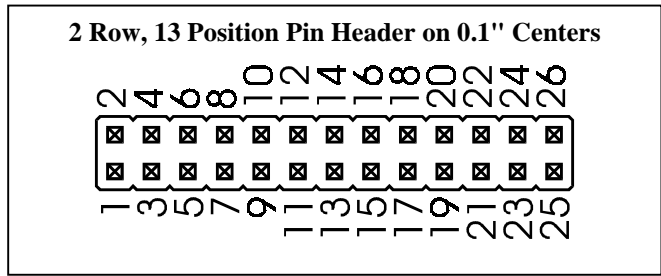# RollSCAN-1 Scanner Controller Interface Summary

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Date: May 10, 2001
Current Revision: C
Revision Date: June 11, 2001

The following notation convention applies to signal type in all pin function tables:
I=input, **O**=output, **P**= power/gnd, **AO**=analog output, **AI**=analog input

J1 - Host Port Connector

2 Row, 13 Position Pin Header on 0.1" Centers

J1 Pin Locations (Top View)

The host port on the RollSCAN-1 controller is jumper-configurable for either parallel port mode (EPP- bidirectional) or microcontroller (8051-style) interface. (see JP3 description below). In parallel port mode, the interface can be connected directly to a PC's EPP-compatible parallel port connector. In microcontroller (μC) mode, data bits 0-7 are an 8-bit bidirectional data bus, and the –CS, –RD, and –WR signals control the bus transactions with the microcontroller. See the LM9830 data sheet for timing details.

J1 Pin Functions

Pin #	Name	Type	Function/Description
1	-Strobe/-WR	I	**PP Mode: STROBE, μC Mode: Write Strobe**
3	HI_D0	I/O	**Data Bit 0 – (Bidirectional)**
5	HI_D1	I/O	**Data Bit 1 – (Bidirectional)**
7	HI_D2	I/O	**Data Bit 2 – (Bidirectional)**
9	HI_D3	I/O	**Data Bit 3 – (Bidirectional)**
11	HI_D4	I/O	**Data Bit 4 – (Bidirectional)**
13	HI_D5	I/O	**Data Bit 5 – (Bidirectional)**
15	HI_D6	I/O	**Data Bit 6 – (Bidirectional)**
17	HI_D7	I/O	**Data Bit 7 – (Bidirectional)**
19	-ACK	O	**PP Mode: ACK, μC Mode: <unused>**
21	-BUSY	O	**PP Mode: BUSY, μC Mode: <unused>**
23	PAPER_ERR	O	**PP Mode: PAPER OUT Signal, uP Mode: <unused>**
25	-SLCTIN/ALE	I	**PP Mode: SELECT IN, μC Mode: ALE (address latch enable)**
2	-AUTOFD/-RD	I	**PP Mode: AUTOFD, μC Mode: Read Strobe**
4	-ERROR	O	**PP Mode: Error, μC Mode: <unused>**
6	-INIT/-CS	I	**PP Mode: INIT, μC Mode: Chip Select**
8	SELECT	O	**PP Mode: SELECT, μC Mode: <unused>**
All others	GND	-	**Digital Ground**

J2 - Printer Port Passthrough Controls

**Single Row, 4 Position Pin Header on 0.1" Centers**

The RollSCAN-1 supports printer port pass-through operation with the addition of two external components: a 74HCT244 buffer and a 74HCT374 buffer/latch. See the LM9830 data sheet for application details.

Printer Passthrough Controls

Pin #	Name	Type	Function/Description
1	+5V	P	5V Power for external buffer/latch
2	-LATCH	O	Gate Control for external latch
3	TRISTATE	O	Output disable control for external buffer
4	GND	P	Ground for external buffer/latch

J3 - Stepping Motor Connector

Single Row, 6 Position Pin Header on 0.1" Centers

Bipolar Winding Arrangement

Unipolar Winding Arrangement
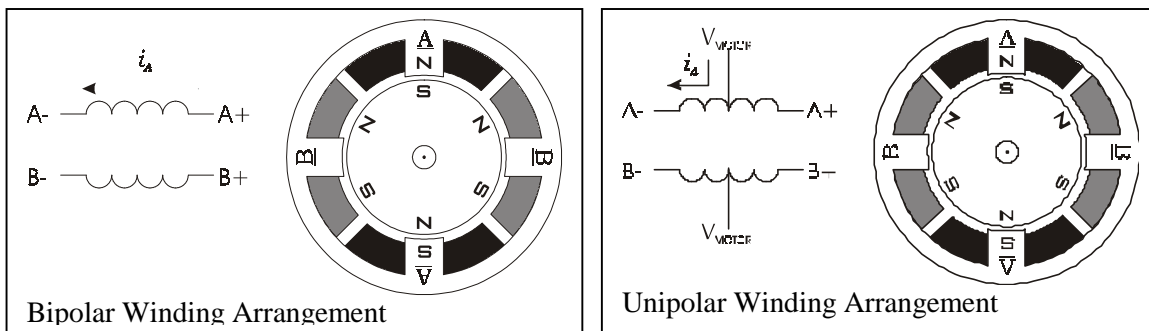
The RollSCAN-1's stepping motor drive circuitry accommodates either bipolar or unipolar drive (see illustrations above). Bipolar drive arrangements will have four-wire motor connections. Unipolar drive arrangements will have either 5 motor connections (if the winding centers are connected together) or 6 motor connections. When configured for unipolar drive, a set of power inverters is engaged to provide current source capability. The stepping motor connector pinouts are given below:

J3 Pin Functions

Pin #	Name	Type	Function/Description
1	A+	AO	Bipolar: Winding 1+, Unipolar: Winding 1 (0 degree)
2	A-	AO	Bipolar: Winding 1-, Unipolar: Winding 3 (90 degree)
3	B+	AO	Bipolar: Winding 2+, Unipolar: Winding 2 (180 degree)
4	B-	AO	Bipolar: Winding 2-, Unipolar: Winding 4 (270 degree)
5,6	MOTOR SUPPLY	P	To common wire for unipolar drive

J6 – CCD/CIS Connector

2 Row, 13 Position Pin Header on 0.1" Centers

J6 Pin Locations (Top View)

J6 Pin Functions

Pin #	Name	Type	Function/Description
1,2	+5V	P	**5 Volt Logic Supply**
3,4	PGND	P	**Main Power Ground (Illum Return ONLY)**
5,6	CCD PWR	P	**CCD Power (User Supplied – See J5-2)**
7,8	ILLUM PWR	P	**Illuminator Power (User Supplied – See J5-3)**
9	LED_R	AO	**Red LED Drive (May be used to control CCFL Intensity)**
10	LED_G	AO	**Green LED Drive (May be used to drive CCFL)**
11	LED_B	AO	**Blue LED Drive (May be used to control CCFL Intensity)**
12	PGND	P	**Main Power Ground (see pins 3,4)**
13	VREF	AO	**Buffered Reference Voltage (See HDR 1)**
14	AGND/DGND	P	**Signal Ground (selectable, see JP4)**
15	OS_R	AI	**CCD/CIS Red Output Signal (tri-linear color only)**
16	OS_G	AI	**CCD/CIS Green Output Signal (tri-linear color only)**
17	OS_B	AI	**CCD/CIS Blue Output Signal or CCD/CIS out (single output)**
18	AGND/DGND	P	**Signal Ground (see pins 13,14)**
19	CP1	O	**CCD/CIS CP1 signal (Clamp Pulse 1)**
20	CP2	O	**CCD/CIS CP2 signal (Clamp Pulse 2)**
21	TR1	O	**CCD/CIS TR1 signal (Transfer/Shift Pulse 1)**
22	TR2	O	**CCD/CIS TR2 signal (Transfer/Shift Pulse 2)**
23	Φ1	O	**CCD/CIS Clock Signal, Phase 1**
24	Φ2	O	**CCD/CIS Clock Signal, Phase 2**
25	RST	O	**CCD/CIS Reset Pulse (Integration Start/Stop)**
26	DGND	P	**Digital Ground**

The RollSCAN-1's CCD/CIS interface provides a great deal of flexibility in connecting to Contact Image Sensor (CIS) modules and Charge-Coupled Device (CCD) line arrrays. In most cases, additional circuitry is not required, although a CCFL inverter is not provided. The 5V logic supply is brought out to the connector, and separate CCD Power and Illuminator Power connections are provided, if necessary. If a CCFL or other white light source is to be used, an LED output can be adapted to control the CCFL inverter. 4-step CCFL dimming (off-low-med-high) is possible by adapting the two remaining LED outputs in to control the dimming circuitry on the inverter.
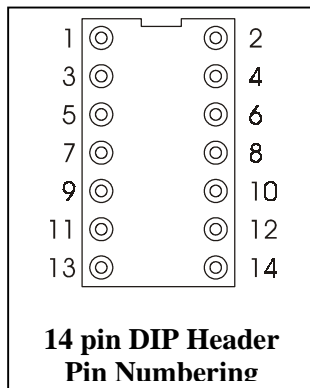
RollSCAN-1 Scanner Controller I/O Summary
- preliminary -

      On tri-linear color sensors (using white illumination), all three CCD/CIS analog output signals are used. When cycled R-G-B illumination is employed on a single-output sensor, the CCD/CIS output is connected to the BLUE input. The 9830 takes care of the rest under software control.

HDR 1-3

       Three 14-pin DIP sockets are provided on the RollSCAN-1 circuit board for monitoring certain critical signals to aid in debugging your scanner design.   The even-numbered pins of these sockets are all grounded. Note that the pinout of these headers does NOT conform to "standard" DIP pin numbering. The correct pinout is shown below:

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

**14 pin DIP Header
Pin Numbering**

HDR 1 – CCD/CIS Analog Signals

       HDR 1 provides monitoring points for the CCD/CIS analog signals. HDR1 also permits selection of one of four reference voltages to be provided to the CCD/CIS via the reference amplified, and permits bridging of the three CCD/CIS input decoupling capacitors. MONITOR THESE SIGNALS ONLY WITH HIGH-IMPEDANCE INSTUMENTATION TO AVOID DISRUPTING PROPER CIRCUIT FUNCTION.

HDR 1 Pin Functions

Pin #	Name	Type	Function/Description
1	OS_R_DC	AI	**Red output signal from CCD/CIS (9830 side of decoupling cap)**
3	OS_G_DC	AI	**Green output signal from CCD/CIS (9830 side of decoupling cap)**
5	OS_B_DC	AI	**Blue output signal from CCD/CIS (9830 side of decoupling cap)**
7	VREF_HI	AO	**LM9830 internal high reference**
9	VREF_MID	AO	**LM9830 internal mid reference**
11	VREF_LO	AO	**LM9830 internal low reference**
13	VBANDGAP	AO	**LM9830 internal bandgap reference**
2	OS_R	AO	**Red output signal from CCD/CIS (sensor side of decoupling cap)**
4	OS_G	AO	**Green output signal from CCD/CIS (sensor side of decoupling cap)**
6	OS_B	AO	**Blue output signal from CCD/CIS (sensor side of decoupling cap)**
8	REF AMP	AI	**Input to reference buffer amplifier – (buffered output -> J6-13)**
10,12,14	AGND	P	**Analog Ground Reference**

HDR 2 – CCD/CIS Timing Signals

HDR 2 provides monitoring points for the CCD/CIS timing signals.

HDR2 Pin Functions

Pin #	Name	Type	Function/Description
1	CP1	O	Clamp Pulse 1 (see LM9830 data sheet)
3	CP2	O	Clamp Pulse 2 (see LM9830 data sheet)
5	RST	O	Reset Signal (Integration Control) (See LM9830 data sheet)
7	Φ1	O	Clock Signal – Phase 1 (see LM9830 data sheet)
9	Φ2	O	Clock Signal – Phase 2 (see LM9830 data sheet)
11	TR1	O	Clamp Pulse 1 (see LM9830 data sheet)
13	TR2	O	Clamp Pulse 2 (see LM9830 data sheet)
even pins	DGND	P	Digital Ground

HDR 3 – Motor Signals

HDR 3 provides monitoring points for the stepping motor control signals and for monitoring the winding current sense signals as the LM9830 sees them.

HDR 3 Pin Functions

Pin #	Name	Type	Function/Description
1	A+	O	"A" winding "+" side logic drive signal
3	A-	O	"A" winding "-" side logic drive signal
5	B+	O	"B" winding "+" side logic drive signal
7	B-	O	"B" winding "-" side logic drive signal
9	B_SENSE	AI	Voltage at "B" winding Current Sense Resistor
11	A_SENSE	AI	Voltage at "A" winding Current Sense Resistor
13	GND_SENSE	AI	Ground Voltage at Motor Drive Circuit
even pins	DGND	P	Digital Ground

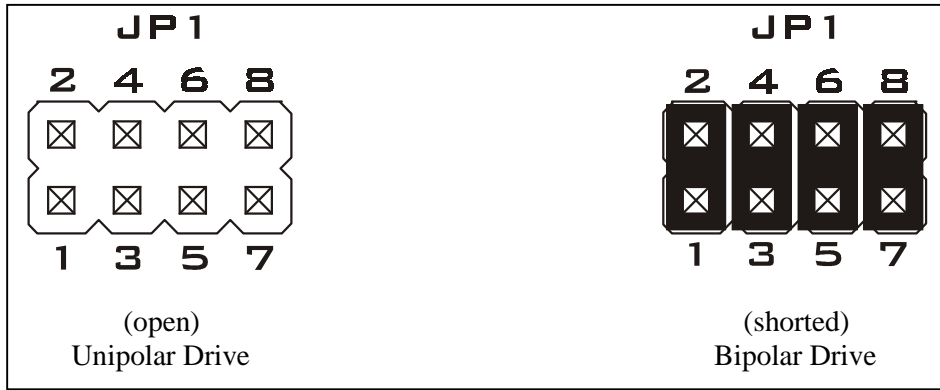## HDR4 – Header for LED current setting resistors

HDR 4 is an 8-pin DIP socket for installing user-provided LED current setting resistors. The pinout of HDR-4 is shown below. Note that HDR-4's pinout DOES NOT conform to "standard" DIP pin numbering.

HDR-4 Pinout
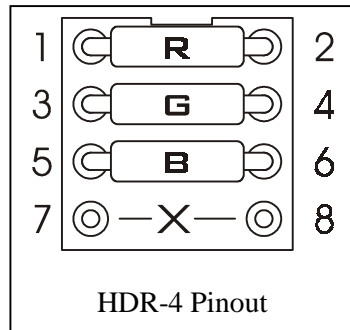
The current setting resistor for the RED Illuminator (R) is installed between pins 1 and 2.
The current setting resistor for the GREEN Illuminator (G) is installed between pins 3 and 4.
The current setting resistor for the BLUE Illuminator (B) is installed between pins 5 and 6.
Pins 7 and 8 are unused.

JP1 – Unipolar/Bipolar Stepper Configuration Jumpers

```
    JP1                          JP1
 2  4  6  8                   2  4  6  8
┌──────────────┐          ┌──────────────┐
│ ⊠  ⊠  ⊠  ⊠ │          │ ⊠  ⊠  ⊠  ⊠ │
│ ⊠  ⊠  ⊠  ⊠ │          │ ⊠  ⊠  ⊠  ⊠ │
└──────────────┘          └──────────────┘
 1  3  5  7                   1  3  5  7

    (open)                      (shorted)
 Unipolar Drive              Bipolar Drive
```

JP2 – Full Step/Microstep jumper

```
       1  2                         1  2
JP2  ┌──────┐               JP2  ┌──────┐
     │ ⊠  ⊠ │                    │ ⊠  ⊠ │
     └──────┘                    └──────┘

     (open)                      (short)
    Microstep                   Full Step
```

JP3 – Host Mode Jumper

```
   1  2  3                     1  2  3
 ┌─────────┐                 ┌─────────┐
 │ ⊠  ⊠  ⊠ │                 │ ⊠  ⊠  ⊠ │
 └─────────┘                 └─────────┘

 µController Mode            Parallel Port Mode
```
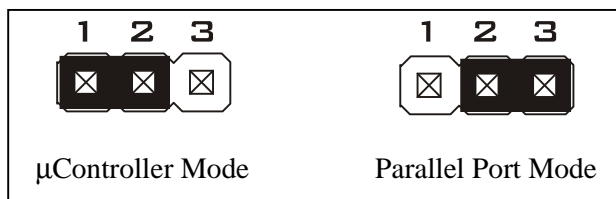
JP4 – CIS/CCD Ground Selector Jumper

```
   1  2  3                     1  2  3
 ┌─────────┐                 ┌─────────┐
 │ ⊠  ⊠  ⊠ │                 │ ⊠  ⊠  ⊠ │
 └─────────┘                 └─────────┘

 DGND to CCD/CIS             AGND to CCD/CIS
```
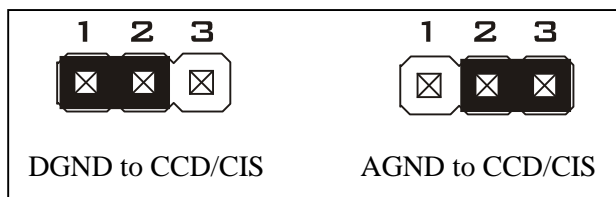
JP5 – JP7 LED Drive Configuration Jumpers
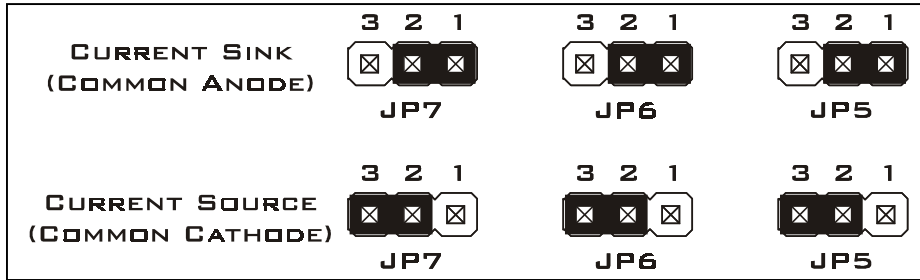
Board Layout and Connector Locations