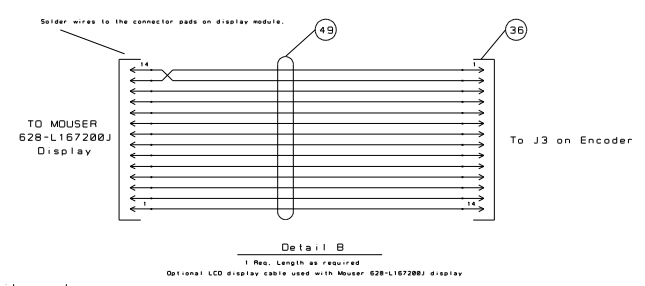
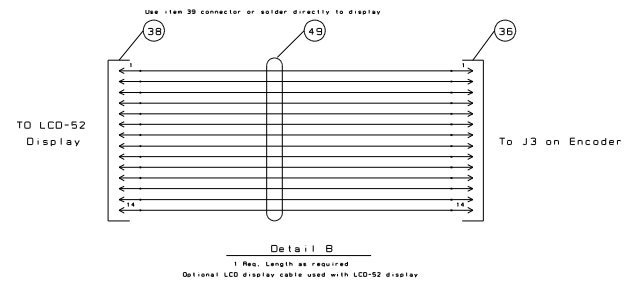
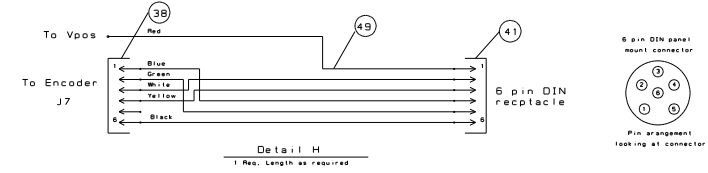
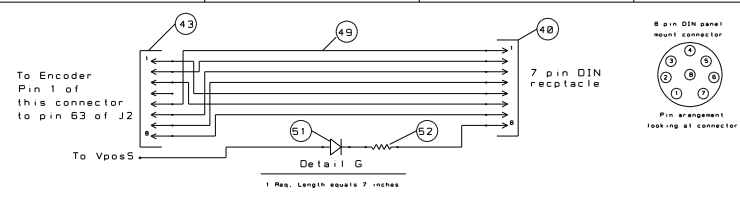
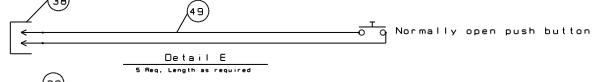
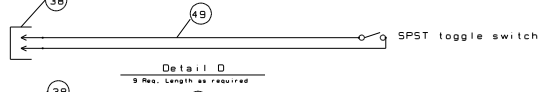
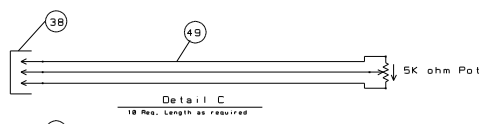
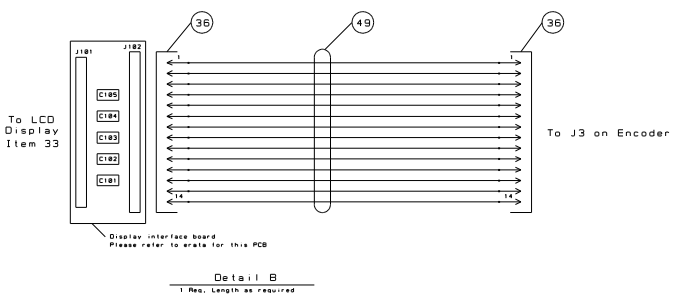
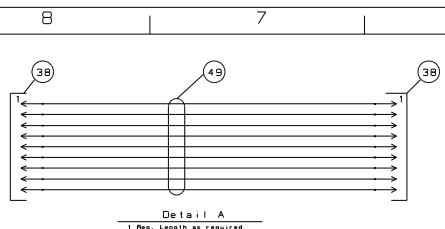


GAA Custom Electronics

ENCODER

| | | | | |
|--------------|----------|------|----------|-----------------|
| CONTRACT NO. | APPROVAL | DATE | ENGINEER | Gordon Anderson |
| DRAWN | | | SIZE | DWG NO. |
| CHECKED | | | DATE | REV. 2.3 |
| ISSUED | | | | SHEET 1 OF |

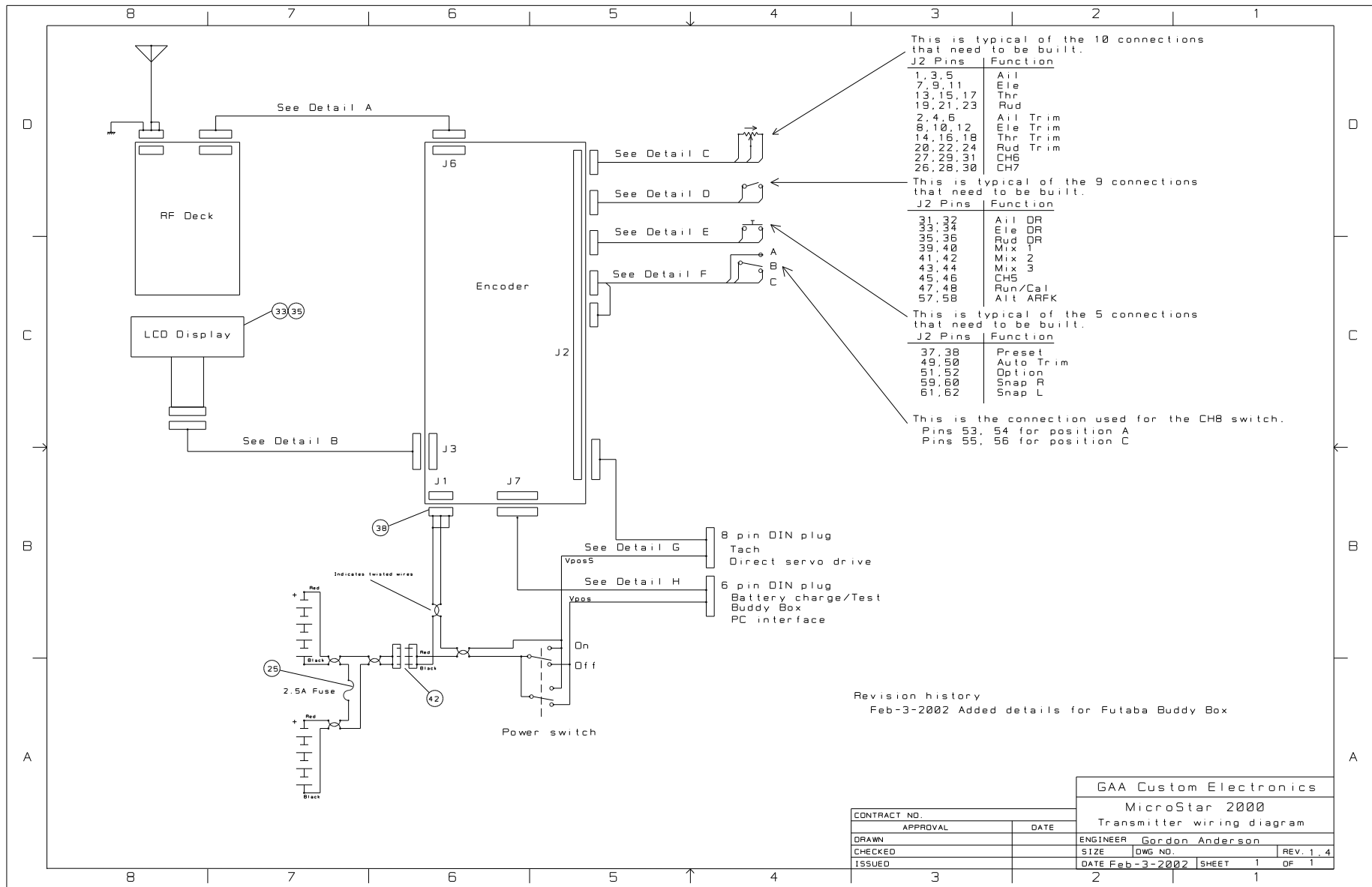


Notes:
1.) Numbers in bubbles indicate item numbers found on parts list

Revision history:
Feb-3-2002 Added details for Futaba Buddy Box support

| | | |
|--------------|----------|------|
| CONTRACT NO. | APPROVAL | DATE |
| DRAWN | | |
| CHECKED | | |
| ISSUED | | |

| | | | |
|------------------------|-----------------|-------|------------|
| GAA Custom Electronics | | | |
| MicroStar 2000 | | | |
| Cable Details | | | |
| ENGINEER | Gordon Anderson | REV. | 1.5 |
| SIZE | DWG NO. | DATE | FEB-3-2002 |
| ISSUED | | SHEET | 1 OF 1 |



This is typical of the 10 connections that need to be built.

| J2 Pins | Function |
|------------|----------|
| 1, 3, 5 | Ail |
| 7, 9, 11 | Ele |
| 13, 15, 17 | Thr |
| 19, 21, 23 | Rud |
| 2, 4, 6 | Ail Trim |
| 8, 10, 12 | Ele Trim |
| 14, 16, 18 | Thr Trim |
| 20, 22, 24 | Rud Trim |
| 27, 29, 31 | CH6 |
| 26, 28, 30 | CH7 |

This is typical of the 9 connections that need to be built.

| J2 Pins | Function |
|---------|----------|
| 31, 32 | Ail DR |
| 33, 34 | Ele DR |
| 35, 36 | Rud DR |
| 39, 40 | Mix 1 |
| 41, 42 | Mix 2 |
| 43, 44 | Mix 3 |
| 45, 46 | CH5 |
| 47, 48 | Run/Cal |
| 57, 58 | Alt ARFK |

This is typical of the 5 connections that need to be built.

| J2 Pins | Function |
|---------|-----------|
| 37, 38 | Presel |
| 49, 50 | Auto Trim |
| 51, 52 | Option |
| 59, 60 | Snap R |
| 61, 62 | Snap L |

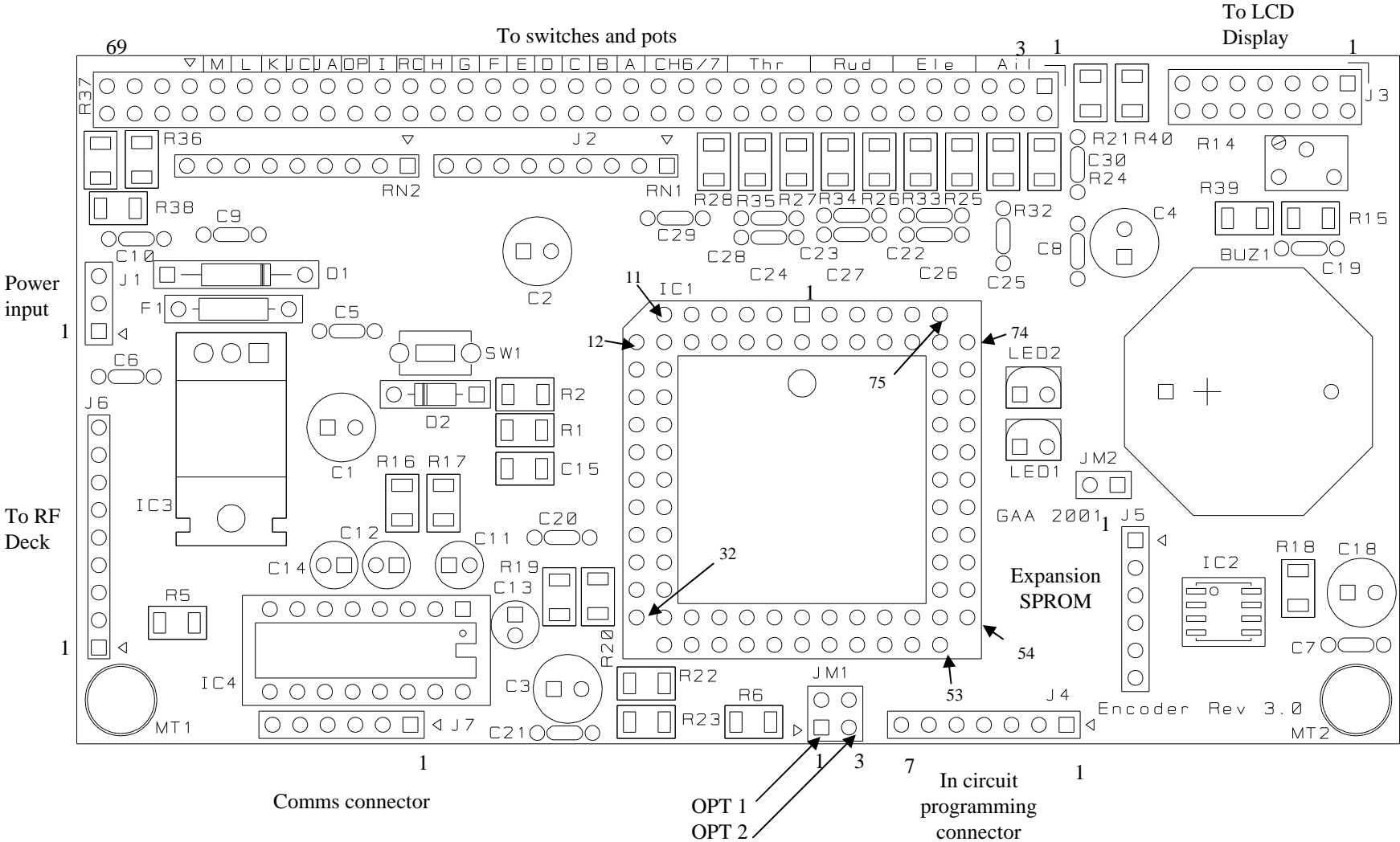
This is the connection used for the CH8 switch.
Pins 53, 54 for position A
Pins 55, 56 for position C

Revision history
Feb-3-2002 Added details for Futaba Buddy Box

GAA Custom Electronics
MicroStar 2000
Transmitter wiring diagram

| | | | | |
|--------------|---|----------|-----------------|--------------|
| CONTRACT NO. | | | | |
| APPROVAL | | DATE | | |
| DRAWN | | ENGINEER | Gordon Anderson | |
| CHECKED | | SIZE | DWG NO. | REV. 1.4 |
| ISSUED | 3 | DATE | Feb-3-2002 | SHEET 1 OF 1 |

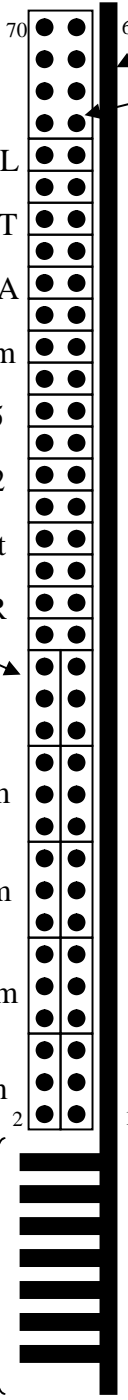
Encoder Top, Component Side



To accessories connector on transmitter. Please see the details drawing.

Encoder, solder side

J2

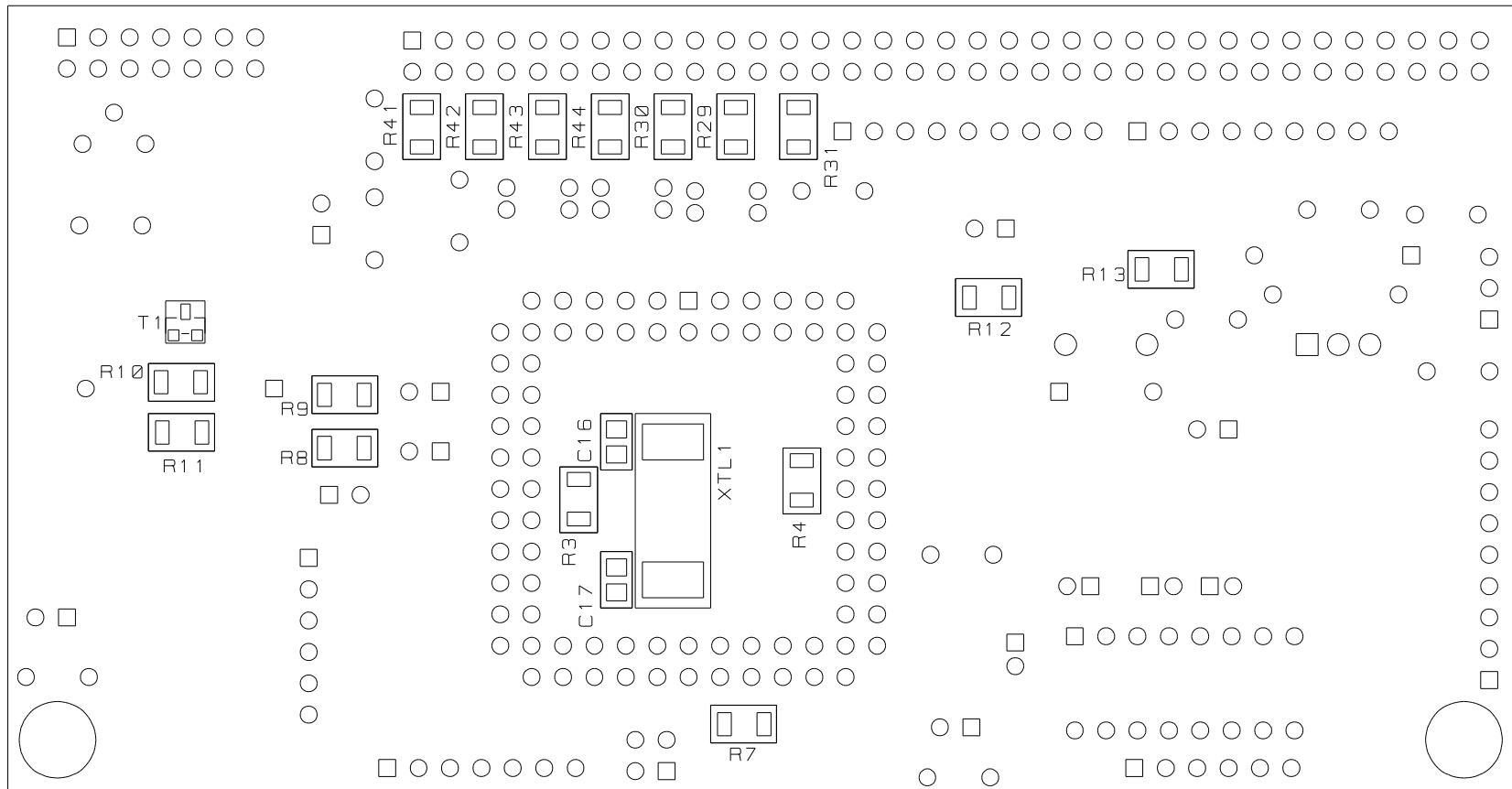


Encoder J2 connector pin assignments

Each of these connectors are cut from parts list item 37. You will need 10 three pin connectors and 16 two pin connectors.

J3, to display

Encoder Bottom, Solder Side



Encoder Parts List

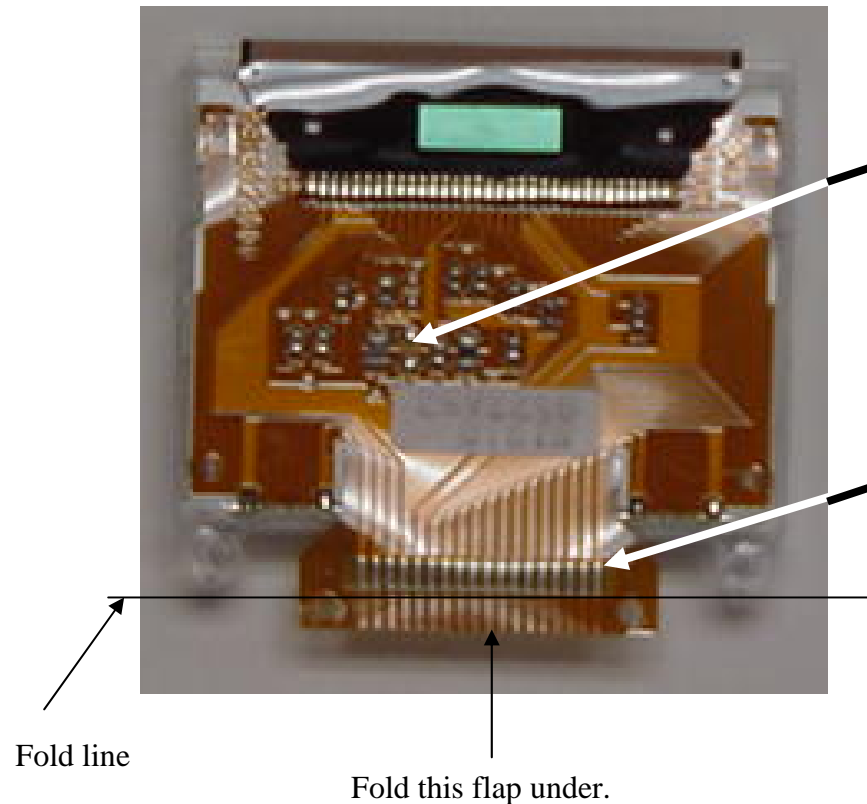
| Item | Quantity | ID | Part number | Description | Supplier | Cost each | Total cost | Notes | Option 1 | Option 2 | Option 3 |
|------|----------|------------------------|------------------------|----------------------------|------------|-----------|------------|-------|----------|----------|----------|
| 1 | 2 | R21,R36,R40 | 263-1 | 1 ohm resistor 1206 | Mouser | 0.08 | 0.16 | | 0.16 | 0.16 | 0.16 |
| 2 | 1 | R3 | 263-10 | 10 ohm resistor, 1206 | Mouser | 0.08 | 0.08 | | 0.08 | 0.08 | 0.08 |
| 3 | 12 | R28-35, R41-R44 | 263-100 | 100 ohm resistor 1206 | Mouser | 0.08 | 0.96 | | 0.96 | 0.96 | 0.96 |
| 4 | 4 | R8-R9, R37-38 | 263-470 | 470 ohm resistor 1206 | Mouser | 0.08 | 0.32 | | 0.32 | 0.32 | 0.32 |
| 5 | 8 | R2,R5,R16-R20,R23 | 263-1K | 1K resistor 1206 | Mouser | 0.08 | 0.64 | | 0.64 | 0.64 | 0.64 |
| 6 | 2 | R22,R45 | 263-2.7K | 2.7K resistor 1206 | | 0.08 | 0.16 | | 0.16 | 0.16 | 0.16 |
| 7 | 8 | R1,R11,R15,R24-R27,R39 | 263-5.1K | 5.1K resistor 1206 | Mouser | 0.08 | 0.64 | | 0.64 | 0.64 | 0.64 |
| 8 | 6 | R4,R6,R7,R10,R12,R13 | 263-10K | 10K resistor 1206 | Mouser | 0.08 | 0.48 | | 0.48 | 0.48 | 0.48 |
| 9 | 2 | RN1,RN2 | 04F4844 | Bourns 4609X-101-103 | Newark | 0.39 | 0.78 | | 0.78 | 0.78 | 0.78 |
| 10 | 1 | R14 | 72-T93YB-10K | 10K trim pot | Mouser | 1.2 | 1.2 | | 1.2 | 1.2 | |
| 11 | 5 | C1-C4,C18 | P981-ND | 22uF 35V cap | Digikey | 0.22 | 1.1 | | 1.1 | 1.1 | 1.1 |
| 12 | 18 | C5-C10,C19-C30 | P4584-ND | .015 uF 50V | Digikey | 0.132 | 2.376 | 1 | 2.376 | 2.376 | 2.376 |
| 13 | 4 | C11-C14 | P993-ND | 1 uF 50V | Digikey | 0.16 | 0.64 | | 0.64 | 0.64 | 0.64 |
| 14 | 2 | C16-C17 | 140-CC501N120J | 12 pF, .0805 | Mouser | 0.08 | 0.16 | | 0.16 | 0.16 | 0.16 |
| 15 | 1 | C15 | 140-CC502B104K | .1 uF 1206 | Mouser | 0.07 | 0.07 | | 0.07 | 0.07 | 0.07 |
| 16 | 1 | IC1 | PIC17C766/CL-ND | 17C766 PIC | Digikey | 18.38 | 18.38 | | 18.38 | 18.38 | 18.38 |
| 17 | 1 | IC2 | 511-M93C86-WMN6 | 93C86 serial eeprom | Mouser | 1.66 | 1.66 | | 1.66 | 1.66 | 1.66 |
| 18 | 1 | IC4 | 570-ICL232CPE | Dual rec/xmit RS232 | Mouser | 2.45 | 2.45 | | 2.45 | 2.45 | 2.45 |
| 19 | 1 | XTL1 | SE2504CT-ND | 8 MHz crystal | Digikey | 1.56 | 1.56 | | 1.56 | 1.56 | 1.56 |
| 20 | 1 | D2 | IN4148DICT-ND | 1N4148 signal diode | Digikey | 0.07 | 0.07 | | 0.07 | 0.07 | 0.07 |
| 21 | 1 | D1 | 1N4004GICT-ND | 1N4004 | Digikey | 0.04 | 0.04 | 1 | 0.04 | 0.04 | 0.04 |
| 22 | 1 | SW1 | P8056S-ND | Reset PB | Digikey | 0.66 | 0.66 | 2 | | 0.66 | 0.66 |
| 23 | 2 | LED1,LED2 | 67-1064-ND | LED | Digikey | 0.117 | 0.234 | | 0.234 | 0.234 | 0.234 |
| 24 | 1 | T1 | FMMT2222ACT-ND | NPN transistor | Digikey | 0.36 | 0.36 | | 0.36 | 0.36 | 0.36 |
| 25 | 1 | F1 | F829-ND | 2.5 Amp pico fuse | Digikey | 0.73 | 0.73 | | 0.73 | 0.73 | 0.73 |
| 26 | 1 | IC3 | NJM7805FA-ND | 7805 5V regulator | Digikey | 0.63 | 0.63 | | 0.63 | 0.63 | 0.63 |
| 27 | 1 | BUZ1 | 539-MSO320 | Mallory sonalert II | Mouser | 3.63 | 3.63 | | 3.63 | 3.63 | 3.63 |
| 28 | 1 | J2 | S2111-36-ND | Right angle header x 2 | Digikey | 3.42 | 3.42 | 2 | 3.42 | 3.42 | 3.42 |
| 29 | 1 | J1,J6 | S1111-36-ND | Right angle header x 1 | Digikey | 1.82 | 1.82 | | 1.82 | 1.82 | 1.82 |
| 30 | 1 | J4,J5,J7,JM2 | S1011-36-ND | Header x 1 | Digikey | 2.37 | 2.37 | | 2.37 | 2.37 | 2.37 |
| 31 | 1 | J3,JM1,J102 | S2011-36-ND | Header x 2 | Digikey | 2.37 | 2.37 | | 2.37 | 2.37 | 2.37 |
| 32 | 1 | | 73-1037-ND | 2 X 16 LCD display | Digikey | 13.35 | 13.35 | 3 | 13.35 | | |
| 33 | 1 | | 73-1177-ND | 2 X 16 LCD display | Digikey | 15.08 | 15.08 | 3 | | 15.08 | |
| 34 | 1 | J101 | HFG24T-ND | 1mm Flex connector, RA | Digikey | 1.37 | 1.37 | 4 | | 1.37 | |
| 35 | 1 | | PRD250LPW-ND | Bezel | Digikey | 3 | 3 | 2 | | | |
| 36 | 1 | | 164-9007 | IDC 2 x 7 connectors | Mouser | 0.5 | 0.5 | | 0.5 | 0.5 | |
| 37 | 1 | | ED80027-ND or A2125-ND | 84 pin plcc socket | Digikey | 1.14 | 1.14 | | 1.14 | 1.14 | 1.14 |
| 38 | 3 | | 929974-01-36-ND | Single row female | Digikey | 1.23 | 3.69 | 2 | 3.69 | 3.69 | 3.69 |
| 39 | 2 | | 534-612 | Threaded bracket | Mouser | 0.14 | 0.28 | | 0.28 | 0.28 | 0.28 |
| 40 | 1 | | CP-1280-ND | 8 pin DIN recptacle | Digikey | 0.86 | 0.86 | | 0.86 | 0.86 | 0.86 |
| 41 | 1 | | CP-1260-ND | 6 pin DIN recptacle | Digikey | 0.74 | 0.74 | | 0.74 | 0.74 | 0.74 |
| 42 | 1 | | 336DN3 | 3 pin deans connector pair | CERMARK | 2 | 2 | 2 | | | |
| 43 | 1 | | 929975-01-36-ND | Dual row female | Digikey | 2.04 | 2.04 | | 2.04 | 2.04 | 2.04 |
| 44 | 5 | C101-C105 | 140-CC502B104K | 0.1 uF capacitor, 1205 | Mouser | 0.07 | 0.35 | 1,4 | | 0.35 | |
| 45 | 1 | | HFF18T-ND | 1mm Flex connector | Digikey | 0.88 | 0.88 | 5 | | | 0.88 |
| 46 | 1 | | 260-100K | 100K resistor, 805 | Mouser | 0.08 | 0.08 | 5 | | | 0.08 |
| 47 | 1 | | R011-10-ND | 25 conductor multi ribbon | Digikey | 5.69 | 5.69 | 2 | 5.69 | 5.69 | 5.69 |
| 48 | 1 | | | Encoder PCB | GAA | 10 | 10 | | 10 | 10 | 10 |
| 49 | 1 | | | On glass display PCB | GAA | 2 | 2 | | | 2 | |
| 50 | 1 | | ECM-A1010 | 4x12 LCD display | Earth Tech | 3 | 3 | 3 | | | 3 |
| 51 | 1 | | 11DQ3-ND | Shottky Rectifier | Digikey | 0.38 | 0.38 | 2 | | | |
| 52 | 1 | | 1.0QBK-ND | 1.0 ohm 1/4 W resistor | Digikey | 0.28 | 0.28 | 2,6 | | | |

Notes

- 1 Sold in pkg of 10
- 2 Optional
- 3 Other display options are possible, select item 32, 33, or 50
- 4 Needed for item 33
- 5 Used for Earth Tech 4x12 display
- 6 Sold in pkg of 5

| | | | |
|------------------------------------|-------|-------|-------|
| 2 x 16 standard display total cost | 87.78 | | |
| 2 x 16 on glass display total cost | | 93.89 | |
| 4 x 12 surplus display total cost | | | 77.35 |

ECM-A1010 Display Modifications for use in MicroStar

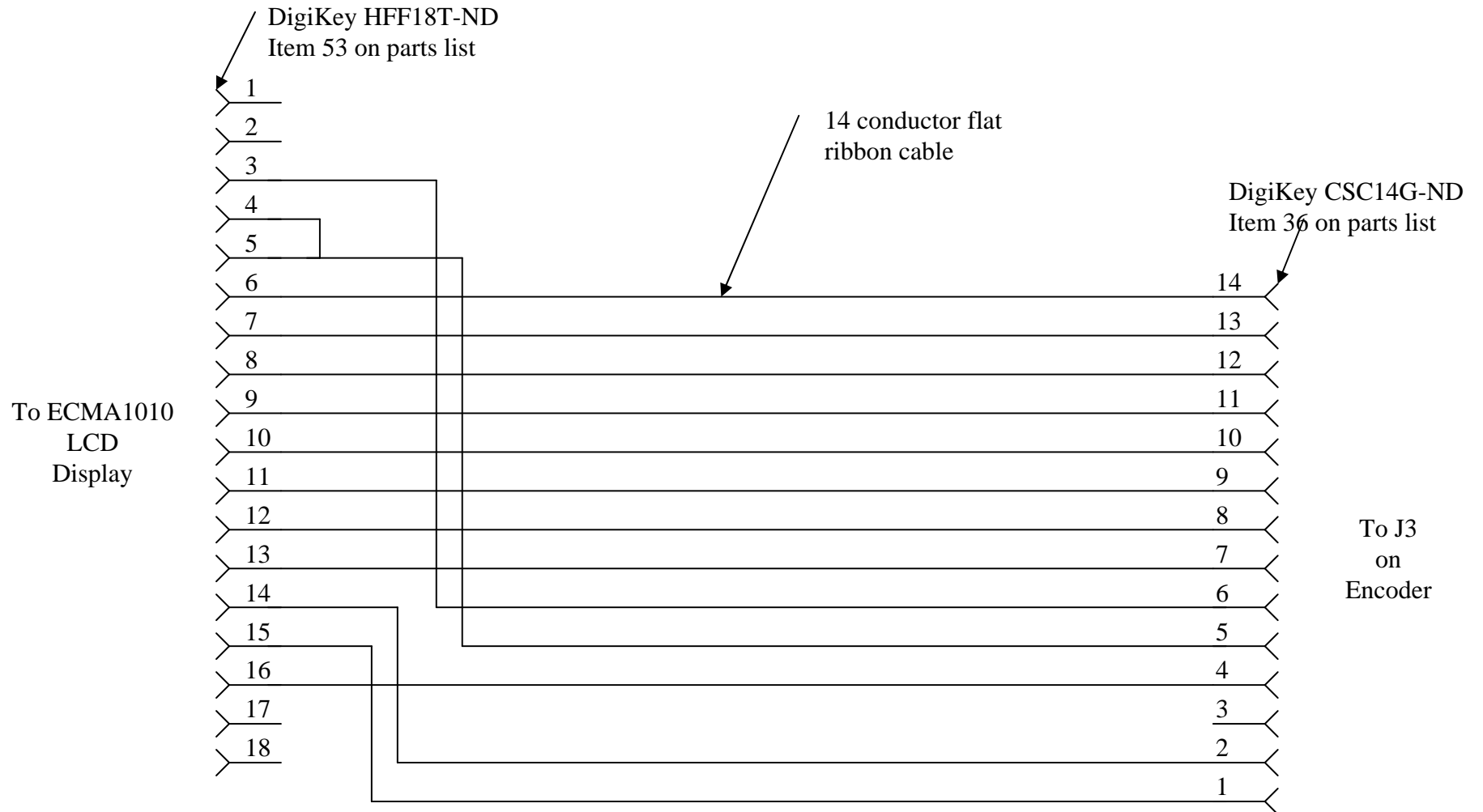


Install a 100K 805 size resistor in this position. There will be nothing in this location and the pads are already tined and ready for this resistor. You can use Mouser part number 260-100K, it will cost about 8 cents for the resistor.

You can use DigiKey HFF18T-ND connector but you will have to make a few modifications. This arrow point to pin 1. To use this connector do the following:

- 1.) Trim the excess insulator from each side of this flexible flat cable. You need to make it the right width to fit into the connector. Make sure the traces line up with the connector pins. You can cut this with a pair of scissors.
- 2.) Fold the insulated flap under as show in the picture to the left. This will put the conductors at the edge, as needed by the connector, and it will thicken the flexible cable so the connector will hold it tight.
- 3.) Make the interconnection cable as shown on the next page.
- 4.) You will not need to install R14, R15, or R39 on the encoder PCB.

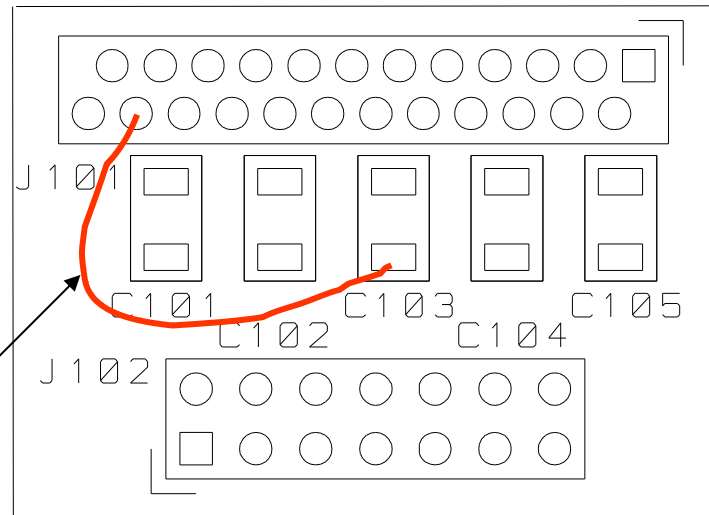
ECMA1010 Cable Details



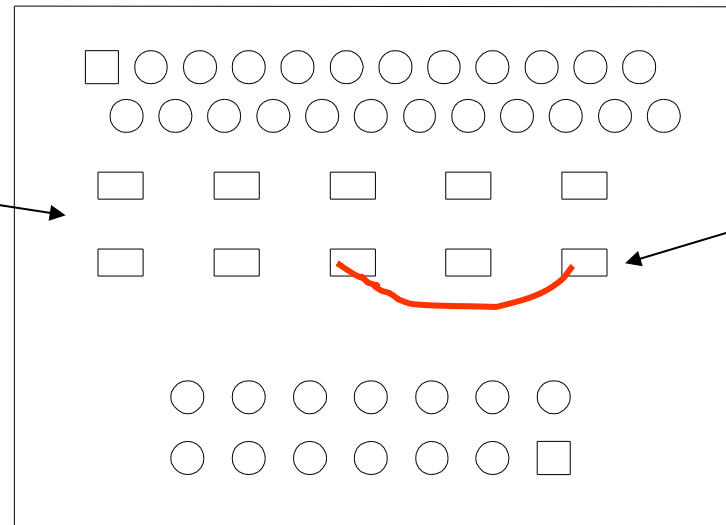
Display adapter errata sheet

This PCB requires two jumper to correct a design error. This document defines the jumpers you must install.

1.) Install this jumper. Insert the jumper with into J101 pads then insert the connector and solder the combination in place. Next solder the other end of the jumper to C103's pad as shown.



These pads do not have any components installed in them.



2.) Install this jumper between the two pads indicated.

Use 28 gauge kynar solid core wire for jumpers.