M Alarm Box for Project 68

Change History

REVISION	CHANGE	REASON
1.00		Initial Release

General

PG51-0028-0100 Firmware release part
IC51-0008-0100 Programmed device
BH51-0008-0100 Binary/Hex file
FW00-0121-0100 Firmware Source Code

Due to M protocol needing a device address, there is a lack of switches for alarm modes. By cutting out the selection for baud rate and the 232/422 selection for port 0, we are able to support alarm modes for only 2 groups of alarms (1-32 and 33-64) where the P protocol application can support 4 groups of alarm modes. This means that port 0 is set for 19200 EIA 232.

The alarm box has 64 alarm inputs and 1 relay. The relay is an alarm follow, meaning that if any alarm is active on the alarm box then the relay will be high.

In M protocol mode, the alarm box at startup will wait to be turned on line by the Bus Master. Once turned on line, the alarm box will wait 15 seconds for the Alarm Master address to be sent by the bus master before assuming there is no Alarm Master. After this time, the switches are used to configure the beginning alarm number.

If the Alarm Master address is provided, the alarm box will query the Alarm Master for the address range it should be using. It will continue to query the Alarm Master every 15 seconds until an answer is provided and is not configured until an answer (ACK or NACK) comes back from the Alarm Master.

If a NACK comes back from the Alarm Master to the request for alarm range then the default alarm range is used. This in effect says “I do not have the capability to provide your alarm range so use your default”.

LED Operation

The right side of the front panel includes the red Alarm LED light. Its operation is as follows:

- OFF Alarm unit is not on line.
- SOLID Alarm unit is on line.

- BLINKING Alarm unit is on line, an alarm is currently active.

Hardware changes

In order to implement 485 using pins 1,2 and 7,8 the following changes must be made to the board:

U11: Lift pins 3 and 4.
Jumper: U11 pin 3 to U26 pin 1
U11 pin 4 to U26 pin 12

This change ties the TX485Enable line to the transmitter at U11 and ties the 485DRIVESELECT line to the receiver at U11. The 485DRIVESELECT now doubles as a RX485Enable line.

Connections when using M protocol

Connector P3 is used for connecting to the M protocol bus.

Pin 1 Tx+
Pin 2 Tx-
Pin 7 Rx-
Pin 8 Rx+

Connector P1 is used for diagnostics. This is an EIA 232 port with a DB9 connector.

DIP SWITCHES

SWITCH1:

1,2,3	4,5,6	7,8	9,10
BAUD1	ALM BEGIN	ALM MODE 1-32	ALM MODE 33-64

where:
BAUD1 = PORT1 Baud rate

DIP 1	DIP 2	DIP 3	BAUD
OFF	OFF	OFF	1200
ON	OFF	OFF	2400
OFF	ON	OFF	4800
ON	ON	OFF	9600
OFF	OFF	ON	19200
ON	OFF	ON	38400
OFF	ON	ON	57600
ON	ON	ON	115200

Begin Alarm Range

DIP 4	DIP 5	DIP 6	BEGINNING ALARM
OFF	OFF	OFF	1
ON	OFF	OFF	65
OFF	ON	OFF	129
ON	ON	OFF	193
OFF	OFF	ON	257
ON	OFF	ON	321
OFF	ON	ON	385
ON	ON	ON	449

ALARM MODE for 32 points

DIP 7,9	DIP 8,10	ALARM MODE

OFF	OFF	Normally Open
OFF	ON	Normally Closed
ON	OFF	Supervised
ON	ON	Defaults to Normally Open

SWITCH2:

1,2,3,4,5,6,7,8	9	10
ADDR	NOT USED	DIAGS ON

where:
ADDR = local device address of the alarm box 0 – 253 (254 and 255 invalid - default to 253).

DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6	DIP 7	DIP 8	ADDRESS
OFF	OFF	OFF	OFF	OFF	OFF	OFF		1
ON	OFF	OFF	OFF	OFF	OFF	OFF		2
OFF	ON	OFF	OFF	OFF	OFF	OFF		3
ON	ON	OFF	OFF	OFF	OFF	OFF		4
OFF	OFF	ON	OFF	OFF	OFF	OFF		5
ON	OFF	ON	OFF	OFF	OFF	OFF		6
OFF	ON	ON	OFF	OFF	OFF	OFF		7
…	…	…	…	…	…	…	…	…
ON	ON	OFF	ON	ON	ON	ON	ON	252
OFF	OFF	ON	ON	ON	ON	ON	ON	253
ON	OFF	ON	ON	ON	ON	ON	ON	253
OFF	ON	ON	ON	ON	ON	ON	ON	253
ON	ON	ON	ON	ON	ON	ON	ON	253

NOT USED

Not used and should be set to OFF.

DIAGS ON

Diagnostics on port 0 if ON, otherwise port 0 is not used. Diagnostics are at 19200, N, 8, 1.

ALARM HANDLING

Alarm Databases

There are four databases for handling alarms. The alarm databases and their functionality are described below.

Database Name	Function
Alm_Current[64]	Current state of alarm input.
Alm_COSRise[64]	Set if a rising edge detected on alarm input.
Alm_COSFall[64]	Set if a falling edge detected on alarm input
Alm_LastReported[64]	Last reported state of an alarm.

Reporting Alarms

To avoid congesting the system with alarm report messages, only one alarm message is sent when the token is granted to the alarm box. This message will also pass the token at the same time.

The following example illustrates the use of databases in the reporting of alarms:

Event	Alm_Current	Alm_COSRise	Alm_COSFall	Alm_LastReported	Action
Startup	0	0	0	0	None
Alarm triggered	1	1	0	0	None
Report time	1	0	0	1	Report alarm triggered
Alarm cleared	0	0	1	1	None
Alarm triggered	1	1	1	1	None
Alarm cleared	0	1	1	1	None
Report time	0	1	0	0	Report alarm cleared
Report time	0	0	0	1	Report alarm triggered
Report time	0	0	0	0	Report alarm cleared

Pseudo code for implementing above table:

```
If ((Alm_LastReported == 0) && ((Alm_COSRise == 1) || (Alm_Current == 1))
        Report Alarm Triggered
        Alm_COSRise = 0
        Alm_LastReported = 1
Else if ((Alm_LastReport == 1) && (Alm_COSFall == 1) || (Alm_Current == 0))
        Report Alarm Cleared
        Alm_COSFall = 0
        Alm_LastReported = 0
```

There are two states that are illegal in the database, these are:

Alm_Current	Alm_COSRise	Alm_COSFall	Alm_LastReported
0	0	1	0
1	1	0	1

Alarm Messages

The alarm box uses the following M protocol Alarm messages. The command byte for each message is Alarms [05].

- Report Alarm Clear [00]
- Report Alarm Triggered [01]
- Request Alarm Range [10]

The alarm box does not set the Response Requested bit in the control byte for the Report Alarm commands. These commands are intended to be broadcast to all devices. While this could be done when reporting to the Alarm Master (if one exists), it would double the traffic on the bus for each Report Alarm command.