Model 3792-A2A

Watchdog Timer/Power Monitor

INSTRUCTION MANUAL

March, 1987

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SPECIAL OPTION

Model 3792-S001

Watchdog Timer/Power Monitor

March, 1988

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Model 3792-S001

*****SPECIAL OPTION*****

The module 3792-S001 is the same as the module 3792-A1A except the time-out period has been extended to three minutes.

Strap options select 180 Sec, 18 Sec, 1.8 Sec, .18 Sec, instead of selecting 10 Sec, 1 Sec, 100 mSec, and 10 mSec.

MLH:rem(3000 Ser. 7)
March, 1988

*****Special Option*****

Model 3792-S002

Watchdog Timer/Power Monitor

August, 1995

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*****Special Option*****

Model 3792-S002

The Model 3792-S002 is the same as the Model 3792-A2A except that the timeout period has been extended to five minutes.

Strap options select 300 sec, 30 sec, 3 sec and .3 sec instead of selecting 10 sec, 1 sec, 100 msec and 10 msec.

August, 1995

Special Option

Model 3792-S003

Watchdog Timer/Power Monitor

September, 1995

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*****Special Option*****

Model 3792-S003

The Model 3792-S003 is the same as the Model 3792-A2A except the timeout period has been extended to 600 seconds.

Timeout selections are now 600 seconds, 60 seconds, 6 seconds and .6 seconds instead of selecting 10 seconds, 1 second, 100 mseconds and 10 mseconds.

September, 1995

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Watchdog Timer/Power Monitor

Monitors Dataway activity and crate power supplies

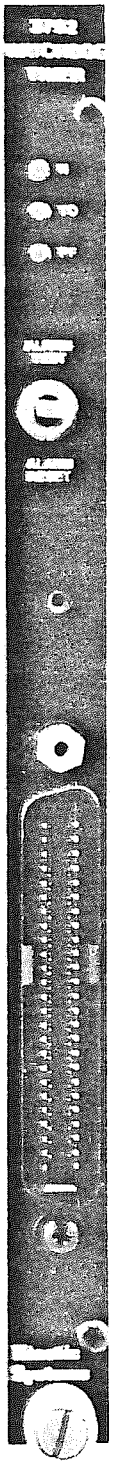
3792

Features

- **Provides Dataway activity monitor and system Watchdog**
- **Timeout activates selectable LAM and Form C relay contacts**
- **Strap-selectable Dataway Inhibit**
- **Strap-selectable Watchdog timeout period**
- **Monitors all voltages in CAMAC crate**
- **Strap-selectable audible alarm with front-panel reset-and-test switch**

Typical Applications

- **System Watchdog timer to detect host or remote computer failure of the failure of a node in a connected network**
- **Power monitor to detect power supply failure in remote CAMAC crates**



General Description

The 3792 Watchdog Timer is a single-width CAMAC module that provides a safety interlock input and a mechanism that determines network or computer failure in complex control or data acquisition systems. When configured for a specific application and enabled by a controlling processor, the Watchdog's warning features remain armed as long as there is Dataway traffic within the selected timeout period.

When the Watchdog is used with modules that can be disabled by Dataway Inhibit (I), a known, well-defined shutdown state is guaranteed if the system fails. Optionally, the relay outputs can be included in safety interlock chains programmable controller inputs, or remote interrupts for automatic shutdown logic; both timeout and power monitor outputs may be used in this way. Both NC and NO contacts are available.

The assertion of LAM from the Watchdog automatically signals a remote or host processor of pending failure in a distributed intelligence application. The timeout LAM will be asserted after one timeout period has elapsed. It is not necessary to have LAMs enabled to use the Watchdog's relay outputs, they are always available. The activity monitor may be strap-selelcted to be Dataway BUSY or XEQ[N·F(25)·A(0)]. The nominal strap-selectable timeout period ranges from 0.01 seconds to 10.0 seconds in four decade increments.

The power monitor will assert a LAM (if enabled) and deenergize a relay if the crate power supply exceeds a ±0.5 volt window on the plus and minus 6 volt outputs, a ±2.5 volt window on the plus and minus 24 volt outputs, or a ±1.5 volt window on the plus and minus 12 volt outputs. The ±12 volt power monitor can be disabled if the crate power supply does not provide this voltage.

The 3792 includes a strap-selectable audible alarm which can be activated by timeout, a power failure, or both. The front-panel provides a manual reset and a momentary test of the audible alarm.

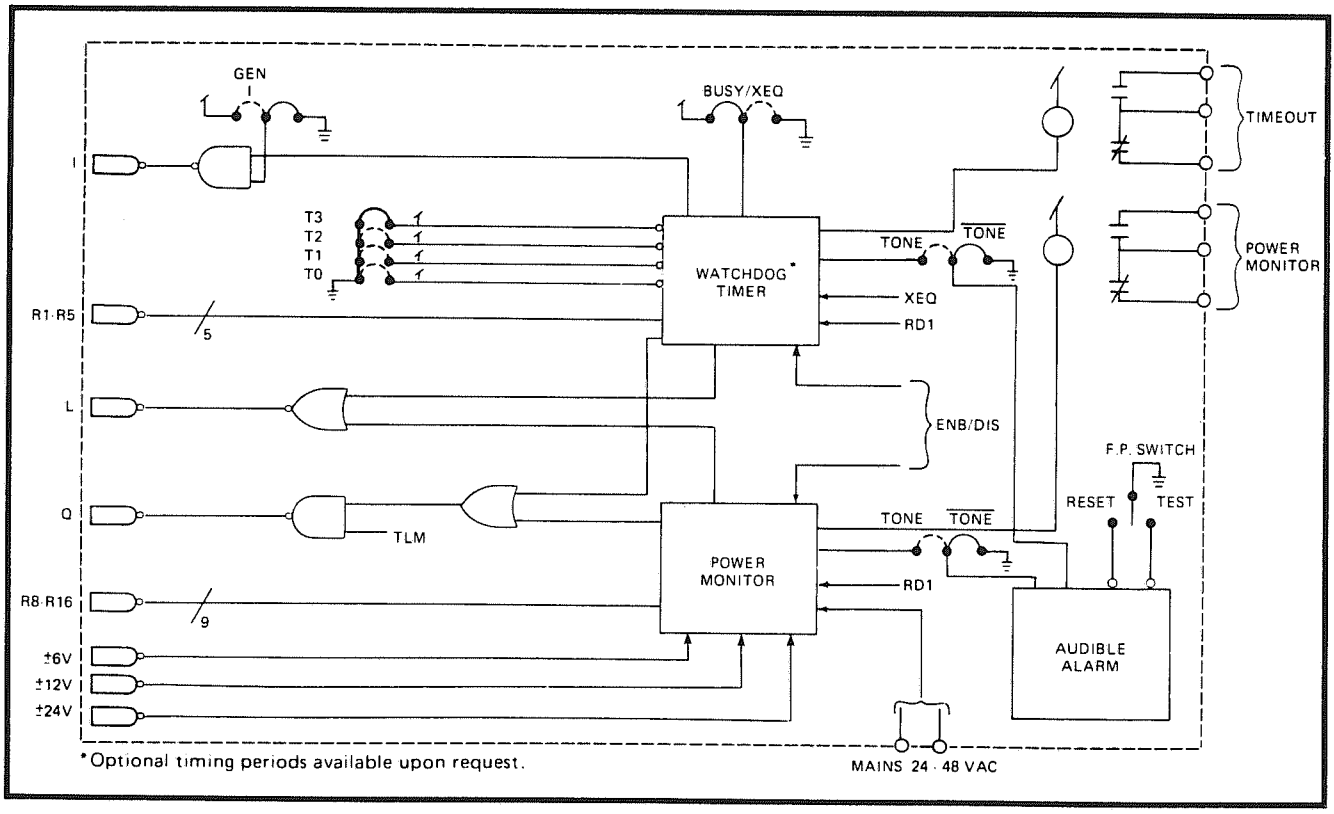
A status register, which can be read from the Dataway, indicates the state of the timeout and Dataway Inhibit strap settings, whether or not a failure has occurred on any of the power outputs, and the state of the LAM bits.

Function Codes

Command		Q	Action
F(0)·[A(0) + A(1)]	RD1	1	Reads the Status register.
F(8)·A(0)	TLM1	TO	Tests the state of the timeout LAM.
F(8)·A(1)	TLM2	PF	Tests the state of the power failure LAM.
F(10)·A(0)	CLM1	1	Clears the timeout LAM, resets the relay output, and resets the timer.
F(10)·A(1)	CLM2	1	Clears the power failure LAM and resets the relay output.
F(24)·A(0)	DIS1	1	Disables the timeout LAM.
F(24)·A(1)	DIS2	1	Disables the power failure LAM.
F(25)·A(0)	XEQ	TO	Restarts the timeout period, if selected. (See Note 4.)
F(26)·A(0)	ENB1	1	Enables the timeout LAM.
F(26)·A(1)	ENB2	1	Enables the power failure LAM.
F(27)·A(0)	TST1	TO	Tests the state of the timeout status bit.
F(27)·A(1)	TST2	PF	Tests the state of the power failure status bit.
Z·S2	ZED		Clears and disables the timeout and power failure LAMs, resets the relay outputs.

Notes: 1. TO indicates that Q = 1 if the timeout bit is set.
2. PF indicates that Q = 1 if the power failure bit is set.
3. X = 1 for all valid addressed commands.
4. If BUSY is selected, then Dataway BUSY will restart the timeout period.

Simplified Block Diagram



Power Requirements

+6 volts:	295 mA	–6 volts:	1 mA
+24 volts:	13 mA	–24 volts:	3 mA

Ordering Information

Model 3792-A2A Watchdog Timer / Power Monitor with audible alarm

Related Products

Model 5950-Z1A Mating Connector
Model 1850-A1D Rack Termination Panel

STATUS REGISTER

The 3792 Status Register contains 16 bits. The status can be read from the Dataway with an F(0)·A(0) or an F(0)·A(1).

16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01
LAM PF	+6V PF	-6V PF	+24V PF	-24V PF	-12V PF	+12V PF	MAINS PF	LAM TO	0	0	T4	T3	T2	T1	INH

BITS

1 INH = 1 when Inhibit generation is selected.

2 T1 = 1 when timeout period of 0.01 second is selected.

3 T2 = 1 when timeout period of 0.1 second is selected.

4 T3 = 1 when timeout period of 1.0 second is selected.

5 T4 = 1 when timeout period of 10.0 seconds is selected.

6-7 Unused.

8 LAM TO = 1 when the timeout period has been exceeded.

9 MAINS PF = 1 if the mains strap is selected and the external source voltage is less than 24 VAC.

10-15 Voltage rail power failure bits = 1 when their respective voltages have failed (the +12V and -12V bits can be inhibited through strap selection).

16 LAM PF = 1 if any of the above power failures occur.

INTRODUCTION - THE WATCHDOG TIMER FUNCTION

In order to effectively use the Watchdog Timer function on the Model 3792, one must become familiar with the following:

1. The BUSY-XEQ* and INH* straps.

2. The timeout period straps.

The positions of these straps are indicated in Figure 1. Determine if any CAMAC Dataway activity is sufficient to maintain the Watchdog in a 'safe' condition, or if the specific command XEQ at A(0), i.e., F(25)·A(0)·N, is necessary. Set the BUSY-XEQ strap accordingly. The module is shipped from the factory with the strap set in the BUSY position.

Then determine if the other CAMAC modules can be shut down in a controlled manner through the use of the INHibit Dataway signal, and if this is the correct action to take when a Watchdog timeout occurs. If so, set the INH strap to INH. The strap is shipped from the factory in the ground (GND) position, not the INH position.

Finally, determine what the likely period between module accesses will be. Set the timeout period strap to the closest time period on the high side of your estimate.

Position 1 = 10 ms nominal

Position 2 = 100 ms nominal

Position 3 = 1000 ms nominal (1 second)

Position 4 = 10 second nominal

The module is shipped from the factory in the 10 second timeout position.

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*BUSY is the Dataway Busy signal.

*XEQ is the mnemonic for N·F(25).

*INH is the mnemonic for Dataway Inhibit.

The timeout, or Watchdog, function may be used in one of two ways (or both):

A Form C relay contact may be connected to the interlock or programmable-controller circuits.

J1 - Pin 28 is common,

J1 - Pin 3 is the NC contact,

J1 - Pin 27 is the NO contact.

J1 is the front-panel ribbon-type connector. In the trip or power-off state, Pin 3 and Pin 28 form a continuous circuit. In the 'safe' state, Pin 27 and Pin 28 form a continuous circuit. The relay output is able to switch a 10 VA maximum load.

If one enables the Watchdog LAM function, the computer system will be notified, via system interrupt, that a timeout has occurred.

PROGRAMMING THE WATCHDOG FUNCTION

The following CAMAC commands at A(0) are specifically used with the Watchdog function:

RD1	Read Status Register
TLM	Test Timeout LAM
CLM	Reset Timeout and Clear LAM
DIS	Disable Timeout LAM
ENB	Enable Timeout LAM
XEQ	Trigger Watchdog Timer (if strap set for XEQ)
TST	Test For Timeout

A ZED (Z-initialize) clears and disables the timeout (and powerfail) LAM and sets the relay output to fail.

The command RD1 at A(0) will return Bits 1-16, with the following bits of importance to the Watchdog function:

+ Bit 1 = 1 if the INH select strap is set to INH.

+ Bits 2-5 are a unary indication of the timeout period (±15% nominal).

  Bit 2 = 1 for 10 ms period.

  Bit 3 = 1 for 100 ms period.

  Bit 4 = 1 for 1000 ms period.

  Bit 5 = 1 for 10 second period.

  These bits are mutually exclusive.

+ Bits 6 and 7 are undefined.

If the Watchdog LAM structure has been enabled, Bit 8 = 1 indicates that a LAM has occurred.

The command TLM at A(0) will return Q = 1 if the Watchdog LAM structure is enabled AND a LAM has occurred.

The command CLM at A(0) will reset the Watchdog timer (arms the relay) if a timout has occurred, and will clear the LAM structure.

The command DIS at A(0) disables the LAM structure, while the command ENB at A(0) enables the structure.

The command XEQ at A(0) has been previously explained in connection with the BUSY-XEQ strap. Q = 1 is returned if a timeout has occurred.

The command TST at A(0) will return Q = 1 if a Watchdog timeout has occurred. This test bypasses the LAM logic, which is especially useful when the LAM structure is not being used.

Always start the initial software sequence by resetting the Model 3792. Then set the LAM structure if it is being used. A module access (or XEQ, if required) must be issued before the nominal timeout period is complete.

If the Model 3792 does timeout, you must issue a CLM at A(0) to clear and reset the Watchdog structure before proceeding.

FRONT PANEL INDICATION - WATCHDOG FUNCTION

The 'N' indicator will light when the module is addressed, while the TO indicator lights only when a timeout of the Watchdog function has occurred.

MODULE POWER - WATCHDOG AND POWERFAIL

The main module power (Vcc) is supplied through a 1 Amp fuse, F1, located in the lower rear of the module.

A strap for selecting INTernal or EXTernal power is provided as indicated in Figure 1. It must be determined if the Model 3792 will be operated from the CAMAC crate's +6 Volt power rail, or if fused +5 Volt power will be supplied externally; set the strap accordingly. The Model 3792 is shipped from the factory with the INTernal power strap set.

The connections on the front-panel blue ribbon connector for EXTernal power are:

J1 - Pin 5 +5 Volts (current limited).

J1 - Pin 30 0 Volt (return, ground or earth).

THE POWERFAIL MONITOR FUNCTION

To use the powerfail monitor function of the Model 3792, one should be familiar with the following straps:

1. The MAINS enable strap.
2. The 12 Volt enable strap.

Both of these straps are located below and slightly forward of the timeout period switch as indicated in Figure 1.

If the CAMAC crate is equipped with a power supply providing +12 Volt power, and one wishes to monitor these rails, place the strap in the ENB12V position. The Model 3792 is shipped with this strap in the disable 12 Volt monitor position.

If one desires to monitor the AC MAINS voltage, the strap should be in the MAINS position. The Model 3792 is shipped from the factory with this function disabled.

The following connections must be made on the front-panel blue ribbon connector for MAINS monitoring:

J1 - Pin 4

Connect to a 24-48 Volt AC, 50-60 cycle.

J1 - Pin 29

The powerfail monitor function on the Model 3792 can be used in one of two ways (or both):

A Form C relay contact may be connected to the interlock or programmable-controller circuits.

J1 - Pin 2 is common,

J2 - Pin 26 is the NC contact, and

J3 - Pin 1 is the NO contact.

J1 is the front-panel blue ribbon connector. In the powerfail trip, or power-off state, Pin 2 and Pin 26 form a continuous circuit. In the power-OK or 'safe' state, Pin 2 and Pin 1 form a continuous circuit. The relay output is able to switch a 10 VA maximum load.

If one enables the powerfail LAM function, the computer system will be notified, via system interrupts, that a failure of a power rail has occurred.

PROGRAMMING THE POWERFAIL MONITOR FUNCTION

The following CAMAC commands of A(1) are specifically used with the powerfail monitor function.

RD1	Read Status Register
TLM	Test Powerfail LAM
CLM	Clear the Powerfail LAM
DIS	Disable the Powerfail LAM
ENB	Enable the Powerfail LAM
TST	Test the Powerfail LAM

A ZED (Z-initialize) clears and disables the powerfail latch circuits (and watchdog circuits) and LAM, and sets the relay outputs to fail.

The command RD1 at A(1) will return Bits 1-16, with the following bits of importance to the powerfail structure:

+ Bit 9 = 1 indicates a MAINS voltage failure. This bit will be active only if the MAINS voltage monitor circuit is enabled.

+ Bit 10 = 1 indicates a -12 Volt rail failure.

+ Bit 11 = 1 indicates a +12 Volt rail failure.

  Bits 10 and 11 will be active only if the +12 Volt monitor circuits are enabled.

+ Bit 12 = 1 indicates a -24 Volt rail failure.

+ Bit 13 = 1 indicates a +24 Volt rail failure.

+ Bit 14 = 1 indicates a -6 Volt rail failure.

+ Bit 15 = 1 indicates a +6 Volt rail failure.

+ Bit 16 = 1 indicates a powerfail LAM has occurred, if the LAM structure has been enabled.

Other bits defined under the Watchdog function are also valid.

The command TLM at A(1) will return Q = 1 if the powerfail LAM structure is enabled and a LAM has occurred.

The command CLM at A(1) will reset the powerfail indication circuits and clear the powerfail LAM.

The command DIS at A(1) disables the LAM structure, while the command ENB at A(1) enables the structure.

The command TST at A(1) will return Q = 1 if a power failure has been detected by the "window" comparator circuits. This command is functional irrespective of the condition of the powerfail LAM structure.

The "window" voltage comparators operate at a nominal +10% of the rail voltage, while the MAINS monitor circuit detects the presence or absence of 24-48 VAC at 50-60 Hz.

Note that a local processor or central computer powerfail interrupt system should be used to detect a primary MAINS failure below a low limit.

The Model 3792 MAINS failure circuit is useful in monitoring secondary, noncomputer, or data-system-related AC voltage failures.

AUDIBLE ALARM - WATCHDOG TIMER AND POWERFAIL INDICATION

The module contains a piezo-alarm which produces an audible tone. The tone is enabled through the use of the Timeout and Powerfail Tone/$\overline{\text{Tone}}$ straps whose positions are indicated in Figure 1. These two straps can be set in any of four possible combinations.

When the Timeout Tone/$\overline{\text{Tone}}$ strap is in the 'tone' position and a timeout occurs, the audible alarm will be activated. The timeout LAM and the alarm will be cleared by an F(10)·A(0) command to the module. When the Powerfail Tone/$\overline{\text{Tone}}$ strap is in the 'tone' position and a power failure occurs, the audible alarm will be activated. After the power failure is corrected, the Powerfail and the alarm will be cleared by an F(10)·A(1) command to the module.

The momentary switch on the front panel of the module provides the ability to manually reset the audible alarm. Pushing this switch to the reset position will turn the alarm off, until another timeout or powerfail occurs. Pushing the switch to the 'Test' position simply turns the alarm on so that its operation can be verified.

FRONT PANEL INDICATIONS - POWERFAIL FUNCTION

In addition to the front panel indicators monitored under the Watchdog function section, the PF or powerfail indicator will light when the powerfail circuits have detected a failure.

POWER REQUIREMENTS

The current and voltage requirements of the Model 3792 are:

Operating on the +6 Volt rail:

263 ma at +6 Volt
1 ma at -6 Volt
2 ma at +12 Volt) if
2 ma at -12 Volt) connected
14 ma at +24 Volt
3 ma at -24 Volt

Operating on the 24 Volt rail:

0 ma at +6 Volt
1 ma at -6 Volt
2 ma at +12 Volt) if
2 ma at -12 Volt) connected
363 ma at +24 Volt
3 ma at -24 Volt

A changeover circuit automatically powers the module from the +24 Volt rail should the +6 Volt rail fail to maintain the visual and audible alarms provided by the Watchdog.

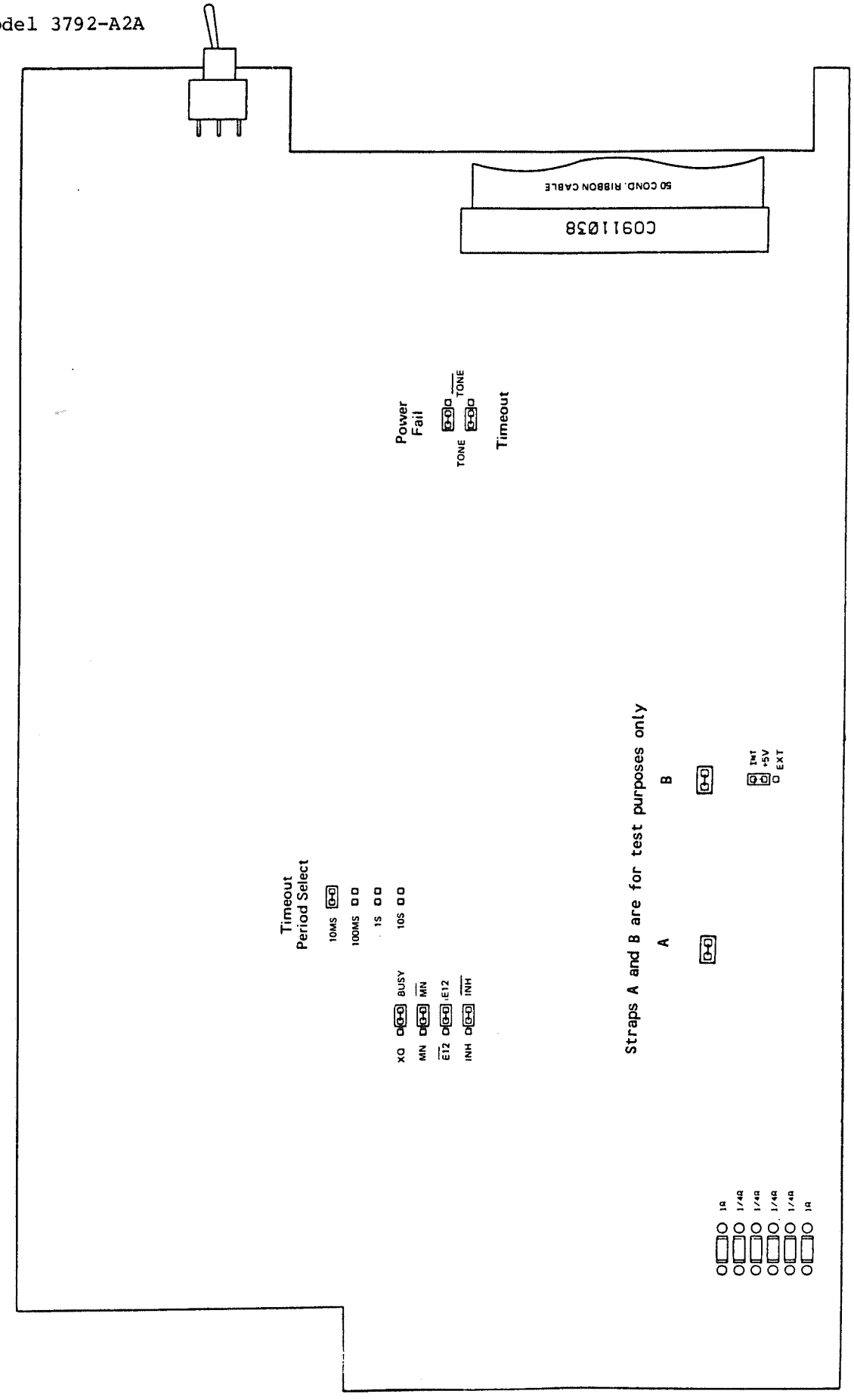
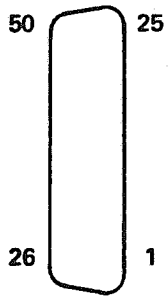


FIGURE 1 - STRAP LOCATIONS



FACE VIEW

Socket/Wire List

50 SOCKET RIBBON CONN.

Model 3792

SOCKET NO.		SOCKET NO.	
50		25	
49		24	
48		23	
47		22	
46		21	
45		20	
44		19	
43		18	
42		17	
41		16	
40		15	
39		14	
38		13	
37		12	
36		11	
35		10	
34		9	
33		8	
32		7	
31		6	
30	Externally Supplied 0 Volts (GND)	5	Externally Supplied +5 Volts
29	Mains (24-48 Volts AC, 50-60Hz)	4	Mains (24-48 Volts AC, 50-60Hz)
28	Timeout Relay Common	3	Timeout NC Relay Contact
27	Timeout NO Relay Contact	2	Power Fail Relay Common
26	Power Fail NC Relay Contact	1	Power Fail NO Relay Contact

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1. Contact KineticSystems and discuss the problem with a Technical Service Engineer.
2. Obtain a Return Authorization (RA) Number.
3. Initiate a purchase order for the estimated repair charge if the product is out of warranty.
4. Include a description of the problem and your technical contact person with the product.
5. Ship the product prepaid with the RA Number marked on the outside of the package to:

KineticSystems Company, LLC
Repair Service Center
900 North State Street
Lockport, IL 60441

Telephone: (815) 838-0005
Facsimile: (815) 838-4424
Email: tech-serv@kscorp.com