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Model 3960-Z1A

System Crate Controller/Drivers

INSTRUCTION MANUAL

May, 1987

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TABLE OF CONTENTS

Item	Page
Features and Applications	1
General Description	1
Executing Dataway Commands	1
Processing Interrupt Requests	2
Internal Function Codes	2
Power Requirements	2
Ordering Information	2
Use of the P2 Line	3
Front Panel Indicators	3
Interrupt Requests	4
Figure 1 - Diagram of 1024 Word x 11 Bit Memory	6
Example of Interrupt Processing in a CAMAC Crate Driven by a 3970 Modcomp Driver	7
Figure 2 - Strap Options	11
Warranty	12
Schematic Drawing #02241-D-271 (2 sheets)	Insert

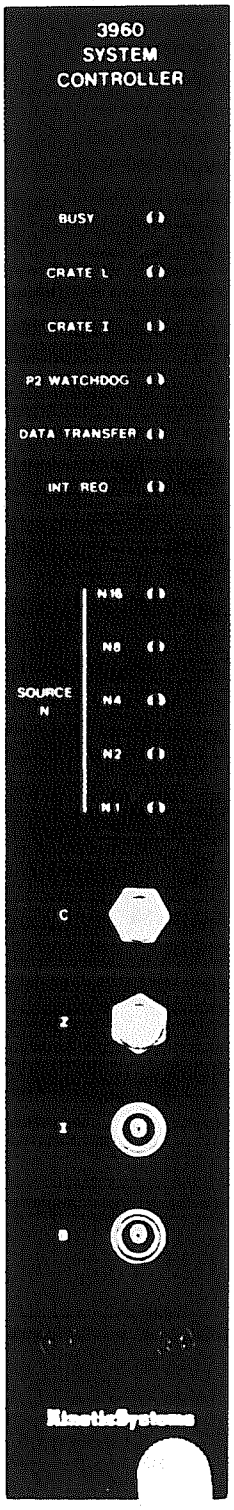
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KineticSystems Corporation

Standardized Data Acquisition and Control Systems **3960-73**

System Crate Controller/Drivers

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(Rev. May 87)



FEATURES

- **Drivers available for MODCOMP and CDC computers**
- **Multiple drivers can be used for redundant systems**
- **MODCOMP and CDC computers can share the same crate**
- **"Automatic" transfers provided to 3991 or 3992 highway drivers**

APPLICATIONS

- **Stand-alone CAMAC systems**
- **Host crate for Serial or Parallel Branch Highway system**

GENERAL DESCRIPTION

This family of modules provides the "system crate" approach to computer interfacing. The modules are summarized here:

Model	Units Wide	Crate Slots	Application
3960	2	Controller	Crate controller that interfaces with system drivers and CAMAC I/O modules.
3970	2	Any	System driver for MODCOMP computers.
3973	4	Any	System driver for CDC 170/6000 computers.

A system crate requires one Model 3960 Crate Controller and at least one Model 3970 or 3973 System Driver. The system driver is interfaced to the I/O bus of its associated computer. When the computer requests a CAMAC transaction, the system driver asserts the Dataway P1 line along with its L-line. This causes the 3960 to address the system driver. The system driver transfers, via the Dataway, the command to be executed by the 3960. The 3960 then immediately performs that command, and the system driver transfers the data associated with the command to (or from) the Dataway.

The process just described allows the system driver to reside in any crate slot and address CAMAC modules with the aid of the 3960 System Crate Controller. Thus, the Dataway is used for a dual purpose (communication between system driver and the 3960 as well as execution of CAMAC commands to modules). Note that the communication sequence between the system driver and the 3960 is controlled by hardware in these modules and is "transparent" to the computer.

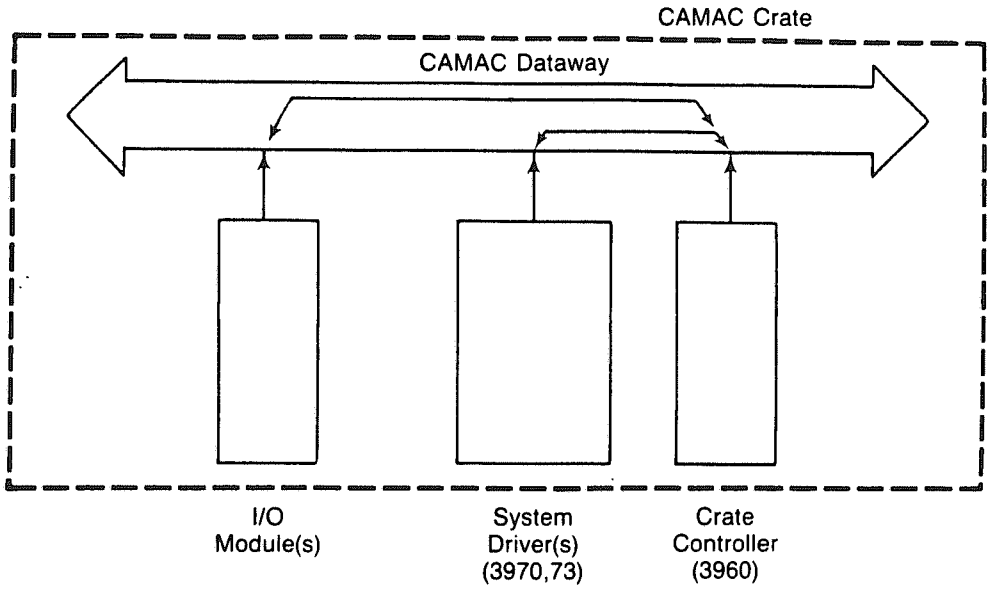
Since the L-line requests are priority-encoded in the 3960, multiple system drivers can reside in the same crate, allowing multiple computers to be interfaced to the same CAMAC system.

One or more Model 3991 Branch Highway Drivers or a Model 3992 Serial Highway Drivers can also reside in the system crate. The system drivers contain logic allowing for "automatic" addressing of the registers in these highway drivers.

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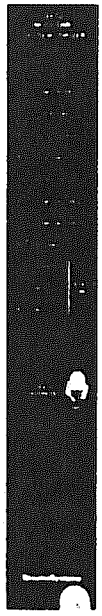
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SYSTEM DIAGRAM

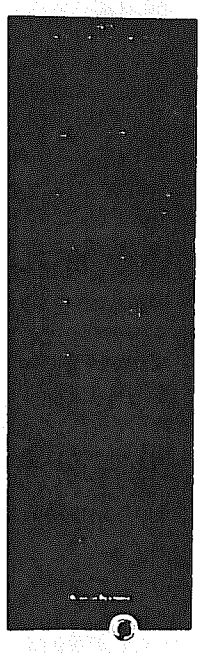


3970 MODCOMP SYSTEM DRIVER

The Model 3970 is a double-width module providing an interface to the I/O bus for MODCOMP II and bus-compatible computers. Connection to the 3970 is made via three ribbon cables that exit from the back of the module above the Dataway connector. A junction box allows direct connection between the ribbon cables and the standard MODCOMP I/O cable.



Model 3970



Model 3973

3973 CONTROL DATA SYSTEM DRIVER

The Model 3973 is a four-wide CAMAC module that interfaces a Control Data Computer to a CAMAC system via the KSC system crate. This module operates with the CDC 170-Series or 6000-Series or other CDC bus-compatible computers. A basic one-crate system must contain one 3973 and one 3960. The 3973 contains two five-foot cable tails terminated with male connectors (National Connector No. A-2255). These cables extend from the rear of the module and provide the standard connections to the CDC high-speed interface bus.

ORDERING INFORMATION

Model 3960-Z1A	—	System Crate Controller	**Weight:** 1.25 kg. (2 lb. 12 oz.)
Model 3970-Z1A	—	MODCOMP System Driver	**Weight:** 1.25 kg. (2 lb. 12 oz.)
Model 3973-Z1A	—	Control Data System Driver	**Weight:** 2.7 kg. (6 lb.)
Accessories	—	I/O Junction Box (included with 3970)	

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USE OF THE P2 LINE

Once a transfer (Data or Interrupt) has been initiated to the 3960, the requesting module may gate S1 onto the Dataway P2 bus during the F(1)·A(12) cycle. This causes the 3960 to abort the F(1)·A(12) cycle before S2 is asserted. The Dataway cycle is thus shortened by approximately 300 nanoseconds, and system latency is reduced.

The P2 line can also be used to lengthen the Dataway cycle. If it is asserted before the time of S1, the Dataway cycle will be suspended. Then, when the P2 line is negated, the Dataway cycle proceeds from S1 to the end. For example, the 3970 Modcomp System Driver has a feature which directs the 3960 to read the data register in a 3992 Serial Highway Driver immediately after a serial read command has been issued. If the P2 hold option on the 3992 has been enabled, when the 3992 detects the data register read command, it will assert the P2 line until the serial message has been completed and the data has been loaded into the data register. Once the 3992 negates P2, the 3960 continues with the read operation and retrieves the data.

Modules have approximately 200 nanoseconds from the start of the Dataway cycle to assert P2. If P2 is not asserted, the controller will continue normally through the cycle.

A P2 Watchdog timer is provided which times out after 500 milliseconds and allows the Dataway cycle to continue. This time period is necessary to accommodate serial messages at slow clock rates. A strap option determines whether or not the Watchdog timer is utilized.

FRONT PANEL INDICATORS

The 3960 has the following LEDs mounted to its front panel to indicate the current state of the crate:

A BUSY light flashes whenever the 3960 makes use of the Dataway. A one-shot extends this signal.

A CRATE L light is lit whenever a LAM is set in the crate.

The CRATE I light monitors the state of the 3960's Dataway Inhibit bit.

The P2 WATCHDOG light is lit when the Watchdog timer times out (that is, when S1 goes true and the P2 line is asserted).

The DATA TRANSFER light is on when a data transfer has been initiated to the 3960.

The INT REQ light is on during interrupt transfers.

Five N SOURCE lights indicate the slot number of the highest priority L-pending.

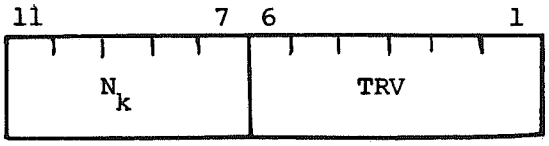
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The push buttons marked "C" and "Z" on the front panel allow for the manual generation of Dataway Clear and Initialize cycles.

A single-pin LEMO connector is provided for the external assertion of Dataway Inhibit, and a buffered Dataway BUSY signal is provided for triggering external equipment.

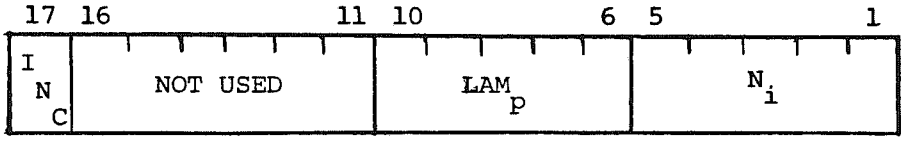
INTERRUPT REQUESTS

Internal Registers



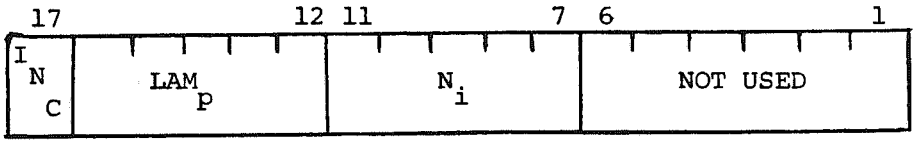
N(30)·F(0)·A(0)
N(30)·F(16)·A(0)

MEMORY DATA



N(30)·F(17)·A(0)

MEMORY ADDRESS (WRITE)



N(30)·F(1)·A(0)

MEMORY ADDRESS (READ)

Register Data Symbols

TRV -- six bits of pointer information

N_k -- most left-hand slot of interface module

N_i -- slot of module with LAM pending

LAM_p -- highest priority LAM in slot N_i

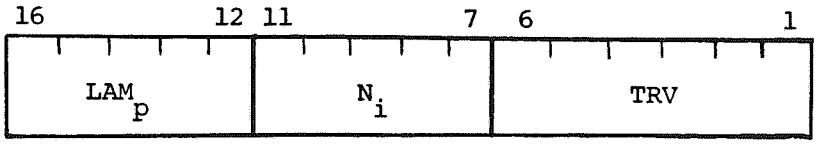
INC -- memory address increment flag

Processing

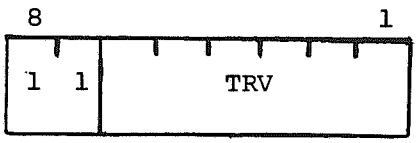
If bit 'inc' is written with a '1', the memory address increments following each N(30)·F(16)·A(0) or N(30)·F(0)·A(0).

When L's are serviced by the 3960, the following 16 bits are written into the interrupt register of the device in slot N_k with an F(17)·A(8). This action, when the 3970 Modcomp interface is the module in N_k, sets the SIRQ request line and disables further interrupt requests. Interrupt requests are enabled by N_k·F(26)·A(1).

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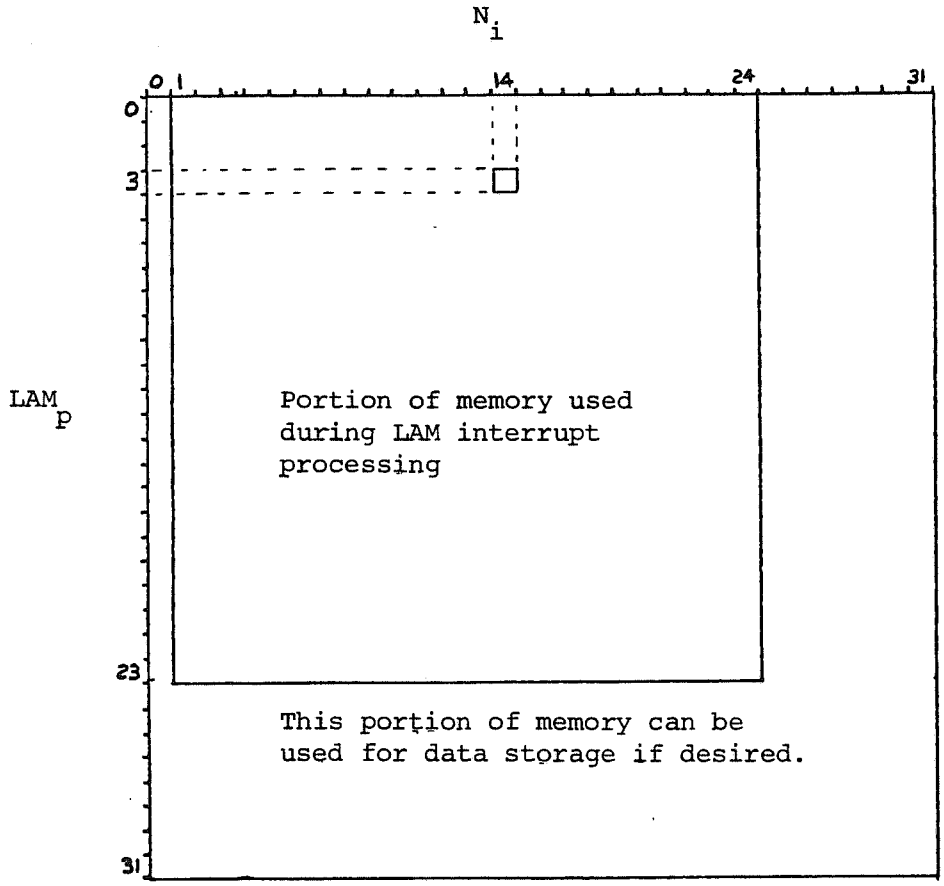


The address of the starting address for the servicing routine is:



Pointers for interrupt service routines are thus located in the 64 locations from CØ to FF.

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Note:

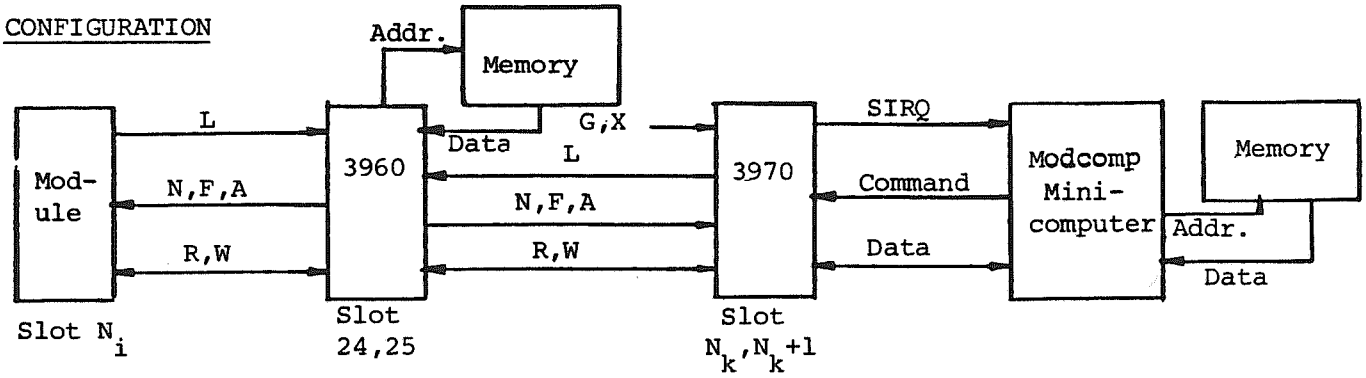
Word shown would contain 11 bits of vector information for processing LAM_4 in slot 14.

FIGURE 1 -- DIAGRAM OF 1024 WORD x 11 BIT MEMORY

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INTERRUPT PROCESSING

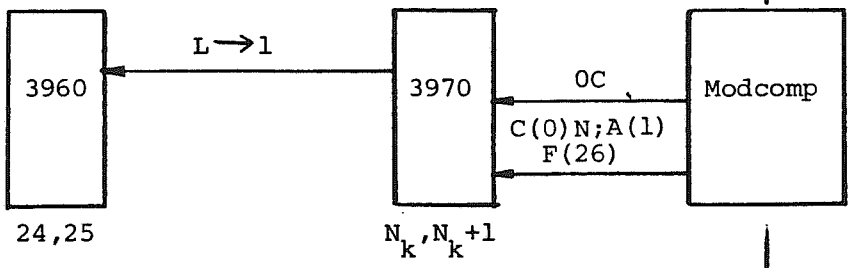
CONFIGURATION



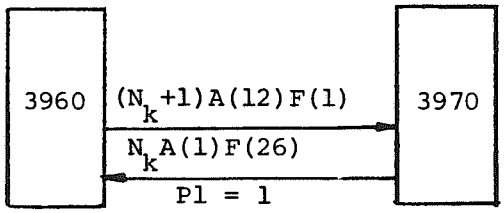
ENABLE INTERRUPTS IN 3970:

Dotted line indicates software stream.

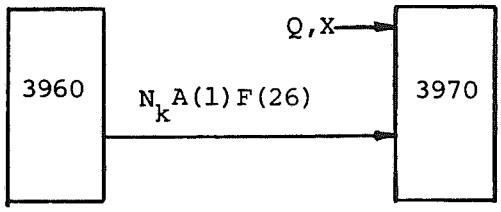
Modcomp outputs command to 3970; L line is set.



3960 recognizes L from 3970 and interrogates with F(1)A(12).



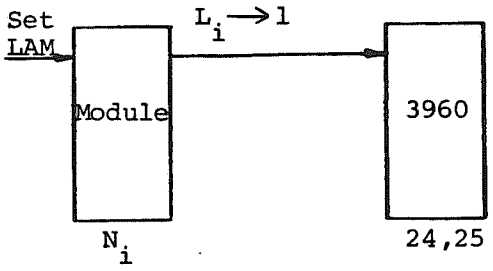
3960 does desired Dataway cycle to 3970 to enable interrupt.



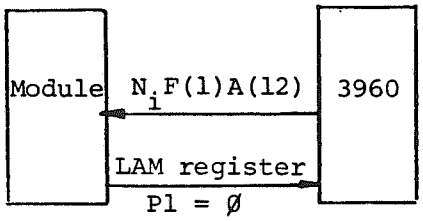
Software continues, meanwhile.

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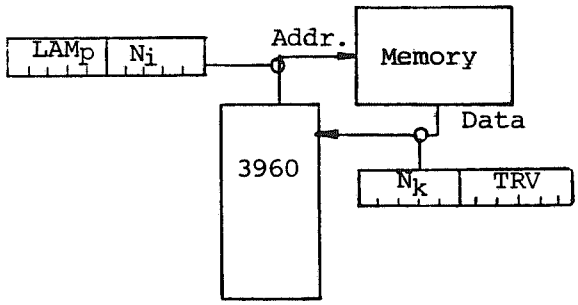
PROCESSING IN 3960



LAM is set, asserting L line.

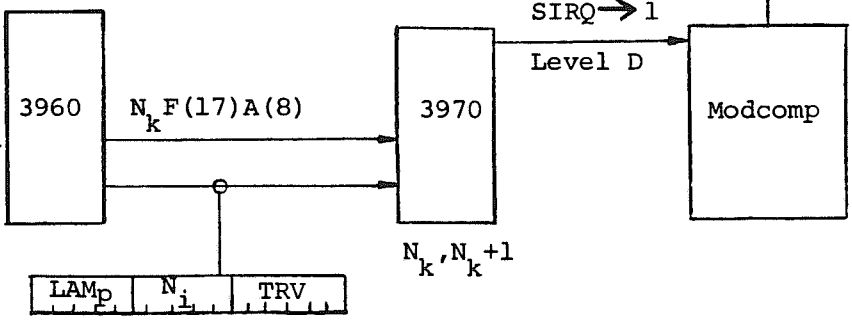


3960 recognizes L from module and interrogates with F(1)A(12).

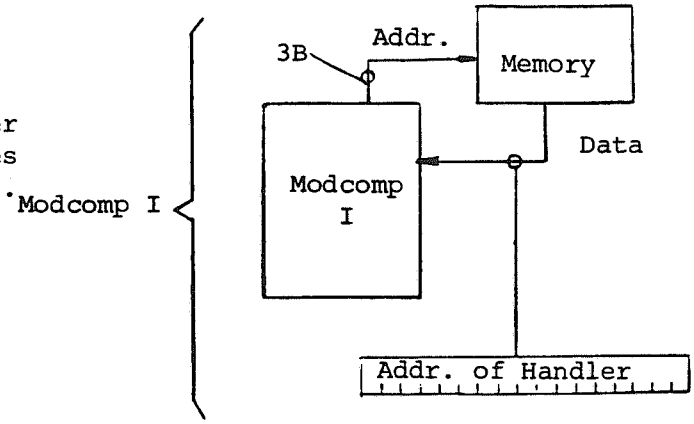


3960 encodes LAM data, forms 10-bit address and interrogates Memory.

3960 writes memory data and address into slot N_k, which causes 3970 to assert SIRQ.

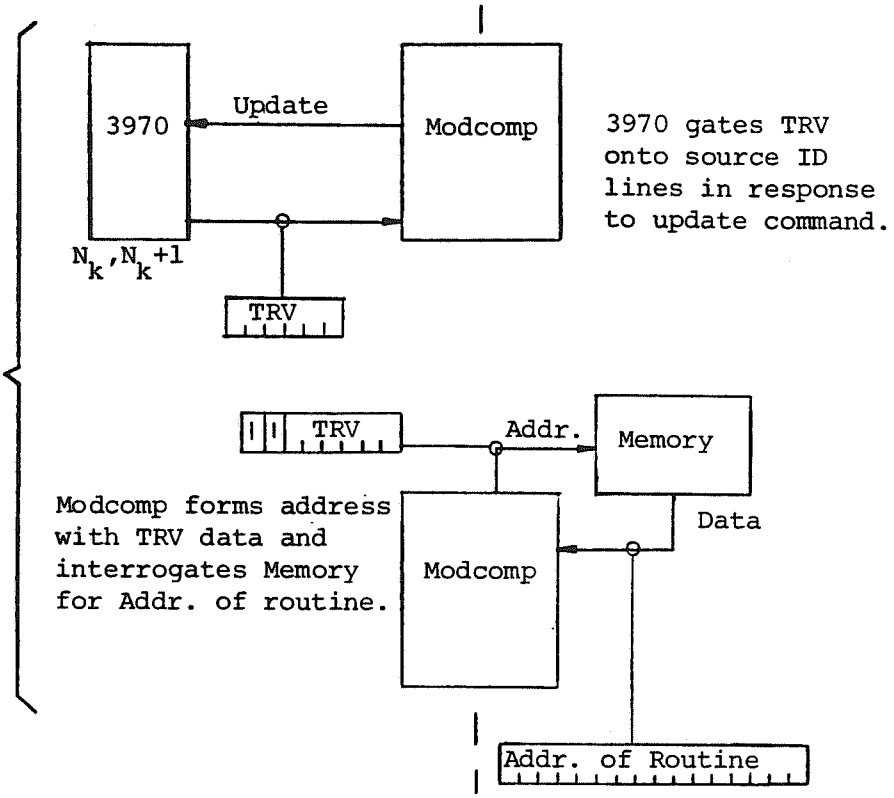


The Modcomp I computer at this point branches to a software handler.



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MODCOMP PROCESSING

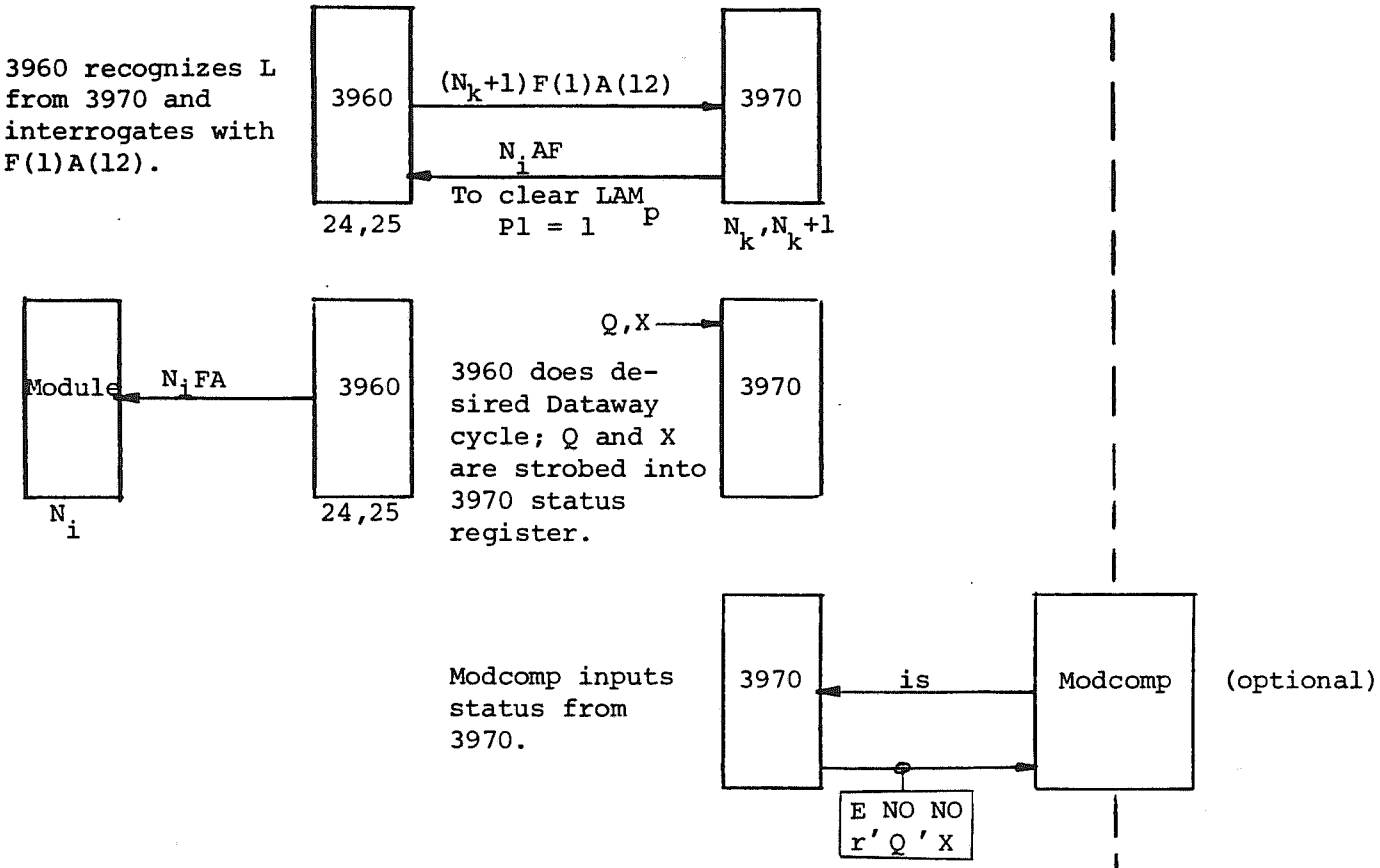


Note

Updating and branching to routine is done via software in Modcomp I and with hardware in Modcomps II and III.

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Model 3960



Routine continues,

Exits

CIR

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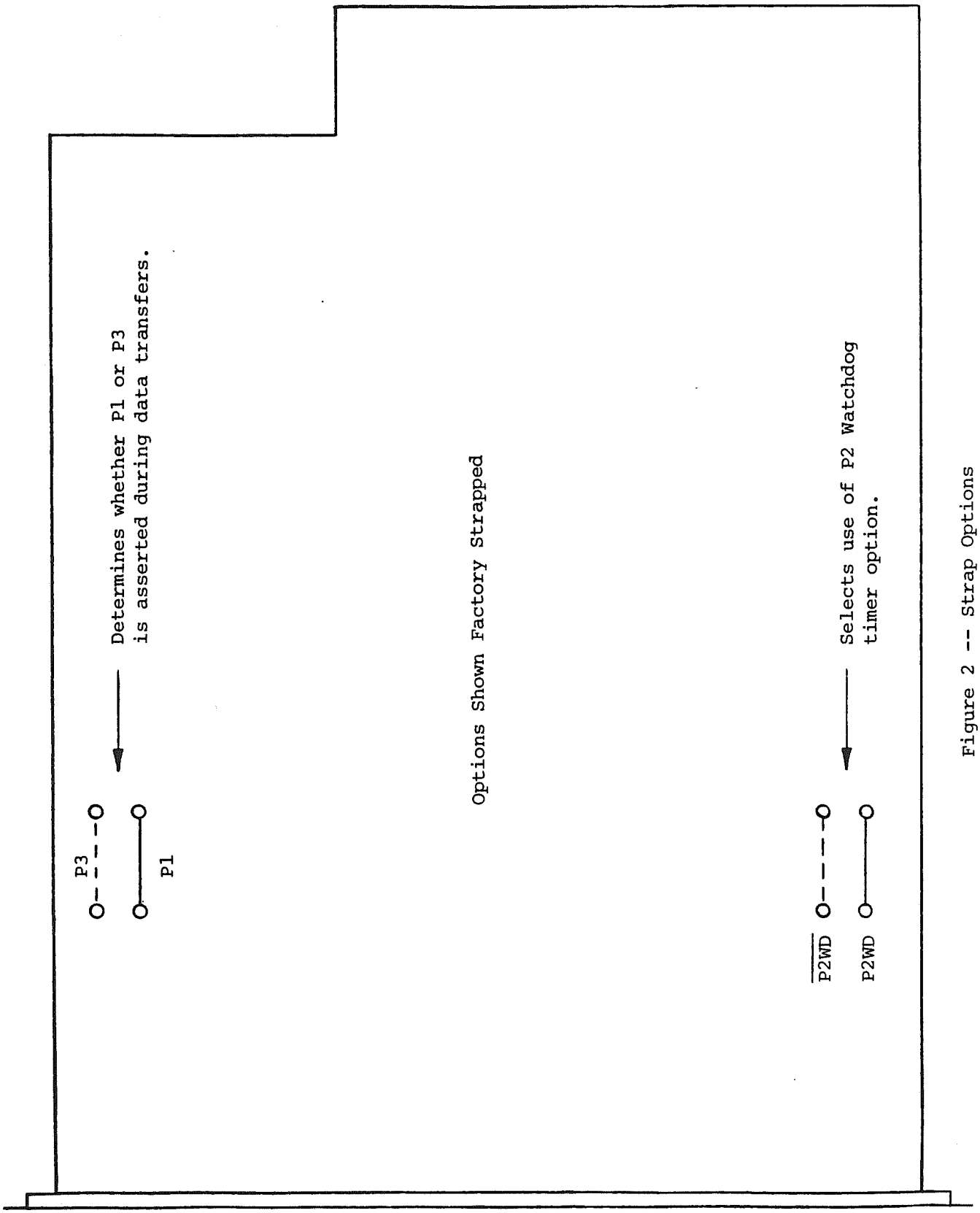


Figure 2 -- Strap Options
View Is Solder Side of Right-hand Board

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