Sheet 1 of 5

Appendix C
Resistive Touch Screen Constructions

For comparison purposes, this section will briefly discuss the four types of analog resistive touch screen technologies. The Dynaclear 4 and 8 wire touch screen constructions and 5 and 7 wire types not offered by Dynapro.

How an Analog Resistive Touch Screen Works

Analog resistive touch screens are typically decoded based on the voltage divider concept. Figure 7 shows a representation of a one dimensional analog resistive touch screen. When connected to power, in this case 5 volts and ground, a linear voltage gradient is developed across the touch screen surface. Measuring the voltage across the surface produces the voltage shown in the graph. This voltage can be directly related to position across the touch screen. Combining two layers, one with the bus bars on the left and right and one with the bus bars on the top and bottom, forms a device whereby both X and Y coordinate position information can be decoded. This will be shown in more detail in the next section.

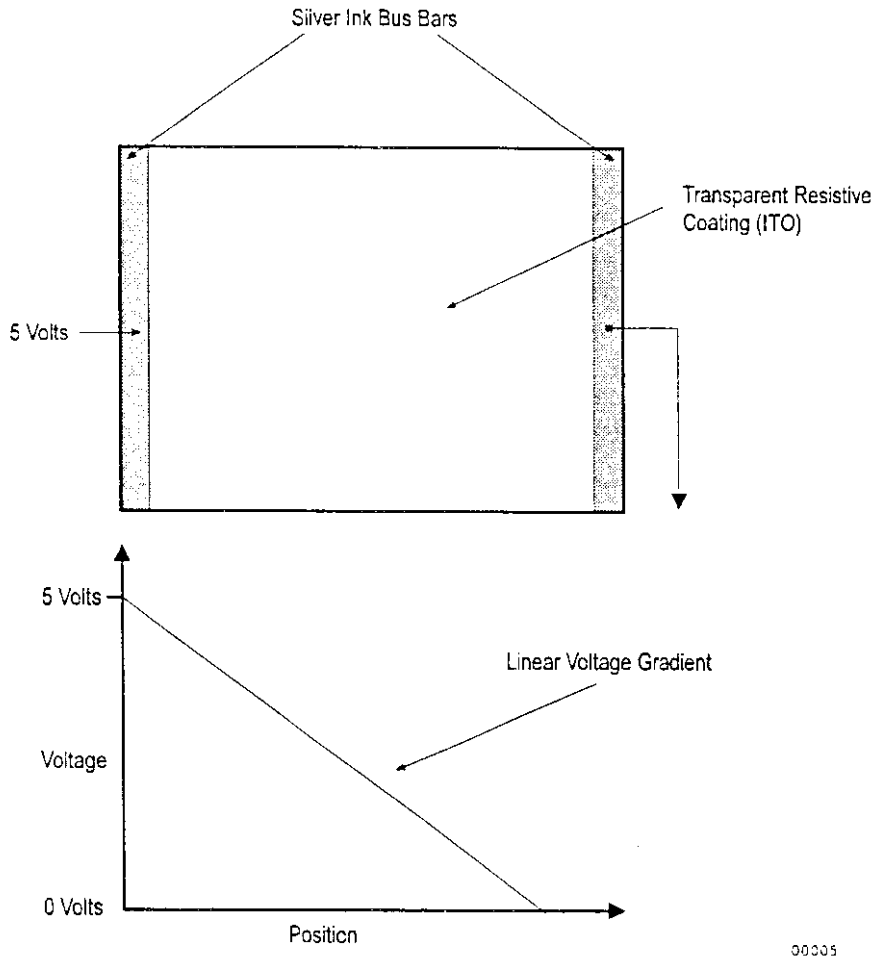

Figure 7: One dimensional Analog Resistive Touch Screen

The silver bus bars are typically very low in resistance (~50 mili-Ω/square), on the order of 5,000 to 10,000 times lower in resistance than the transparent conductive coating. The transparent conductive coating, typically indium tin oxide (ITO), ranges from 60 to 800 Ω/square with a nominal value in the 350 Ω/square range. Dynapro patterns and coats the ITO material in-house using proprietary processes offering superior linearity and quality. In addition, all printing, laminating, assembly, and packaging are done at Dynapro providing the highest quality and lowest cost product available.

4 Wire Touch Screens

Refer to Figure 8. The construction consists of two facing transparent conductive layers. The one conductive layer has the bus bars on the left and right and the second has the bus bars on the top and bottom. These layers are sandwiched together at the perimeter and separated by insulating spacer dots. When touched the normally separated layers come into contact and through electronics the position can be determined. The touch screen is

decoded by developing a voltage gradient, as discussed previously, on one layer and sensing the voltage (position) on the other. Switching the drive voltage and sense from layer to layer allows for X and Y position decoding.

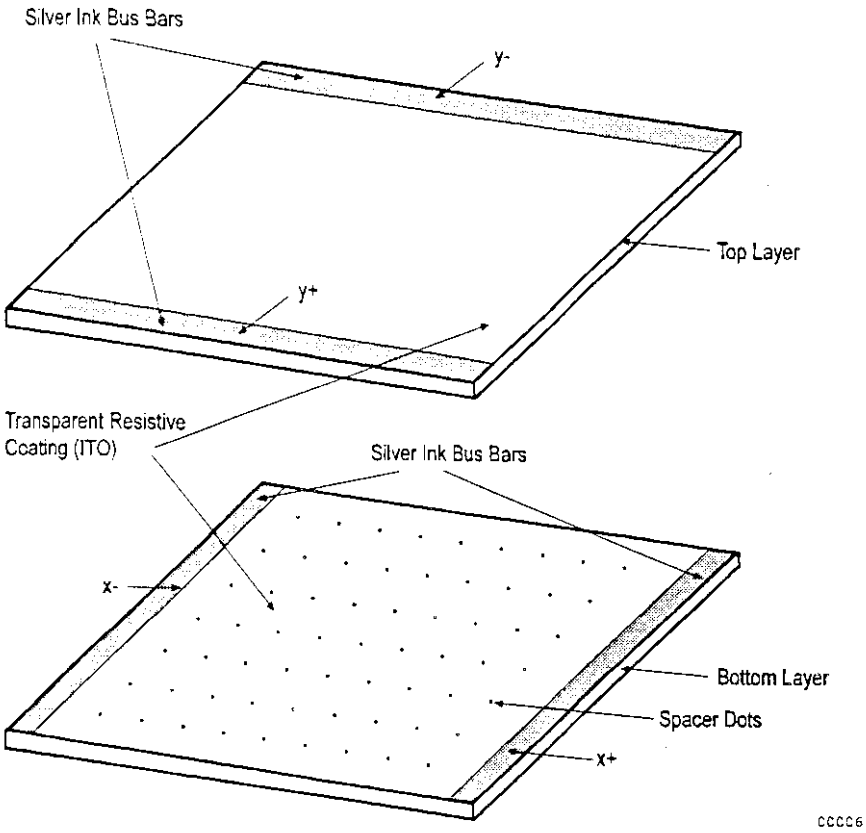

Figure 8: 4 Wire Resistive Touch Screen Switch Layers

Table 8: Scan Sequence for 4 Wire Touch Screen

Axis	X+	X-	Y+	Y-
X Axis	5 volts	Gnd	N/C	Sense
Y Axis	N/C	Sense	5 volts	Gnd

Where sense refers to the input to an analog to digital converter and N/C means no connect.

Sheet 4 of 5

Appendix C
Touch Screen Electrical Connections

This appendix shows the connection diagrams for the Dynaclear 4 and 8 wire analog resistive touch screens.

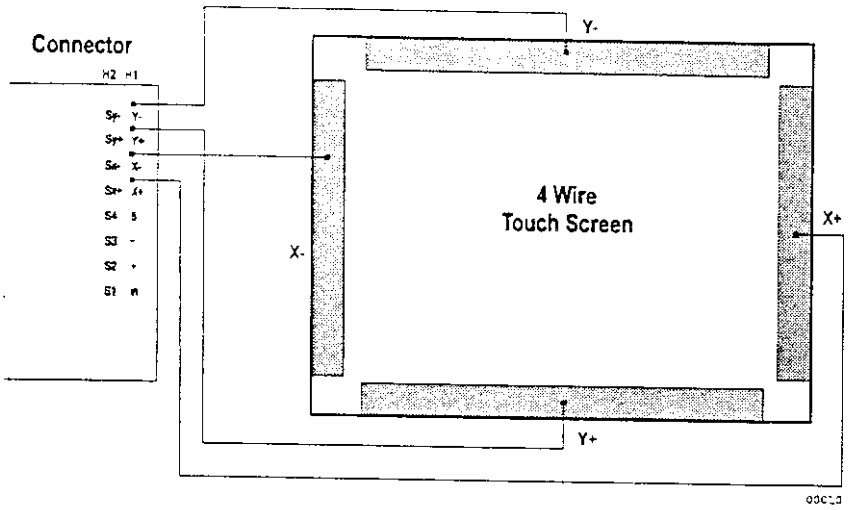

Figure 12: Connections for 4 Wire Touch Screen

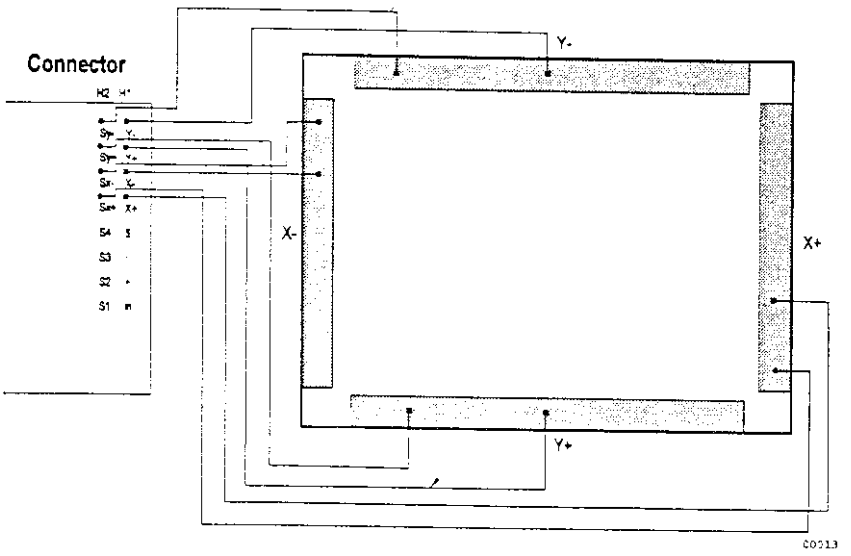

Figure 13: Connections for 8 Wire Touch Screen