ICM PROGRAMMABLE CONTROLLER

PART NO. ICM-CT-01

HIGH SPEED COUNTER

DESCRIPTION

The High Speed Counter gives you the added dimension of count rates up to 10 KHZ. This feature card is programmable and its' setpoint is stored in EPROM. You may use this card as a single or dual counter.

FEATURES

Easy connection to the Bear Bones CPU, its' Expander, or Baby Bear.
No additional panel space used when connected to the Bear Bones.
Reset and enable functions fully programmable.
LED's furnished for each counter input.
Page selectable so that it fits anywhere in the I/O address set.

SPECIFICATIONS

Supply Voltage	5 VDC	
Power Consumption	100 ma maximum	
Maximum Count Rate	10 KHZ	
Maximum Setpoint	Single Counter	16,777,215
	Dual Counter	4,095 each
Input Signal Level	5 to 24 VDC	60 MADC continuous
		3 AMP for 1 sec.
		2 MADC minimum

APPLICATIONS

The High Speed Counter Card gives you the ability to implement those count applications that are too fast for the Bear or Baby Bear. Your application could be counting an output from an encoder. You might use this product as a totalizer. This card is page selectable so you can put it anywhere in your I/O structure. It can mount directly over a Bear Bones or a Bear Bones Expander. This card can plug into the PIC Baby Bear and mounts directly on the panel.

OPERATION

The counter(s) function as true binary counters. The counter(s) will accept counts when the reset line is low and it is enabled, see page 3. If the counter is disabled no more counts will be accepted but the current count will be retained. When reset the current count will be set to zero.

Divelbiss CORPORATION
9776 MT. GILEAD ROAD
FREDERICKTOWN, OHIO 43019
(614) 694-9015

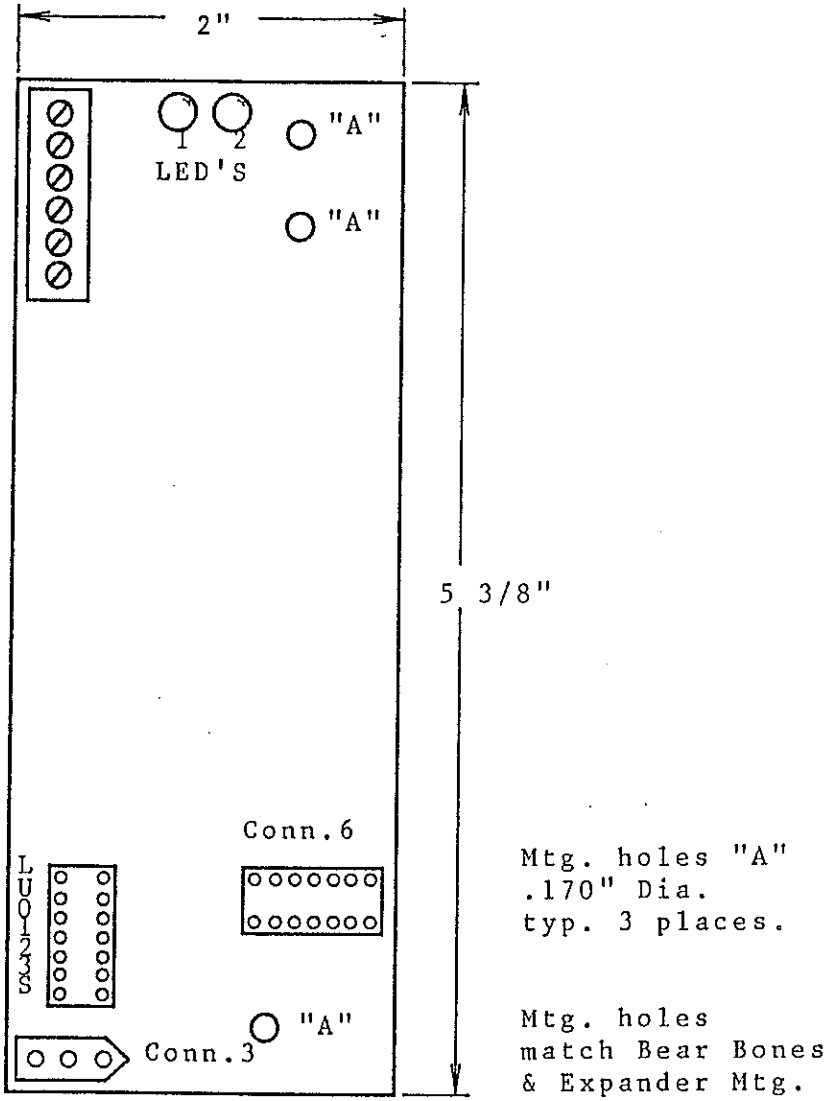
HIGH SPEED COUNTER

No Connection-------
Counter 2(-)--------
Counter 2(+)--------
No Connection-------
Counter 1(-)--------
Counter 1(+)--------

CASE	Pins U	Pins L
U	X	0
L	0	X

PAGE	Pins 0	Pins 1	Pins 2
0	X	X	X
1	0	X	X
2	X	0	X
3	0	0	X
4	X	X	0
5	0	X	0
6	X	0	0
7	0	0	0

Counter	Pins
ONE	X
TWO	0



Note: Align counter over center holes and avoid the input/output terminal blocks.
Note: Specifications subject to change without notice.

WARNING
The ICM High Speed Counter, 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 counter. Precautions must be taken to provide mechanical and/or electrical safeguards external to the counter.

HIGH SPEED COUNTER

FUNCTIONS

Inputs, other than counter 1 and 2, are outputs from the PLC. When programming the coil symbol is used. Outputs from the counter are inputs to the PLC. In the programming section the contact symbol is used. You may assign the counter to any page from 0 thru 7 except page 1. Page one is reserved for the CPU. Should you select page 1 random and unreliable operation may occur. In the tables below the page number is represented by an "X".

COUNTER INPUT	FUNCTION
X/00	Group 1 LSB (set low)
X/01	Group 2 NSB (set low)
X/02	Group 3 MSB (set low)
X/03	Counter latch (set high)
X/04	Counter 1 Reset (set low)
X/05	Counter 2 Reset (set low)
X/06	Counter 1 Enable (set low)
X/07	Counter 2 Enable (set high)

COUNTER OUTPUT	FUNCTION
X/00	Bit 1 (least significant)
X/01	Bit 2
X/02	Bit 3
X/03	Bit 4
X/04	Bit 5
X/05	Bit 6
X/06	Bit 7
X/07	Bit 8

PRE-PROGRAMMING

Set the card for one or two counters, see sheet 2. The card is set for one counter at the factory. With one counter selected connect your pulse train to counter 1+ and 1-.

Select the page address you wish to use. Remember do not use page 1! The High Speed Counter is shipped from the factory preselected for page 0. The card is also preselected for lower case. You received enough paging links to select any address within our address set. The factory preselection gives you addresses 0/00 thru 0/07.

HIGH SPEED COUNTER

PRE-PROGRAMMING (con't)

Most applications of this card will use a setpoint. For our example we will assumes a set point of 10,551,296. A single counter application allows counting to 16,777,215. You must assign any 24 CRs' to act as the counter bits. We will use CRs' 84 thru 107 with 107 used as the most significant bit. The table below illustrates the value of each CR.

CR	BIT	VALUE	CR	BIT	VALUE
107	24	8,388,608	95	12	2,048
106	23	4,194,304	94	11	1,024
105	22	2,097.152	93	10	512
104	21	1,048,576	92	9	256
103	20	524,288	91	8	128
102	19	262,144	90	7	64
101	18	131,072	89	6	32
100	17	65,536	88	5	16
99	16	32,768	87	4	8
98	15	16,385	86	3	4
97	14	8,192	85	2	2
96	13	4,096	84	1	1

Note that if two counters are used each has a maximum setpoint or 4,095. Counter one would use CRs' 84 thru 95. Counter two would use CRs' 96 thru 107 with CR 96 as the one bit and CR 107 as the 2048 bit. Remember that any of the 491 CRs, available to you in a Bear or Baby Bear may be used for the counter.

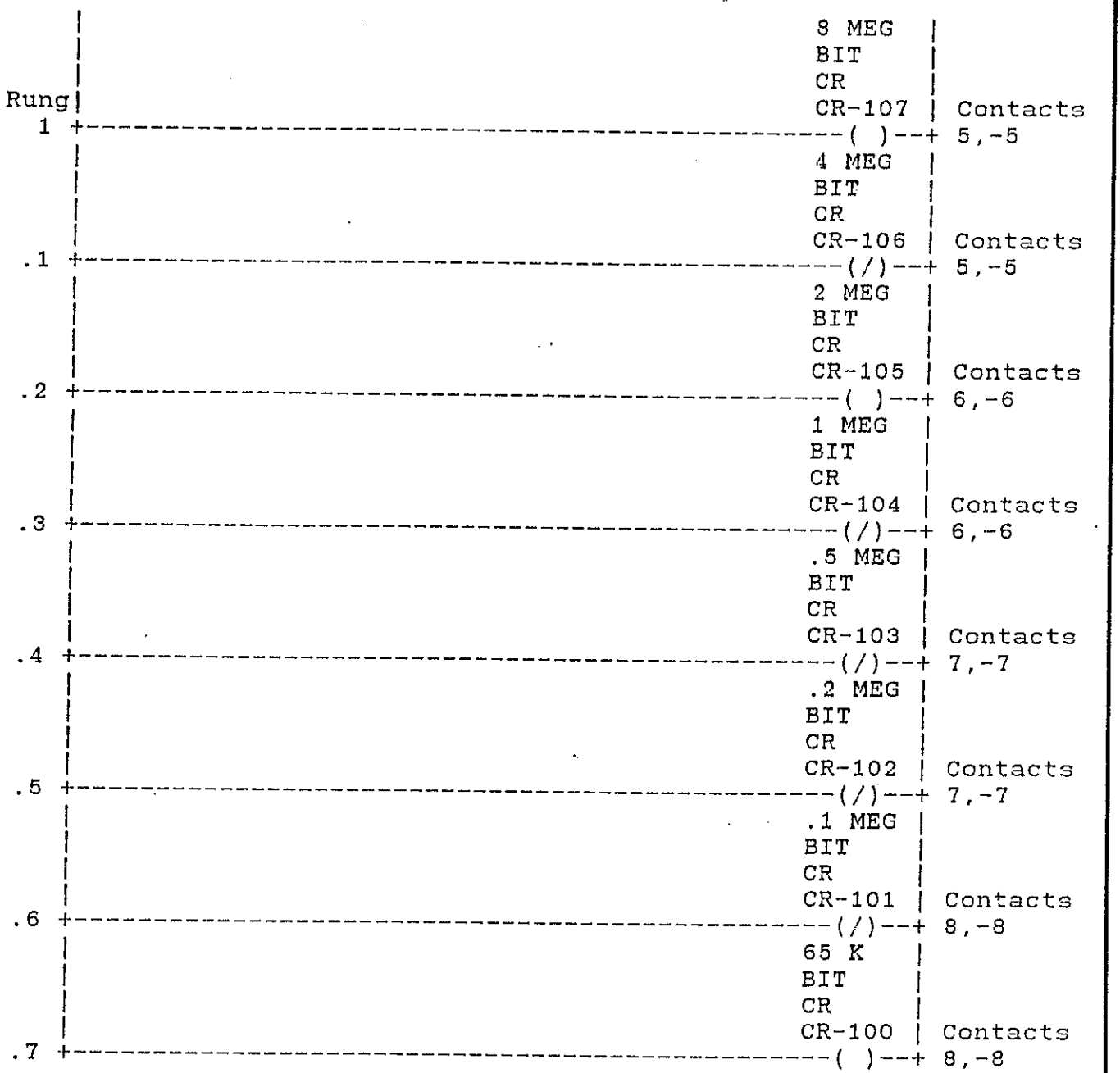
We must now determine which CRs' must be on to enable a setpoint of 10,551,610. Look at our table and find the largest number that is smaller than 10,551,610. The example shows how to establish which of the CRs' must be on.

Setpoint	10,551,610
CR 107	8,388,610
Remainder	2,162,686
CR 105	2,097,150
Remainder	65,536
CR 100	65,536

CRs' 107, 105 and 100 must be on and all others off.

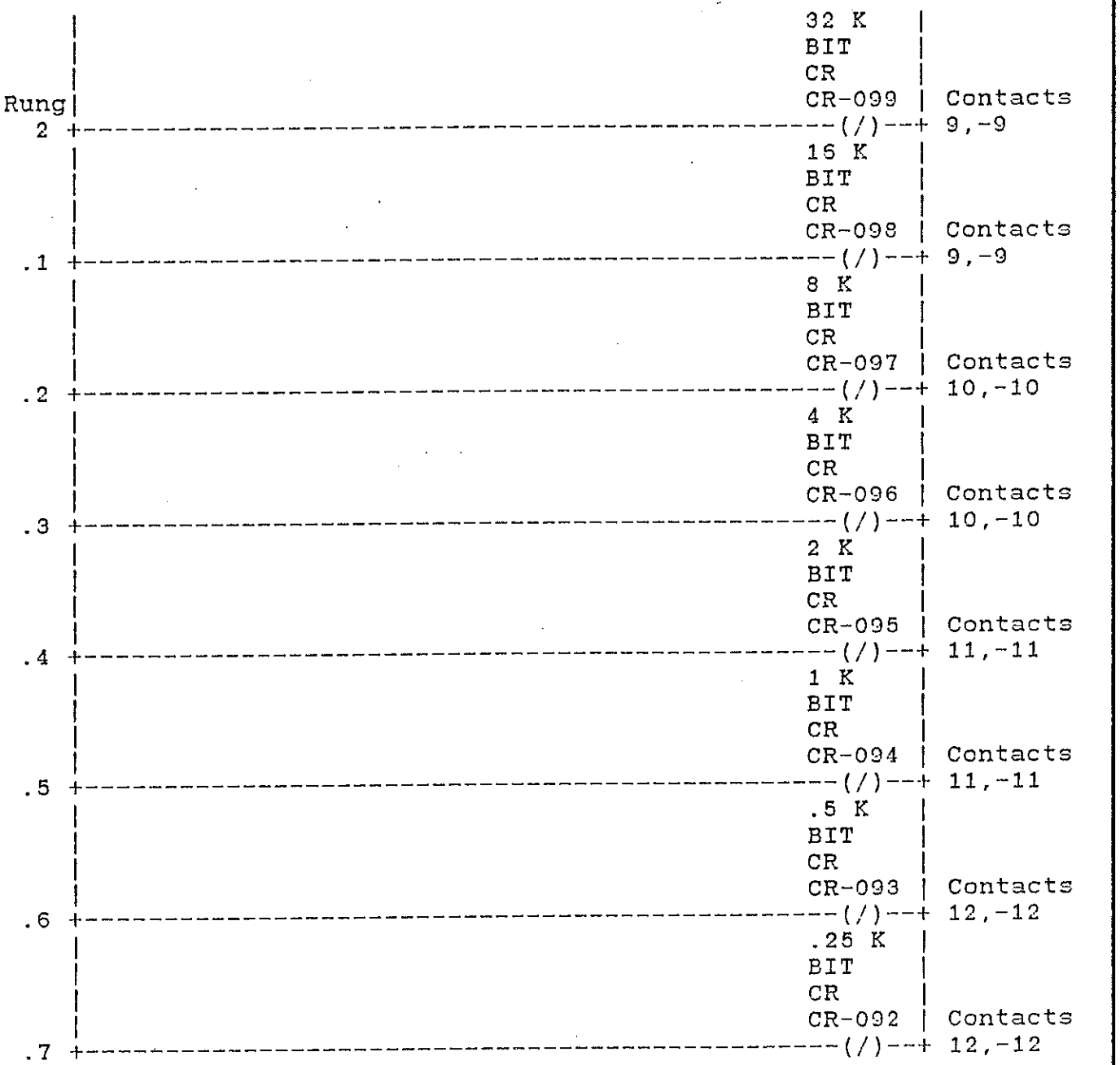
HIGH SPEED COUNTER

PROGRAMMING



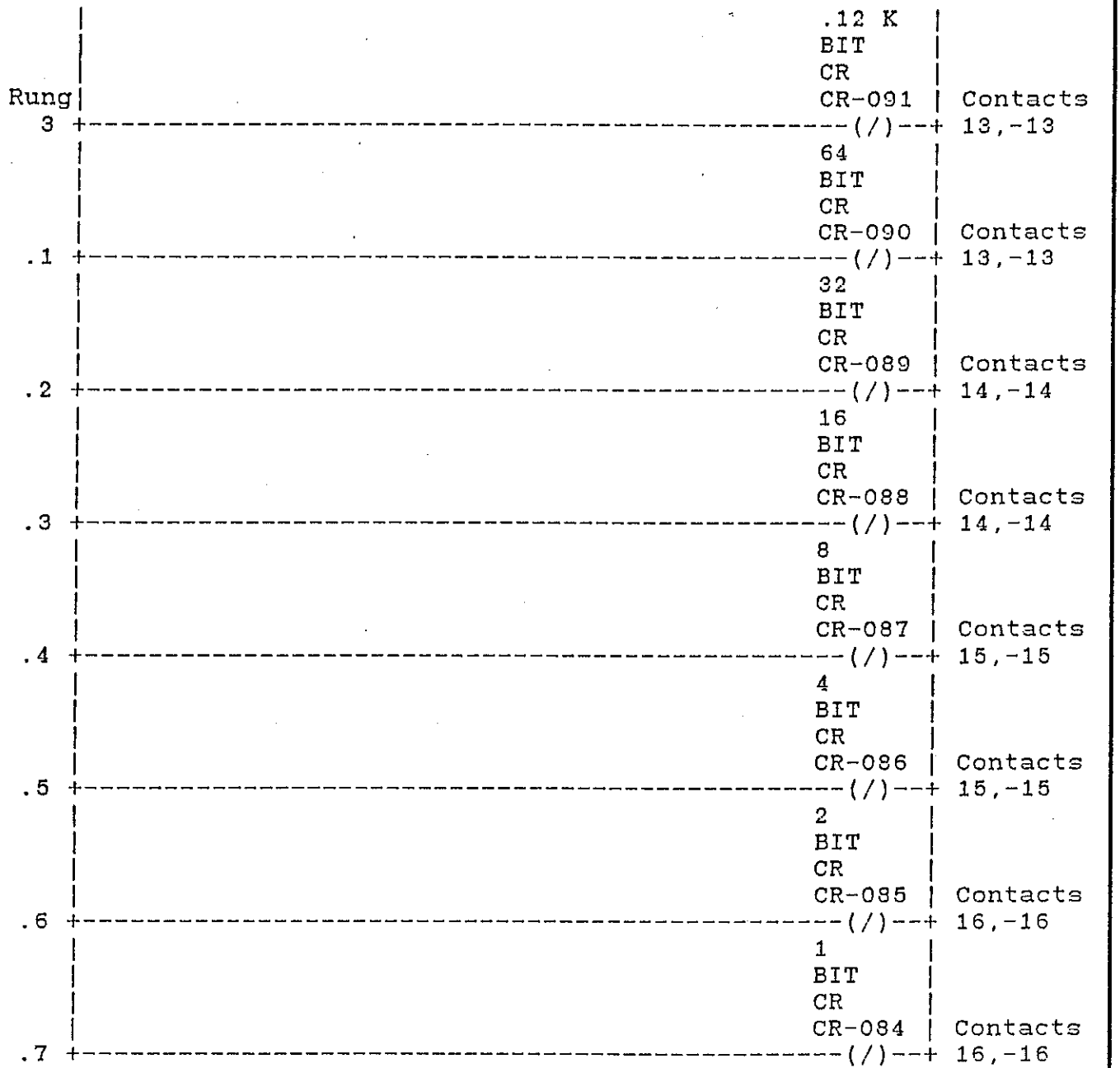
HIGH SPEED COUNTER

PROGRAMMING (con't)



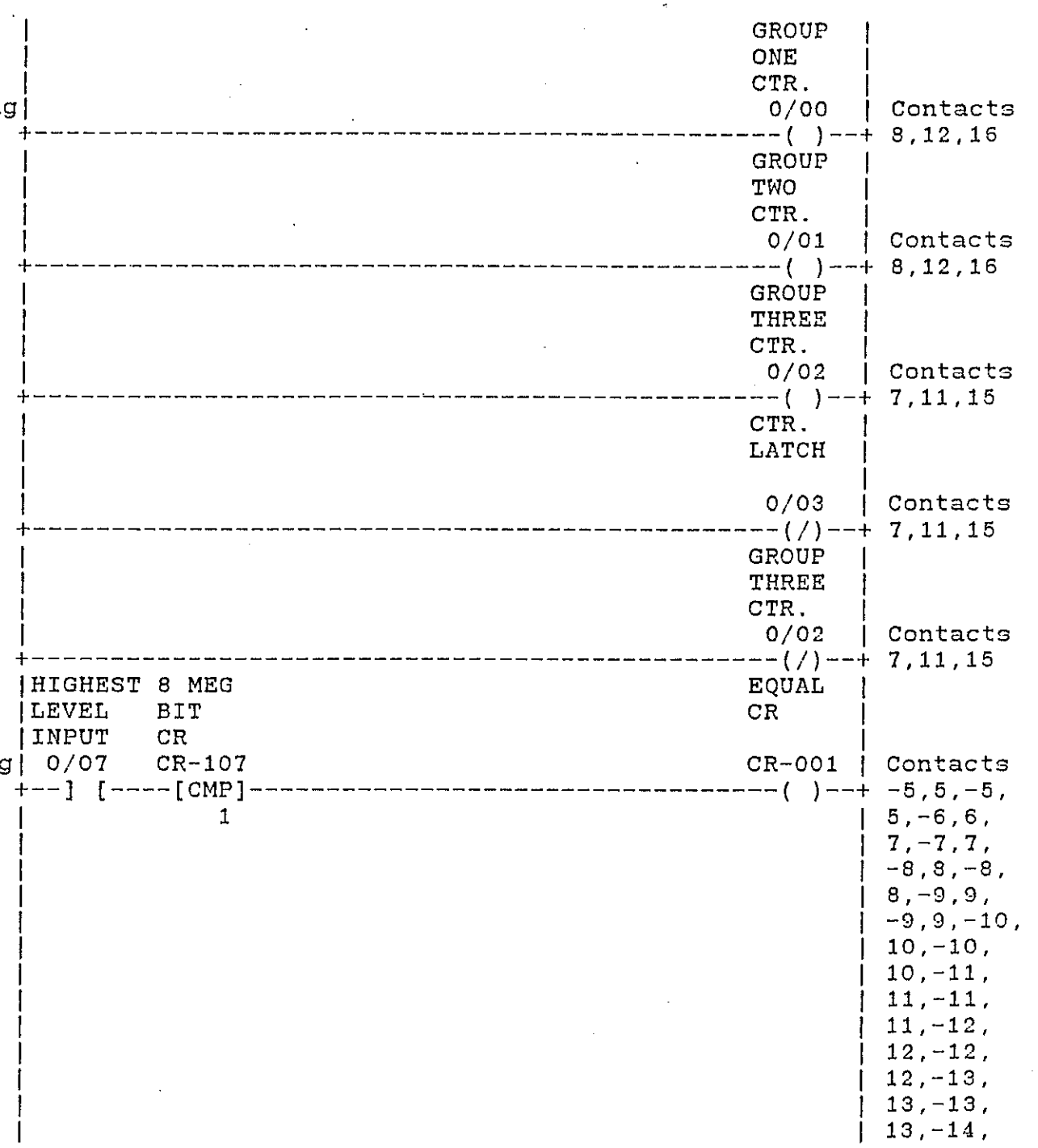
HIGH SPEED COUNTER

PROGRAMMING (con't)



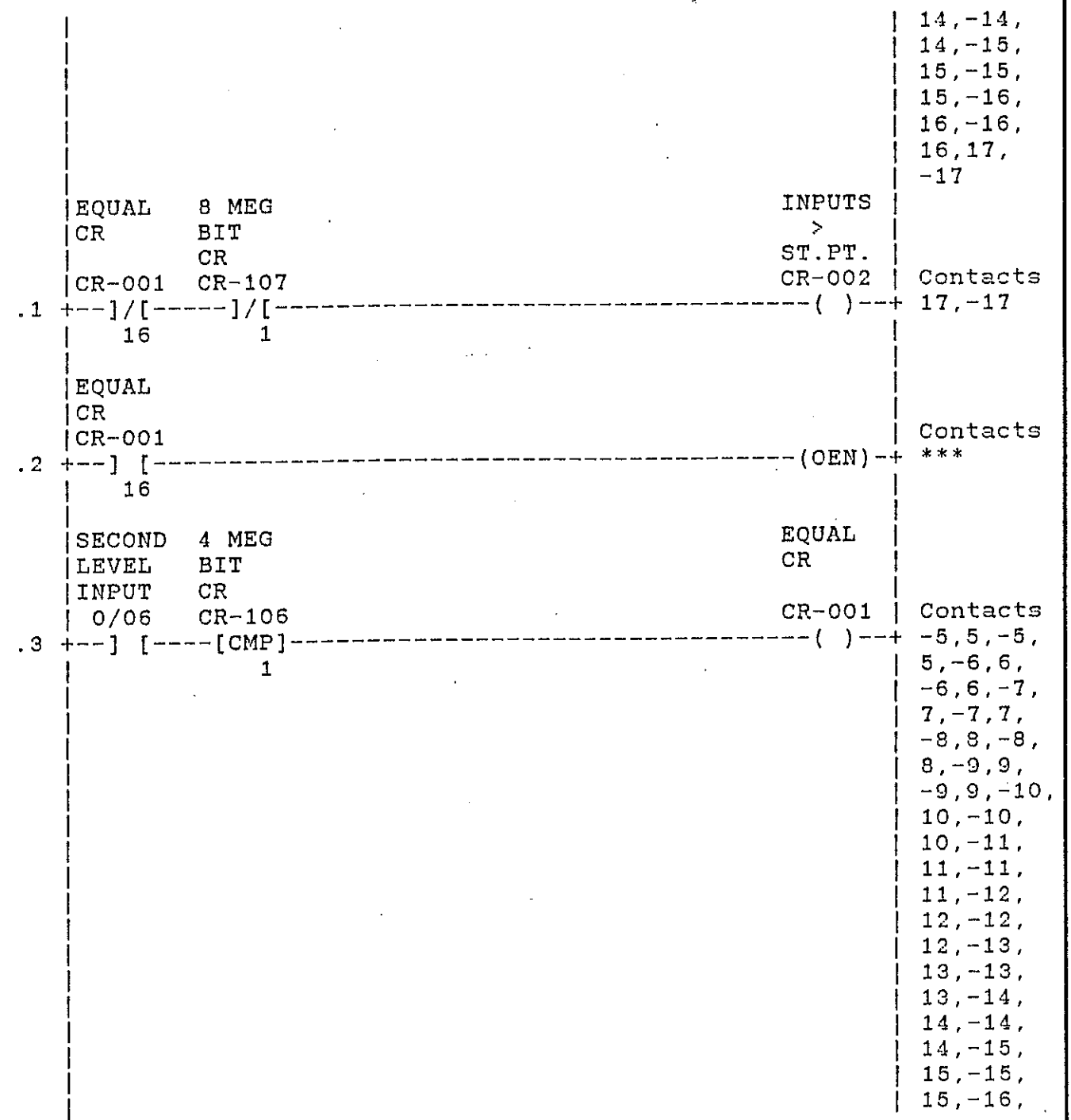
HIGH SPEED COUNTER

PROGRAMMING (con't)



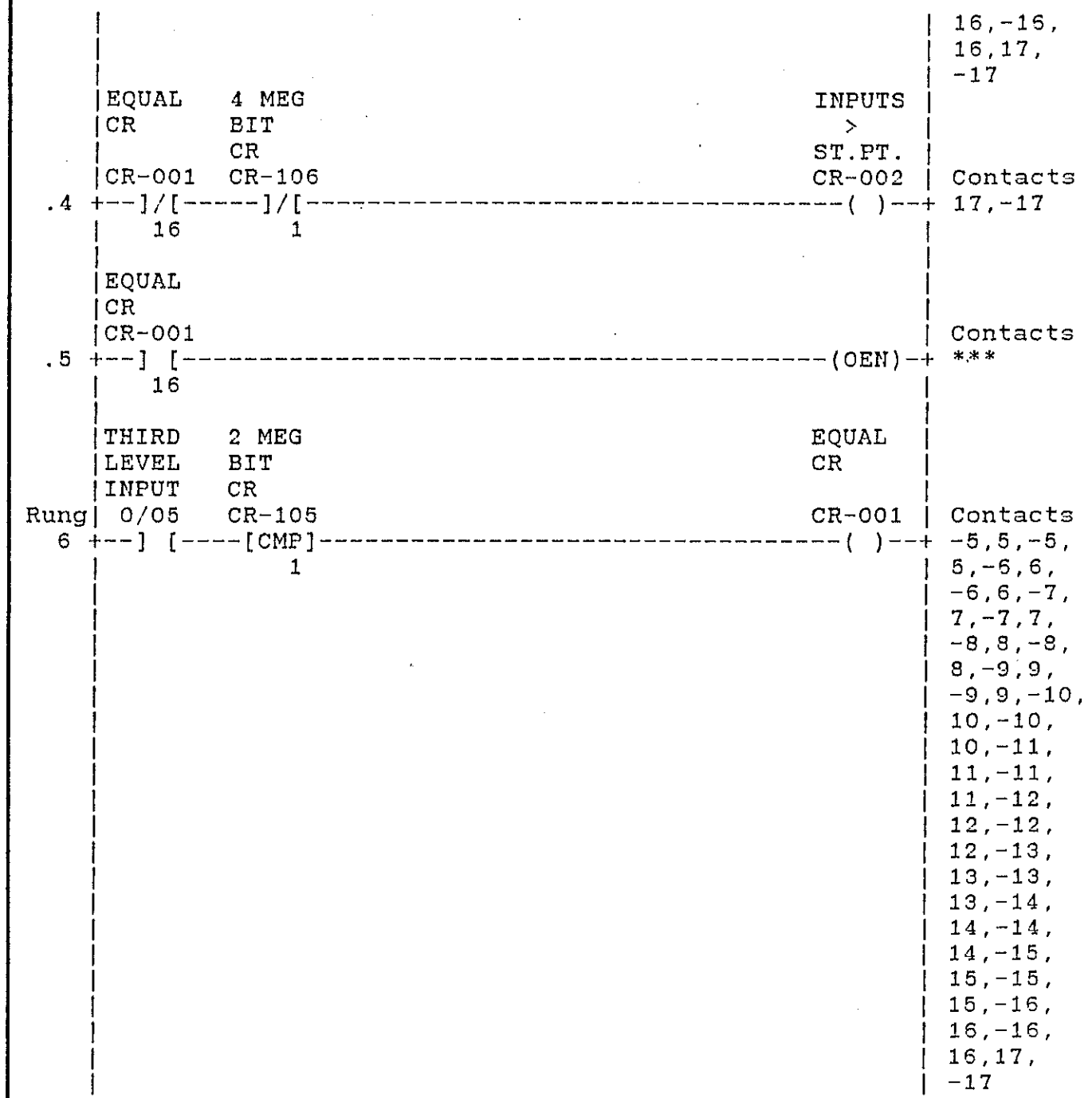
HIGH SPEED COUNTER

PROGRAMMING (con't)



HIGH SPEED COUNTER

PROGRAMMING (con't)



HIGH SPEED COUNTER

PROGRAMMING (con't)

```
    |EQUAL    2 MEG                                          INPUTS  |
    |CR       BIT                                              >     |
    |         CR                                             T.PT.   |
    |CR-001   CR-105                                         R-002   | Contacts
.1  +--]/[-----]/[-------------------------------------------( )--+  | 17,-17
    |   16        1                                                  |
    |                                                                |
    |EQUAL                                                           |
    |CR                                                              |
    |CR-001                                                          | Contacts
.2  +--] [-----------------------------------------------OEN)--+     | ***
    |   16                                                           |
    |                                                                |
    |FOURTH   1 MEG                                          EQUAL   |
    |LEVEL    BIT                                            CR      |
    |INPUT    CR                                                     |
    | 0/04    CR-104                                         CR-001  | Contacts
.3  +--] [----[CMP]-------------------------------------------( )--+  | -5,5,-5,
    |              1                                                 | 5,-6,6,
    |                                                                | -6,6,-7,
    |                                                                | 7,-7,7,
    |                                                                | -8,8,-8,
    |                                                                | 8,-9,9,
    |                                                                | -9,9,-10,
    |                                                                | 10,-10,
    |                                                                | 10,-11,
    |                                                                | 11,-11,
    |                                                                | 11,-12,
    |                                                                | 12,-12,
    |                                                                | 12,-13,
    |                                                                | 13,-13,
    |                                                                | 13,-14,
    |                                                                | 14,-14,
    |                                                                | 14,-15,
    |                                                                | 15,-15,
    |                                                                | 15,-16,
    |                                                                | 16,-16,
    |                                                                | 16,17,
    |                                                                | -17
```

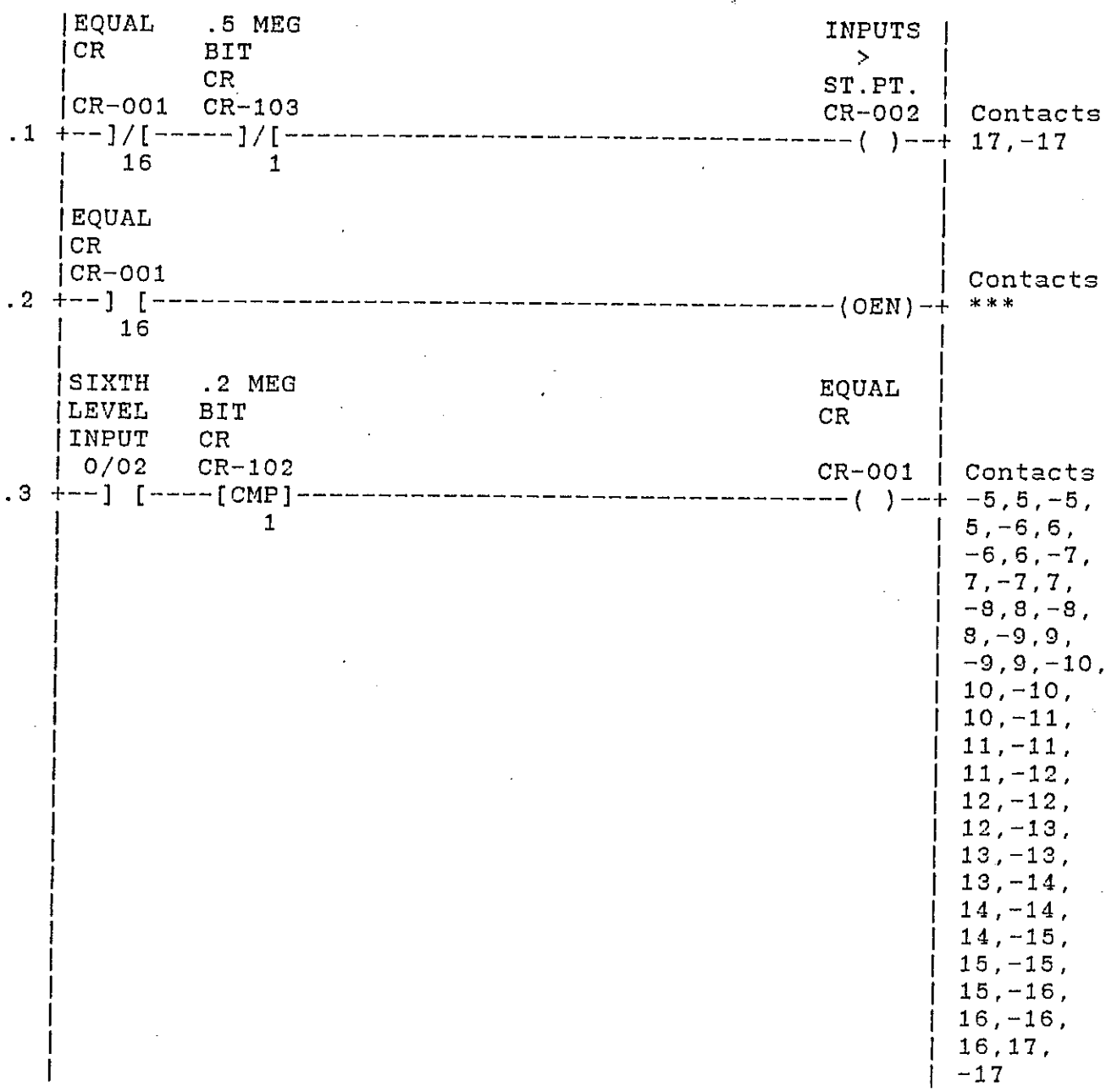
HIGH SPEED COUNTER

PROGRAMMING (con't)

```
     |EQUAL    1 MEG                                          INPUTS  |
     |CR       BIT                                              >     |
     |         CR                                             ST.PT.  |
     |CR-001   CR-104                                         CR-002  | Contacts
  .4 +--]/[-----]/[---------------------------------------( )--+ 17,-17
     |    16        1                                               |
     |                                                              |
     |EQUAL                                                         |
     |CR                                                            |
     |CR-001                                                        | Contacts
  .5 +--] [-------------------------------------------(OEN)--+ ***
     |    16                                                        |
     |                                                              |
     |FIFTH    .5 MEG                                         EQUAL   |
     |LEVEL    BIT                                            CR      |
     |INPUT    CR                                                     |
Rung| 0/03    CR-103                                         CR-001  | Contacts
  7 +--] [----[CMP]---------------------------------------( )--+ -5,5,-5,
     |              1                                               | 5,-6,6,
     |                                                              | -6,6,-7,
     |                                                              | 7,-7,7,
     |                                                              | -8,8,-8,
     |                                                              | 8,-9,9,
     |                                                              | -9,9,-10,
     |                                                              | 10,-10,
     |                                                              | 10,-11,
     |                                                              | 11,-11,
     |                                                              | 11,-12,
     |                                                              | 12,-12,
     |                                                              | 12,-13,
     |                                                              | 13,-13,
     |                                                              | 13,-14,
     |                                                              | 14,-14,
     |                                                              | 14,-15,
     |                                                              | 15,-15,
     |                                                              | 15,-16,
     |                                                              | 16,-16,
     |                                                              | 16,17,
     |                                                              | -17
```

HIGH SPEED COUNTER

PROGRAMMING (con't)



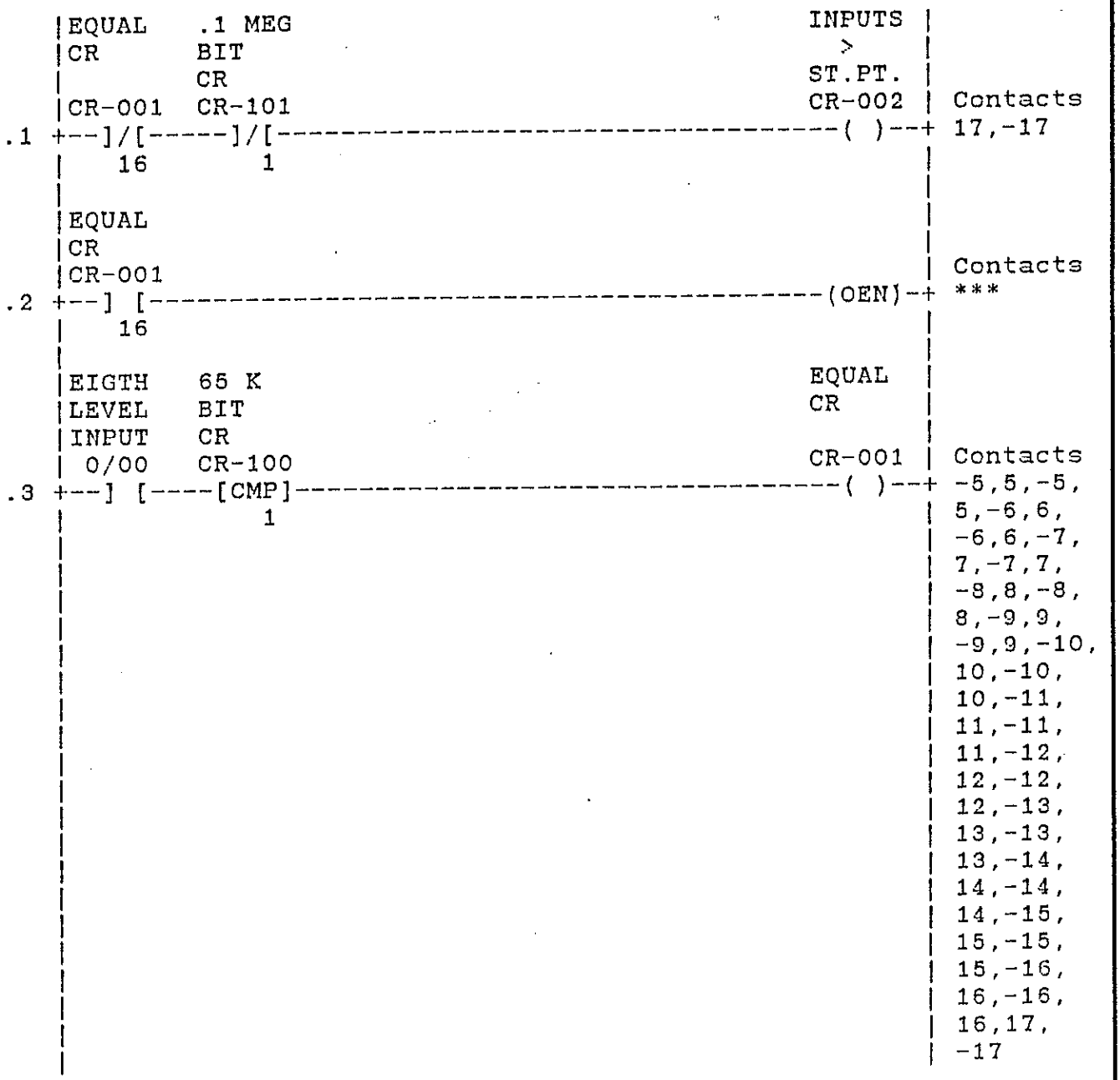
HIGH SPEED COUNTER

PROGRAMMING (con't)

```
     |EQUAL    .2 MEG                                          INPUTS  |
     |CR       BIT                                               >     |
     |         CR                                              ST.PT.  |
     |CR-001   CR-102                                          CR-002  | Contacts
 .4  +--]/[-----]/[-----------------------------------------( )--+ 17,-17
     |   16        1                                                   |
     |                                                                 |
     |EQUAL                                                            |
     |CR                                                               |
     |CR-001                                                           | Contacts
 .5  +--] [-----------------------------------------------(OEN)--+ ***
     |   16                                                            |
     |                                                                 |
     |SEVENTH .1 MEG                                           EQUAL   |
     |LEVEL   BIT                                              CR      |
     |INPUT   CR                                                       |
Rung| 0/01    CR-101                                          CR-001  | Contacts
  8  +--] [----[CMP]-----------------------------------------( )--+ -5,5,-5,
     |              1                                                  | 5,-6,6,
     |                                                                 | -6,6,-7,
     |                                                                 | 7,-7,7,
     |                                                                 | -8,8,-8,
     |                                                                 | 8,-9,9,
     |                                                                 | -9,9,-10,
     |                                                                 | 10,-10,
     |                                                                 | 10,-11,
     |                                                                 | 11,-11,
     |                                                                 | 11,-12,
     |                                                                 | 12,-12,
     |                                                                 | 12,-13,
     |                                                                 | 13,-13,
     |                                                                 | 13,-14,
     |                                                                 | 14,-14,
     |                                                                 | 14,-15,
     |                                                                 | 15,-15,
     |                                                                 | 15,-16,
     |                                                                 | 16,-16,
     |                                                                 | 16,17,
     |                                                                 | -17
```

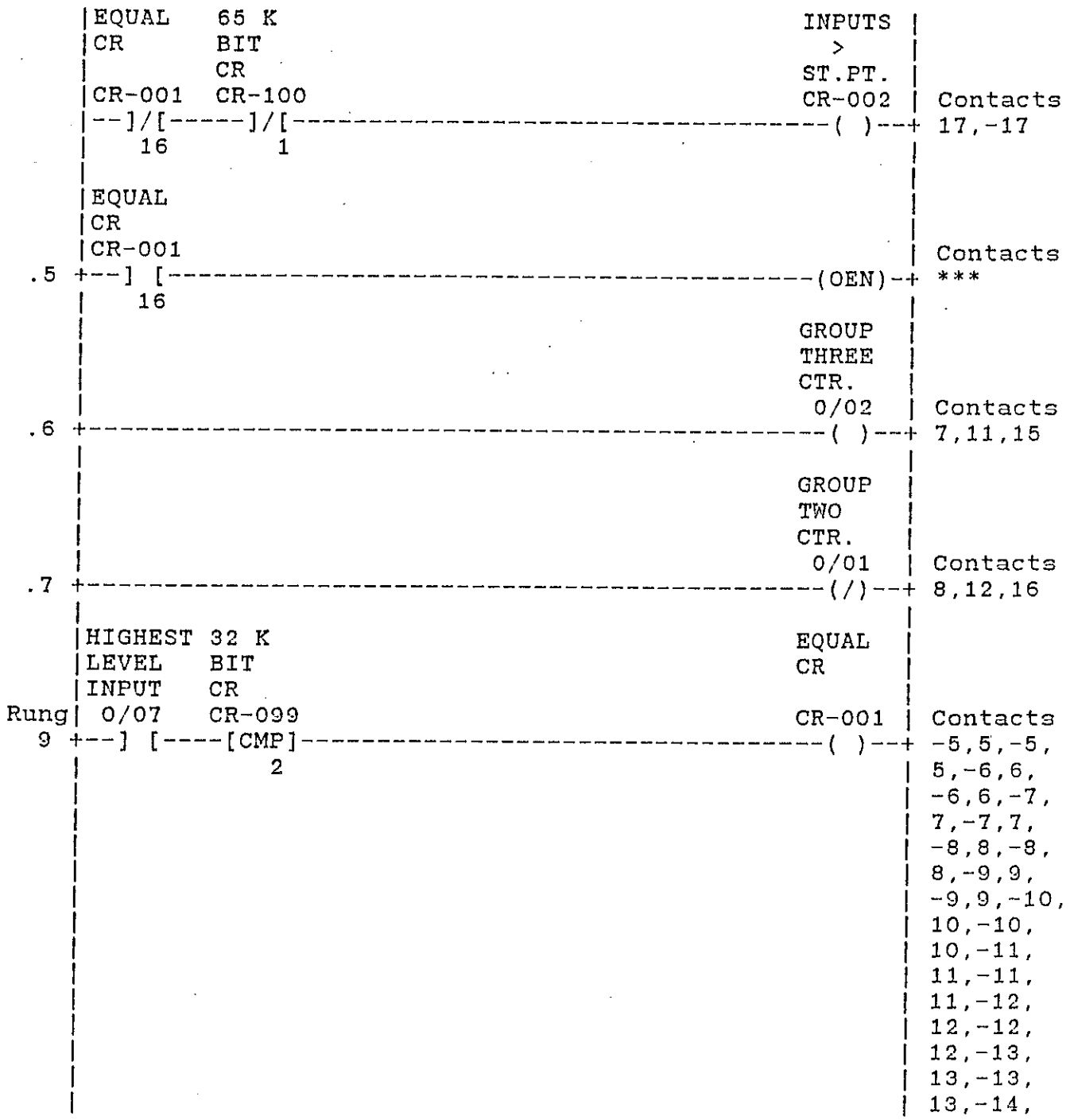
HIGH SPEED COUNTER

PROGRAMMING (con't)



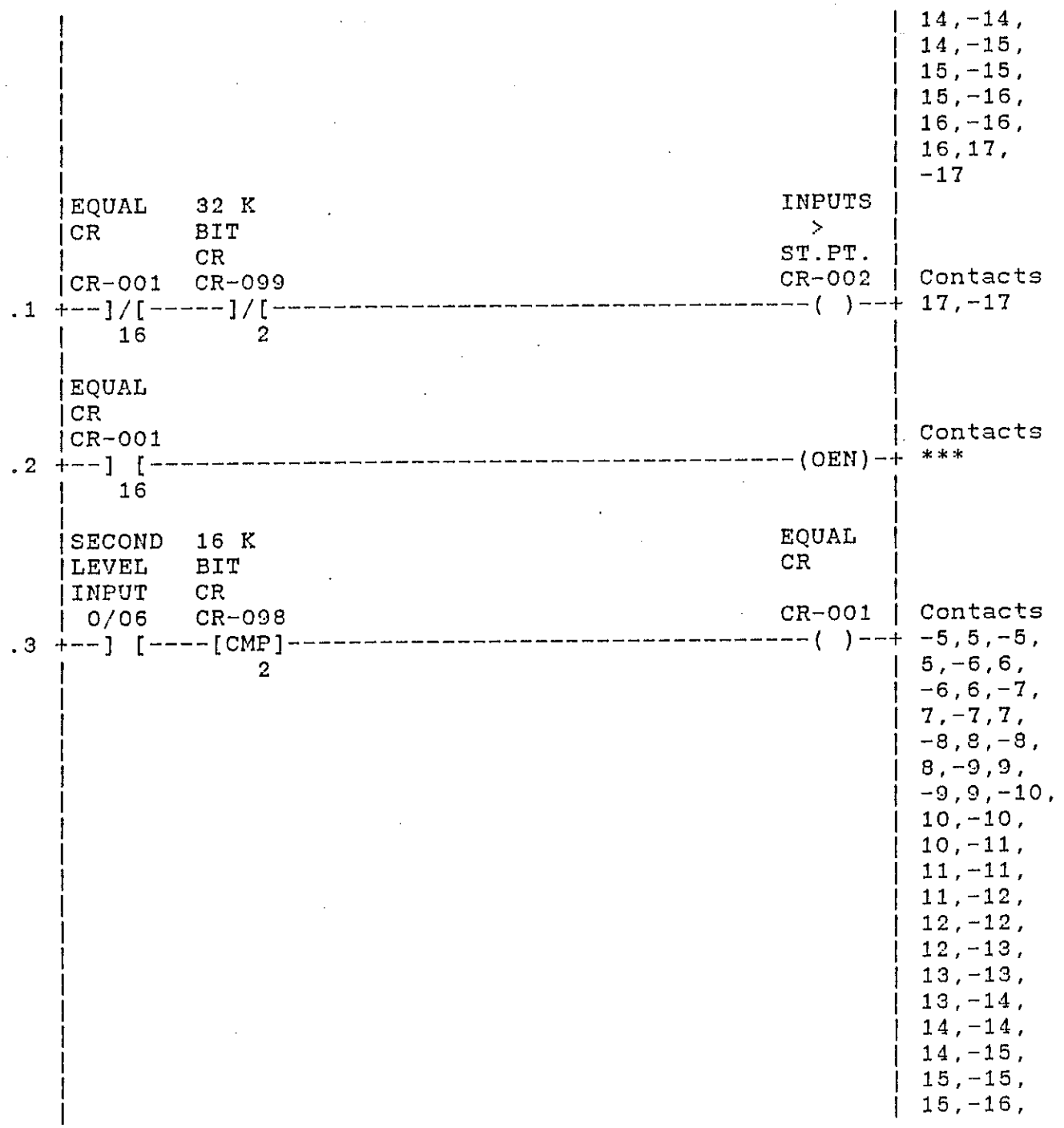
HIGH SPEED COUNTER

PROGRAMMING (con't)



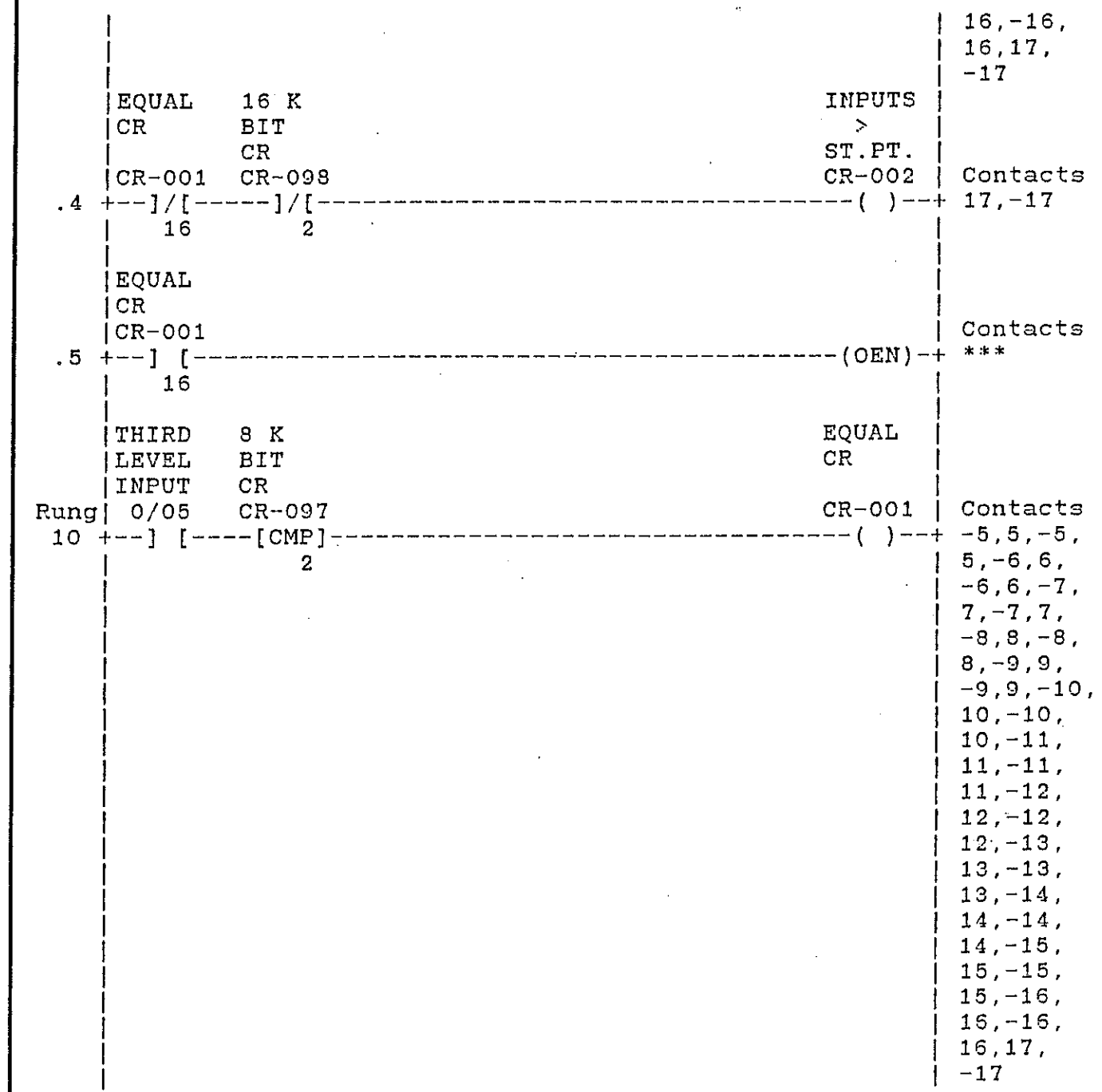
HIGH SPEED COUNTER

PROGRAMMING (con't)



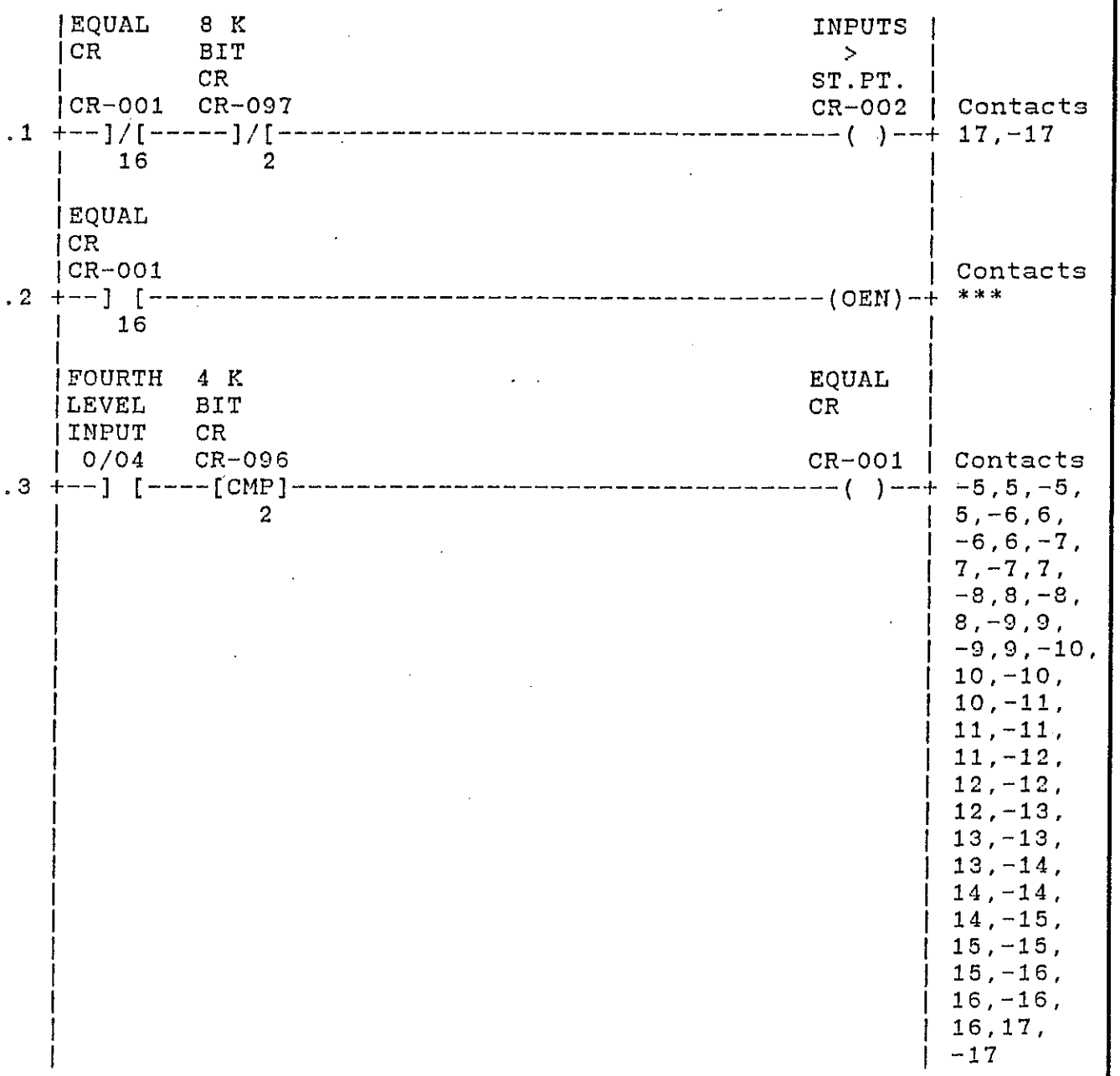
HIGH SPEED COUNTER

PROGRAMMING (con't)



HIGH SPEED COUNTER

PROGRAMMING (con't)



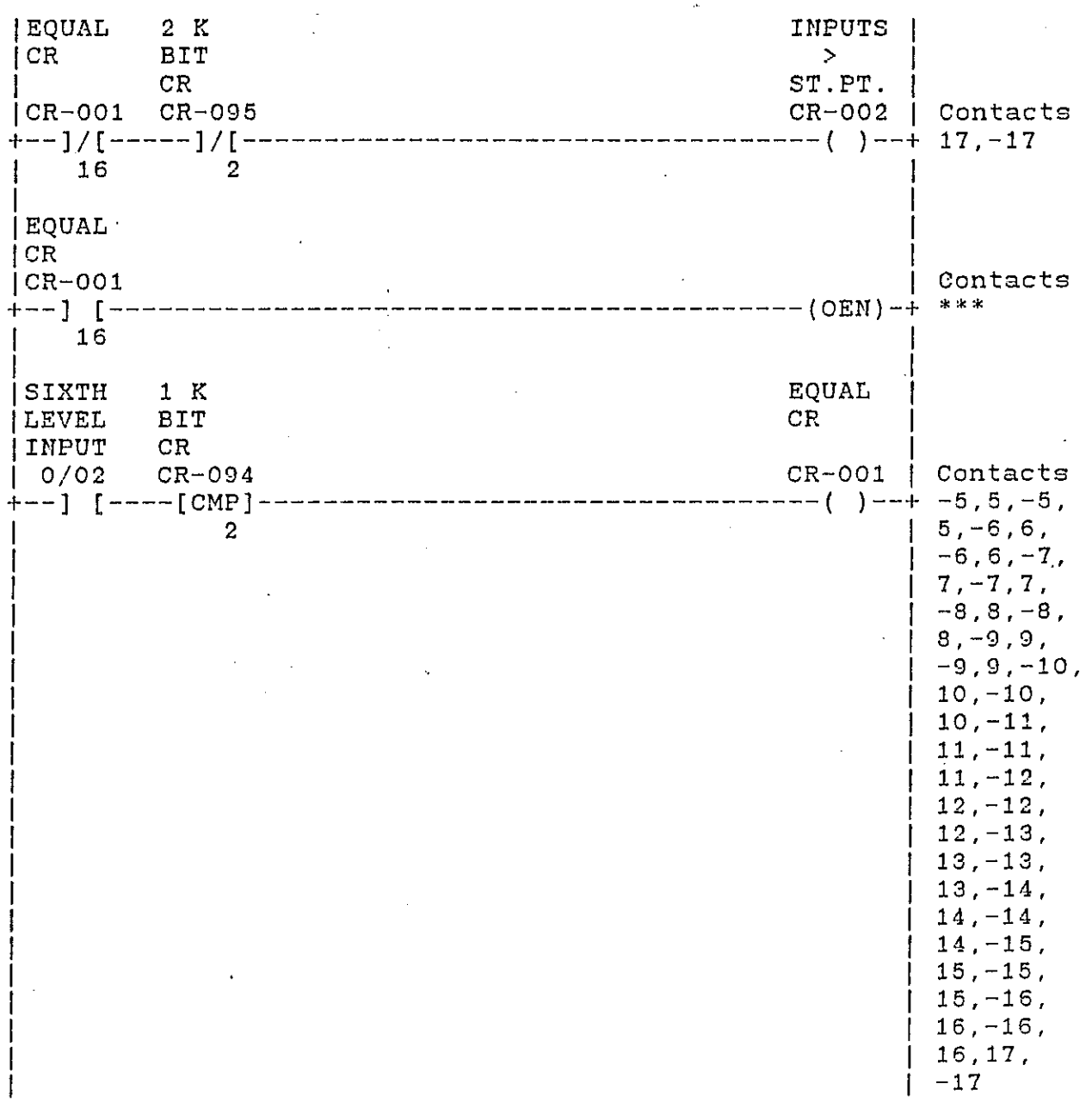
HIGH SPEED COUNTER

PROGRAMMING (con't)

```
     |EQUAL    4 K                                          INPUTS  |
     |CR       BIT                                            >     |
     |         CR                                           ST.PT.  |
     |CR-001   CR-096                                       CR-002  | Contacts
 .4  +--]/[-----]/[-----------------------------------------( )--+  | 17,-17
     |    16        2                                              |
     |                                                             |
     |EQUAL                                                        |
     |CR                                                           |
     |CR-001                                                       | Contacts
 .5  +--] [-----------------------------------------------(OEN)--+  | ***
     |    16                                                       |
     |                                                             |
     |FIFTH    2 K                                          EQUAL   |
     |LEVEL    BIT                                          CR      |
     |INPUT    CR                                                   |
Rung| 0/03    CR-095                                       CR-001  | Contacts
 11  +--] [----[CMP]-----------------------------------------( )--+  | -5,5,-5,
     |               2                                             | 5,-6,6,
     |                                                             | -6,6,-7,
     |                                                             | 7,-7,7,
     |                                                             | -8,8,-8,
     |                                                             | 8,-9,9,
     |                                                             | -9,9,-10,
     |                                                             | 10,-10,
     |                                                             | 10,-11,
     |                                                             | 11,-11,
     |                                                             | 11,-12,
     |                                                             | 12,-12,
     |                                                             | 12,-13,
     |                                                             | 13,-13,
     |                                                             | 13,-14,
     |                                                             | 14,-14,
     |                                                             | 14,-15,
     |                                                             | 15,-15,
     |                                                             | 15,-16,
     |                                                             | 16,-16,
     |                                                             | 16,17,
     |                                                             | -17
     |
```

HIGH SPEED COUNTER

PROGRAMMING (con't)



HIGH SPEED COUNTER

PROGRAMMING (con't)

```
     |EQUAL    1 K                                          INPUTS  |
     |CR       BIT                                            >     |
     |         CR                                           ST.PT.  |
     |CR-001   CR-094                                       CR-002  | Contacts
  .4 +--]/[-----]/[-----------------------------------------( )--+ 17,-17
     |    16        2                                             |
     |                                                            |
     |EQUAL                                                       |
     |CR                                                          |
     |CR-001                                                      | Contacts
  .5 +--] [-----------------------------------------(OEN)--+ ***
     |    16                                                      |
     |                                                            |
     |SEVENTH  .5 K                                         EQUAL |
     |LEVEL    BIT                                          CR    |
     |INPUT    CR                                                 |
Rung| 0/01    CR-093                                       CR-001  | Contacts
 12 +--] [----[CMP]-----------------------------------------( )--+ -5,5,-5,
     |              2                                             | 5,-6,6,
     |                                                            | -6,6,-7,
     |                                                            | 7,-7,7,
     |                                                            | -8,8,-8,
     |                                                            | 8,-9,9,
     |                                                            | -9,9,-10,
     |                                                            | 10,-10,
     |                                                            | 10,-11,
     |                                                            | 11,-11,
     |                                                            | 11,-12,
     |                                                            | 12,-12,
     |                                                            | 12,-13,
     |                                                            | 13,-13,
     |                                                            | 13,-14,
     |                                                            | 14,-14,
     |                                                            | 14,-15,
     |                                                            | 15,-15,
     |                                                            | 15,-16,
     |                                                            | 16,-16,
     |                                                            | 16,17,
     |                                                            | -17
```

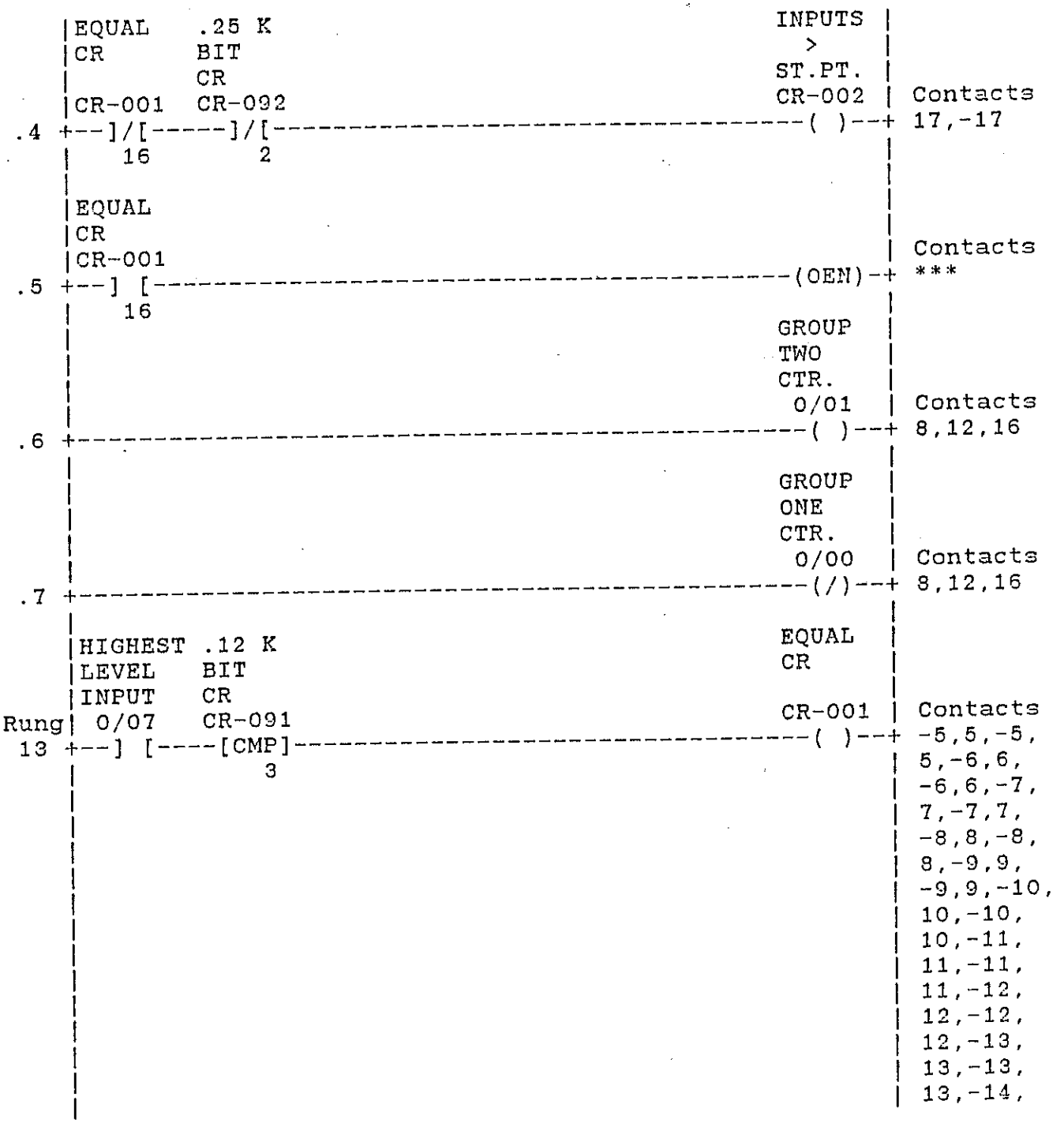
HIGH SPEED COUNTER

PROGRAMMING (con't)

```
    |EQUAL    .5 K                                          INPUTS  |
    |CR       BIT                                             >     |
    |         CR                                            ST.PT.  |
    |CR-001   CR-093                                        CR-002  | Contacts
.1  +--]/[-----]/[-----------------------------------------( )--+ 17,-17
    |   16        2                                               |
    |                                                             |
    |EQUAL                                                        |
    |CR                                                           |
    |CR-001                                                       | Contacts
.2  +--] [-------------------------------------------(OEN)--+ ***
    |   16                                                        |
    |                                                             |
    |EIGTH    .25 K                                         EQUAL   |
    |LEVEL    BIT                                           CR      |
    |INPUT    CR                                                    |
    | 0/00    CR-092                                        CR-001  | Contacts
.3  +--] [----[CMP]-----------------------------------------( )--+ -5,5,-5,
    |               2                                             | 5,-6,6,
    |                                                             | -6,6,-7,
    |                                                             | 7,-7,7,
    |                                                             | -8,8,-8,
    |                                                             | 8,-9,9,
    |                                                             | -9,9,-10,
    |                                                             | 10,-10,
    |                                                             | 10,-11,
    |                                                             | 11,-11,
    |                                                             | 11,-12,
    |                                                             | 12,-12,
    |                                                             | 12,-13,
    |                                                             | 13,-13,
    |                                                             | 13,-14,
    |                                                             | 14,-14,
    |                                                             | 14,-15,
    |                                                             | 15,-15,
    |                                                             | 15,-16,
    |                                                             | 16,-16,
    |                                                             | 16,17,
    |                                                             | -17
```

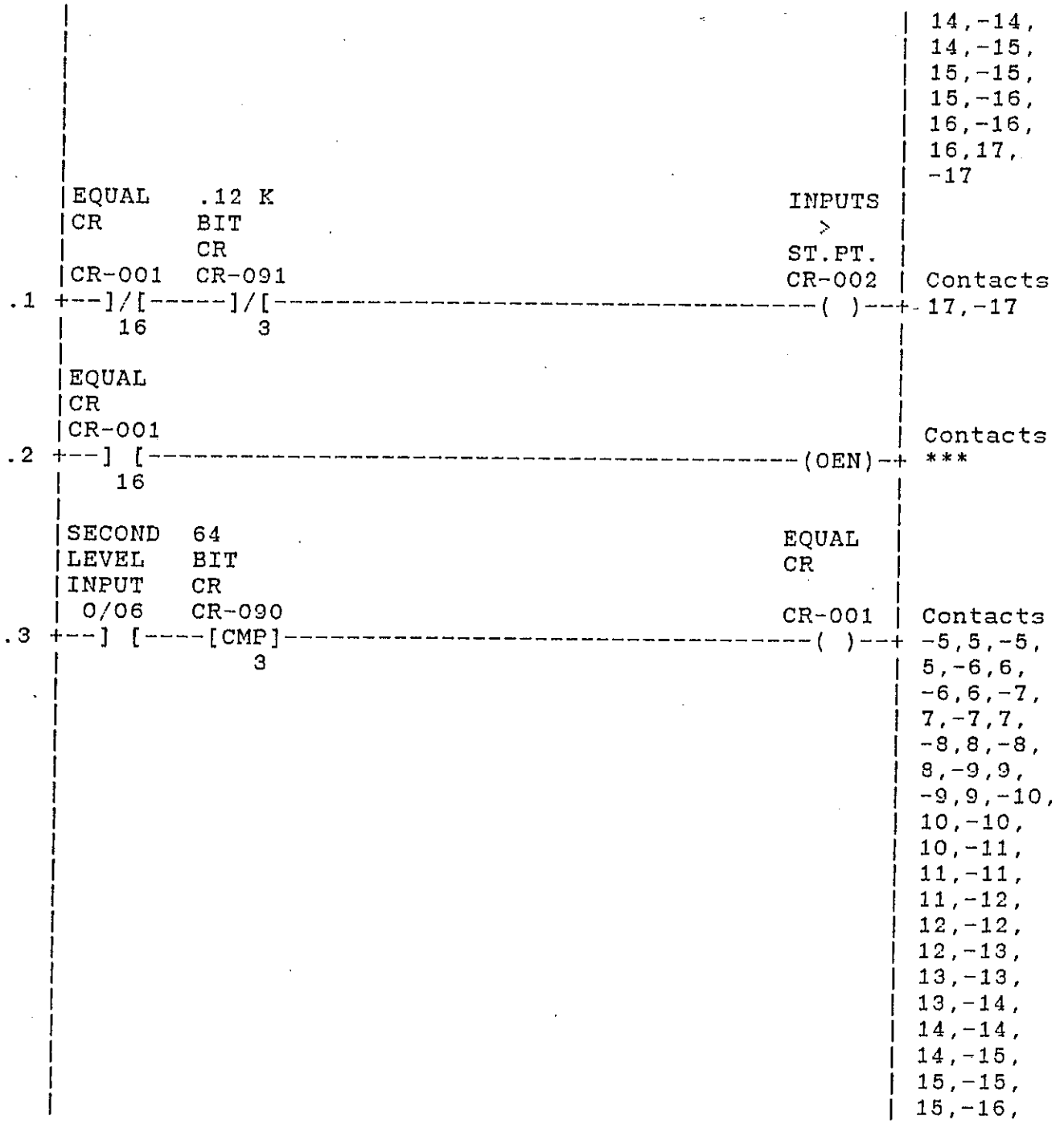
HIGH SPEED COUNTER

PROGRAMMING (con't)



HIGH SPEED COUNTER

PROGRAMMING (con't)



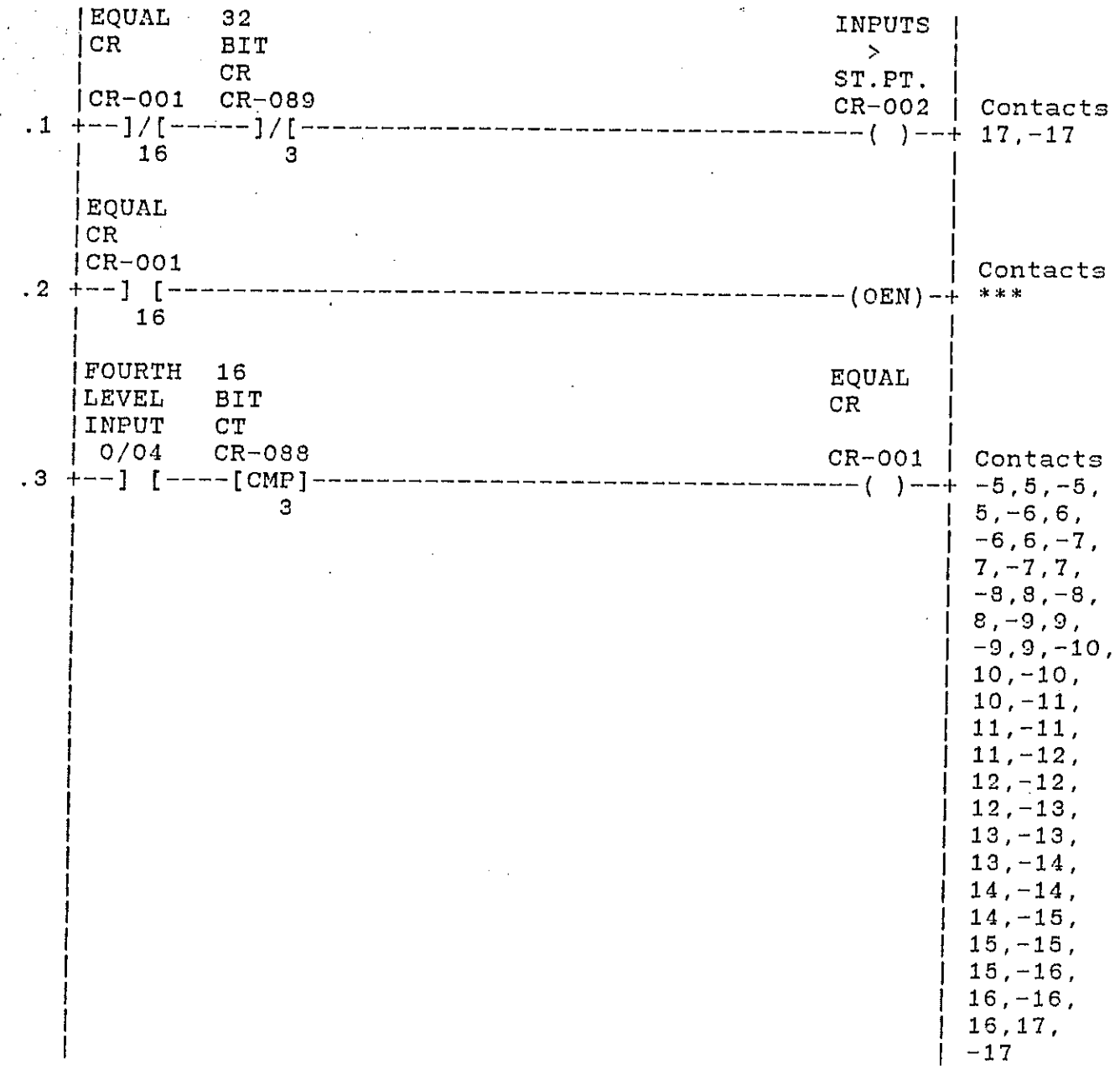
HIGH SPEED COUNTER

PROGRAMMING (con't)

```
     |                                                                  | 16,-16,
     |                                                                  | 16,17,
     |                                                                  | -17
     |EQUAL    64                                          INPUTS      |
     |CR       BIT                                           >         |
     |         CR                                          ST.PT.      |
     |CR-001   CR-090                                      CR-002      | Contacts
  .4 +--]/[-----]/[-----------------------------------------( )--+      | 17,-17
     |   16        3                                                    |
     |                                                                  |
     |EQUAL                                                             |
     |CR                                                                |
     |CR-001                                                            | Contacts
  .5 +--] [-----------------------------------------------(OEN)-+      | ***
     |   16                                                             |
     |                                                                  |
     |THIRD    32                                          EQUAL       |
     |LEVEL    BIT                                         CR          |
     |INPUT    CR                                                      |
Rung| 0/05    CR-089                                      CR-001      | Contacts
 14 +--] [----[CMP]-----------------------------------------( )--+      | -5,5,-5,
     |             3                                                    | 5,-6,6,
     |                                                                  | -6,6,-7,
     |                                                                  | 7,-7,7,
     |                                                                  | -8,8,-8,
     |                                                                  | 8,-9,9,
     |                                                                  | -9,9,-10,
     |                                                                  | 10,-10,
     |                                                                  | 10,-11,
     |                                                                  | 11,-11,
     |                                                                  | 11,-12,
     |                                                                  | 12,-12,
     |                                                                  | 12,-13,
     |                                                                  | 13,-13,
     |                                                                  | 13,-14,
     |                                                                  | 14,-14,
     |                                                                  | 14,-15,
     |                                                                  | 15,-15,
     |                                                                  | 15,-16,
     |                                                                  | 16,-16,
     |                                                                  | 16,17,
     |                                                                  | -17
```

HIGH SPEED COUNTER

PROGRAMMING (con't)



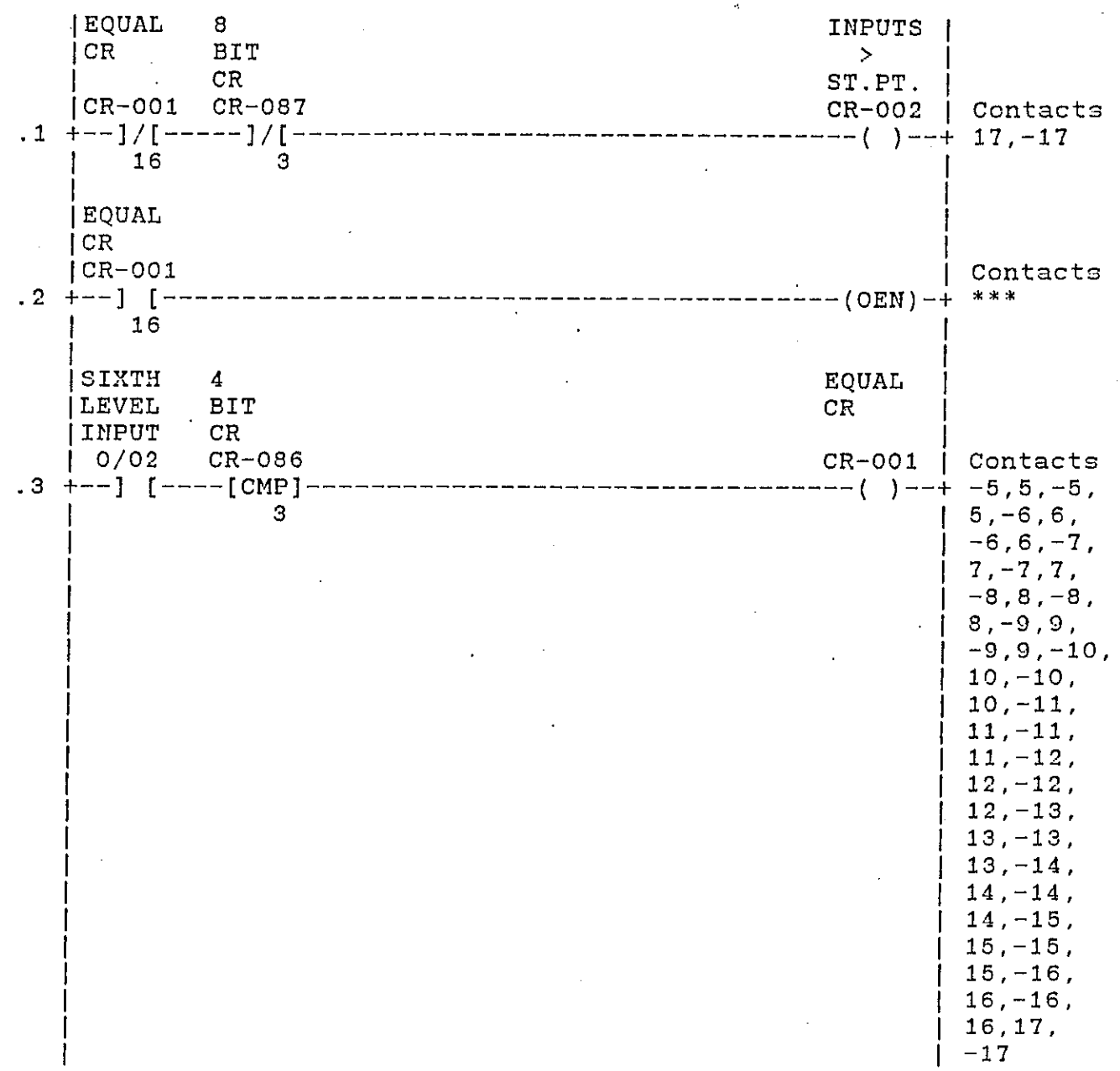
HIGH SPEED COUNTER

PROGRAMMING (con't)

```
     |EQUAL    16                                              INPUTS  |
     |CR       BIT                                               >     |
     |         CT                                              ST.PT.  |
     |CR-001   CR-088                                          CR-002  | Contacts
 .4  +--]/[-----]/[-----------------------------------------( )--+ 17,-17
     |   16        3                                               |
     |                                                             |
     |EQUAL                                                        |
     |CR                                                           |
     |CR-001                                                       | Contacts
 .5  +--] [-----------------------------------------------(OEN)--+ ***
     |   16                                                        |
     |                                                             |
     |FIFTH    8                                               EQUAL   |
     |LEVEL    BIT                                             CR      |
     |INPUT    CR                                                      |
Rung| 0/03    CR-087                                          CR-001  | Contacts
 15  +--] [----[CMP]-----------------------------------------( )--+ -5,5,-5,
     |               3                                             | 5,-6,6,
     |                                                             | -6,6,-7,
     |                                                             | 7,-7,7,
     |                                                             | -8,8,-8,
     |                                                             | 8,-9,9,
     |                                                             | -9,9,-10,
     |                                                             | 10,-10,
     |                                                             | 10,-11,
     |                                                             | 11,-11,
     |                                                             | 11,-12,
     |                                                             | 12,-12,
     |                                                             | 12,-13,
     |                                                             | 13,-13,
     |                                                             | 13,-14,
     |                                                             | 14,-14,
     |                                                             | 14,-15,
     |                                                             | 15,-15,
     |                                                             | 15,-16,
     |                                                             | 16,-16,
     |                                                             | 16,17,
     |                                                             | -17
```

HIGH SPEED COUNTER

PROGRAMMING (con't)



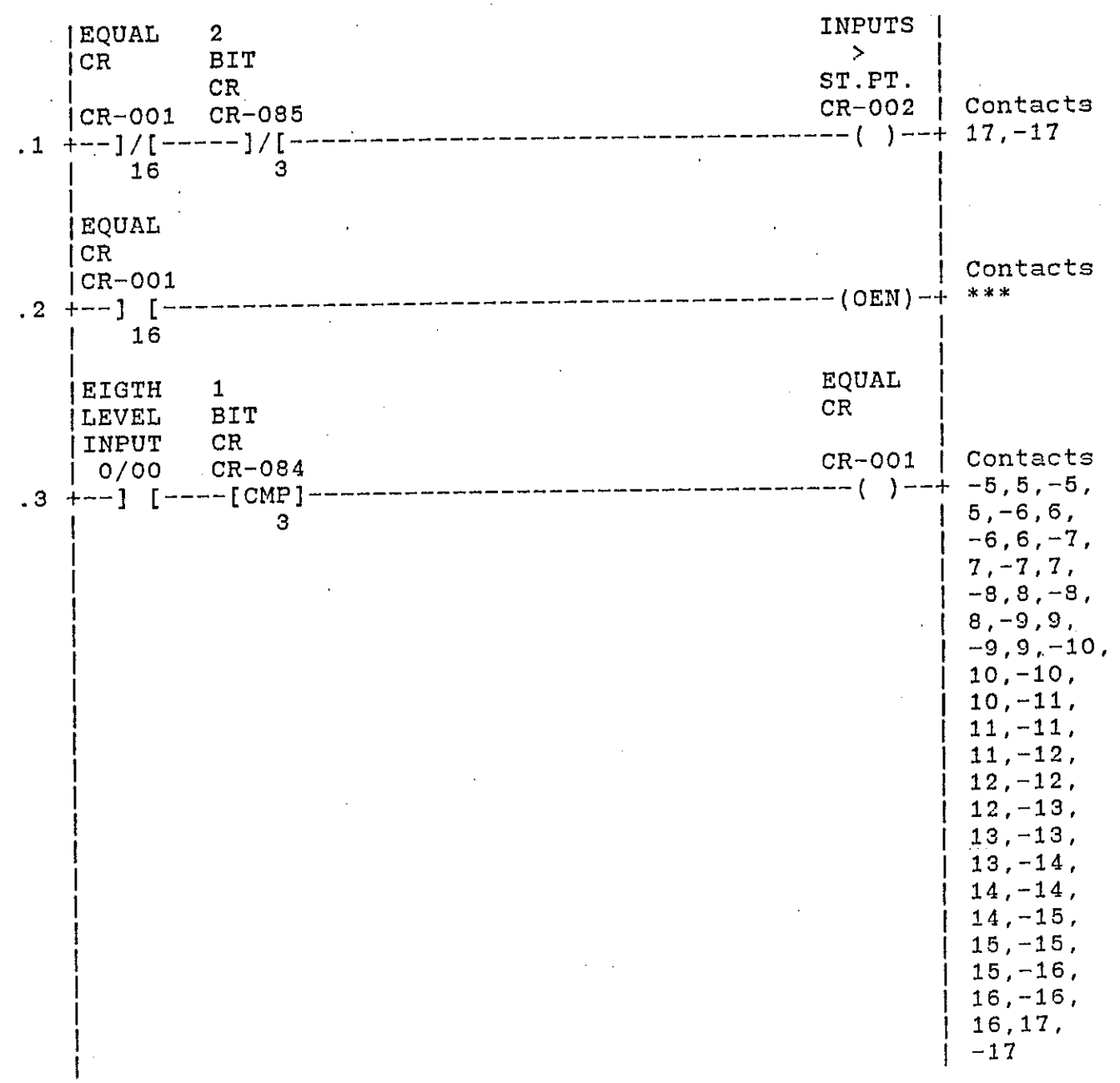
HIGH SPEED COUNTER

PROGRAMMING (con't)

```
     |EQUAL    4                                              INPUTS  |
     |CR       BIT                                              >     |
     |         CR                                             ST.PT.  |
     |CR-001   CR-086                                         CR-002  | Contacts
 .4  +--]/[-----]/[-------------------------------------------( )--+  | 17,-17
     |    16        3                                                 |
     |                                                                |
     |EQUAL                                                           |
     |CR                                                              |
     |CR-001                                                          | Contacts
 .5  +--] [---------------------------------------------(OEN)--+      | ***
     |    16                                                          |
     |                                                                |
     |SEVENTH  2                                              EQUAL   |
     |LEVEL    BIT                                            CR      |
     |INPUT    CR                                                     |
Rung| 0/01    CR-085                                         CR-001  | Contacts
 16  +--] [----[CMP]-------------------------------------------( )--+  | -5,5,-5,
     |               3                                                | 5,-6,6,
     |                                                                | -6,6,-7,
     |                                                                | 7,-7,7,
     |                                                                | -8,8,-8,
     |                                                                | 8,-9,9,
     |                                                                | -9,9,-10,
     |                                                                | 10,-10,
     |                                                                | 10,-11,
     |                                                                | 11,-11,
     |                                                                | 11,-12,
     |                                                                | 12,-12,
     |                                                                | 12,-13,
     |                                                                | 13,-13,
     |                                                                | 13,-14,
     |                                                                | 14,-14,
     |                                                                | 14,-15,
     |                                                                | 15,-15,
     |                                                                | 15,-16,
     |                                                                | 16,-16,
     |                                                                | 16,17,
     |                                                                | -17
     |
```

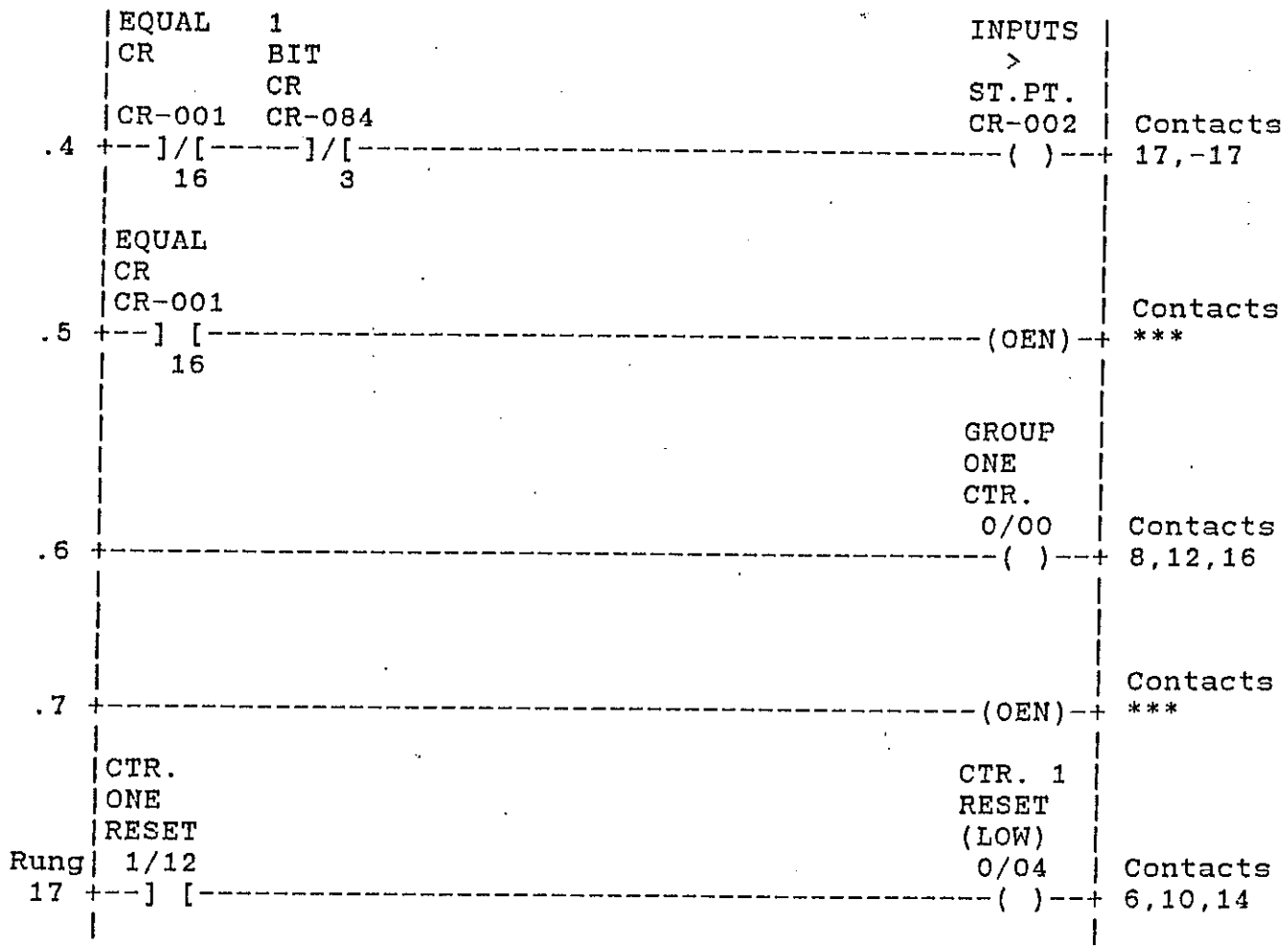
HIGH SPEED COUNTER

PROGRAMMING (con't)



HIGH SPEED COUNTER

PROGRAMMING (con't)



HIGH SPEED COUNTER

PROGRAMMING (con't)