DESCRIPTION

Printed Circuit Boards

A 2100/2120 Interface Kit is required for each 2100 transponder which will be required to communicate with a 2120 BMUX. This kit consists of two printed circuit boards which will replace the 2100 Transmission and the Controller boards in the 2100 transponder. The new Communications board can be identified by two yellow and one red LED on the outside edge of the board. The new Controller board has a single green LED on it and also contains an 87C51 microcontroller IC.

Transient Protection

A Simplex Model 2081-9027 Isolated Loop Circuit Protector is required on both sides of any communications line that leaves the building.

Distance Restrictions

If the 2100 transponder is located more than 10,000 feet (1.9 miles) from the BMUX, a DC repeater or a modem is required.

Related Documents

1. 2100 Multiplex Transponder Parts List MUX1-81-002
2. 2100 Multiplex Installation Instructions 575-544

INSTALLATION PROCEDURES

Transponder Preparation

1. Disconnect the AC power and batteries from all transponders.
2. Remove the DC transmission board and the controller board from each 2100 transponder.
   - See Figure 1 for board locations.
3. Disconnect all lines from the 2100 CPU and connect them to the (replacement) 2120.
4. Install Model 2098-2097 Isolated Loop Circuit Protectors on any DC communication lines that leave the building.
5. (If called for) Install any repeaters or modems on the communication line.
   - Be sure that the polarity of the communication lines are correct. (The A and A’ lines are positive and the B and B’ lines are negative. If using McCulloh, the A’ and B’ terminals are the primary connections.)

Figure 1
2100 Transponder
PC Board Preparation

IMPORTANT: Use the Anti-static Kit (Part No. 553-503) when handling these boards.

Communications Board

If not operated in McCulloh (style 7), no alterations need to be made to the board. If operated in style 7, contact Service Support at Headquarters.

Controller Board

There are three banks of dip switches on the controller board which must be configured properly for the transponder to operate. These switch banks are read and stored by the microcontroller upon power up or when the RESET button is pressed. If the settings are changed once the transponder is powered up, the RESET button must be pressed or the power must be removed and re-applied for the new settings to be read and stored.

Encoder Card Address Switch Settings (SW1 and SW2)

Dip switches on switch banks SW1 and SW2 are numbered 0 to 15 and are set ON if their number corresponds to an encoder card address present in the transponder. These addresses are found by either (a) looking them up on the 2100 TRANSPONDER SPECIFICATION SHEETS for the particular job being converted or by (b) reading the jumpers on the mother board of the transponder. These four jumpers are located next to the encoder card's connector. (See Figure 2.) Each jumper corresponds to a bit in a four-bit address and is either a binary one by being connected to +12 Volts or a binary zero by being connected to GND. To determine the address, simply add up the binary weights for each bit tied to 12 Volts.

Example: (Refer to Figure 2)
The jumpers on the second encoder card are connected as follows:

1B -> GND
2B -> +12V
4B -> GND
8B -> +12V

This encoder card has an address of 2 + 8 = 10.

Once the encoder card address is determined, set the appropriate dip switch located along the edge of the board to ON. These switches are split into two switch banks. The first bank is next to the reset button and is labeled EC numbers 0 to 7 for encoder numbers 0 thru 7. The second bank is next to the side of the board and labeled EC numbers 8 to 15 for encoder numbers 8 thru 15.

Repeat the procedure for every encoder card in the transponder (up to ten).

Note: If a dip switch is set for an encoder card which does not exist, an error will be reported. Likewise, if a dip switch is not set for an encoder card present in the transponder, an error will be reported.

According to the jumpers, the address for the encoder in slot J2 would be 1010 in binary or address 10.

NOTES:
FOR ENCODERS IN USE, EACH POINT MUST HAVE A JUMPER.
ALL ADDRESS BITS MUST HAVE A JUMPER.

Monitor point 1 is NC
Monitor point 2 is NO
Monitor point 3 is NO
Monitor point 4 is NC

Make sure there are no jumpers from 12V to ground

Figure 2
2100 Transponder Mother Bd.
Baud Rate

The baud rate is set by setting dip switches 1 and 2 of switch bank SW3. These two dip switches are labeled "BR". (See Figure 3.) Use the following table to set these switches to the proper baud rate:

<table>
<thead>
<tr>
<th>SW3-1</th>
<th>SW3-2</th>
<th>BAUD</th>
</tr>
</thead>
<tbody>
<tr>
<td>off</td>
<td>off</td>
<td>1200</td>
</tr>
<tr>
<td>off</td>
<td>on</td>
<td>2400</td>
</tr>
<tr>
<td>on</td>
<td>don't care</td>
<td>4800</td>
</tr>
</tbody>
</table>

Transponder Address Setting

Switches 3 through 8 of switch bank SW3 are for setting the transponder address. Each dip switch carries a binary weight corresponding to its position. These switches are labeled "ADDR" and the switches with a binary weight of 1 and 32 are marked. The address of the transponder in the example shown in Figure 3 is 18.

The 2100 transponder requires two transponder addresses. The first address is the monitor point transponder address, the second is the control point transponder address. Set the ADDR dip switches to the address of the first transponder. (The second transponder always occupies the next consecutive address.) This is done in the identical manner which other 2120 transponder addresses are set. Remember, the transponder address is always one less than the transponder number.

INSTALLATION INSTRUCTIONS

1. Power down the 2100 transponder by disconnecting both battery and AC power.
2. Prepare the 2100 Transponder and the 2100/2120 Interface boards as described above.
3. Insert the communication board in the slot which the 2100 Transmission board previously occupied. If the 2120 is transmitting, the two yellow LED s will flicker indicating reception of DC transmissions. The LED s are labeled PRI and SEC and indicate activity on the primary and secondary channels of the transponder. (The A' and B' terminals on the 2100 are the primary terminals.)
4. Insert the controller board in the slot previously occupied by the 2100 Controller board.
5. Apply first AC power and then battery power to the transponder while observing the green “ON LINE” LED for 10 seconds.

- Replace the controller board if either:
  A. The LED fails to flash at a high rate (about 10 flashes/second) upon power up.
  B. The LED continues flashing at a high rate 10 or more seconds after power on.

**Note:** The 8-second watch dog timer test which takes place while the green LED flashes at a high rate can be bypassed by pressing the RESET button.

6. Check the green “ON LINE” LED again.

- If it is not on steady, refer to the TROUBLE DIAGNOSIS chart below.

7. If the green ON LINE LED remains lit, replace the cover over the PC boards on the transponder. Close and secure the transponder door. Installation is complete.

### TROUBLE DIAGNOSIS

<table>
<thead>
<tr>
<th>2120 message</th>
<th>Other Symptoms</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>2100 EC MALF/SW-SEL</td>
<td>4 consecutive points in trbl</td>
<td>Encoder does not respond to controller. Faulty encoder or wrong switch setting.</td>
</tr>
<tr>
<td>2100 XPNDR TROUBLE and above message</td>
<td>Point mapping may be incorrect</td>
<td>An encoder card responds to an address not set on switch. Faulty encoder or wrong switch settings.</td>
</tr>
<tr>
<td>POWER/BATTERY FAIL</td>
<td>none</td>
<td>Power failure or battery disconnected.</td>
</tr>
<tr>
<td>GROUND FAULT</td>
<td>none</td>
<td>Path to Earth ground in system</td>
</tr>
<tr>
<td>2100 EC INTER FAULT</td>
<td>4 consecutive points in trbl</td>
<td>Interconnect ribbon cable between encoder and zone interface board disconnected.</td>
</tr>
<tr>
<td>XPNDR COMM FAILED</td>
<td>Yellow and red LEDs off</td>
<td>1. Comm lines not connected.</td>
</tr>
<tr>
<td></td>
<td>All LEDs OK</td>
<td>2. Faulty communication board.</td>
</tr>
</tbody>
</table>

**NOTE:**

In general, if the green LED is off, it indicates that the transponder is not communicating with the 2120 and that the communications have been interrupted for ten seconds or longer. A flashing green LED indicates the transponder is on line but it is reporting a trouble with the transponder.

The red LED indicates the presence of data being sent to the 2120 BMUX. The yellow LEDs indicate the presence of data coming in from the 2120 BMUX.
ADDITIONAL INFORMATION

2100 System Overview

 CHANNEL 1 = MONITOR POINTS 1-64 + CONTROL POINTS 1-48
 CHANNEL 2 = MONITOR POINTS 65-128 + CONTROL POINTS 49-96
 CHANNEL 3 = MONITOR POINTS 129-192 + CONTROL POINTS 97-144
 CHANNEL 4 = MONITOR POINTS 193-256 + CONTROL POINTS 145-192
 CHANNEL 5 = MONITOR POINTS 257-320 + CONTROL POINTS 193-240
 CHANNEL 6 = MONITOR POINTS 321-384 + CONTROL POINTS 241-288
 CHANNEL 7 = MONITOR POINTS 385-448 + CONTROL POINTS 289-336
 CHANNEL 8 = MONITOR POINTS 449-512 + CONTROL POINTS 337-384

A 2100 system can have up to 8 channels using separate communication lines for each channel.

Each 2100 encoder has 4 monitor points and 3 control points.

Each 2100 transponder can have up to 40 monitor points and 36 control points for a total of 10 encoders within the same 6 unit cabinet.

Maximum of 16 encoders for a total of 64 monitor points and 48 control points per channel.

Maximum of 10 encoders in a 6 unit cabinet.

Maximum of 6 encoders in a 4 unit cabinet.

Maximum of 3 encoders in a 2 unit cabinet.

In converting the 2100 system to a 2120 configuration, the existing four to eight 2100 channels will be reduced to one or two 2120 channels (depending on the system requirements).

* This will necessitate communication line wiring and hardware changes.
Interface Operation

The 2100/2120 Interface scans the 2100 encoders in numerical order, configuring them into 2120 transponder slots from the lowest to the highest encoder address (missing addresses are ignored). All monitor points appear on the first address; all control points appear on the second address.

Example: A 2100 transponder cabinet on channel 1 contains encoders 00, 01, 02, 07, 08.

The 2120 transponder addresses to be assigned to this cabinet are 105/106.

Under the above conditions, point relationships are as follows:

<table>
<thead>
<tr>
<th>ENCODER</th>
<th>2100 MON. PT.</th>
<th>2120 PT.</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>1-4</td>
<td>105-101 THRU 105-104</td>
</tr>
<tr>
<td>01</td>
<td>5-8</td>
<td>105-105 THRU 105-108</td>
</tr>
<tr>
<td>02</td>
<td>9-12</td>
<td>105-201 THRU 105-204</td>
</tr>
<tr>
<td>07</td>
<td>29-32</td>
<td>105-209 THRU 105-208</td>
</tr>
<tr>
<td>08</td>
<td>33-36</td>
<td>105-301 THRU 105-304</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ENCODER</th>
<th>2100 CTL. PT.</th>
<th>2120 PT.</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>1</td>
<td>106-101</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>106-102</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>106-103</td>
</tr>
<tr>
<td>01</td>
<td>4</td>
<td>106-104</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>106-201</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>106-202</td>
</tr>
<tr>
<td>02</td>
<td>7</td>
<td>106-203</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>106-204</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>106-301</td>
</tr>
<tr>
<td>07</td>
<td>22</td>
<td>106-302</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>106-303</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>106-304</td>
</tr>
<tr>
<td>08</td>
<td>25</td>
<td>106-401</td>
</tr>
<tr>
<td></td>
<td>26</td>
<td>106-402</td>
</tr>
<tr>
<td></td>
<td>27</td>
<td>106-403</td>
</tr>
<tr>
<td></td>
<td></td>
<td>106-404 (unused)</td>
</tr>
</tbody>
</table>