BEAR BONES CONTROLLER

DESCRIPTION

The ICM-BB-XX series of single board programmable controllers is a complete system, you need only add a programmed memory chip and your controller is ready. This single board contains all the hardware for real world inputs, real world outputs, and the power supply with the transformer mounted off the card.

TABLE 1

BEAR BONES PLUS (491 CR's)	Line PWR	I/O GROUPS In	Out
ICM-BB-30	120VAC	2	2
ICM-BB-40	120VAC	1	1
ICM-BB-50	120VAC	3	1 & 3
ICM-BB-60	24VAC	3	1 & 3
ICM-BB-110	240VAC	4	4
ICM-BB-20	120VAC	1	5

(See Table 2)

SPECIFICATIONS

CPU TYPE	Single bit processor
MEMORY	4K (ICM-ME-07)
INPUTS	See Table 2
OUTPUTS	See Table 2
POWER	120VAC at 25°C, 2.0W all 8 I/O OFF, 4.7W all 8 I/O ON
INSTRUCTIONS	15 (See manual ICM-UM-05)
SCAN TIME	5 usec per instruction
TEMPERATURE RANGE	0 to 60°C
DIMENSIONS	8"H x 9"W x 3"D (allow 2" on dimension H to mount transformer)
CLOCK	200KHZ
TIME BASE	0.1 second, I/O location 1/02
FIELD TERMINATIONS	14 AWG maximun wire size, with or without lugs.
WATCH DOG LED	Blinks to indicate that the system clock is operating.
LINE FUSE (TS-3)	Recommended 1 amp no delay
5VDC SUPPLY	Will operate entire system and will drive up to 40 outputs at one time. The outputs will require a connection to your real world power.

WARNING

The ICM Programmable Controller, as with other solid state controls, must not be used in applications which would be hazardous to personnel in the event of failure of the controller. Precautions must be taken to provide mechanical and/or electrical safeguards external to the controller.

NOTE: Specifications subject to change without notice.

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APPLICATION

This stand alone controller requires only a memory prom (with your program) and connections to the real world. It is all you need to accept contact closures and drive your solenoids or pick-up your motor starters. This controller is dedicated to Page 1 of the I/O address set. The inputs and outputs that are available are 8 thru 15. The CUB expander ICM-IO-30 adds the capabilities of inputs and outputs 3 thru 7, see data sheet 7809-27. Should further expansion be required refer to ICM-IO-XX data sheet 7809-28 to add inputs and outputs in groups of 8 each. The maximum I/O count is 125 inputs and 125 outputs.
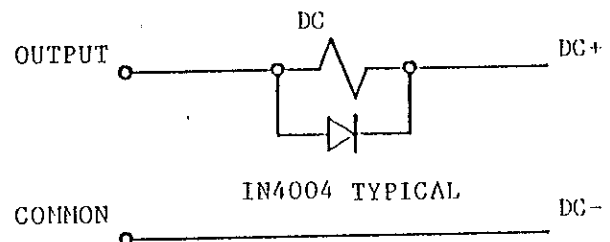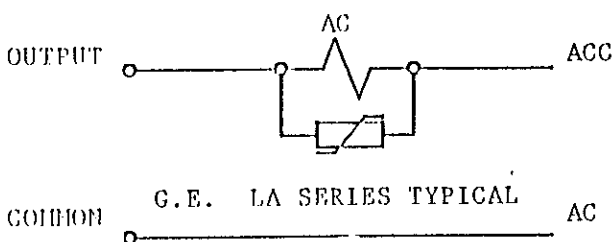
OPERATION

These controllers utilize the 14500 single bit processor. Instructions are read one at a time. The result of the instruction and the status of the data line are stored in the resultant register. If a normally open contact is programmed and the data line is high the resultant register is set to one. If a normally closed contact is programmed and the data line is low the resultant register is set to one. If a standard output symbol is programmed and the resultant register is one the output is energized. If a complimented output symbol is programmed and the resultant register is one the output is de-energized.

OPTIONS

Both products can be ordered with pull apart terminal strips. This minimizes change out time and reduces the possibility of wiring errors since the wires need not be disconnected.

PRECAUTIONS

It is highly recommended that all output drivers be protected by connecting varistors to AC loads and snubbers to DC loads. Pictorial examples are shown below. Be sure to size these protective devices to service the loads you connect.

OUTPUT — AC — ACC

G.E. LA SERIES TYPICAL — AC

COMMON

OUTPUT — DC — DC+

IN4004 TYPICAL

COMMON — DC-

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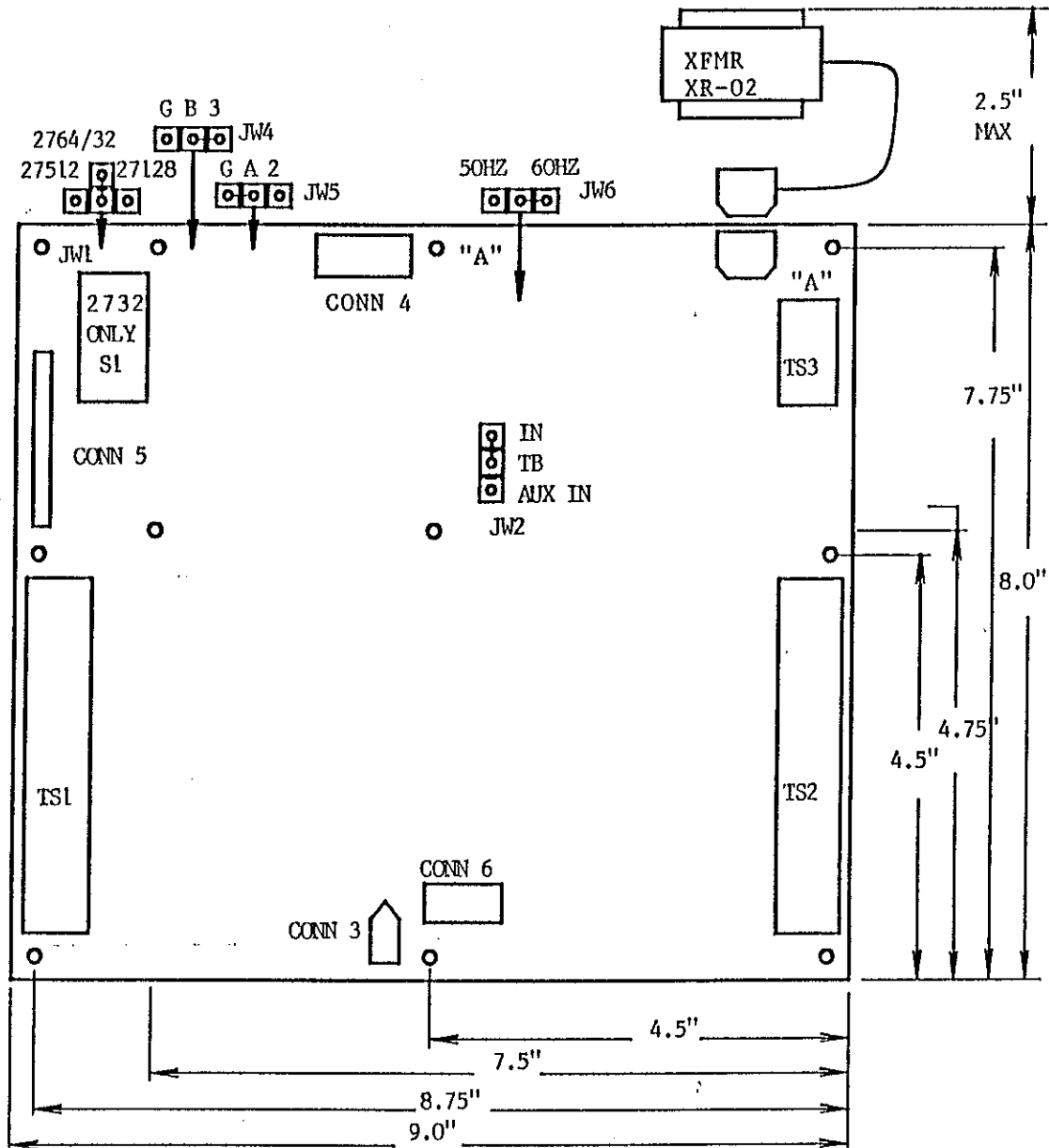
NOTE: Addition of snubbers may increase drop out time of DC devices 200 to 500%. AC loads are not usually effected.

BEAR BONES CONTROLLER

FIGURE #1 (TOP VIEW)

For TS-1, 2, 3   See Sheet 4
For CONN-1, 3, 4   See Sheet 5
For CONN-5, 6   See Sheet 6
For Traces   See Sheet 7

CAUTION: Connect transformer before wiring TS3.

CAUTION: Either of the holes labeled "A" must be mounted with metal standoffs to insure proper grounding.

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BEAR BONES CONTROLLER

TERMINAL STRIPS

Interfaces line power, input devices, and output devices to the BEAR BONES and BEAR BONES PLUS. Barrier type strips are standard. Pull apart strips are optional.
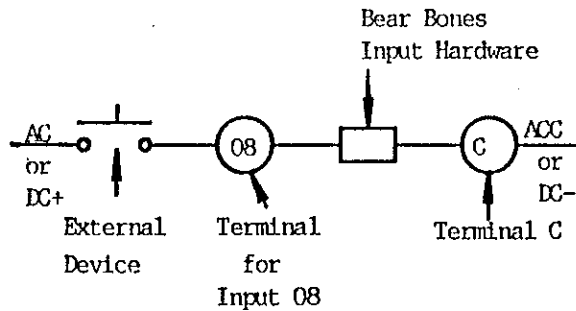
TS 3

GND
ACC
AC

The Ground wire terminates here and to chassis.
The Grounded conductor terminates here.
The Ungrounded conductor terminates here.

TS 1

08	Input 08
09	Input 09
10	Input 10
11	Input 11
C	Common to Above
C	Common to Below
12	Input 12
13	Input 13
14	Input 14
15	Input 15

EXAMPLE OF EXTERNAL CONNECTIONS FOR INPUTS

TS 2

08	Output 08
09	Output 09
10	Output 10
11	Output 11
C	Common to Above
C	Common to Below
12	Output 12
13	Output 13
14	Output 14
15	Output 15

EXAMPLE OF EXTERNAL CONNECTIONS FOR OUTPUTS
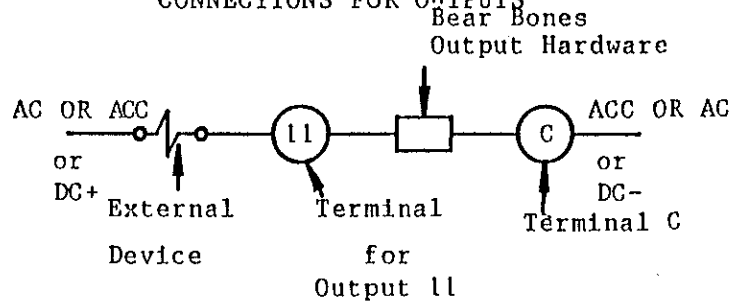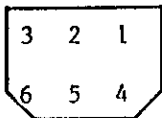

NOTE: For output connections AC and ACC may be interchanged. See sheet 8 for additional connection comments.

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BEAR BONES CONTROLLER
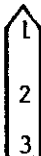
CONNECTOR 1

Interfaces the transformer to the BEAR BONES. Transformer mounted separate from board.

```
 3   2   1
 6   5   4
```

Pins
4 & 6 Connects the transformer primary to TS 3
1 & 3 Connects the transformer secondary to the power supply
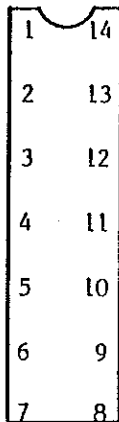2 & 5 Connects the transformer secondary to the time base circuit.

CONNECTOR 3

```
 1
 2
 3
```

Pin
1   Card Ground

2   +5 VDC Logic Supply

3   Card Ground

CONNECTOR 4

Interfaces the CUB expander I/O to the BEAR BONES.

```
 1    14
 2    13
 3    12
 4    11
 5    10
 6     9
 7     8
```

Pin
1   Card Ground
2   Not connected (see page 7, Clock Jumper)
3   Input #3
4   Input #4
5   Input #5
6   Input #6
7   Input #7
8   Card Ground
9   Output #3
10 Output #4
11 Output #5
12 Output #6
13 Output #7
14 +5 VDC Logic Supply

NOTE: Only 5 input and 5 output points are available with CONNECTOR 4. You can connect only one type of expander here. See 7809-27, 7809-32, 7809-35.

NOTE: The BEAR BONES PLUS does use output 3 for executive programming. This output is not available to you.

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CONNECTOR 5

ICM programmers connected here can command the BEAR BONES.

Pin

Pin	
1	Connecting to ground advances the program one step.
2	Connecting to ground halts the controller.
3	Not used
4	+5 VDC = Data Buss High; 0 VDC = Data Buss Low
5	+5 VDC = Halted; 0 VDC = Running.
6	Not used
7	+5 VDC = Result register is high
8	Keying pin, no connection
9	Connecting to +5 VDC resets outputs and resets program to step 000.
10	Card ground.

CONNECTOR 6

Interfaces the I/O expanders to the BEAR BONES.

Pin

Pin	
1	Connecting to +5 VDC resets outputs
2	Program clock synchronizes the I/O expanders and the BEAR BONES.
3	IO/CR Bit 3 status
4	+5 VDC = write to outputs; 0 VDC = Read from inputs
5	Data Channel for outputs
6	Data Channel for inputs
7	IO/CR bit 2 status
8	IO/CR bit 1 status
9	IO/CR bit 0 status
10	Same as connector 5 pin 6
11	Same as connector 5 pin 12
12	Same as connector 5 pin 13
13	Same as connector 5 pin 14
14	Card Ground

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CAUTION! Be sure to remove 1/8" minimum of a trace when a cut is called for. Jumpers must be soldered. The user is responsible for his soldering techniques. Please feel free to consult ICM Applications at the Home office.

50/60 HZ JUMPER

The BEAR BONES is shipped with the 60 HZ trace intact. To convert the 50 HZ cut the trace between G and 60 HZ, and install a jumper from G to 50 HZ.

2732 EPROM JUMPER

The BEAR BONES and BEAR BONES PLUS are shipped with the 2732 pad connected to all. No other options are available 2732=4K.

CLOCK JUMPER

The BEAR BONES is shipped with the IN (internal) trace intact. To convert to the AUX (external) capability cut the trace between TB and IN, then install a jumper from TB to AUX IN.

SHIPPING TRACES

The BEAR BONES is shipped with traces G to $\emptyset$, B to G, and A to G intact, this allows 10 functions. The BEAR BONES PLUS is shipped with traces C to $\emptyset$, B to 3, and A to G intact, this allows 32 functions.

Also contact the factory prior to attempting to make changes in other RAM jumpers, you may disable the programmable timers/counters.

THE REAL WORLD

While we design special circuitry including opto coupling, to isolate the controller from noise, external snubbing may be beneficial when energizing inductive loads.

W A R N I N G

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INPUTS

GROUP	SIGNAL LEVEL	POWER	FUSE	TURN ON/OFF		ISOLATION	LED	OPTO
1	90-130VAC	1.2W	1 AMP	25MS MAX		1500V	Y	Y
2	7-32VDC	1.3W	1 AMP	10/25 MS MAX		1500V	Y	Y
3	10-40VAC	1.2W	1 AMP	10/25 MS MAX		1500V	Y	Y
4	90-260VAC	2.4W	1 AMP	25MS MAX		1500V	Y	Y

NOTE: FOR GROUPS 1,3,4 CONNECT ACC TO COMMON. FOR GROUP 2 CONNECT DC- TO COMMON.

OUTPUTS

GROUP	SIGNAL LEVEL	POWER	FUSE	TURN ON/OFF	OVER VOLT.	Ø X	ISOLATION	LED	OPTO
1&3	12-130VAC;.1-2A	240W	2AMP	1/2 CYCLE	400 PEAK	Y	7500V	Y	Y
2	7-32VDC: 2A	64W	2AMP	5 MS MAX	80VDC	N/A	1500V	Y	Y
4	35-260VAC;.1-1A	240W	1AMP	1/2 CYCLE	600 PEAK	Y	7500V	Y	Y
5	12-130VAC;.01 to .75A	120W	.75AMP	1/2 CYCLE	400 PEAK	Y	7500V	Y	Y

NOTE: FOR GROUPS 1, 3, 4, 5 CONNECT AC TO COMMON TO COMMON TO AVOID SWITCHING THE NEUTRAL CONDUCTOR. FOR GROUP 2 CONNECT DC- TO COMMON.

NOTE: GROUPS 1,3,& 5 OUTPUTS HAVE LEAKAGE CURRENTS LESS THAN 1 MADC.

INPUT/OUTPUT SPECIFICATIONS

Divelbiss CORPORATION

Rev. 01
9/25/87

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