

MODEL 1021 INTERSYNC SERVO SET-UP
GENERAL REMARKS

1. This complete Servo set-up procedure, after initial adjustment, should not need to be performed except at very infrequent intervals to compensate for component aging, etc. The adjustments which are accessible without removing the module overlays are the only ones which may require adjustment at more frequent intervals. Steps marked with a box 3 will seldom be required. Where possible, operating checks have been suggested.
2. In using any of these procedures, make certain that the line sync signals and video signals from the same sync generator are connected to the proper inputs of the machine.
3. Reference under MACHINE VTR MODE to "TEST" apply to the VR2000 only.
4. Looking at the rear of the chassis, locate the TAPE H TRIGGER switch in the upper right hand corner. Set the Switch to EXT, selecting tape horizontal trigger pulses from Amtec (VR1100), or the Signal System (VR2000, VR1200). Set the REF H TRIGGER Switch, in the same area, to INT if no Colortec is installed, or to EXT if a Colortec is installed.

NOTE

THESE ARE THE NORMAL OPERATING POSITIONS OF THESE TWO SWITCHES.

5. Remove all Servo overlays except those over EB1, 5 and 14 when doing a complete alignment.
6. If power supply adjustments are required, make them prior to any of the following procedures. They should be 12 volts ± 0.25 volts, and identical in magnitude to within 0.1 volt.
7. Separate controls for 50 Hz, 60 Hz and -08 versions are listed only when applicable. Test points and controls listed under -08 apply also to machines modified for Universal Colortec. These servos can be identified by the small knob and switch (fixed/variable control track record phase) on the front of EB9.

8. If servo mode is not listed, then it may be in PRESET. (P/B EXT, RECORD-VIDEO) VERTICAL, HORIZONTAL or AUTOMATIC.
9. Component designations used: 2R28 - indicates resistor number 28 on Printed Wiring Board (PWB) number 2.
10. Lower dash numbered servos may have controls under overlays which are not so indicated in this procedure. It is suggested that holes be drilled to make these controls accessible.
11. Where the "A" Scope (VR2000) or Waveform Monitor (VR1200) is used, be certain that the scope is actually synced to the EXTERNAL REFERENCE.
12. If an adjustment does not provide expected results, check:
 - a. Test points connected to scope.
 - b. Control being adjusted.
 - TP 1 Bd 2 c. Scope sync.
 - d. Avoid errors due to "Screwdriver Drift".
13. Allow machine to reach normal operating temperature. Except in emergency, adjustment should not be attempted until machine has had power applied for 30 minutes.
14. Some 625 Hz operations are using third serration of Sync. This requires a modification of EB8, Record Phase Sensing.
15. A meter may be used for any adjustment requiring a Voltage Level; i.e. discriminators.
16. Because conditions of usage, such as hours of operation per day, and environmental extremes of temperature and vibration, vary widely, it may be desirable to perform the checks more or less frequently than indicated in order to better suit the needs of the particular installation. The periods indicated should be more than adequate for an average installation.
17. PLAYback a recording made to SMPTE standards in AUTO mode. Check for a steady glow of the VERT and HORIZ LOCK lamps. Observe the DRUM ERROR display on the "A" Scope, and trim HORIZONTAL STABILITY controls 1 and 2 on the servo panel for the smallest error signal. Check lock-in time by starting AUTO mode playback from READY mode (motors running), several times. The lock-in time should not exceed four seconds on 525-line standards, or five seconds on 405-, 625-, and 819-line standards. If a longer time is required, make checks for the following undesirable conditions:

- a. Tracking control not adjusted for peak RF output after lock-in, or equalization incorrect.
- b. Tape slippage at the pinch roller during boost torque due to excessive boost torque.
- c. Tape slippage at pinch roller during boost torque, due to low pinch roller pressure.
- d. Loss of vertical or equalizing pulses or presence of spurious pulses in the vertical blanking region of either reference sync or tape sync, especially during the locking process.
- e. Use of 5-mil track width video head for recording at 15 in/s.

If none of these conditions exist, perform checks for an abnormal condition of the servo.

18. Before Electronic Editor Operation:

1. Perform Steps 2 and 14B of the Weekly checks section, but allow not more than 1/10 Hz drift of either drum or capstan oscillator.
2. With the drum and capstan motors running in READY mode for a minute or more, check the centering of the meter on the servo center panel. If the meter is not giving an average center reading, or at least within the white scale area, remove the overlay from Board 6 and trim R85, Board 6, to center the meter. (Meter switch to REC PHASE).
3. Adjust the H PHASE and REC PHASE controls on the servo meter panel in accordance with the instructions accompanying the Electronic Editor.

19. Summary of Servo Periodic Checks:

DAILY:

1. Check the scope for stable trigger.
2. Check the drum oscillator frequency.
3. Check the capstan oscillator frequency.
4. Check the drum tach phasing.

19. Summary of Servo Periodic Checks: (Continued)

5. Check the VERT LOCK phasing. (step 28)
6. Check the AUTO mode stability and lock-in. (See para 17)

WEEKLY:

1. Check the reference frequency discriminator adjustment. (step 1)
2. Check the tach frequency discriminator adjustment. (step 5)
3. Check the control track/capstan oscillator frequency discriminator adjustment. (step 15)

When Video Head is Changed:

1. Check the control track record and playback adjustment (step 19,20,21)
2. Check damping (step 7).

Before Electronic Editor Operation:

1. Check the "A" Scope triggering, drum and capstan oscillator frequencies.
2. Check the servo EDITOR panel meter for centering in READY mode in "REC PHASE" position of switch.
3. Adjust the servo EDITOR panel H PHASE and REC PHASE controls for correct splices.

STEP	ADJUSTMENT	60 Hz	50 Hz	SCOPE		MACHINE		ADJUST FOR
				INPUT	SYNC/ SWEEP SPEED	HEAD	VTR MODE	
10	HOME TRACK OR RECORD PHASING (weekly) <i>ON AFTER WITH STABILITY DOTS ON MONITOR</i>	3R84	3R1	3TP4/ RMKS <i>DO NOT USE DELAYED SWEEP</i>	2TP1/ 20 US		RECORD (TEST)	<i>1TP2</i> Compare input video to TACH at 3TP4. Adjust 3R84 (60 Hz) for positive edge of tach crossing third serration of sync or 3R1 (50 Hz) for crossing of first serration. (Refer to graph 14 of General Remarks. Observe that as tach is moved one serration in either direction that the Servo warning light comes on. Stability marker dots on the monitor may be used
11a	SCOPE CALIBRATE	-	-	3TP4	2TP1	ON	EE TRACK 1 STOP	Adjust VARIABLE SWEEP SPEED control on scope to display one cycle of tach across ten centimeters.
11b	SCOPE CALIBRATE	-	-	3TP4	2TP1	ON	EE TRACK 1 STOP	A quick check is to observe that the stability marker dots change position as tracking switch is changed. They should move about 16 lines down on each switch.
11c	TRACK 2	3R21	-	3TP4	2TP1	ON	EE TRACK 2 STOP	Adjust until positive edge of tach is located 2.5 cm after start of sweep. (Ninety degree phase shift).

STEP	ADJUSTMENT	60 Hz	50 Hz	SCOPE		MACHINE		ADJUST FOR
				INPUT	SYNC/ SWEEP SPEED	HEAD	VTR MODE	
12	TRACK 3	3R39	-	3TP4	2TP1	ON	EE TRACK 3 STOP	Adjust until positive edge of tach is located 5 cm after start of sweep (180 degree phase shift).
13	TRACK 4	3R40	-	3TP4	2TP1	ON	EE TRACK 4	Adjust until positive edge of tach is located 7.5 cm after start of sweep (270 degree phase shift)
14a	CAPSTAN SENSITIVITY →	13R19						Set to mid-range -12 turns from maximum CCW Normal. Setup in Step 26. <u>Do not perform Step 14a unless serious misadjustment has occurred or components have been replaced.</u>
14b	CAPSTAN OSCILLATOR (daily)	13R20	13R78	13TP4	2TP1	ON	EE STOP	Nearly stationary 60/62.5 cycle square wave (TACH divided by four. If the "A" Scope or WFM is used, the frequency is 240 (60 Hz) or 250 (50 Hz). <u>The head must be on only in the VR2000</u> , since TACH is used as sync to the <u>scope</u> standards where 13R20 has not been adjusted, it may be necessary to center 13R20.
								<i>IF MIS SET WILL CAUSE STEP 10 TO BE BATTY!!</i>

STEP	ADJUSTMENT	60 Hz	50 Hz	SCOPE		MACHINE		ADJUST FOR
				INPUT	SYNC/ SWEEP SPEED	HEAD	VTR MODE	
15	CAPSTAN DISC.	12R1	12R2	13TP4	2TP1	ON	RECORD (TEST)	Stop any horizontal movement of trace. <u>Normally only Step 16 is necessary.</u>
16	CAPSTAN DISC. (weekly) -08	12R1 meter	12R2	12TP3 <i>if NOT on FRONT PANEL DRILL ACCESS HOLE</i>	2TP1	ON	RECORD (TEST)	Zero volts. In later versions of the servo, the front panel meter may be used. Scope or Meter may be used.
17	CAPSTAN OSC. TRIM	13R18	-	13TP1	2TP1	ON	RECORD (TEST)	Zero volts with the scope or meter. While this may require occasional adjustment to compensate for aging, a more usual cause is an off fre- quency oscillator. <u>Check 14b before adjusting 13R18.</u> NOTE: When making assemblies adjusting the Capstan Oscillator to have the same voltage in Record that it has in P/B prior to the Edit will pro- duce better "ASSEMBLE" Edits. Or the Capstan oscillator may be adjusted for the same drift on the "A" Scope or WFM.

STEP	ADJUSTMENT	60 Hz	50 Hz	SCOPE		MACHINE		ADJUST FOR
				INPUT	SYNC/ SWEEP SPEED	HEAD	VTR MODE	
18	RECORD PHASING SENSOR	8R9	See ADJ. FOR	8TP1 and 8TP2	2TP1	ON	RECORD (TEST) ANY BUT PRESET	Not applicable to systems using first serration. Check for an approximate 55 usec pulse at 8TP1. Usually all that will be necessary is to trim 8R9 for the widest pulse at 8TP2 (about 18-20 usec). (See paragraph 14 of General Remarks.)
19	CONTROL TRACK RECORD OPTIMIZE	9R1	-	10TP1 and 10TP2	2TP1	ON	RECORD AND P/B	Record a section of tape with control track record level set from about 1.5V to 2V and observe Playback at 10TP2 or Monitor Scope. Inflection of the zero crossing in Playback should be just visible. Readjust 9R56 to obtain this. After <u>a recording observe the wave form monitor when a new head is installed or a different type of tape is used.</u> This will indicate the need for re- optimizing control track head.
		-08 9R56		10TP1 and 10TP2	2TP1			
20	CONTROL TRACK PHASE	9R12	-	10TP1	INT NEG		RECORD (TEST)	At 10TP1 or on Monitor Scope, adjust so that leading edge of the frame pulse is at the <u>90°</u> point of the sine wave.
		-08 9R34						

STEP	ADJUSTMENT	60 Hz	50 Hz	SCOPE		MACHINE		ADJUST FOR
				INPUT	SYNC/ SWEEP SPEED	HEAD	VTR MODE	
21	CONTROL TRACK P/B LEVEL	11R79	-	11TP6	INT		P/B	Adjust for ten volts P/P or observe on Monitor Scope.
22	TRACKING HOME TRACK	11R43	-	11TP5	INT POS		P/B HOME TRACK	TRACKING control centered. Adjust for maximum Tracking Meter current with a pulse width of between 200 and 800 usec.
23	TRACKING TRACK 2	11R44	-	11TP5	INT POS		P/B TRACK 2	TRACKING control centered. Adjust for maximum indication of Tracking meter with a pulse width of between 1200 and 1800 usec.
24	TRACKING TRACK 3	11R61	-	11TP5	INT POS		P/B TRACK 3	TRACKING control centered. Adjust for maximum current on Tracking meter with a pulse width of between 2200 and 2800 usec.
25	TRACKING TRACK 4	11R62	-	11TP5	INT POS		P/B TRACK 4	TRACKING control centered. Adjust for maximum current on Tracking meter when pulse width is between 3200 and 3800 usec. Vernier tracking moving off center position is an indication that Steps 23-26 are required on tapes made on the same machines.

ADJUST for HOME TAPES

STEP	ADJUSTMENT	60 Hz	50 Hz	SCOPE		MACHINE		ADJUST FOR
				INPUT	SYNC/ SWEEP SPEED	HEAD	VTR MODE	
26	CAPSTAN DAMPING	13R19	-	13TP1	LINE/ 0.1 SEC		P/B	Disturb capstan sufficiently to cause 1-2V P/P error. Adjust for about 3 Hz of decaying oscillation. <u>Adjustment too far clockwise will result in excessive hunting or osc.</u>
27	REFERENCE TRAPEZOID	10R77	-	10TP6	INT NEG	OFF	STOP EE	Symmetrical trapezoid 60 Hz - 30 Hz trapezoid 50 Hz - 25 Hz trapezoid 625 Hi Band 12.5 Hz trapezoid infrequent adjustment. <u>Serious mis- adjustment results in slow servo lock- up in VERTICAL or AUTOMATIC Mode.</u>
	-08 <i>MAY BE MARKED R8</i>	10R80		10TP4				
28	DRUM VERTICAL PHASING	1R72	-	2TP3	2TP1 NEG	OFF	STOP EE VERT	Zero volts. <u>Normal adjustment is Step 31 unless serious misadjustment has occurred.</u>
29	FRAMING PHASE	10R50	-	1TP4/ and 1TP2	2TP1		P/B HOME TRACK VERT	Adjust for frame lock. <u>Step 30 is normal adjustment.</u>
	-08	10R44						

STEP	ADJUSTMENT	60 Hz	50 Hz	SCOPE		MACHINE		ADJUST FOR
				INPUT	SYNC/ SWEEP SPEED	HEAD	VTR MODE	
30	FRAMING ADJ. -08	10R50 10R44	-	10TP4 10TP5	2TP1		P/B HOME TRACK VERT.	Adjust for 0 Volts. The Vertical comparator Lamp on the Servo Chassis must be on. If not perform Step 29. <i>SWING TO +4 - 3 VOLTS TO CHECK OPERATION OF COMPARATOR LOCK.</i>
31	DRUM VERTICAL P/B TIMING (weekly)	1R72	-	1TP4/ and 1TP2	2TP1		P/B HOME TRACK VERT	After Vertical Comparator light on Servo Chassis is on, adjust for coin- cidence between tape and Reference Vertical ± 5 usec. Jitter is normal in this mode.
32	HORIZ TRAPEZOID 625 405 819	4R25	 4R25 4R42 4R56	4TP2	INT NEG/ 20 usec.	OFF	STOP	Symmetrical trapezoid. Infrequently required. <i>NOT VERY CRITICAL</i>
33	HORIZONTAL STABILITY CONTROLS ON SERVO CHASSIS (weekly)			6TP2	2TP1		P/B HORIZ	After machine is in Horiz lock as indicated by control panel HORIZ lamp (or on A Scope or WFM drum error has changed from Vertical to Horizontal rate error), adjust both controls for quietest and straightest display of drum error.

STEP	ADJUSTMENT	60 Hz	50 Hz	SCOPE		MACHINE		ADJUST FOR
				INPUT	SYNC/ SWEEP SPEED	HEAD	VTR MODE	
34	HORIZONTAL LOCK WITH AMTEC	4R24		1TP2 and 1TP4	2TP1		P/B HORIZ	<p>Put Intersync 5 turn HORIZONTAL PHASE control (Servo Chassis control panel) to center of its range. Turn Amtec EXT REF POSITION knob full counter clockwise. Adjust 4R24 to put the Amtec meter pointer on the counterclockwise black dot of the meter. Adjust Amtec EXT REF Position to center control voltage meter.</p> <p>NOTE: Refer to Universal Colortec Manual for setup of EE timing on 625 machine.</p>
	HORIZONTAL LOCK, NO AMTEC	4R24		1TP2 and 1TP4	2TP1		P/B HORIZ	<p>Put Intersync 5 turn HORIZONTAL PHASE control on the Servo Chassis to mid-range. HORIZONTAL DRUM COMPARATOR Lamp on adjust so that Tape and Reference Sync leading edges are coincident, ± 0.5 usec.</p>
35	HORIZONTAL LOCK	6R100	6R100	6TP3	INT POS		P/B HORIZ	<p>A positive pulse. Continue to adjust for the widest possible pulse. It will be approximately 2 usec. HORIZ. Lock Light on the control panel should now be on.</p> <p>This must be adjusted whenever 4R24 is adjusted (Step 34).</p>