SIN TM1	
15023	74 1 70335		LDD A	COS TM1	
15024	70750426		CPF PL	CLP 026	ROTY
15025	74 4 70336		LDD D	SIN PM1	
15026	74 1 70337		LDD A	COS PM1	
15027	70750425		CPF PL	CLP 025	ROTX
15030	23270260		LDM 2P	CTS 60	EXIT
			HAC		

ROT2

			TTL	ROT2		
			LOCO	15044	CALL1	VECTOR ADDRESS TO C
			MIC			PF6=1 FOR -ROT2
			MIC			CPF PL CLP 006
			MIC			
			MIC		USES WORKING 2,6,7	
			MIC		C IS UNALTERED	
			MIC			
			MIC			
			STW 2L	NOP		
			ICF PF6	FTR 13		
			LDD D	SIN PH2		
			CCL DD	CIL DD		
			LDD A	COS PH2		
			CPF PL	CLP 025	ROTX	
			LDD D	SIN TH2		
			CCL DD	CIL DD		
			LDD A	COS TH2		
			CPF PL	CLP 026	ROTY	
			LDD D	SIN PS2		
			CCL DD	CIL DD		
			LDD A	COS PS2		
			CPF PL	CLP 027	ROTZ	
			LDD D	CTS 60	EXIT	
			LDD D	SIN PS2		
			LDD A	COS PS2		
			CPF PL	CLP 027	ROTE	
			LDD D	SIN TH2		
			LDD A	COS TH2		
			CPF PL	CLP 026	ROTY	
			LDD D	SIN PH2		
			LDD A	COS PH2		
			CPF PL	CLP 025	ROTX	
			LDD D	CTS 60	EXIT	
			MAC			

15044	21250000	ROT2				
15045	35061615					
15046	74 4 70344					
15047	63444444					
15050	74 1 70345					
15051	70750425					
15052	74 4 70342					
15053	63444444					
15054	74 1 70343					
15055	70750426					
15056	74 4 70340					
15057	63444444					
15060	74 1 70341					
15061	70750427					
15062	23270260					
15063	74 4 70340					
15064	74 1 70341					
15065	70750427					
15066	74 4 70342					
15067	74 1 70343					
15070	70750426					
15071	74 4 70344					
15072	74 1 70345					
15073	70750425					
15074	23270260					

ROT3

			YTL	ROT3	
			LOCO	19110	
			MIC		CALL:
			MIC		VECTOR ADDRESS TO C
			MIC		PF6=1 FOR -ROT3
			MIC		CPF PL CLP 007
			MIC		USES WORKING 2,6,7
			MIC		C IS UNALTERED
			MIC		
			MIC		
19110	21250000	ROT3	STW 2L	NOP	
19111	35061615		TCF PF6	FTR 13	
19112	74 4 70352		LDD D	SIN PH3	
19113	63444444		CCL DD	CIL DD	
19114	74 1 70353		LDD A	COS PH3	
19115	70750425		CPF PL	CLP 025	ROTX
19116	74 4 70350		LDD D	SIN TH3	
19117	63444444		CCL DD	CIL DD	
19120	74 1 70351		LDD A	COS TH3	
19121	70750426		CPF PL	CLP 026	ROTY
19122	74 4 70346		LDD D	SIN PS3	
19123	63444444		CCL DD	CIL DD	
19124	74 1 70347		LDD A	COS PS3	ROZE
19125	70750427		CPF PL	CLP 027	EXIT
19126	23270260		LDW 2P	CTS 60	
19127	74 4 70346		LDD D	SIN PS3	
19130	74 1 70347		LDD A	COS PS3	
19131	70750427		CPF PL	CLP 027	ROZ2
19132	74 4 70350		LDD D	SIN TH3	
19133	74 1 70351		LDD A	COS TH3	
19134	70750426		CPF PL	CLP 026	ROTY
19135	74 4 70352		LDD D	SIN PH3	
19136	74 1 70353		LDD A	COS PH3	
19137	70750425		CPF PL	CLP 025	ROTX
19140	23270260		LDW 2P	CTS 60	EXIT
			MAC		

ROTA

			TTL	ROTA	
			LOCO	15154	
			MIC		
			MIC		
			MIC		
			MIC		
			MIC		
			MIC		
15154	21250000	ROTA	STW 2L	NOP *	
15155	35061615		TCF PF6	FTR 13	
15156	74 4 17106		LDD D	SIN GA	
15157	63444444		CCL DD	CIL DD	
15160	74 1 17107		LDD A	COS GA	
15161	70750425		CPF PL	CLP 025	ROTX
15162	74 4 70356		LDD D	SIN BA	
15163	63444444		CCL DD	CIL DD	
15164	74 1 70357		LDD A	COS BA	
15165	70750426		CPF PL	CLP 026	ROTY
15166	74 4 70354		LDD D	SIN AA	
15167	63444444		CCL DD	CIL DD	
15170	74 1 70355		LDD A	COS AA	
15171	70750427		CPF PL	CLP 027	ROTX
15172	23270260		LDM 2P	CTS 60	EXIT
15173	74 4 70354		LDD D	SIN AA	
15174	74 1 70355		LDD A	COS AA	
15175	70750427		CPF PL	CLP 027	ROTX
15176	74 4 70356		LDD D	SIN BA	
15177	74 1 70357		LDD A	COS BA	
15200	70750426		CPF PL	CLP 026	ROTY
15201	74 4 17106		LDD D	SIN GA	
15202	74 1 17107		LDD A	COS GA	
15203	70750425		CPF PL	CLP 025	ROTX
15204	23270260		LDM 2P	CTS 60	EXIT
			MAC		

CALL: VECTOR ADDRESS TO C  
 PF6=1 FOR -ROTA  
 CPF PL CLP 010  
 USES WORKING 2,6,7  
 C IS UNALTERED

ROTB

TTL  
LOCO 15220  
MIC  
MIC  
MIC  
MIC  
MIC  
MIC  
MIC

CALL: VECTOR ADDRESS TO C  
PF6=1 FOR -ROTB  
CPF PL CLP 011  
USFS WORKING 2.0.7  
C IS UNALTERED

15220 21250000 ROTB  
15221 35061615  
15222 74 4 17110  
15223 63444444  
15224 74 1 17111  
15225 70750425  
15226 74 4 70362  
15227 63444444  
15230 74 1 70363  
15231 70750426  
15232 74 4 70360  
15233 63444444  
15234 74 1 70361  
15235 70750427  
15236 23270260  
15237 74 4 70360  
15240 74 1 70361  
15241 70750427  
15242 74 4 70362  
15243 74 1 70363  
15244 70750426  
15245 74 4 17110  
15246 74 1 17111  
15247 70750425  
15250 23270260

STW 2L NOB  
TCF PF6 FYR 13  
LDD D SIN GB  
CCL DD CIL DD  
LDD A COS GR  
CPF PL CLP 025  
LDD D SIN BR  
CCL DD CIL DD  
LDD A COS BR  
CPF PL CLP 026  
LDD D SIN AB  
CCL DD CIL DD  
LDD A COS AB  
CPF PL CLP 027  
LDW 2P CTS 60  
LDD D SIN AB  
LDD A COS AB  
CPF PL CLP 027  
LDD D SIN BR  
LDD A COS BR  
CPF PL CLP 026  
LDD D SIN GB  
LDU A COS GB  
CPF PL CLP 025  
LDW 2P CTS 60  
MAC

ROTX

ROTY

ROTE

EXIT

ROTE

ROTY

ROTX

EXIT

ROTC

			TTL	ROTC	
			LOCO	15264	
			MIC		CALL:
			MIC		VECTOR ADDRESS TO C
			MIC		PF6=1 FOR -ROTC
			MIC		CPF PL CLP 012
			MIC		USES WORKING 2.0.7
			MIC		C IS UNALTERED
			MIC		
			MIC		
			STM 2L	NOP	
15264	21250000	ROTC	TCF PF6	FTR 13	
15265	35061615		LDD D	SIN GC	
15266	74 4 17112		CCL DD	CIL DD	
15267	63444444		LDD A	COS GC	
15270	74 1 17113		CPF PL	CLP 025	ROTX
15271	70750425		LDD D	SIN 8C	
15272	74 4 70366		CCL DD	CIL DD	
15273	63444444		LDD A	COS 8C	
15274	74 1 70367		CPF PL	CLP 026	ROTY
15275	70750426		LDD D	SIN AC	
15276	74 4 70364		CCL DD	CIL DD	
15277	63444444		LDD A	COS AC	
15300	74 1 70365		CPF PL	CLP 027	ROTZ
15301	70750427		LDW 2P	CTS 60	EXIT
15302	23270260		LDD D	SIN AC	
15303	74 4 70364		LDU A	COS AC	
15304	74 1 70365		CPF PL	CLP 027	ROTE
15305	70750427		LDD D	SIN 8C	
15306	74 4 70366		LDJ A	COS 8C	
15307	74 1 70367		CPF PL	CLP 026	ROTY
15310	70750426		LDD D	SIN GC	
15311	74 4 17112		LDD A	COS GC	
15312	74 1 17113		CPF PL	CLP 025	ROTX
15313	70750425		LDW 2P	CTS 60	EXIT
15314	23270260		MAC		

RUNIT

15330 05112671  
15331 00 0 16174  
15332 26720000  
15333 00 0 17510  
15334 26132423  
15335 54660000  
15336 30671475  
15337 45570000

RUNIT

TYL  
LOCO  
MIC  
MIC  
MIC  
LRC 09  
ADR  
LDI PB  
ADR  
LDI AC  
CDL NN  
TN2 N7  
EXC LP  
MAC

RUNIT  
15330

RESTORE I UNIT X.Y,Z-->WORK AREA  
CALLI CPF PL CLPO 13

LDI PA  
0001UNITXX  
NOP  
000UNITXX  
STI BC  
NOP  
BTR 02  
NOP  
STORE I VALUE

IUNITXX-->A  
UNITXX-->B

DADD

15340 05030260  
15341 21054553  
15342 26132624  
15343 55342114  
15344 26132624  
15345 43342313  
15346 37224433  
15347 24532454  
15350 54660000  
15351 30671470  
15352 23070000

DADD

YTL DADD  
LOCO 15340  
MIC  
MIC  
MIC  
MIC  
MIC  
MIC  
MIC  
LRC 03 CTS 60  
STW 0L EXC LC  
LDI AC LDI 8D  
ADL CD STW 1D  
LDI AC LDI 8D  
ADM CD LDW 1C  
TCT CT1 CIL CC  
STI LC STI LD  
CDL NN NOP  
TNE N7 BYR 07  
LDW 0P NOP  
MAC

USES WORKING: 0,1  
ADD DOUBLEWORD VECTOR 1 TO  
DOUBLE WORD VECTOR 2 AND STORE  
SUM IN LOC SPECIFIED BY C  
CALL: 1ST VECTOR ADDRESS-->A  
2ND VECTOR ADDRESS-->B  
STORAGE ADDRESS --> C  
CPF PL CLPO 14

SAVE RETURN  
U1-->C,U2-->D  
ADD UPERS-->M1  
L1-->C,L2-->D  
SUML-->D SUMU-->C

STORE U=L



MJD1

15427 23642313  
15430 27412443  
15431 23232742  
15432 24432174  
15433 74 3 17512  
15434 70750415  
15435 21112122  
15436 23742333  
15437 27412443  
15440 23432742  
15441 24432174  
15442 74 3 17515  
15443 70750415  
15444 23132324  
15445 55314342  
15446 37224411  
15447 21112122  
15450 23742164  
15451 26412642  
15452 74 3 17520  
15453 70750415  
15454 23132324  
15455 55314342  
15456 37224411  
15457 23642441  
15460 24422307

LDW 6D LDW 1C  
LDM DA STI DC  
LDW 2C LDW DR  
STI DC STW 7D  
LDD C UNITX2  
CPF PL CLPO 15  
STW 1A STW 2B  
LDW 7D LDW 3C  
LDM DA STI DC  
LDW 4C LDW DR  
STI DC STW 7D  
LDD C UNITY2  
CPF PL CLPO 15  
LDW 1C LDW 2D  
ADL CA ADM DR  
TCT CT1 CIL AA  
STW 1A STW 2B  
LDW 7D STW 6D  
LDI DA LDI DR  
LDD C UNIT22  
CPF PL CLPO 15  
LDW 1C LDW 2D  
ADL CA ADM DR  
TCT CT1 CIL AA  
LDW 6D STI DA  
STI DB LDW 0P  
MAC

UP-->A,UP ANS-->STORAGE  
LOW-->B  
ANS,LOW-->STORAGE  
UNITX2-->C  
MDS

UP-->A STORE RESULT 2 UP  
LOW B  
STORE RESULT 2 LOW  
UNITY2-->C  
MDS

ACCUM ADD

STORE PARTIAL RESULT  
SAVE 2 VECTOR ADDRESS  
UP-->A LOW-->B  
UNIT22-->C  
MDS

ACCUM. ADD

EXIT



SCG SUBROUTINE

15555	37221612	TCT CT1 FTR 10	XFER IF 20V>R
15556	76272751	DFS 23 LDM LA	
15557	00003014	NOP TN2 AS	
15560	63224422	CCL 88 CIL 88	
15561	23611614	LDM 6A FTR 12	GO TO STORAGE
15562	30471605	TN2 D7 FTR 09	
15563	26712345	LDI PA LDM 4L	COSINE =0
15564	37777777	OCT 37777777	
15565	27533234	LDM LC TPO CS-	CHECK SIGN OF 20V
15566	63114411	CCL AA CIL AA	
15567	57221606	XOR 88 FTR 06	GO TO STORAGE
15570	26722345	LDI PB LDM 4L	SINE =0
15571	37777777	OCT 37777777	
15572	44552753	CIL LL LDM LC	
15573	00003034	NOP TN2 CS	
15574	63224422	CCL 88 CIL 88	
15575	57110000	XOR AA NOP	
15576	23542675	LDM 5D LDI PL	STORAGE
15577	00 0 17106	ADR 000SINGA	
15600	54445544	CDL DD ADL DD	
15601	55452451	ADL DL STI LA	
15602	25522307	STM LB LDM OP	EXIT
		MAC	

ROTP1R

15610 74 4 17075 ROTP1R  
15611 63444444  
15612 74 1 17076  
15613 21550000  
15614 70750426  
15615 36060000  
15616 70750410  
15617 36060000  
15620 70750405  
15621 23570000

YTL ROTP1R  
LOGO 15610  
MIC  
MIC  
MIC  
MIC  
MIC  
MIC  
MIC  
MIC  
MIC  
MIC  
LDD D SINDA  
CCL DD CIL DD  
LDD A COS DA  
STW SL NOP  
CPF PL CLP 026  
STT PF6 NOP  
CPF PL CLP 010  
STT PF6 NOP  
CPF PL CLP 005  
LDW SP NOP  
MAC

ROTATES P VECTOR FROM SYSTEM  
1 TO REFERENCE

USES WORKING 2.5.6.7

CALL: CPF PL CLPO 22

-ROTY

-ROTA

-ROT1

ROTP2R

15624 74 4 17077  
15625 63444444  
15626 74 1 17100  
15627 21550000  
15630 70750426  
15631 36060000  
15632 70750411  
15633 36060000  
15634 70750406  
15635 23570000

```
TTL      ROTP2R
LOCO     15624
MIC
MIC
MIC      ROTATES P VECTOR FROM
MIC      SYSTEM 2 TO REFERENCE
MIC
MIC      USES WORKING 2,5,6,7
MIC      CALL: CPF PL CLP 023
MIC
LDD D    SIN DB
CCL DD   CIL DD
LDD A    COS DB
STW 5L   NOP
CPF PL   CLP 026      -ROT1
STT PF6  NOP
CPF PL   CLP 011     -ROT0
STT PF6  NOP
CPF PL   CLP 006     -ROT2
LDM SP   NOP        EXIT
MAC
```

ROTP3R

15640 74 4 17101  
15641 63444444  
15642 74 1 17102  
15643 21550000  
15644 70750426  
15645 36060000  
15646 70750412  
15647 36060000  
15650 70750407  
15651 23570000

TTL ROTP3R  
LOCO 15640  
MIC  
MIC  
MIC  
MIC  
MIC  
MIC  
MIC  
MIC  
LDD D SIN DC  
CCL DD CIL DD  
LDD A COS DC  
STW 5L NOP  
CPF PL CLP 026  
STT PF6 NOP  
CPF PL CLPD 12  
STT PF6 NOP  
CPF PL CLP 007  
LDW 5P NOP  
MAC

ROTATES P VECTOR FROM  
SYSTEM 3 TO REFERENCE

USES WORKING 2, 5, 6, 7

CALL: CPF PL CLP 024

-ROTY

-ROTC

-ROTS

EXIT

EVEN/ODD FIELD SUBROUTINE

15653 74 3 17213  
 15654 21332100  
 15655 26712674  
 15656 77777400  
 15657 00000200  
 15660 55435613  
 15661 63334433  
 15662 21235722  
 15663 74 1 17210  
 15664 21116311  
 15665 44117627  
 15666 26745422  
 15667 77740000  
 15670 56422142  
 15671 23322671  
 15672 00001200  
 15673 55210512  
 15674 13672312  
 15675 55216311  
 15676 44112323  
 15677 57227627  
 15700 54222671  
 15701 77740000  
 15702 56122341  
 15703 57122671  
 15704 40000000  
 15705 30272101  
 15706 74 3 17246  
 15707 26712674  
 15710 77777400  
 15711 00000200  
 15712 55435613  
 15713 63334433  
 15714 21235722  
 15715 74 1 17243  
 15716 21116311  
 15717 44117627  
 15720 26745422  
 15721 77740000  
 15722 56422142  
 15723 23322671  
 15724 00001200  
 15725 55210512  
 15726 13672312  
 15727 55216311  
 15730 44112323  
 15731 57227627  
 15732 54222671  
 15733 77740000  
 15734 56122341

TTL EVEN/ODD FIELD SUBROUTINE  
 LOCO 15653  
 MIC  
 MIC USES WORKING 0,1,2,3,4  
 MIC CALL CPF PL CLPO 36  
 MIC  
 LDD C PLARZ VIEW A  
 STW 3C STW 00  
 LDI PA LDI PD  
 DEC -1815  
 OCT 200  
 ADL DC AND AC ROUND PL  
 CCL CC CIL CC  
 STW 2C XOR BR -PL IN WORKING 2  
 LDD A PCARZ  
 STW 1A CCL AA  
 CIL AA DFS 23 83/B-6-89  
 LDI PD CDL BB SUB 2-14  
 DEC -189  
 AND DB STW 4B  
 LDW 3B LDI PA  
 DEC 1.25814  
 ADL 8A LRC 10  
 SDL 67 LDW 1B  
 ADL 8A CCL AA  
 CIL AA LDW 2C  
 XOR BB DFS 23  
 CDL BB LDI PA  
 DEC -189  
 AND AB LDW 4A  
 XOR AB LDI PA  
 OCT 40000000  
 TNZ B7 STW 0A  
 LDD C PLBRZ VIEW B  
 LDI PA LDI PD  
 DEC -1815  
 OCT 200  
 ADL DC AND AC ROUND PL  
 CCL CC CIL CC  
 STW 2C XOR BR -PL IN WORKING 2  
 LDD A PCBRZ  
 STW 1A CCL AA  
 CIL AA DFS 23 83/B-6-89  
 LDI PD CDL BB SUB 2-14  
 DEC -189  
 AND DB STW 4B  
 LDW 3B LDI PA  
 DEC 1.25814  
 ADL 8A LRC 10  
 SDL 67 LDW 1B  
 ADL 8A CCL AA  
 CIL AA LDW 2C  
 XOR BB DFS 23  
 CDL BB LDI PA  
 DEC -189  
 AND AB LDW 4A

EVEN/ODD FIELD SUBROUTINE

15735 57122671  
 15736 20000000  
 15737 23033027  
 15740 64132103  
 15741 74 3 17301  
 15742 21330000  
 15743 26712674  
 15744 77777400  
 15745 00000200  
 15746 55435613  
 15747 63344433  
 15750 21235722  
 15751 74 3 17276  
 15752 21116311  
 15753 44117627  
 15754 26745422  
 15755 77740000  
 15756 56422142  
 15757 23322671  
 15760 00001200  
 15761 55210512  
 15762 13672312  
 15763 55216311  
 15764 44112323  
 15765 57227627  
 15766 54222671  
 15767 77740000  
 15770 56122341  
 15771 57122671  
 15772 10000000  
 15773 23033027  
 15774 64130000  
 15775 75 3 17360  
 15776 70570000

XOR AB LDI PA  
 DEC 181  
 LDW OC TNZ 07  
 LOR AC STM OC  
 LDD C PLCR2  
 STM 3C NOP  
 LDI PA LDI PD  
 DEC -1815  
 OCT 200  
 ADL DC AND AC  
 CCL CC CIL CC  
 STM 2C XOR BB  
 LDD A PCCR2  
 STM 1A CCL AA  
 CIL AA DFS 23  
 LDI PD CDL RR  
 DEC -189  
 AND DB STM 4A  
 LDW 3B LDI PA  
 DEC 1.25814  
 ADL 8A LRC 10  
 SDL 67 LDW 1B  
 ADL 8A CCL AA  
 CIL AA LDW 2C  
 XOR BB DFS 23  
 CDL 8B LDI PA  
 DEC -189  
 AND AB LDW 4A  
 XOR AB LDI PA  
 DEC 182  
 LDW OC TNZ 07  
 LOR AC NOP  
 STD C FI  
 CPF LP NOP  
 MAC

ROUND PL

-PL IN WORKING 2

83/B-6-89  
 SUB 2\*-14

SUN CONSTANTS

16352 21050000  
 16353 74 1 16025  
 16354 70750400  
 16355 21110000  
 16356 74 1 16025  
 16357 70750401  
 16360 05055722  
 16361 13672313  
 16362 63334433  
 16363 76272112  
 16364 74 1 16024  
 16365 70750401  
 16366 63124422  
 16367 23137654  
 16370 75 1 17345  
 16371 74 1 16024  
 16372 70750400  
 16373 63124422  
 16374 23137654  
 16375 75 1 17346  
 16376 23070000

XXXXXXX

TTL  
 LOCO  
 MIC  
 MIC  
 MIC  
 MIC  
 STW DL  
 LDD A  
 CPF PL  
 STW 1A  
 LDD A  
 CPF PL  
 LRC 05  
 SDL 67  
 CCL CC  
 DFS 23  
 LDD A  
 CPF PL  
 CCL AB  
 LDW 1C  
 STD A  
 LDD A  
 CPF PL  
 CCL AB  
 LDW 1C  
 STD A  
 LDM DP  
 MAC

SUN CONSTANTS  
 16352.

USES WORKING 0.1  
 CALL CPF PL CLP 044

NOP  
 SUNE  
 CLP 000  
 NOP  
 SUNE  
 CLP 001  
 XOR BR  
 LDW 1C  
 CIL CC  
 STW 1R  
 SIINA  
 CLP 001  
 CIL BR  
 MCS 12  
 CSC  
 SUNA  
 CLP 000  
 CIL BR  
 MCS 12  
 SSC  
 NOP

SIN

COS

COTANGENT

COS

SIN

EXIT

DACU CALCULATION PROGRAM

			TTL	DACU CALCULATION PROGRAM	
			LOCO	16400	
			MIC		
			MIC		
			MIC		CALL: CPF PL CLP 003
			MIC		
			MIC		
16400	21050000	DACUC	STM 0L	NOP	
16401	74 1 16471		LDD A	CMCTR	
16402	26750000		LDI PL	NOP	
16403	00 0 16334		ADR	000LSF1	
16404	55152754		ADL AL	LDM LD	LOADS LSF TO D
16405	16010000		FTR 01	NOP	
16406	74 1 16471		LDD A	CMCTR	
16407	26750000		LDI PL	NOP	
16410	00 0 17450		ADR	000DAC11	
16411	55152753		ADL AL	LDM LC	INPUT -->C
16412	26725732		LDI PB	XOR CB	CHECK FOR BAD GUY
16413	40000000		OCT	40000000	
16414	32274433		TZO 07	CIL CC	FIX IT
16415	26750000		LDI PL	NOP	CONSTANT TABLE ADDRESS-->L
16416	00 0 16300		ADR	000DACC	
16417	00000260		NOP	CTS 60	
16420	32341602		TZO CS	FTR 02	COMPLEMENT INPUT VALUE IF NEG.
16421	63334433		CCL CC	CIL CC	
16422	34010000		STT PF1	NOP	
16423	55452652		ADL DL	LDI LB	LOAD MULT. CONST. TO B
16424	76542673		MCS 12	LDI PC	
16425	37777000		OCT	37777000	MAX GOOD NUM IN A REG IS 777
16426	55133034		ADL AC	TNZ CS	TEST FOR TOO LARGE INPUT VALUE
16427	16020000		FTR 02	NOP	
16430	05041320		LRC 04	SDL LDM	
16431	16070000		FTR 07	NOP	
16432	46430704		CPL DC	CLD 04	
16433	55342673		ADL CD	LDI PC	ADD 4 TO D
16434	37777744		OCT	37777744	CK FOR LARGEST SF
16435	55433234		ADL DC	TZO CS	
16436	14470000		BTR 24	NOP	
16437	74 1 16471		LDD A	CMCTR	
16440	16210000		FTR 17	NOP	
16441	26535513	TMVP	LDI LC	ADL AC	MIN VALUE CONST TO C
16442	30341603		TNZ CS	FTR 03	MIN VALUE O.K. FTR 03
16443	26735534	DSF	LDI PC	ADL CD	SUBT 4 FROM D
16444	77777774		DEC	-4	
16445	14400000		BTR 31	NOP	
16446	35011601		TCP PF1	FTR 01	O.K. MIN AND MAX NO.
16447	63114411		CCL AA	CIL AA	
16450	26735613		LDI PC	AND AC	MASK NO. TO C
16451	00037777		OCT	37777	
16452	26526423		LDI LB	LOR BC	OR IN CHAN NO. TO C
16453	74 1 16471		LDD A	CMCTR	
16454	26750000		LDI PL	NOP	
16455	00 0 16334		ADR	000LSF1	
16456	55152554		ADL AL	STM LD	STORE LSF INDEX TO LSF TABLE
16457	26750000		LDI PL	NOP	
16460	00 0 17464		ADR	000DAC01	

DACU CALCULATION PROGRAM

16461 55152553  
16462 07139714  
16463 32471603  
16464 44110000  
16465 75 1 16471  
16466 14120000  
16467 75 0 16471  
16470 23070260  
16471 00000000

CMCTR

ADL AL STM LC  
CLD 11 XOR AD  
TZO D7 FTR 03  
CIL AA NOP  
STD A CMCTR  
STR 53 NOP  
STD 0 CMCTR  
LDW 0P CYS 60  
OCT 0  
MAC

C-->OUTPUT TABLE

CK FOR LAST CHAN

INCREMENT A AND STORE IN CMCTR

RVV

16600 21450260  
 16601 70752673  
 16602 00000000  
 16603 54332553  
 16604 70722674  
 16605 00000000  
 16606 32341606  
 16607 32471607  
 16610 57442524  
 16611 24742554  
 16612 00000012  
 16613 75 0 17343  
 16614 23470000  
 16615 32472347  
 16616 14030000  
 16617 07012924  
 16620 24742554  
 16621 00000012  
 16622 26712672  
 16623 00 0 16021  
 16624 00.0 17126  
 16625 26733606  
 16626 00 0 17700  
 16627 70750420  
 16630 26737034  
 16631 00 0 17700  
 16632 70750433  
 16633 26733606  
 16634 00 0 17700  
 16635 70750406  
 16636 70750405  
 16637 70750410  
 16640 74 3 17700  
 16641 30341643  
 16642 26715631  
 16643 34000000  
 16644 32171640  
 16645 63334433  
 16646 26715722  
 16647 02000000  
 16650 76272112  
 16651 74 3 17702  
 16652 76544612  
 16653 74 3 16115  
 16654 76542674  
 16655 00200000

RVV

TTL  
 LOC0  
 MIC  
 MIC  
 MIC  
 MIC  
 MIC  
 MIC  
 MIC  
 MIC  
 MIC  
 STW 4L CYS 60  
 CPF PL LDI PC  
 OCT 0  
 CDL CC STM LC  
 CPF PB LDI PD  
 OCT 0  
 T20 CS FTR 0A  
 T20 D7 FTR 07  
 XOR DD STM BD  
 LDI PD STM LD  
 DEC 10  
 STD 0 BEACON  
 LDW 4P NOP  
 T20 D7 LDW 4P  
 FTR 03 NOP  
 CLD 01 STM BD  
 LDI PD STM LD  
 DEC 10  
 LDI PA LDI PR  
 ADR 0001BCNX  
 ADR 000LA2XU  
 LDI PC STY PF6  
 ADR 000TEMP  
 CPF PL CLPD 20  
 LDI PC CPF CD  
 ADR 000TEMP  
 CPF PL CLPD 33  
 LDI PC STY PF6  
 ADR 000TEMP  
 CPF PL CLPD 06  
 CPF PL CLPD 05  
 CPF PL CLPD 10  
 LDD C TEMP  
 TNZ CS FTR 35  
 LDI PA AND CA  
 OCT 34000000  
 T20 A7 FTR 32  
 GCL CC CIL CC  
 LDI PA XOR BB  
 DEC 194  
 DFS 23 STW 18  
 LDD C TEMP+2  
 MCS 12 CPL AB  
 LDD C IPCAX  
 MCS 12 LDI PD  
 DEC 187

RVV  
16600

RESOLVE BEACON VECTOR  
BEACON IN SYSTEM 2  
SEEN BY VIEW A IN SYSTEM 1

CALL: CPF PL CLPD 34

USES WORKING 0,1,2,3,4,6,7

FRAME CTR ADR,-->L  
 FRAME COUNTER  
 DECREMENT AND STORE COUNT  
 SAVE 'BLINK' ADDRESS  
 'BLINK'  
 FTR IF CTR =0  
 FTR IF BLINK NO 'ON'  
 0-->BLINK  
 OFF COUNT-->CTR  
 'OFF' FRAME COUNT

EXIT  
 EXIT IF BLINK NOT 'ON'  
 GO TO CALCULATION  
 1-->BLINK  
 ON COUNT-->CTR.  
 ON FRAME COUNT  
 START CALCULATION

SDS:LA2-1BCNX

NDV,NORMALIZE

ROT 2 , 2-->R  
 ROT 1 , R-->1  
 ROTA  
 BEACON BCNX -->C  
 BEACON BCNX IS NEG:OUT OF SIGHT

BCNX<2-->3:OUT OF SIGHT

1/BCNX-->WORKING 1

ANS SCALED B4  
 MULT. BY P/D  
 ANS. SCALED R7

R0V

16654 55414612  
16657 26737694  
16660 00114600  
16661 26745614  
16662 77776000  
16663 30471621  
16664 23132121  
16665 74 2 17701  
16666 74544612  
16667 74 3 16115  
16670 76542674  
16671 00200000  
16672 55414612  
16673 26737694  
16674 00111600  
16675 26745614  
16676 77776000  
16677 30471604  
16700 05136621  
16701 23225522  
16702 64214411  
16703 75 1 17343  
16704 23470260  
16705 75 0 17343  
16706 23470260

ADL DA CPL AB  
LDI PC MCS 12  
DEC 307B16  
LDI PD AND AD  
OCT 77776000  
TNE D7 FTR 17  
LDW 1C STW 2A  
LDD B TEMP-1  
MCS 12 CPL AB  
LDD C IPCAX  
MCS 12 LDI PD  
DEC 187  
ADL DA CPL AB  
LDI PC MCS 12  
DEC 295B16  
LDI PD AND AD  
OCT 77776000  
TNE D7 FTR 04  
LRC 11 SSL LOMA  
LDW 2B ADL BR  
LOR BA CIL AA  
STD A WFACON  
LDW 4P CYS 60  
STD 0 WEACON  
LDW 4P OTS 60  
MAC

ADD 1 TO RESULT  
MULT. BY 295, JR23-->A

J>10 BITS, BLANK BEACON  
J--> WORKING 2

MULT. BY P/D

ADD ONE TO RESULT  
MULT BY 307

J>10 BITS, BLANK BEACON

SET BLINK TO ONE

EXIT  
ZERO BEACON  
EXIT



DORC

16764 00 0 16205  
16765 27527654  
16766 55112342  
16767 55215722  
16770 70750402  
16771 23640000  
16772 26755545  
16773 00 0 17361  
16774 25512307

ADR 000 DCONA B12  
LDM LB MCS 12 B23  
ADL AA LDW 4R B22  
ADL BA XOR 88  
CPF PL CLP 02 SORT  
LDM 6D NOP  
LDI PL ADL DL  
ADR 000 DORCA  
STM LA LDW 0P STORE J1 B11  
MAC

MOVE SYSTEM TWO FOR LUNAR TER

17600 74 1 17120  
 17601 74 2 17121  
 17602 05131320  
 17603 00003214  
 17604 07001607  
 17605 26725512  
 17606 00006000  
 17607 32241474  
 17610 74 1 17122  
 17611 00003214  
 17612 07001601  
 17613 07140000  
 17614 26712672  
 17615 00 0 17627  
 17616 00 0 17010  
 17617 55410504  
 17620 26132423  
 17621 54663067  
 17622 14750000  
 17623 26132712  
 17624 75 3 17543  
 17625 75 2 17347  
 17626 44570000  
 17627 00000000  
 17630 00000000  
 17631 00000000  
 17632 00000000  
 17633 00000000  
 17634 00000000  
 17635 00000002  
 17636 20160000  
 17637 77777777  
 17640 03700000  
 17641 72525253  
 17642 00000002  
 17643 00000002  
 17644 20470000  
 17645 00000000  
 17646 34720000  
 17647 05252525  
 17650 00000001

LDATA

MOVE SYSTEM TWO FOR LUNAR TER

MAC  
 LOGO 17600  
 MIC  
 LDD A LARXU  
 LDD B LARXL  
 LRC 11 SDL LOM  
 NOP TZO AS  
 CLD 0 FTR 07  
 LDI PB ADL AB  
 OCT 6000  
 TZO 85 BTR 03  
 LDD A LARYU  
 NOP TZO AS  
 CLD 06 FTR 01  
 CLD 12 NOP  
 LDI PA LDI PB  
 ADR 000LDATA  
 ADR 000T2XU  
 ADL DA LRC 04  
 LDI AB STI BC  
 CDL MN TNZ N7  
 BTR 02 NOP  
 LDI AC LDM AB  
 STD C PS2  
 STD B POS  
 CIL LP NOP  
 OCT 0  
 OCT 0  
 OCT 0  
 OCT 0  
 OCT 0  
 OCT 0  
 OCT 00000002  
 OCT 20160000  
 OCT 77777777  
 OCT 03700000  
 OCT 72525253  
 OCT 2  
 OCT 00000002  
 OCT 20470000  
 OCT 00000000  
 OCT 34720000  
 OCT 05252525  
 OCT 1

SCALE X POSITION

ORIGINAL POSITION

X LIMIT 3072 FT 823  
 ORIGINAL POSITION

LEFT POSITION  
 RIGHT POSITION

EXIT  
 XU ORIGINAL POSITION

XL  
 YU  
 YL  
 PS2  
 POS

XU LEFT POSITION  
 XL 5134 FEET

YL -1800 FEET  
 PS2 -30 DEG

POS  
 XU RIGHT POSITION

XL 5159 FEET  
 YU

YL 1850 FEET  
 PS2 30 DEG

POS

SUB LINK

			TTL	SUB LINK	
			COM	SUBROUTINE LINKAGE PROGRAM	
XXXX			EOVO	16500	
A			LOCU	70000	
			RIC		
70000	74 7	16500	LDU P	A	SINE
70001	74 7	16501	LDU P	A+1	COSINE
70002	74 7	16502	LDU P	A+2	SQRT
70003	74 7	16503	LDU P	A+3	DACU
70004	74 7	16504	LDU P	A+4	NOTU
70005	74 7	16505	LDU P	A+5	NOT1
70006	74 7	16506	LDU P	A+6	NOT2
70007	74 7	16507	LDU P	A+7	NOT3
70010	74 7	16510	LDU P	A+8	NOTA
70011	74 7	16511	LDU P	A+9	NOTB
70012	74 7	16512	LDU P	A+10	NOTC
70013	74 7	16513	LDU P	A+11	MUNIT
70014	74 7	16514	LDU P	A+12	DADU
70015	74 7	16515	LDU P	A+13	MDS
70016	74 7	16516	LDU P	A+14	M3D1
70017	74 7	16517	LDU P	A+15	CSV
70020	74 7	16520	LDU P	A+16	SUS
70021	74 7	16521	LDU P	A+17	SCG
70022	74 7	16522	LDU P	A+18	NOTP1M
70023	74 7	16523	LDU P	A+19	NOTP2M
70024	74 7	16524	LDU P	A+20	NOTP3M
70025	74 7	16525	LDU P	A+21	NOTX
70026	74 7	16526	LDU P	A+22	NOTY
70027	74 7	16527	LDU P	A+23	NOTZ
70030	74 7	16530	LDU P	A+24	MELSGS
70031	74 7	16531	LDU P	A+25	UACUAT
70032	74 7	16532	LDU P	A+26	XMTU
70033	74 7	16533	LDU P	A+27	NDV
70034	74 7	16534	LDU P	A+28	DUORC
70035	74 7	16535	LDU P	A+29	EUF
70036	74 7	16536	LDU P	A+30	XMTLP
70037	74 7	16537	LDU P	A+31	XMTS
70040	74 7	16540	LDU P	A+32	SYS1
70041	74 7	16541	LDU P	A+33	SYS2
70042	74 7	16542	LDU P	A+34	SYS3
70043	74 7	16543	LDU P	A+35	SUN
70044	74 7	16544	LDU P	A+36	SHAD
70045	74 7	16545	LDU P	A+37	COLPAC
70046	74 7	16546	LDU P	A+38	SYS1 IC
70047	74 7	16547	LDU P	A+39	SYS2 IC
70050	74 7	16550	LDU P	A+40	SYS3 IC
70051	74 7	16551	LDU P	A+41	XMITCOL
70052	74 7	16552	LDU P	A+42	
70053	74 7	16553	LDU P	A+43	
70054	74 7	16554	LDU P	A+44	
70055	74 7	16555	LDU P	A+45	TVECT 1
70056	74 7	16556	LDU P	A+46	TVECT 2
70057	74 7	16557	LDU P	A+47	TVECT 3
70060	74 7	16560	LDU P	A+48	
70061	74 7	16561	LDU P	A+49	
70062	74 7	16562	LDU P	A+50	

SUB LINK

70063	74	7	16563
70064	74	7	16564
70065	74	7	16565
70066	74	7	16566
70067	74	7	16567
70070	74	7	16570
70071	74	7	16571
70072	74	7	16572
70073	74	7	16573
70074	74	7	16574
70075	74	7	16575
70076	74	7	16576
70077	74	7	16577

LDD P	A-51
LDD P	A-52
LDD P	A-53
LDD P	A-54
LDD P	A-55
LDD P	A-56
LDD P	A-57
LDD P	A-58
LDD P	A-59
LDD P	A-60
LDD P	A-61
LDD P	A-62
LDD B	A-63
HAC	

SIN COS

		CCCC	TTL	SIN COS	
			COM	START SIN COSINE ROUTINE	
			COM	ENTER WITH ANGLE IN A REG.	
			COM	(IN FRACTIONS OF A CIRCLE)	
			COM	ANS. IN A REG. B0	
			COM	CALL SIN 1 CPF PL CLP 00	
			COM		
			COM	CALL COSINE 1 CPF PL CLP 01	
			COM		
			COM		
			MIC		
			LOCO	070100	
70100	26725521	COS	LDI PB	ADL BA	ADD 90 TO ANGLE
70101	20000000		DEC	121	
70102	26745514	SIN	LDI PD	ADL AD	CHECK FOR ANGLE BETWEEN
70103	20000000		DEC	121	90 AND 270 DEGREES
70104	30446211		TNZ DS	CCM AA	
70105	30144411		TNZ AS	CTL AA	
70106	55114612		ADL AA	CPL AB	
70107	46134614		CPL AC	CPL AD	
70110	76544613		MCS 12	CPL AC	
70111	26727654		LDI PB	MCS 12	
70112	77734206		OCT	77734206	C4
70113	26725512		LDI PB	ADL AB	
70114	01213123		OCT	01213123	C3
70115	76542672		MCS 12	LDI PB	
70116	65524473		OCT	65524473	C2
70117	55127654		ADL AB	MCS 12	
70120	26725512		LDI PB	ADL AR	
70121	31103747		OCT	31103747	C1
70122	46437654		CPL DC	MCS 12	
70123	55117057		ADL AA	CPF LP	RETURN TO CALLING PROG.
			MAC		

SORT

```

                7222224
                TTL      SORT
                COM      FSORT
                COM      NEWTON RAPHSON APPROXIMATION TO THE FIXED
                COM      POINT SQUARE ROOT,
                COM      9 MAY 67
                COM      ENTER WITH NO. IN A AND B REG,
                COM      AT AN EVEN B FACTOR.
                COM
                COM      ANSWER IN A REG. AT B/2 SCALE FACTOR
                COM      CALL1 CPF PL CLP002
                COM      WORKING 1,2,3, USED BY THIS PROG.
                COM      70125
                LOC0
                MIC
FSORT          CCL ON T20 AXF
              T20 8XF FTR 31
              CPS AD TN2 AS
              CCL AA CCL 88
              SLC 21 CCR ND
              LRC 1 SL8 NC
              SDL ROM1LRC 1
              TMT 01 ADL CC
              SSL ROMDADL AC
              STM 1D TCF D9
              ADM 88 AHK AA
              STM 2A CPS AR
              STM 3B CPL CD
              CCL CC CIL CC
              DFS 23 ADL 8D
              LDW 2A LRC 1
              LDW 3B SSL ROLD
              CCL DC CIL CC
              DFS 23 ADL 8D
              LDW 2A LRC 1
              LDW 3B SSL ROLD
              CCL DC CIL CC
              DFS 23 ADL 8D
              LDW 2A LRC 1
              LDW 3B SSL ROLD
              CCL DC CIL CC
              DFS 23 ADL 8D
              CPL 08 DFS 23
              CPL 0A LRC 1
              SDL ROM7CPS 0A
              LDW 1D CPX DN
              SDL ROM TN2 DS
              CCM 88 CCL AA
              CPF LP NOP
              MAC
              EXIT
70125 63063213
70126 32231637
70127 72143014
70130 63116322
70131 03216064
70132 05016763
70133 13610501
70134 33015533
70135 66645513
70136 21143561
70137 43224211
70140 21217212
70141 21324634
70142 63334433
70143 76275524
70144 23210501
70145 23326674
70146 63434433
70147 76275524
70150 23210501
70151 23326674
70152 63434433
70153 76275524
70154 23210501
70155 23326674
70156 63434433
70157 76275524
70160 46027627
70161 46410501
70162 13677201
70163 23145046
70164 13603044
70165 67226311
70166 70570000
```

ROTX

			YTL	ROTX	
			LOCO	70170	
			NIC		
			NIC		
			NIC		VECTOR ADDRESS IN C
			NIC		SIN PH IN D
			NIC		COS PH IN A
			NIC		CPF PL CLP 029
			NIC		
			NIC		USES WORKING 6,7
			NIC		
70170	21654435	ROTX	STM 6L	CIL CL	
70171	26924613		LDI L8	CPL AC	COS TO C
70172	76542171		MCS 12	STM 7A	YCOS TO W7
70173	27525455		LDM L8	CDL LL	Z TO B
70174	76544514		MCS 12	EXC AD	ECOS TO D, SIN TO A
70175	26524613		LDI L8	CPL AC	Y TO B, SIN TO C
70176	76546311		MCS 12	CCL AA	
70177	27524411		LDM L8	CIL AA	Z TO B, -SIN TO A
70200	55142554		ADL AD	STM LD	STORE Z
70201	76545453		MCS 12	CDL LC	ZSIN TO A
70202	23745514		LDM 7D	ADL AD	
70203	25345433		STM CD	CDL CC	STORE Y
70204	23670000		LDM 6P	NOP	EXIT
			MAC		

ROTY

			TTL	ROTY
			LOC0	70206
			NIC	
			NIC	
			NIC	
			NIC	
			NIC	
			NIC	
			NIC	
70206	21654513	ROTY	STM 6L	EXC AC
70207	26127015		LDI AB	CPF AL
70210	76544455		HCS 12	CIL LL
70211	21712752		STM 7A	LDM LR
70212	76544514		HCS 12	EXC AD
70213	54555455		CDL LL	CDL LL
70214	26524613		LDI LB	CPL AC
70215	76544495		HCS 12	CIL LL
70216	27525514		LDM LB	ADL AD
70217	76546311		HCS 12	CCL AA
70220	25544411		STM LD	CIL AA
70221	23745514		LDM 7D	ADL AD
70222	54535433		CDL LC	CDL CC
70223	25342367		STM CD	LDM 6P
			MAC	

VECTOR ADDRESS TO C  
SIN TM TO D  
COS TM TO A  
CPF PL CLP 026

USES WORKING 6,7

COS TO C

YCOS IN A  
Z TO B  
PCOS TO D, SIN TO A  
L AT X  
SIN TO C, X TO B  
XSIN TO A  
Z TO B  
ZSIN TO A  
STORE Z, -ZSIN TO A

STORE X, EXIT

ROTU

			TTL	ROTU	
			LOCO	70226	
			MIC		ROTATE UNIT VECTOR THRU SPECIFIED
			MIC		SYSTEM
			MIC		CALL: CLD 1,2,OR 3-->SYSTEM
			MIC		NUMBER
			MIC		CPF PL CLPO 04
			MIC		USES WORKING 0,1,2,3,4,6,7
			MIC		SET PF6 TO 1 FOR NEG ROT.
			MIC		
70226	77712141	ROTU	CFS 7A	STW 4A	
70227	45410716		EXC DA	CLD 14	
70230	55742541		ADL PD	STW DA	STORE SYSTEM NUMBER
70231	21350000		STW JL	NOP	STORE RETURN
70232	70750413		CPF PL	CLPO 13	TO RUNIT
70233	26730000		LBI PC	NOP	
70234	00 0 17510		ADR	000UNITXX	UNITXX-->C
70235	70751607		CPF PL	FTR 07	
70236	26730000		LBI PC	NOP	
70237	00 0 17513		ADR	000UNITVX	UNITVX-->C
70240	70751604		CPF PL	FTR 04	
70241	26730000		LBI PC	NOP	
70242	00 0 17516		ADR	000UNITZX	UNITZX-->C
70243	70751601		CPF PL	FTR 01	
70244	23370000		LDM JP	NOP	RETURN-->P
70245	23410271		LDM 4A	CTS 7A	SET PF
70246	27745547		LDM PD	ADL DP	
70247	00000000		OCT	0	SYSTEM NUMBER
70250	04050000		CLP 05	NOP	ROT1
70251	04060000		CLP 06	NOP	ROT2
70252	04070000		CLP 07	NOP	ROT3
			MAC		

MDS

TTL MDS  
LOCO 70254  
MIC  
MIC  
MIC  
MIC  
MIC  
MIC  
MIC  
MIC  
CPS DB CPL AD  
MCS 12 EXC AD  
CPL AB MCS 12  
ADL DB CPS QR  
TCT CT1 CIL AA  
TNE DS CDL AA  
EXC LP NOP  
MAC

NO WORKING LOC. USED  
DOUBLE WORD MULTIPLICAND  
TIMES SINGLE WORD MULTIPLIER  
CALL:

MULT-->C  
UP-->A  
LOW-->R  
CPF PL CLPO 15

70254 72074614  
70255 76544514  
70256 46177654  
70257 55427202  
70260 37224411  
70261 30445411  
70262 45570000

MDS

SDS

			TTL	SDS	
			LOCO	70264	
			MIC		USES WORKING 0.1
			MIC		SUBTRACT DOUBLE VECTOR FROM
			MIC		SINGLE VECTOR.
			MIC		CALL
			MIC		SINGLE VECTOR ADDRESS-->A
			MIC		DOUBLE VECTOR ADDRESS-->B
			MIC		STORAGE ADDRESS-->C
			MIC		CPF PL CLPO 20
			MIC		SET PF 6 TO 1 FOR ADD
			MIC		
70264	09030000	SDS	LRC 03	NOP	
70265	21054553		STW 0L	EXC LC	SAVE RETURN
70266	26232624		LDI BC	LDI BD	
70267	37061603		TCT PF6	FTR 03	
70270	63444444		CCL DD	CIL DD	COMPLEMENT C.D
70271	63337204		CCL CC	CPS DD	
70272	37224433		TCT CT1	CIL CC	
70273	21132613		STW 1C	LDI AC	STORE UP-->M1
70274	43347234		ADM CD	CPS CD	SAVE SINGLE SIGN
70275	23130000		LDW 1C	NOP	
70276	37224433		TCT CT1	CIL CC	
70277	30445433		TN2 DS	CDL CC	
70300	72045466		CPS 0D	CDL NN	ZERO LOW SIGN
70301	24532454		STI LC	STI LD	STORE ANSWER
70302	30671463		TN2 N7	BTR 12	
70303	23070260		LDW 0P	CTS 60	EXIT
			HAC		

CSV

70305 70340503 CSV  
70306 26123701  
70307 63224422  
70310 54662442  
70311 30671474  
70312 45570260

TTL CSV  
LOCO 70305  
MIC  
MIC  
MIC  
MIC  
MIC  
MIC  
MIC  
MIC  
MIC  
CPF CD LRC 03  
LDI AB TCT PF1  
CCL 88 CIL88  
CDL NN STI DB  
TNE 47 BTR 03  
EXC LP CTS 60  
MAC

COPY SINGLE VECTOR  
CALL  
SOURCE ADDRESS-->A  
DESTINATION ADDRESS-->C  
CPF PL CLPO 17  
C REG SET TO DEST. ADDRESS  
PF1=1 FOR COPY NEG. OF VECTOR  
NO WORKING STORAGE USED

EXIT

ROT2

			TTL	ROT2	
			LOCO	70314	
			MIC		
			MIC		VECTOR ADDRESS TO C
			MIC		SIN PS TO D
			MIC		COS PS TO A
			MIC		CPF PL CLP 027
			MIC		
			MIC		USES WORKING 6,7
			MIC		
70314	21654513	ROT2	STM 6L	EXC AC	COS TO C, X TO A
70315	26127015		LDI AB	CPF AL	S TO B
70316	76542171		MCS 12	STM 7A	XCOS TO W7
70317	27525455		LDM LB	CDL LL	
70320	76544514		MCS 12	EXC AD	YCOS TO D, SIN TO A
70321	24524613		LDI LB	CPL AC	
70322	76546311		MCS 12	CCL AA	XSIN TO A
70323	27524411		LDM LB	CIL AA	-XSIN TO A
70324	55142554		ADL AD	STM LD	STORE Y
70325	76542374		MCS 12	LDW 7D	YSIN IN A
70326	55145493		ADL AD	CDL LC	
70327	25342367		STM CD	LDW 6P	STORE X, EXIT
			END	0	

### 3.3.2 Transmit Control

\*SUNPAC\* \*PACK SURFACE COLOR COMPOSITIONS\*

		TTL	*SURFAC*	*PACK SURFACE COLOR COMPOSITIONS*
		MAC		*****
		COM		
		COM	PACK BACKGROUND AND FOREGROUND	
		COM	SURFACES COLOR COMPOSITIONS	
		COM		J. C. BARR
		COM		
		LOCU	2520 -	
		MIC		
2550	07032174	SUNPAC	CLU 3	STW 7D SET UP FOR 3 VIEWS
2551	55445947		ADL 00	ADL 00
2552	74 / 6146		LDU 0	URETURN
2553	00000000		NOP	NOP
2554	26711004		LDI PA	PTH 4 VIEW C
2555	04025530		OCI	04025530 OUTPUT BUFFER AND DATA ADDRESS
2556	26711002		LDI PA	PTH 2 VIEW B
2557	04005514		OCI	04005514 OUTPUT BUFFER AND DATA ADDRESSES
2560	26710000		LDI PA	NOP VIEW A
2561	04005500		JCT	04005500 OUTPUT BUFFER AND DATA ADDRESSES
2562	05141370		LRC 12	SDL 70
2563	21010514		STW 0A	LRC 12 NO ADDRESS FOR VECTOR STORE
2564	00724625		SSL 7B	CPL 0L L=DATA ADDRESS
2565	07032144		CLU 3	STW 4D INITIALIZE COLOR COUNT
2566	21102120	11	STW 10	STW 20
2567	21000706		STW 30	CLU 6
2570	21542343		STW 00	LDN 4C INITIALIZE SURFACE COUNT
2571	07035734		CLU 3	XON CD
2572	32410500		TEU 0F	LRC 0 IS IT BLUE
2573	07025734		CLU 2	XON CD NO
2574	32410506		TEU 0F	LRC 6 IS IT GREEN
2575	07015734		CLU 1	XON CD NO
2576	32410514		TEU 0F	LRC 12 IS IT RED
2577	32311043		TEU 0F	PTH 35 NO, THROUGH ... GO TO 13
2600	21002051	12	STW 0N	LDI LA FORE IN A
2601	26521370		LDI LB	SDL 70 BACK IN B
2602	07175641		CLU 15	AND DA MASK OFF 1 HEX DIGIT
2603	50426323		AND 0B	CCL 0C DIGIT IN A AND B
2604	44335513		CIL CC	ADL AC IS FONE .GT. BACK
2605	30341007		TNE CS	PTH 7 NO, GO TO 13
2606	46312313		CPL CA	LDN 1C YES, A=FORE-BACK
2607	05046633		LRC 4	SSL 3C
2610	04230504		LDN 0C	LRC 4
2611	21132323		STW 1C	LDN 2C STORE BACK
2612	06336413		SSL 3C	LDN AC
2613	21232333		STW 2C	LDN 3C STORE DIFFERENCE
2614	55331010		ADL CC	PTH 8 GO TO 14
2615	03334432	13	CCL CC	CIL 0B
2616	23130504		LDN 1C	LRC 4
2617	06336413		SSL 3C	LDN AC
2620	05042113		LRC 4	STW 1C STORE FURE IN BACK
2621	23236633		LDN 2C	SSL 3C
2622	04232123		LDN 0C	STW 2C STORE DIFFERENCE

NOT REPRODUCIBLE

\*SURPAC\* \*PACK SURFACE COLUMN COMPOSITIONS\*

2623	23335533		LDW JC	ADL CC	
2624	44332366		CIC CC	LDW 6N	SET INDICATOR BIT
2625	21332353	14	STW JC	LDW 5C	STONE INDICATOR
2626	23662344		LDW 6N	LDW 4D	
2627	54332153		CDC CC	STW 5C	DECREMENT SURFACE COUNT
2630	30311447		TNE CH	STW 24	GO TO 12
2631	46435533		CPL UC	ADL CC	FORM ADDRESS INDEX FOR
2632	55342673		ADL CU	LDI PC	TEMP
2633	00 0	5655	ADW	UOUT-3	
2634	55432311		ADL UC	LDW 1A	INDEX TEMP
2635	24312321		STI CA	LDW 2A	STORE BACK
2636	24312331		STI CA	LDW 3A	STORE DIFFERENCE
2637	24312341		STI CA	LDW 4A	STORE INDICATOR
2640	54112141		CUL AA	STW 4A	DECREMENT COLUMN COUNT
2641	07136344		CLU 11	UCL DD	RESET L
2642	14235545		STW 44	ADL UL	GO TO 11
2643	23052673	15	LDW UL	LDI PC	PICK UP OUTPUT BUFFER ADDRESS
2644	00 0	5660	ADW	UOUT	
2645	05030711		LRU S	CLU 9	SET UP LOOP COUNT
2646	46420703		CPL UB	CLU 3	AND ADDRESS BUMPS
2647	26312551	16	LDI CA	STW LA	LOAD AND STORE
2650	55452631		ADL UL	LDI CA	NINE TIMES INTO
2651	25515545		STW LA	ADL UL	OUTPUT BUFFER
2652	26312551		LDI CA	STW LA	
2653	55255406		ADL BL	UCL NN	ADD 10. DECREMENT LOOP COUNT
2654	30621472		TNE XA	STW 5	GO TO 10
2655	23745444		LDW 7D	UCL DD	DECREMENT VIEW COUNT
2656	21742777		STW 7D	LUM PP	SAVE. START AGAIN
2657	00 0	5551	ADW	UUGSURPAC*1	
2660	00000000	T	RIC		*****
2661	00000000		OCT	U	BLOCK OF 9 LOCATIONS
2662	00000000		OCI	U	USED FOR TEMPORARY
2663	00000000		OCI	U	STORAGE BY THE
2664	00000000		OCI	U	SURFACE PACK ROUTINE
2665	00000000		OCI	U	
2666	00000000		OCI	U	
2667	00000000		OCI	U	
2670	00000000		OCI	U	
			MAC		

'XMITCONTROL' \*TRANSMIT CONTROL DATA TO VCU\*

		TTL	'XMITCONTROL' *TRANSMIT CONTROL DATA TO VCU*	
		MAC		
		COM	XMIT CONTROL DATA TO VCU	
		MAC		
		LOCU	6000	
		EQVU	17700	
		MIC		
XXXX	TEMP	CTS	70	COM 60
0000	02706560	XMITCONTROL		RESET ALL INDICATORS, LUCK COM
0001	26711201	LDI	PA	SEL QA
0002	20300000	UCI		XMIT CONTROL DATA
0003	27711021	LDI	PA	VCU ON CH 0
0004	00100000	UCI		
0005	26716560	LDI	PA	2 STACK LOC. 0
0006	10300420	UCI		
0007	26722673	LDI	PB	LDI PC
0010	01671040	UCI		01671040
0011	20302100	OCT		20302100
0012	26742675	LDI	PD	LDI PL
0013	06274200	UCI		06274200
0014	00000074	DEC		00
0015	10210100	DTM	2A	HLT
0016	10220100	DTM	2B	HLT
0017	10230100	DTM	2C	HLT
0020	10240100	DTM	2D	HLT
0021	54553051	CDL	LL	INE LF
0022	14721021	DTM	UP	DTM 2A
		MIC		XMITTED CONTROL WORDS FOR
		LDI	PA	240 'A' AND 'B' VALUES
		UCI		NO GO BACK
				*****
0023	26710727	LDI	PA	CLU 23
0024	00630401	UCI		00630401
0025	26720000	LDI	PB	NOP
0026	02232004	UCI		02232004
0027	10210100	DTM	2A	HLT
0030	10220100	DTM	2B	HLT
0031	54443041	CDL	DD	INE DF
0032	14741021	DTM	US	DTM 2A
		MIC		XMITTED 23 PRIORITY CONTROL
		CLU	19	WORD 7 NO GO BACK
		LDI	PL	*****
		ADR		-20 INTO 0 NEG.
		DEC		
0033	07236342	CLU	19	CCL DB
0034	26752673	LDI	PL	LDI PC
0035	00 0 6540	ADR		0000GDYN
0036	00000005	DEC		5
0037	26510724	LDI	LA	CLU 20
0040	10210100	DTM	2A	HLT
0041	54443041	CDL	DD	INE DF
0042	26511475	LDI	LA	BTH 02
0043	54333031	CDL	CC	INE CF
0044	14725525	DTM	US	ADL BL
		MIC		XMIT 5 BLOCKS (20 WORDS EACH)
		LDI	PA	OF DYNAMIC CONTROL DATA.
				*****
0045	26712672	LDI	PA	LDI PB
0046	02022004	OCT		02022004
0047	04244100	OCT		04244100
0050	10210000	DTM	2A	NOP
0051	10220000	DTM	2B	NOP
0052	26750760	LDI	PL	CLU 48
0053	00 0 6320	ADR		000 VPU2
0054	26510000	LDI	LA	NOP
0055	10210000	DTM	2A	NOP
				XMIT VPU CONTROL DATA

'XMITCONTROL' \*TRANSMIT CONTROL DATA TO VCU\*

0056	54443041		CDL DD	INE DF	
0057	26511475		LDI LA	BTH U2	VPU CONTROL DATA
			NIC		*****
0060	26750706		LDI PL	CLU 06	SEND OBJECT
0061	00 U	7744	ADM	000PRIVIEW	ASSIGNMENT TO VIEW INFO.
0062	26711201		LDI PA	SEL 0A	
0063	20300000		OCI	20300000	
0064	2711021		LDM PA	UTH 2A	
0065	00020360		UCI	20360	
0066	26515444		LDI LA	CDL DD	
0067	10210000		UTH 2A	NOP	
0070	30411475		INE DF	BTH U2	SENT 6 WORDS
			NIC		*****
			NIC		PACK COLOR ASSIGNMENT CODES
			NIC		
0071	26750724	CULCODE	LDI PL	CLU 20	COUNT =20
0072	00 U	7217	ADM	000 C CODES*15	
0073	26754642		LDI PC	CPL 08	
0074	00 U	6601	ADM	000STATX	
0075	21020706	B5K	STI UB	CLU 06	
0076	27510504		LDM LA	LRC 04	
0077	13705444		SDL 70	CDL DD	
0100	54553041		CDL LL	INE DF	
0101	14740000		BTH U3	NOP	
0102	24320706		STI CB	CLU 06	STONE CODES 11-16
0103	27510504		LDM LA	LRC 04	
0104	13705444		SDL 70	CDL DD	
0105	54553041		CDL LL	INE DF	
0106	14740000		BTH U3	NOP	STONE CODES 9-10
0107	24320704		STI CB	CLU 04	
0110	27510504		LDM LA	LRC 04	
0111	13705444		SDL 70	CDL DD	
0112	54553041		CDL LL	INE DF	
0113	14740000		BTH U3	NOP	
0114	05101370		LRC 08	SDL 70	FIX FOR 4 CODES IN LAST WORD
			NIC		
0115	24320740		STI CB	CLU 32	STONE CODES X,X-1-4
0116	23025545		LDM UB	ADL DL	ADDRESS OF NEXT 8IN
0117	07045543		CLU 04	ADL DC	SKIP OVER 4 WORDS (SHADOW,SELECTS,AND VIEW ASGN.)
			NIC		
0120	54223021		CDL UB	INE BF	
0121	14530000		BTH 20	NOP	B5K****
			NIC		*****
			NIC		TRANSMIT VIEW ASSIGNMENTS, COLOR CODES, AND SELECT WORDS TO THE VCU
			NIC		
			NIC		
0122	26711201	XMITCULCODE	LDI PA	SEL 0A	SELECT VCU
0123	20300000		OCI	20300000	
0124	2711021		LDM PA	UTH 2A	XMIT STARTING ADDRESS
0125	00020436		UCI	20436	X STACK LOC. 436
0126	05050000		LRC 05	NOP	
0127	26752671		LDI PL	LDI PA	
0130	00 0	6600	ADM	000 VIEW	

NOT REPRODUCIBLE

\*XMITCONTROL\* \*TRANSMIT CONTROL DATA TO VCU\*

0131	00 0	6643		ADN	VOU VIEW*35	
0132	07060000			CLU 06	NOP	
0133	26521022			LDI LB	UTM 28	0GU1
0134	00 0	6071	CCADM	ADN	VOUCOLCODE	
0135	26121022			LDI AB	UTM 28	0GU2
0136	00 0	6264	XMITCOLADR	ADN	VOUXMITCOL	
0137	10200000			DTR 20	NOP	
0140	10200000			DTR 20	NOP	
0141	10200000			DTR 20	NOP	
0142	10200000			DTR 20	NOP	
0143	10200000			DTR 20	NOP	
0144	10200000			DTR 20	NOP	SKIP OVER DYNAMIC DATA
0145	26521022			LDI LB	UTM 28	0GU1
0146	00010000		CRETURN	OCI	10000	
0147	26121022			LDI AB	UTM 28	0GU2
0150	00000000			OCI	0	
0151	54443041			CDL DU	INE DF	
0152	14720000			BTR 05	NOP	
				MIC		STATIC OGU DATA FOR 1 BIN AND VIEW ASSIGNMENT
0153	54663067			CUL NN	INE N7	
0154	14560706			BTR 17	CLU 06	
				MIC		*****
				MIC		XMIT BACK FACE COLORS
0155	26711201			LDI PA	SEL 0A	SELECT VCU
0156	20300000			OCI	40300000	
0157	27711021			LDM PA	UTM 2A	A XMIT STARTING ADDRESS
0160	00040446			OCI	40446	Y STACK LOC. 440
0161	05050000			LRC 05	NOP	
0162	26752671			LDI PL	LDI PA	
0163	00 0	6707		ADN	VOU STATY*1	
0164	00 0	6752		ADN	VOU STATY*36	
0165	07070000			CLU 07	NOP	
0166	26521022			LDI LB	UTM 28	0GU1
0167	00 0	5550	SPADM	ADN	VOUSURPAC	
0170	26121022			LDI AB	UTM 28	0GU2
0171	00000000		DYNCOLOR	OCI	0	
0172	54443041			CDL DU	INE DF	
0173	14720000			BTR 05	NOP	
				MIC		BACK COLORS
0174	07060000			CLU 6	NOP	SEND SIX ZEROS
0175	10200000			DTR 20	NOP	
0176	54443041			CDL DU	INE DF	
0177	14750000			BTR 2	NOP	
0200	54663062			CDL NN	INE NX	DONE ALL OGU'S
0201	14640707			BTR 11	CLU 7	NO, DO NEXT OUG
0202	70750446			CPF PL	CLPO 46	YES, GO PACK COLOR COMPOSITIONS
0203	27750452			LDM PL	CLPO 52	GO TRANSMIT COLOR COMPOSITIONS
0204	00010000			OCI	10000	ADDN. SOURCE INPUT
				MIC		*****
				MAC		

NOT REPRODUCIBLE

'COLPAC' \*PACK OBJECT COLOR COMPOSITIONS\*

			TTL	'COLPAC'	*PACK OBJECT COLOR COMPOSITIONS*	
			MIC			
			MIC		*****	
			MIC			
			MIC		PACK OBJECT COLOR COMPOSITION	
			MIC		FOR THE VCU	
			MIC			
			MIC		*****	
0205	75 5	6140	COLPAC	STU L	CRETURN	SAVE RETURN ADDRESS
0206	26732675			LDI PC	LDI PL	
0207	00 0	7713		ADN	UOV C COMP*11	
0210	00 0	17700		ADN	UOV TEMP	
0211	07032104			CLU 03	STM 00	INITIALIZE VIEW COUNT
0212	07032114			CLU 03	STM 10	NET TO START VIEW PACKING
0213	05142136			LRC 12	STM 3N	
0214	07022124			CLU 02	STM 20	NET TO START COLOR PACKING
0215	07060000			CLU 06	NOP	NET TO START WORD GROUP PACKING
0216	27312336			LDM CA	LDM 3N	GET WORD AND INITIAL SHIFT COUNT
0217	06710504			SSL 7A	LRC 04	NET TO PACK WORD
0220	13705444			SOL 70	COL 00	
0221	54333041			COL CC	INZ 01	
0222	14730000			BTM 04	NOP	
0223	24222324			STI LB	LDM 20	SAVE PACKED WORD IN B
0224	54443041			COL DD	INZ 01	
0225	21241467			STM 20	BTM 8	
0226	23342676			LDM 3U	LDI PN	
0227	37200000			OCT	37200000	
0230	53402130			ADN UN	STM 3N	
0231	07144143			CLU 12	ADF DC	RETURN C TO C COMP * 11
0232	23145444			LDM 10	COL DD	
0233	00003041			NOP	INZ 01	
0234	21141457			STM 10	BTM 16	
0235	07144143			CLU 12	ADF DC	MOVE C TO C COMP*23
0236	23045444			LDM 00	COL DD	
0237	00003041			NOP	INZ 01	
0240	21041451			BTM 00	BTM 22	
0241	07034643			CLD 3	CPL DC	COUNTER COUNT
0242	26752672			LDI PL	LDI PB	L=STONE ADDRESS
0243	00 0	6411		ADN	UOVVPUX*9	B=PICKUP ADDRESS
0244	00 0	17700		ADN	UOVTEMP	
0245	05030000			LRC 3	NOP	N=LOOP COUNT
0246	26212551		START	LDI BA	STM LA	A=DATA
0247	07035545			CLU 3	ADL DL	D=ADDRESS BUMP
0250	26212551			LDI BA	STM LA	
0251	07145545			CLU 12	ADL DL	D=ADDRESS BUMP
0252	54663062			COL NN	INZ NX	FINISHED
0253	14720000			STM 5	NOP	NO, GO BACK TO START
0254	54332675			COL CC	LDI PL	DECREMENT VIEW COUNT
0255	00 0	6471		ADN	UOVVPUX*9	
0256	32311604			TZU CF	PTH 4	THROUGH .... GO TO ENDCOLPAC
0257	07015734			CLU 1	XOR CD	
0260	30411464			INZ UP	BTM 11	GO TO START-1
0261	27751463			LDM PL	BTM 12	GO TO START-1
0262	00 0	6413		ADN	UOVVPUX*11	
0263	74 7	6167	ENDCOLPAC	LDU P	SPADR	
				HAC		

\*XMITCOL\* \*SEND COLOR COMPOSITIONS TO VCU\*

0264 75 5 6140 XMITCOL  
 0265 26730760  
 0266 20300000  
 0267 26711203  
 0270 00020604  
 0271 10210000  
 0272 26732651  
 0273 00 0 6400  
 0274 10210000  
 0275 54443041  
 0276 26511475  
 0277 07600000  
 0300 26711203  
 0301 00040604  
 0302 10210000  
 0303 26732651  
 0304 00 0 6460  
 0305 10210000  
 0306 54443041  
 0307 26511475  
 0310 10600000  
 0311 74 7 6140

TTL \*XMITCOL\* \*SEND COLOR COMPOSITIONS TO VCU\*  
 COM \*\*\*\*\*  
 MIC  
 MIC TRANSMIT PACKED OBJECT  
 MIC AND SURFACE COLOR COMPOSITIONS  
 MIC TO VCU  
 MIC  
 STJ L CRETURN  
 LDI PC CLD 48 TRANSMIT COLOR COMPS TO X STACK  
 UCI 20300000  
 LDI PA SEL OC  
 OCT 20604 X STACK LOC. 604  
 DTR ZA NOP  
 LDI PL LDI LA  
 ADX 000 VPUX  
 DTR ZA NOP  
 CDL UD INE DF  
 LDI LA DTR 02  
 CLD 48 NOP  
 LDI PA SEL OC  
 UCI 40604 Y STACK LOC. 604  
 DTR ZA NOP  
 LDI PL LDI LA  
 ADX 000 VPUY  
 DTR ZA NOP  
 CDL UD INE DF  
 LDI LA DTR 02  
 DTR 60 NOP DISCONNECT FROM VCU.....  
 LDU P CRETURN RETURN  
 RAC

NOT REPRODUCIBLE

\*\*\*\*\* DATA BLOCKS \*\*\*\*\*

		TYL	***** DATA BLOCKS *****
		MAC	
		LOCU	0500
		MAC	
		COM	BLUE IN BITS 8-11
		COM	GREEN IN BITS 14-17
		COM	RED IN BITS 20-23
		COM	
		COM	VIEW A *****
0500	00111515	SURFACE COLORS	OCF 0111515 FORE GROUND PLANE
0501	00051010		OCF 0051010 BACK SKY PLANE
0502	00151210		OCF 0151210 FORE HNDV. SURF.
0503	00151210		OCF 0151210 BACK DOCK SYMBOL
0504	00070715		OCF 0070715 FORE BEACON
0505	00050510		OCF 0050510 BACK BACK DROP
0506	00040315		OCF 0040315 FORE
0507	00010401		OCF 0010401 BACK
0510	00000000		OCF 00
0511	00000000		OCF 00
0512	00000000		OCF 00
0513	00000000		OCF 00
		COM	VIEW B *****
0514	00111515		OCF 0111515 FORE GROUND PLANE
0515	00051010		OCF 0051010 BACK SKY PLANE
0516	00151210		OCF 0151210 FORE HNDV. SURF.
0517	00151210		OCF 0151210 BACK DOCK SYMBOL
0520	00070715		OCF 0070715 FORE BEACON
0521	00050510		OCF 0050510 BACK BACK DROP
0522	00040315		OCF 0040315 FORE
0523	00010401		OCF 0010401 BACK
0524	00000000		OCF 00
0525	00000000		OCF 00
0526	00000000		OCF 00
0527	00000000		OCF 00
		COM	VIEW C *****
0530	00111515		OCF 0111515 FORE GROUND PLANE
0531	00051010		OCF 0051010 BACK SKY PLANE
0532	00151210		OCF 0151210 FORE HNDV. SURF.
0533	00151210		OCF 0151210 BACK DOCK SYMBOL
0534	00070715		OCF 0070715 FORE BEACON
0535	00050510		OCF 0050510 BACK BACK DROP
0536	00040315		OCF 0040315 FORE
0537	00010401		OCF 0010401 BACK
0540	00000000		OCF 00
0541	00000000		OCF 00
0542	00000000		OCF 00
0543	00000000		OCF 00
		MAC	
		LOCU	0320
0320	01671420	VP02	OCF 01671420
0321	00000000		OCF 00
0322	02272004		OCF 02272004
0323	01671420		OCF 01671420
0324	00000000		OCF 00
0325	02272004		OCF 02272004
0326	01451420		OCF 01451420

\*\*\*\*\* DATA BLOCKS \*\*\*\*\*

0327	00000000	OCI	U	
0330	02052004	OCI	02052004	
0331	01071420	UCI	01071420	
0332	00000000	UCI	U	
0333	02272004	OCI	02272004	
0334	01071420	OCI	01071420	
0335	00000000	UCI	U	
0336	02272004	OCI	02272004	
0337	01071420	UCI	01071420	
0340	00000000	UCI	U	
0341	02272004	UCI	02272004	
0342	01071420	UCI	01071420	
0343	00000000	UCI	U	
0344	02272004	UCI	02272004	
0345	01451420	UCI	01451420	
0346	00000000	UCI	U	
0347	02052004	UCI	02052004	
0350	01071420	UCI	01071420	
0351	00000000	UCI	U	
0352	02272004	UCI	02272004	
0353	01071420	UCI	01071420	
0354	00000000	UCI	U	
0355	02272004	OCI	02272004	
0356	01071420	OCI	01071420	
0357	00000000	UCI	U	
0360	02272004	UCI	02272004	
0361	01071420	UCI	01071420	
0362	00000000	UCI	U	
0363	02272004	OCI	02272004	
0364	01451420	UCI	01451420	
0365	00000000	UCI	U	
0366	02052004	UCI	02052004	
0367	01071420	UCI	01071420	
0370	00000000	UCI	U	
0371	02272004	UCI	02272004	
0372	01071420	UCI	01071420	
0373	00000000	UCI	U	
0374	02272004	UCI	02272004	
0375	01401420	OCI	01401420	
0376	00000000	UCI	U	
0377	02002004	UCI	02002004	
		COM	*****	
		MAC		
		LOCU	0400	
		MAC		
		COM	BLUE COMPONENT	
0400	00000000	OCI	U	SURFACE VPVA 24 BITS
0401	00000000	OCI	U	
0402	00000000	OCI	U	SURFACE VPVC 24 BITS
0403	00000000	UCI	U	DIFFERENCE VPVA 24 BITS
0404	00000000	UCI	U	
0405	00000000	UCI	U	DIFFERENCE VPVC 24 BITS
0406	00000000	OCI	U	INDICATOR VPVA 6 BITS
0407	00000000	OCI	U	
0410	00000000	UCI	U	INDICATOR VPVC 6 BITS
0411	00000000	OCI	U	OBJ. COLORS 7-12 VPVA 24 BITS

\*\*\*\*\* DATA BLOCKS \*\*\*\*\*

6412	00000000		OCT	U	
6413	00000000		OCT	U	OBJ. COLORS 7-12 VPUC 24 BITS
6414	00000000		OCT	U	OBJ. COLORS 1-6 VPUA 24 BITS
6415	00000000		UCI	U	
6416	00000000		UCI	U	OBJ. COLORS 1-6 VPUC 24 BITS
			COM		*****
			COM		GREEN COMPONENT
6417	00000000		UCI	U	
6420	00000000		UCI	U	SURFACE VPUA 24 BITS
6421	00000000		UCI	U	
6422	00000000		OCT	U	SURFACE VPUC 24 BITS
6423	00000000		UCI	U	DIFFERENCE VPUA 24 BITS
6424	00000000		UCI	U	
6425	00000000		OCT	U	DIFFERENCE VPUC 24 BITS
6426	00000000		UCI	U	INDICATOR VPUA 6 BITS
6427	00000000		UCI	U	
6430	00000000		OCT	U	INDICATOR VPUC 6 BITS
6431	00000000		OCT	U	OBJ. COLORS 7-12 VPUA 24 BITS
6432	00000000		UCI	U	
6433	00000000		UCI	U	OBJ. COLORS 7-12 VPUC 24 BITS
6434	00000000		UCI	U	OBJ. COLORS 1-6 VPUA 24 BITS
6435	00000000		UCI	U	
			OCT	U	OBJ. COLORS 1-6 VPUA 24 BITS
			COM		*****
			COM		RED COMPONENT
6436	00000000		OCT	U	
6437	00000000		UCI	U	SURFACE VPUA 24 BITS
6440	00000000		OCT	U	
6441	00000000		OCT	U	SURFACE VPUC 24 BITS
6442	00000000		OCT	U	DIFFERENCE VPUA 24 BITS
6443	00000000		UCI	U	
6444	00000000		UCI	U	DIFFERENCE VPUC 24 BITS
6445	00000000		OCT	U	INDICATOR VPUA 6 BITS
6446	00000000		OCT	U	
6447	00000000		OCT	U	INDICATOR VPUC 6 BITS
6450	00000000		OCT	U	OBJ. COLORS 7-12 VPUA 24 BITS
6451	00000000		UCI	U	
6452	00000000		UCI	U	OBJ. COLORS 7-12 VPUC 24 BITS
6453	00000000		OCT	U	OBJ. COLORS 1-6 VPUA 24 BITS
6454	00000000		OCT	U	
			UCI	U	OBJ. COLORS 1-6 VPUA 24 BITS
			COM		*****
6455	00000000		UCI	U	OBJ. SURF. IND. VPUA 1 BIT
6456	00000000		UCI	U	
6457	00000000		OCT	U	OBJ. SURF. IND. VPUC 1 BIT
			COM		END OF BLOCK
			COM		*****
			COM		BLUE COMPONENT
6460	00000000	VPUB	OCT	U	
6461	00000000		OCT	U	SURFACE VPUB 24 BITS
6462	00000000		OCT	U	
6463	00000000		OCT	U	DIFFERENCE VPUB 24 BITS
6464	00000000		UCI	U	
6465	00000000		OCT	U	
6466	00000000		OCT	U	INDICATOR VPUB 6 BITS

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\*\*\*\*\* DATA BLOCKS \*\*\*\*\*

0467	00000000	UCI	U	
0470	00000000	UCI	U	
0471	00000000	OCI	U	OBJ. COLORS 7-12 VPUB 24 BITS
0472	00000000	OCI	U	
0473	00000000	OCI	U	
0474	00000000	OCI	U	OBJ. COLORS 1-6 VPUB 24 BITS
0475	00000000	UCI	U	
0476	00000000	UCI	U	
		COM		*****
		COM		GREEN COMPONENT
0477	00000000	UCI	U	SURFACE VPUB 24 BITS
0500	00000000	UCI	U	
0501	00000000	UCI	U	
0502	00000000	UCI	U	DIFFERENCE VPUB 24 BITS
0503	00000000	UCI	U	
0504	00000000	UCI	U	
0505	00000000	OCI	U	INDICATOR VPUB 6 BITS
0506	00000000	OCI	U	
0507	00000000	UCI	U	
0510	00000000	UCI	U	OBJ. COLORS 7-12 VPUB 24 BITS
0511	00000000	OCI	U	
0512	00000000	UCI	U	
0513	00000000	UCI	U	OBJ. COLORS 1-6 VPUB 24 BITS
0514	00000000	UCI	U	
0515	00000000	UCI	U	
		COM		*****
		COM		RED COMPONENT
0516	00000000	OCI	U	SURFACE VPUB 24 BITS
0517	00000000	UCI	U	
0520	00000000	UCI	U	
0521	00000000	OCI	U	DIFFERENCE VPUB 24 BITS
0522	00000000	UCI	U	
0523	00000000	UCI	U	
0524	00000000	UCI	U	INDICATOR VPUB 6 BITS
0525	00000000	OCI	U	
0526	00000000	OCI	U	
0527	00000000	UCI	U	OBJ. COLORS 7-12 VPUB 24 BITS
0530	00000000	UCI	U	
0531	00000000	UCI	U	
0532	00000000	OCI	U	OBJ. COLORS 1-6 VPUB 24 BITS
0533	00000000	OCI	U	
0534	00000000	OCI	U	
		COM		*****
0535	00000000	OCI	U	OBJ. SURF. IND. VPUB 1 BIT
0536	00000000	UCI	U	
0537	00000000	UCI	U	
		COM		END OF VPU BLOCK
		COM		
0540	00670401	OCI	U	00670401 VCU DYNAMIC CONTROL DATA
0541	02272004	OCI	U	02272004
0542	00570401	UCI	U	00570401
0543	02172004	UCI	U	02172004
0544	00570401	OCI	U	00570401
0545	02172004	UCI	U	02172004

\*\*\*\*\* DATA BLOCKS \*\*\*\*\*

0546	00000002		OCT	00000002	
0547	00000010		UCI	00000010	
0550	40670420	06STA1	UCI	40670420	VCU STATIC CONTROL DATA
0551	42272100		UCI	42272100	
0552	40670420		UCI	40670420	
0553	42272100		UCI	42272100	
0554	40570420		OCT	40570420	
0555	42172100		OCT	42172100	
0556	00670401		OCT	00670401	
0557	02272004		OCT	02272004	
0560	00610401		UCI	00610401	
0561	02212004		UCI	02212004	
0562	00550401		OCT	00550401	
0563	02152004		UCI	02152004	
			COM		*****
			LOCU	0600	FOR X STACK FRONT FACES
			COM	BIN1	*****
0600	00000000	VIEW	OCT	U	VIEW ASSIGN.
0601	00000000	STATX	OCT	U	COLOR CODES 11-16
0602	00000000		UCI	U	COLOR CODES 5-10
0603	00000000		UCI	U	COLOR CODES X,X,1-4
0604	00000000		OCT	U	SHADOW,FACE PAIR/OBJ.
0605	00000000		OCT	U	SEL 1 SOLIDS
0606	00000000		UCI	U	SEL 2 PLANAMS
			COM	BIN2	*****
0607	00000000		UCI	U	VIEW ASSIGN.
0610	00000000		OCT	U	COLOR CODES 11-16
0611	00000000		UCI	U	COLOR CODES 5-10
0612	00000000		UCI	U	COLOR CODES X,X,1-4
0613	00000000		OCT	U	SHADOW,FACE PAIR/OBJ.
0614	00000000		OCT	U	SEL 1 SOLIDS
0615	00000000		OCT	U	SEL 2 PLANAMS
			COM	BIN3	*****
0616	00000000		UCI	U	VIEW ASSIGN.
0617	00000000		OCT	U	COLOR CODES 11-16
0620	00000000		OCT	U	COLOR CODES 5-10
0621	00000000		OCT	U	COLOR CODES X,X,1-4
0622	00000000		OCT	U	SHADOW,FACE PAIR/OBJ.
0623	00000000		UCI	U	SEL 1 SOLIDS
0624	00000000		OCT	U	SEL 2 PLANAMS
			COM	BIN4	*****
0625	00000000		OCT	U	VIEW ASSIGN.
0626	00000000		OCT	U	COLOR CODES 11-16
0627	00000000		UCI	U	COLOR CODES 5-10
0630	00000000		UCI	U	COLOR CODES X,X,1-4
0631	00000000		OCT	U	SHADOW,FACE PAIR/OBJ.
0632	00000000		OCT	U	SEL 1 SOLIDS
0633	00000000		OCT	U	SEL 2 PLANAMS
			COM	BIN5	*****
0634	00000000		OCT	U	VIEW ASSIGN.
0635	00000000		OCT	U	COLOR CODES 11-16
0636	00000000		OCT	U	COLOR CODES 5-10
0637	00000000		OCT	U	COLOR CODES X,X,1-4
0640	00000000		UCI	U	SHADOW,FACE PAIR/OBJ.
0641	00000000		OCT	U	SEL 1 SOLIDS
0642	00000000		OCT	U	SEL 2 PLANAMS

\*\*\*\*\* DATA BLOCKS \*\*\*\*\*

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0643	00000000		COM	BINA	*****
0644	00000000		OCI	U	VIEW ASSIGN.
0645	00000000		OCI	U	COLOR CODES 11-16
0646	00000000		OCI	U	COLOR CODES 5-10
0647	00000000		UCI	U	COLOR CODES X,X,1-4
0650	00000000		UCI	U	SHADOW,FACE PAIR/OBJ.
0651	00000000		UCI	U	SEL 1 SOLIDS
			UCI	U	SEL 2 PLANARS
0652	00000000		COM	BINA	*****
0653	00000000		OCI	U	VIEW ASSIGN.
0654	00000000		OCI	U	COLOR CODES 11-16
0655	00000000		OCI	U	COLOR CODES 5-10
0656	00000000		UCI	U	COLOR CODES X,X,1-4
0657	00000000		UCI	U	SHADOW,FACE PAIR/OBJ.
0660	00000000		UCI	U	SEL 1 SOLIDS
			UCI	U	SEL 2 PLANARS
0661	00000000		COM	BINA	*****
0662	00000000		UCI	U	VIEW ASSIGN.
0663	00000000		OCI	U	COLOR CODES 11-16
0664	00000000		OCI	U	COLOR CODES 5-10
0665	00000000		UCI	U	COLOR CODES X,X,1-4
0666	00000000		UCI	U	SHADOW,FACE PAIR/OBJ.
0667	00000000		UCI	U	SEL 1 SOLIDS
			UCI	U	SEL 2 PLANARS
0670	00000000		COM	BINA	*****
0671	00000000		UCI	U	VIEW ASSIGN.
0672	00000000		OCI	U	COLOR CODES 11-16
0673	00000000		OCI	U	COLOR CODES 5-10
0674	00000000		UCI	U	COLOR CODES X,X,1-4
0675	00000000		UCI	U	SHADOW,FACE PAIR/OBJ.
0676	00000000		UCI	U	SEL 1 SOLIDS
			UCI	U	SEL 2 PLANARS
0677	00000000		COM	BINA	*****
0700	00000000		OCI	U	VIEW ASSIGN.
0701	00000000		UCI	U	COLOR CODES 11-16
0702	00000000		UCI	U	COLOR CODES 5-10
0703	00000000		OCI	U	COLOR CODES X,X,1-4
0704	00000000		OCI	U	SHADOW,FACE PAIR/OBJ.
0705	00000000		UCI	U	SEL 1 SOLIDS
			UCI	U	SEL 2 PLANARS
0706	00000000	STATY	COM	*****	*****
			OCI	U	BLOCK FOR BACK FACE COLORS
			COM	00 LOC. LONG.	
			MAC		
7200	00000000	C CODES	LOCU	7200	
			OCI	U	
			LOCU	7700	COLOR COMPOSITION
			COM		INITIAL COLORS ARE GRAY SHADES
			COM		BLUE IN BITS 8-11
			COM		GREEN IN BITS 14-17
			COM		RED IN BITS 20-23
			COM		VIEW A
7700	00010101	C COMP	OCI	00010101	
7701	00020202		OCI	00020202	
7702	00030303		UCI	00030303	
7703	00040404		OCI	00040404	

\*\*\*\*\* DATA BLOCKS \*\*\*\*\*

7704	00050505		OCI	00050505	
7705	00060606		OCI	00060606	
7706	00070707		OCI	00070707	
7707	00101010		OCI	00101010	
7710	00111111		OCI	00111111	
7711	00121212		OCI	00121212	
7712	00131313		OCI	00131313	
7713	00141414		OCI	00141414	
			COM	VIEW B	
7714	00010101		OCI	00010101	
7715	00020202		OCI	00020202	
7716	00030303		OCI	00030303	
7717	00040404		OCI	00040404	
7720	00050505		OCI	00050505	
7721	00060606		OCI	00060606	
7722	00070707		OCI	00070707	
7723	00101010		OCI	00101010	
7724	00111111		OCI	00111111	
7725	00121212		OCI	00121212	
7726	00131313		OCI	00131313	
7727	00141414		OCI	00141414	
			COM	VIEW C	
7730	00010101		OCI	00010101	
7731	00020202		OCI	00020202	
7732	00030303		OCI	00030303	
7733	00040404		OCI	00040404	
7734	00050505		OCI	00050505	
7735	00060606		OCI	00060606	
7736	00070707		OCI	00070707	
7737	00101010		OCI	00101010	
7740	00111111		OCI	00111111	
7741	00121212		OCI	00121212	
7742	00131313		OCI	00131313	
7743	00141414		OCI	00141414	
			COM	*****	
7744	00000000	PRIVIEW	COM	1MU - 3X20 MATRICES USED FOR 2ND LEVEL	
7745	00000000		UCT	U	OBJS.ASSIGNED TO VIEW C UGU1
7746	00000000		OCI	U	OBJS.ASSIGNED TO VIEW C UGU2
7747	00000000		UCT	U	OBJS.ASSIGNED TO VIEW B UGU1
7748	00000000		OCI	U	OBJS.ASSIGNED TO VIEW B UGU2
7749	00000000		UCT	U	OBJS.ASSIGNED TO VIEW A UGU1
7751	00000000		OCI	U	OBJS.ASSIGNED TO VIEW A UGU2
			COM	*****	
4777	00000000		LOCU	4777	
			OCI	U	DUMMY FOR UNDEFINED
			END	U	

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