

URSA Installation

Note: Installation of the Meta-Speed[□] digital servo modification kit should be undertaken only after confirming that the present analog servo, scan, and zoom systems are working properly and are aligned correctly.

Inserting and Removing Circuit Boards

ALWAYS TURN OFF THE POWER before inserting or removing Meta-Speed[□] circuit boards. These boards contain CMOS chips that could be damaged or erased if this procedure is not observed. Additionally, when working on the spooling motors, be sure to unplug the Supervisor board from the rack to avoid damaging the software.

Remove Servo Rack

1. Disconnect all cables to the Servo Rack after checking that they are properly marked.

Note: If the URSA telecine is fitted with **JumpFree** there is a 40-conductor ribbon cable that must be disconnected from the Phase Servo board (102133). This cable will be temporarily removed from the Servo Rack, and is reconnected to the Meta-Speed[□] Phase Adapter 4 later.

2. Remove the Servo Rack from the telecine and place it on a stable work surface.

Remove Servo Rack Boards

3. Remove the Cintel boards from the Servo Rack indicated in .

Cintel Board Name	Cintel Board #
Servo Logic 8	101037
Framing Board	100829
Capstan Servo Control 1/3	101036
Capstan Servo Control 2	100828
Velocity Servo	102394 or 101038
Phase Servo	102133 or 100899
Gate & System Coding	100794

Table 1 - Ursa Servo Rack Boards to be removed

Install Servo Rack Connector Panel 2 (23017)

The Servo Rack Connector Panel 2 (SRCP2) will be mounted on the rear rails of the Servo Rack, just to the left (as viewed from the rear) of the metal panel for **BSK4** and **BSK5**. Perform the following modifications:

1. If a **TLC Connector Panel** is installed on the back of the Servo Rack, relocate it to the back of the PEC Rack.
2. If a **TLC Varispeed Panel** is installed on the back of the Servo Rack, relocate it to the back of the PEC Rack.
3. Install the SRCP2 Power Cable (19001). Solder the cable to the pins of **PL1** of the Servo Logic 10 (100733) board on the back side of the Servo Rack motherboard as shown in Table 2. Secure this cable to the main wiring bundle at the bottom of the Servo Rack.

Note: *The choice of the Servo Logic 10 board (100733) is merely a suggestion, since all that is required is to provide the needed voltages to the SRCP2.*

E9S Pin	Wire Color	100733 pin	Signal
1	violet	PL1-17	GND
4	red	PL1-2	+5V
6	yellow	PL1-4	+12V
8	white	PL1-29	-12V

Table 2 - SRCP2 Power Cable (19001)

4. Position the SRCP2 next to the rear of the Servo Rack to use as a reference for connector locations. Do not attach it to the Servo Rack at this time.
5. Table 3 details cable connections (19003 and 19016). Route cable (19016) from the Phase Servo slot (100899 or 102133) near the edge connector, around the right end of the motherboard and connect to **P15** of the SRCP2.

Cable	Conductors	SRCP2	To Connector and Board
19003	26	P13	P5 of Supervisor (23021)
19016	26	P15	P3 of Phase 4 (23019)

Table 3 - SRCP2 Cables

Install Servo Rack Connector Panel 2 (cont.)

- Route cable (19003) as shown in Figure 1. Starting at **P13** of the SRCP2, this cable goes outside the top of the Servo Rack and re-enters the rack just to the right of the Servo Control 2 (100828) slot. This routing is to ensure that the Supervisor board in the Framing board (100829) slot can be withdrawn from the servo rack without disconnecting or entangling its associated cables.

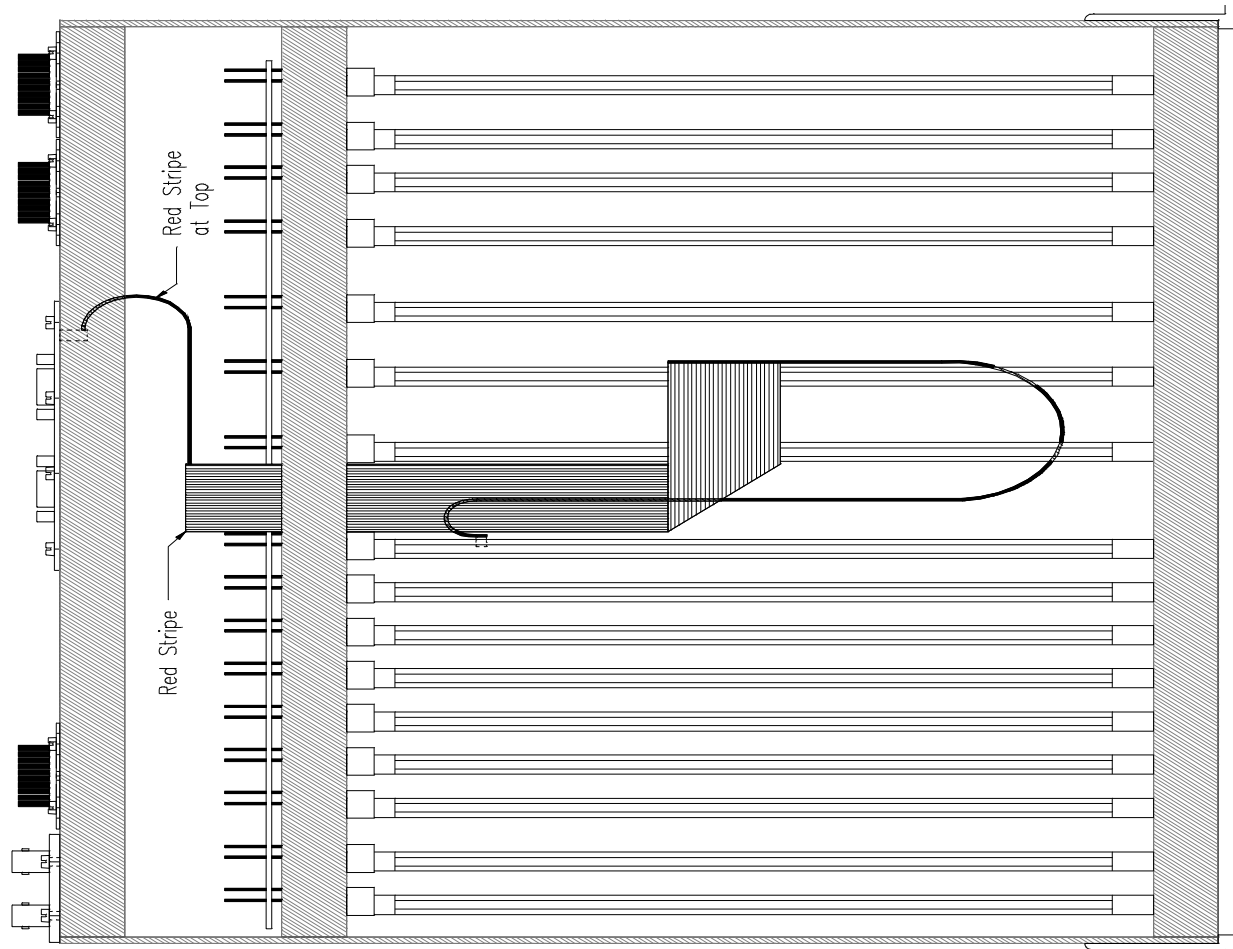


Figure 1 - 19003 Cable Routing (Top View)


- Connect cable (19001) (installed in step 3) to **P10** on the SRCP2. Note that pin 3 is a coding pin.
- Using the screws and washers provided, mount the SRCP2 on the rear rails of the Servo Rack, just to the left (as viewed from the rear) of the metal panel for **BSK4** and **BSK5**. It may be necessary to loosen the screws attaching the other connector panels to the rear rails of the Servo Rack. This will allow the nut bars to slide sideways, so that the holes will line up with the mounting holes SRCP2.

Install Meta-Speed[□] Boards

1. Set the jumpers on the Meta-Speed[□] Servo Rack boards as shown in . For more detailed information, refer to the Jumper Setting Charts in the Detailed Board Descriptions section starting at page 83.

Capstan Servo Control 2 Adapter (23006)		
J1-J6	in	Speedbus present

Capstan Servo Control 1/3 Adapter (23008)		
J1	in	Shuttle present
J2	out	No TLC
	1-2 (up)	FSOSlow* on Phase Servo PL1-25
	2-3 (down)	FSOSlow* on Phase Servo PL1-27
Note: J2 depends on the pins used by TLC		

Velocity DSP (23004)		
J1	out	WVD Hi-Z input
J2		Standard Interrupts
J3	out	WHD Hi-Z input
J4	1-2 (up)	WVD positive pulse
J5	2-3 (down)	WHD negative pulse
J6	out	WDT disabled
J7	out	SCLK Master
J8	in	SFRAME Slave
J9	2-3 (right)	PLL Ref is WHD
J10	1-2 (left)	URSA Gate Codes

Phase Adapter 4 (23019)		
J1-J8	in	URSA
J9- J12	1-2 (up)	URSA
J13	2-3 (down)	WVD negative pulse
J14	2-3 (down)	WVD negative pulse
J15-J16	1-2 (up)	J/F URSA
	2-3 (down)	Non J/F URSA
J17-J18	1-2 (up)	URSA

Table 4 - Typical URSA Jumper Settings

Install Meta-Speed[□] Boards (cont.)

2. Install 3-connector 50-conductor ribbon cable (19011) between the Supervisor board (23021) and the two associated adapter boards. These adapter boards are **NOT INTER-CHANGEABLE** and must be assembled in the following order:
 - a) Connect the long end of the 50-conductor ribbon cable (19011) to **P2** of the Supervisor board (23021).
 - b) Connect the center connector of the 50-conductor ribbon cable (19011) to **P2** of the Capstan Servo Control 1/3 Adapter (23008).
 - c) Connect the short end of the 50-conductor ribbon cable (19011) to **P2** of the Capstan Servo Control 2 Adapter (23006).
3. Install this Supervisor assembly (all 3 boards) in the servo rack: (Refer to for board arrangement).
 - a) Replace the Cintel Servo Control 2 board (100828) with the Meta-Speed Capstan Servo Control 2 Adapter (23006).
 - b) Replace the Cintel Servo Control 3 board (101036) with the Meta-Speed Capstan Servo Control 1/3 Adapter (23008).
 - c) Connect the free end of the 26-conductor ribbon cable (19003), installed earlier to **P5** of the Supervisor board (23021).
 - d) Replace the Cintel Framing board (100829) with the Meta-Speed Supervisor board (23021).

Supervisor 2 (23021) Left-most	Capstan Servo Ctrl 1/3 (23008) Middle	Capstan Servo Control 2 (23006) Right-most
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Table 5 - Supervisor 2 Group

Install Meta-Speed[□] Boards (cont.)

4. Install ribbon cables between the Velocity DSP board (23004) and the two associated adapter boards. These adapter boards are **NOT INTERCHANGEABLE** and must be assembled in the following order:
 - a) Connect one end of 50-conductor ribbon cable (19014) to **P2** of the Velocity DSP board (23004).
 - b) Connect the other end of 50-conductor ribbon cable (19014) to **P2** of the Phase Adapter 4 (23019). Note that this connector is on the solder side of the Phase Adapter 4.
 - c) Connect one end of 50-conductor ribbon cable (19018) to **P4** of the Phase Adapter 4 (23019).
 - d) Connect the other end of 50-conductor ribbon cable (19018) to **P2** of the Gate & System Coding Adapter (23005).
5. Install this Velocity DSP assembly (all 3 boards) in the servo rack: (Refer to 6 for board arrangement).
 - a) Replace the Cintel Gate & System Coding/Shrinkage 1 board (100794) with the Meta-Speed[□] Gate/System Adapter (23005).
 - b) Connect the free end of the 26-conductor ribbon cable (19016), installed earlier to **P3** of the Phase Adapter 4 board (23019).
 - c) Replace the Cintel Phase Servo board (100899 or 102133) with the Meta-Speed[□] Phase Adapter 4 (23019).
 - d) Replace the Cintel Velocity Servo board (101038 or 102394) with the Meta-Speed[□] Velocity DSP board (23004).

Velocity DSP	Phase Adapter 4	Gate/System Adapter
(23004)	(23019)	(23005)
Left-most	Middle	Right-most

Table 6 - Velocity DSP Group

6. Replace the Servo Logic 8 board (101037) with the Meta-Speed[□] Servo Logic 8M board (23009).
7. Connect the 40-conductor ribbon cable (19012) from the component side of the Supervisor 2 board (23021) **P3** to the solder side of the Velocity DSP board (23004) **P3**.
8. Connect the 10-conductor 'twist-n-flat' ribbon cable (19019) between the Velocity DSP (23004) **P4** and the Phase Adapter 4 (23019) **P6**.
9. On the Servo Logic 10 (100733) board, lift pin **8** of **IC7**. This disables Shuttle = 0 logic, a necessary modification for Meta-Speed[□] in an URSA.

Frame Counter Modifications

Description

This procedure describes the modifications required for the Meta-Speed[□] to drive the telecine Frame Counter and associated devices (color correctors, TLC, etc.). The advantages of this approach include:

- Arbitrary perfs per frame (such as 3 perf 35mm with a 4 perf gate) operation, with appropriate Frame Counter and color corrector operation.
- Adjustable, consistent timing of the count pulses.
- More consistent editing with TLC, etc.

Discussion

In Cintel telecines, the frame count information is derived from the slots on the sprocket encoder cylinder, in the rear of the film gate. The slots are arranged in a pattern which generates a biphasic pair of signals, when sensed with phototransistors and LEDs. These signals indicate the position of the film, and are called **2ØA** and **2ØB**. The analog phototransistor signals go first to the Counter Board (100853), where they are level-shifted to TTL, conditioned by the Gate Code information to maintain consistent count direction for different gate types, and decoded to drive the local counter display. The TTL versions of the signals then go to the Sep Mag & Counter board (100585), where they are buffered by transistors, and sent out to external devices, such as Color Correctors. In URSA Gold and modified URSA telecines that have been wired for JumpFree, the output of the Sep Mag & Counter board (100585) also goes to the Phase Servo board (100899 or 102133) in the Servo Rack.

The purpose of this modification is to replace the signals generated by the encoder cylinder slots with signals from the servo. The servo signals are derived from the encoder cylinder castellations. After performing this modification procedure, the source of 2ØA and 2ØB will be the Meta-Speed[□] Servo System.

In telecines with JumpFree wiring, the 2ØA and 2ØB signals are already connected to the Servo Rack, via TwinAx cable. The Meta-Speed[□] Phase Adapter 4 board (23019) includes circuits to drive the TwinAx signals directly. This uses the wiring already in place, so no framework wiring modification is required. The Sep Mag & Counter board's (100585) 2ØA and 2ØB output driver must be disabled. In other telecines including MkIII, Turbo, and URSA's not wired for JumpFree, a pair of wires must be added from the Servo Rack to the PEC Rack. The Sep Mag & Counter board (100585) requires no modification.

Procedure

If you have a JumpFree equipped URSA, follow the section entitled:

I. Frame Counter Mod. for URSA with JumpFree. (below)

If your URSA does not have the JumpFree option installed, follow the section entitled:

II. Frame Counter Mod. for non-JumpFree URSA. (page 15)

I. Frame Counter Mod. Procedure, URSA with JUMPFREE

Power down the telecine before removing any boards!

Disable Sep Mag & Counter (100585) output drivers:

1. Solder a jumper wire between VT2-Emitter and VT2-Base.
2. Solder a jumper wire between VT4-Emitter and VT4-Base.
3. Solder a jumper wire between **PL1-9** and **PL1-11**.
4. Solder a jumper wire between **PL1-7** and **PL1-10**.

Disable Frame Counter (100853) TTL outputs:

1. Remove **IC7**.
2. Remove **IC8**.

Enable and Adjust Meta-Speed[□] 2ØA and 2ØB Drivers

1. On the Phase Adapter 4 board (23019), set bit 4 of **SW2** to **ON**. This enables the drivers.
2. On the Phase Adapter 4 board (23019), bits 1 and 2 adjust the timing of the 2ØA and 2ØB signals, in 1/4 frame increments. Set these bits so that the Color Corrector frame count changes when the frame line passes the center of the picture monitor.
3. Reinstall the Servo Rack and reconnect all the cables.
4. Locate the cable that was previously connected to the J/F Phase Servo board (102133) and connect it to the Phase Adapter 4 board (23019) connector **P5**. Proceed to page 16 “Change Servo Drive Pulse to Write Vertical Drive”.

II. Frame Counter Mod. for non Jump-Free URSA

Power down the telecine before removing any boards!

Disable Frame Counter Board TTL outputs.

Note: Some machines may have a 100594 board rather than a 100853.

On the Frame Counter board (100594), remove **IC33** and **IC34**.

On the Frame Counter board (100853), remove **IC7** and **IC8**.

Add 2ØA and 2ØB Signals to Servo Rack

Add a cable between the PEC Rack and the Servo Rack as detailed in Figure 2. This cable must have a disconnect to allow removal of the racks. Suggested connectors are XLR 3-pin.

Suggested cable is Belden 9451 or equivalent shielded 1-pair 'audio' cable. Note that there will be wires already present on some of the pins indicated. The new wires should be added to the existing wires, leaving the old signal paths intact.

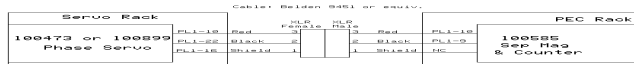


Figure 2 - Servo Rack to PEC Rack Interconnect

1. Power down the telecine.
2. Disconnect and remove the Servo Rack (if not already out of the machine).
3. Solder a shielded 1-pair cable to the Phase Servo socket as follows:
 - Shield to Phase PL1-16
 - Black to Phase PL1-22 (2ØA Signal)
 - Red to Phase PL1-10 (2ØB Signal)
4. Cut the cable to an appropriate length for the layout of your telecine and terminate it with a female 3-pin XLR connector as follows:
 - Shield to pin 1
 - Black to pin 2 (2ØA Signal)
 - Red to pin 3 (2ØB Signal)
5. Re-install the Servo Rack and reconnect all cables.
6. Disconnect and remove the PEC Rack.

II. Frame Counter Mod. for non Jump-Free URSA (cont.)

7. Solder a shielded 1-pair cable to the Sep Mag & Counter (100585) socket as follows:
 - Shield – no connection. This is to avoid ground loops, while still shielding the cable.
 - Black to PL1-9 (2ØA Signal)
 - Red to PL1-10 (2ØB Signal)
8. Cut the cable to an appropriate length for the layout of your telecine and terminate it with a male 3-pin XLR connector as follows:
 - Shield to pin 1
 - Black to pin 2 (2ØA Signal)
 - Red to pin 3 (2ØB Signal)
9. Re-install and re-connect the PEC Rack.
10. Connect the two XLR connectors.

Enable and Adjust Meta-Speed[□] 2 A and 2 B Drivers

1. On the Phase Adapter 4 (23019), set bit 4 of **SW2** to **On**. This enables the drivers for the 2ØA and 2ØB signals.
2. On the Phase Adapter 4 (23019), bits 1 and 2 adjust the timing of the 2ØA and 2ØB signals, in 1/4 frame increments. Set these bits so that the Color Corrector frame count changes when the frame line passes the middle of the picture.

Change Servo Drive Pulse to Write Vertical Drive

The Meta-Speed[□] for URSA requires the Servo Rack **PL11** to be driven by Write Vertical Drive (WVD) instead of the customary Servo Drive Pulse. WVD is normally available at PEC Rack **PL28**, originating at Scans Rack **SK30**. Perform the following modification:

1. Disconnect the coaxial cable going to Servo Rack **PL11**, which is a BNC on the right end of the Servo Rack, as viewed from the rear.
2. Move the Write Vertical Drive cable (or the ‘tee’ connector on URSA Gold) from PEC Rack **PL28** to Servo Rack **PL11**.
3. Connect the coax cable removed in step 1 to PEC Rack **PL28** for storage. This signal is not used by the PEC Rack.

<p>Note: Omit step 3 above. If a Cintel LTC Generator (101117) is fitted in the PEC rack. It will be necessary to add a ‘tee’ connector and a short length of video coax to continue to provide the PEC Rack with the WVD signal. Because this signal is used by the LTC Generator board.</p>
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Verify Write Horizontal Drive to the Servo Rack

Late model URSA and URSA Gold telecines which are JumpFree-equipped already supply the Write Horizontal Drive (WHD) signal to Phase Servo **PL1-18** and require no modification. If your machine fits this description, proceed to the section entitled “**Miscellaneous**” on page 20.

Older URSA’s without JumpFree that do not have this signal must be modified as follows:

1. Connect WHD to AUX2 of the SRCP2 using one of the following:
 - a) **URSA 4:2:2:** Add a coax cable from Scan Rack **SK39** (Write AHD1) to the Meta-Speed[□] SRCP2 BNC connector marked **AUX2**.
 - b) **URSA 4x4:** Add a coax cable from Scan Rack **SK40** (Write AHD2) to the Meta-Speed[□] SRCP2 BNC connector marked **AUX2**.
2. Configure jumpers the Phase Adapter 4 (23019) in the Servo Rack as follows:
 - a) J15 - 2 to 3 (down) This defines the **AUX2 BNC** connector as an input.
 - b) J16 - 2 to 3 (down) This sets the source of **WHD** to be **AUX2**.

For more information, see the Phase Adapter 4 schematic (Drawing 23019 Sheet 4 on page 132).

Scan Rack Ribbon Cables for non JumpFree URSA only

This section describes additional cabling and modifications required for installation of Meta-Speed[□] in URSA telecines that are **NOT** wired for JumpFree.

Description

Meta-Speed[□] uses the same connector and ribbon cable as JumpFree to communicate with the Scan Rack. On older URSA telecines, this connector may not be active and could require modification. On newer URSA and URSA Gold telecines the connector has an associated jumper which activates the connector. Also, on URSA Gold telecines if the customer purchases the telecine without JumpFree (intending to install Meta-Speed[□]), Cintel may remove the pre-installed ribbon cable from the Scan Rack, so it must be re-installed.

Installation (non JumpFree URSA)

Install Ribbon Cable (19021) in the Scan Rack

This ribbon cable is intended to be equivalent to Cintel 55690A. One end will be mounted on the back of the Scan Rack and the other will be connected to **PL1** on the Scan Generator board (102112). The Cintel procedure requires the Scan Rack to be removed from the telecine, which is a lot of work. This procedure should be much easier.

Check that the following has been included with the Meta-Speed[□] kit: a ribbon cable (19021), and an extra 40-pin female ribbon cable connector.

1. Using a pair of scissors or a ribbon cable cutter, cut the female connector off of ribbon cable (19021) about 1/2 inch from the connector. Save the connector and its attached 1/2 inch cable to show the proper orientation of the connector on the end of the cable.
2. Remove the Scan Output board (102111) from the Scan Rack.
3. At the rear of the Scan Rack, slide the cut end of ribbon cable (19021) between the motherboard and the right (as viewed from the rear) Scan Rack side plate.
4. Mount the male connector on the right (as viewed from the rear) Scan Rack side plate with the included stick-on mounting pads and cable ties. The connector should be flush to the rear of the side plate, and the bottom of the cable should be about (2.75in.) from the bottom of the Scan Rack. Replace the Scan Output board (102111) in the Scan Rack.
5. Crimp the 40-pin ribbon cable to the cut end of the ribbon cable (19021). Use the cut-off connector from step 1 as a guide to insure proper orientation. This connector will connect to the 102112 board later.

Modify the Scan Generator Board (102112)

1. Remove the Scan Generator board (102112).
2. Remove the Scan Effects piggyback board (102113) from the Scan Generator board (102112).
3. The Scan Generator board (102112) edition can be identified in the issue box on the component side of the board. Depending on the edition, perform **ONE** of the following:

Edition A: This board is not current - it should have been updated to Edition B as part of the kit 18/19 update. Please contact Cintel for an update **before** proceeding.

Edition B: (See Figure 3 next page)

- a) If NOT already fitted, add a wire between **IC103** pin 12 and **PL1-36**.
- b) If NOT already fitted, add a wire between **IC125** pin 10 and **PL1-2,4,6,...32** (even). (Be sure to stop at **PL1-32**.)
- c) Cut the track connected to **PL1-33** on the solder side of the board.

Modify the Scan Generator Board (102112) (cont.)

- d) Remove resistor R4.
- e) Add a wire between **IC125** pin 1 and **IC134** pin 10.
- f) If there are other wires connected to **PL1**, record where they go and then remove them.
- g) Mark the board as *Edition C, CC Issue 1, DI Issue 1*.

Edition C or later: If present, set link **LK1** to **JF**. This enables **PL1** for input.

4. Connect the newly crimped connector on ribbon cable (19021) to Scan Generator (102112) connector **PL1**. The ribbon cable should fold over the top of the connector, and exit at the front of the board.
5. Replace the Scan Effects piggyback board (102113) on the Scan Generator board (102112), taking care to not damage the ribbon cable.
6. Replace the Scan Generator board (102112) in the Scan Rack.

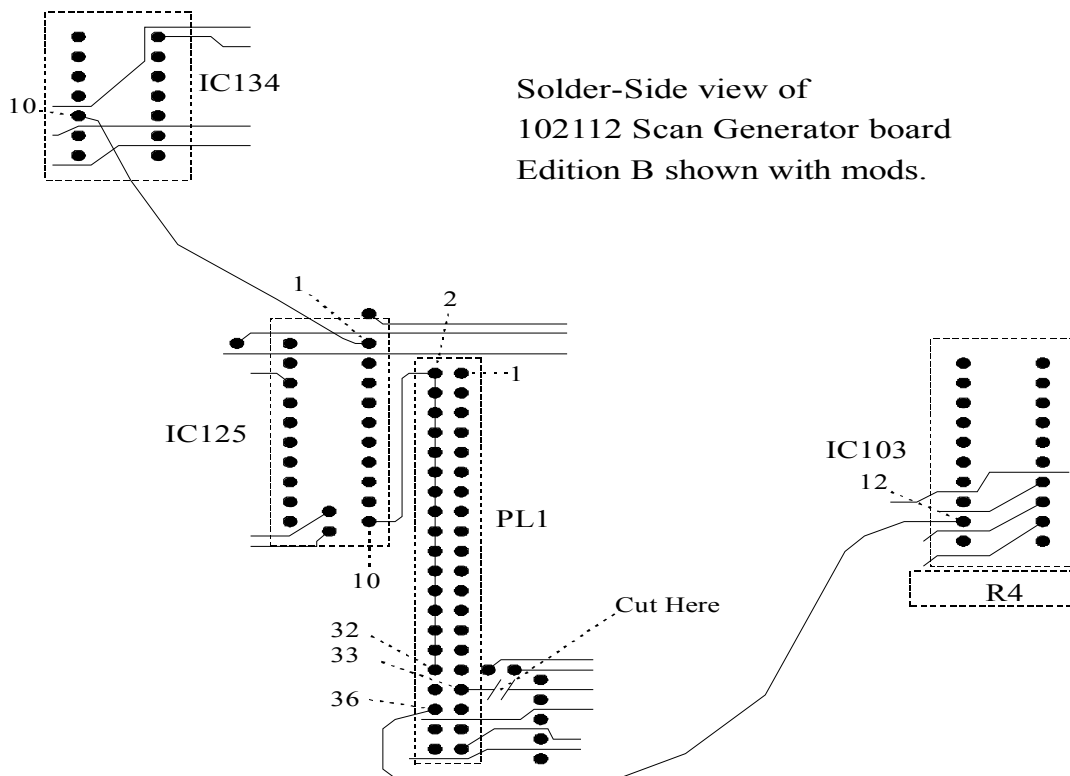


Figure 3 - Scan Generator Board Modification

Install Ribbon Cable (19020)

1. Pass the ribbon cable between the rear mounting rails of the Servo Rack, so that the connector marked **Phase-4 P5** is at the front of the Servo Rack.
2. Fold the cable to form a right angle turn and connect it to **P5** of the Meta-Speed[□] Phase Adapter 4 card (23019). Connect the other end to the connector mounted on the Scan Rack side plate earlier. This connector is part of ribbon cable (19021).
3. The Scan Rack Ribbon Cable Installation for a non JumpFree URSA is complete.

Note: For telecines equipped with ITK's Scandal the 40-conductor ribbon cable that connects from the Phase Adapter 4 **P5** to the URSA Scan Generator card **PL1** also needs to connect to the TK109 board **PL5**. (Details may be found in the Scandal installation manual)

Miscellaneous

Digiscan 4:2:2 WVD Problems (NOT applicable to URSA 4x4)

Digiscan 4:2:2 has excessive droop and low levels on its Write Vertical Drive (WVD) signal. To reduce the droop rate and increase the signal level, perform the following modification to the Store Control 2 board (101133) (See page 1 of the Cintel schematic):

1. Change capacitor **C62** from **0.1uF** to a **2.2uF** tantalum, **16** volts or higher. Orient this capacitor with the **positive** side towards the **lower** edge of the circuit board. On page 1 of the Cintel Store Control 2 (101133) schematic, the positive side of the capacitor is to the left (towards **IC24** pin 10). This will decrease the droop.
2. Add a **10K8** resistor from **IC24 pin 16** to **IC24 pin 10**. This will increase the voltage swing of the WVD signal.

SlowScan Disable GPI Input

Some users (especially those with Kinesis units) have requested a GPI input to disable SlowScan. This is available at PL1-6 of the Meta-Speed[□] Gate/System Adapter (23005). If this line is pulled low, SlowScan will be turned Off. This input overrides any selection made at the VT100 terminal or CTM control panel.

Time Logic Controller

Meta-Speed[®] software versions 1.98 and above require TLC RK 3.44 or later software. To use the TLC with Meta-Speed[®], the TLC Buffer Electronics Assembly must be modified and **J2** on the Meta-Speed[®] Capstan Servo Control 1/3 Adapter (23008) must be set to select the Film Speed Override (FSO*) signal.

1. Remove **U6** and **U7** (both are chip type HI-5043) from the TLC Buffer Electronics Assembly. **WARNING:** On some URSA telecines, chip **U7** may have pin 16 cut or lifted, or a modified socket between chip **U7** and the board. Should reinstallation of the Cintel Servo become necessary ensure that the modified **U7** is inserted in the correct socket.
2. Replace **U6** with the header marked **U6** (this header connects pin 1 to pin 10).
3. Replace **U7** with the header marked **U7** (this header connects pin 1 to pin 15).
4. Set **J2** on the Meta-Speed[®] Capstan Servo Control 1/3 Adapter (**23008**) to select the pin on **PL1** which is the source of the FSO* signal from the TLC Buffer Electronics Assembly. See Table 7, which shows the location of this signal.
5. After installation is complete TLC will need to be enabled at the software **Setup Menu**, under **Film Speed Override Type**.

J2	FSO* signal	Telecine
1 to 2	PL1-25	MkIIIB, Turbo 2, most URSAs
2 to 3	PL1-27	MkIIIC, some URSAs

Table 7 - TLC Signal location

Next Step – Proceed to “Getting Started” on page 53.

Removal of Meta-Speed[®] from URSA or URSA Gold

Should it be desired to remove the Meta-Speed[®] system from the telecine, the ribbon cables and connector panels can be left installed, but disconnected. The old boards can be re-installed without modification. **It is important to reconnect the Servo Drive Pulse, which was changed to Write Vertical Drive.**

The following steps summarize the removal procedure:

1. Power down the telecine.
2. Disconnect the coaxial cable going to **PEC Rack PL28**. This cable is the Servo Drive Pulse, which was moved as part of the installation procedure.
3. Move the Write Vertical Drive cable (or the 'tee' connector on URSA Gold) from **Servo Rack PL11** back to **PEC Rack PL28**.
4. Connect the Servo Drive Pulse coax cable removed in step 2 to **Servo Rack PL11**. This should result in both the Servo Drive Pulse and Write Vertical Drive being restored to their original configuration.
5. Replace the chips on the TLC Buffer Electronics Assembly, if applicable. Note that some TLC installations have chip U7 pin 16 cut or lifted.
6. Reverse the procedures used to perform the Frame Counter Modification.
7. Replace the Meta-Speed[®] boards with the original Cintel boards.
8. On the Servo Logic 10 (100733) board, reconnect pin **8** of **IC7** to enable Shuttle control logic.
9. Reapply power.