



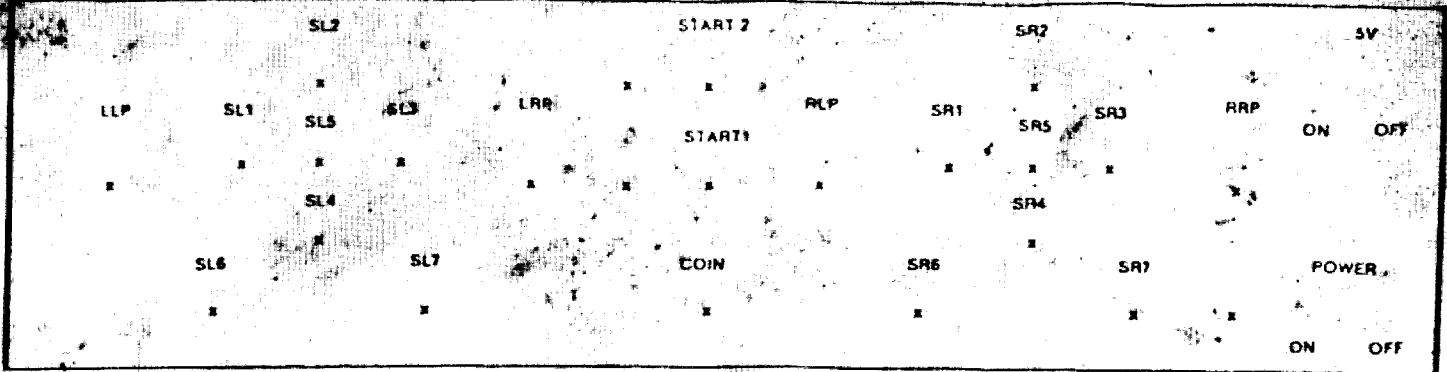
Kurz-Kasch, Inc.

Electronics Division  
 Box 1246 • 2271 Arbor, Blvd.  
 Dayton, Ohio 45439  
 Telephone (513) 299-0990

# Operating Instructions

For Model 309A, 309C

VECTORBEAM/CINEMATRONICS



NOTE: THESE CARDS ARE TO BE USED FOR SIGNATURE ANALYSIS. NOT FOR VIDEO DISPLAY.

1. Insert 309A in TF-650 "A Port"
2. Insert 309C in TF-650 "C Port"
3. Connect 309C to Game Board as follows:
  - A. P<sub>1</sub> ( short ribbon cable ) to Dip Socket at Location U-14
  - B. P<sub>3</sub> ( long ribbon cable ) to Dip Socket at Location D-8
  - C. 12 Pin Molex into J-1
  - D. From Ground Post ( near Audio Dip Socket ) on 309C connect jumpers to R-13-10 & to A8-7.
  - E. Jumper from "Clock" Test Point between J-4 & K-4 to "C" of 4 Pin connector on 309C.
4. Connect Signature II as follows:
  - A. Start ( Blue ) & Stop ( Yellow ) EZ hooks to "S" on 4 Pin connector on 309C.
  - B. Clock ( white ) to either 2 middle Pins "C" on 4 Pin connector.
  - C. Ground ( Black ) to "G" on 4 Pin connector.
5. Connect a Jumper from A8-8 to U2-4.
6. Connect a Jumper from U2-7 to TP near U2-1.

7. Connect Test Clip ( TC-590-89 ) with Red Dot to IC T2.

NOTE: ON STEP 7 ABOVE & 8 & 9 BELOW BE SURE SHIELD OF CABLES GOES TO PIN 8 OF IC.

8. Connect Test Clip (TC-590-89 ) with Blue Dot to IC R2

9. Connect Test Clip ( TC-590-89 ) with Yellow Dot to IC N2

10. Turn on 5V & Power to TF-650.

11. Turn on Signature II. Gate Light should come on. If not recheck all connections. If it still will not come on check OSC circuit on Game Board. ( IZ, N2, H2, G2 & J4 )

12. For detail instructions see the maintenance literature from Vectorbeam. Signatures for individual games are available from Cinematronics or Vectorbeam.

AUDIO

1. For Audio Test DO NOT use main Game board.

2. Connect space blue Ansley cable to Audio Dip Socket on 309C & connect other end to Audio Board.

3. Connect 9 Pin Molex from 309C to Audio Board - Speaker is connected to Black & Red wire on Molex.

4. TF-650 switches control the following Pins on Audio board connector - Refer to Vectorbeam/Cinematronics drawing for pin function.

<u>Switch</u>	<u>Connector Pin</u>
SL-1	12
SL-2	10
SL-3	13
SL-4	11
SL-5 (must be pushed before others will work)	14

NOTE: DO NOT LET P1 & P3 CABLE CONNECTORS TOUCH METAL.



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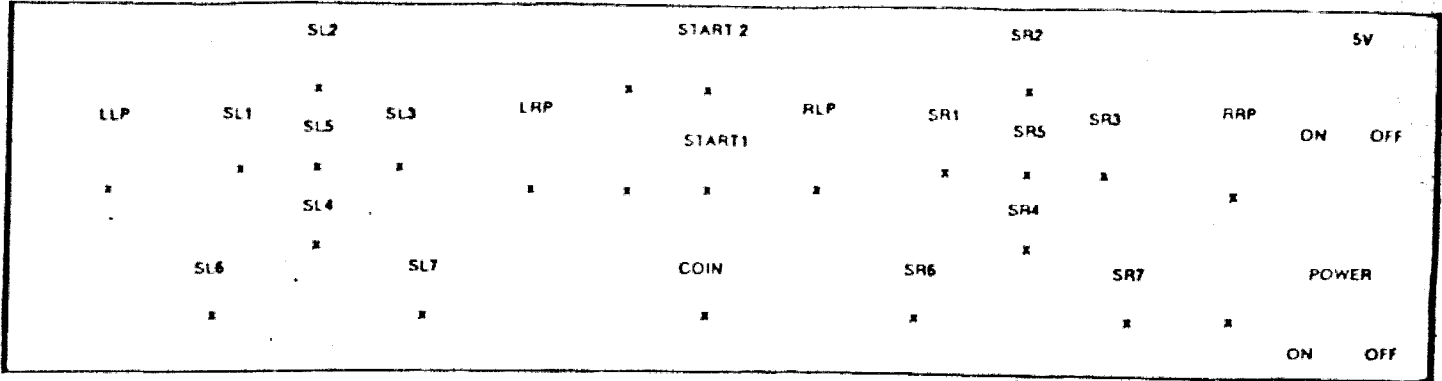
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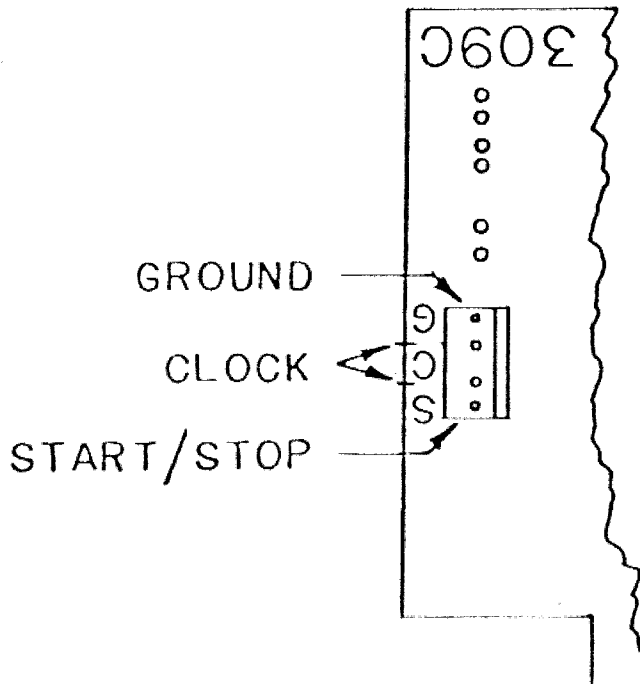
For Model

TO TEST 309C

CINEMATRONICS/VECTORBEAM



1. Plug in 309A into TF-650.
2. Plug in 309C into TF-650.
3. Connect 10 to 15 MHz square wave into pin "C" of 309C (see sketch)
4. Connect Signature II to 309C per sketch.
5. Turn on 5V & 110 volts.
6. Probe 309C I.C. pins for Signatures per Kurz-Kasch drawing #9350014.



## INTRODUCTION

The Exorciser Test Fixture is a diagnostic tool designed to be used in conjunction with a Signature Analyzer to trouble shoot the main logic board of a Cinematronics game.

A Signature Analyzer is a piece of test equipment which is used to monitor digital signals versus time, and which produces an alphanumeric readout which represents the signal's "Signature." Any circuit can be tested by measuring the signatures of the desired signals and then comparing them to previously determined correct signatures. For a detailed discussion of signature analysis theory, consult the operators manual for your specific piece of equipment.

The purpose of the Exorciser circuit is to provide a known set of reference inputs to the logic board. These reference inputs are designed to generate a known set of signatures which the signature analyzer can then measure. When the two dip headers containing the jumper wires are removed from the logic board, various signal paths are disconnected. Inserting the Exorciser cables into these sockets allows the Exorciser to inject it's reference signals into the main logic board. The actual Exorciser circuit consists of a 16-bit counter chain whose outputs are then combined via a number of simple gating circuits to generate the input reference signals. There is also circuitry to produce the start/stop signal to the Signature Analyzer.

### CONNECTING THE EXORCISER TO THE LOGIC BOARD

Refer to the operating instructions of the board Exorciser (309C). As an aid to identify the terminations of Cables with test clips a color dot has been placed on each of the three 16-pin dip connectors under Pin 8. The red dotted connector goes to T2, the blue to R2, and the yellow to N2.

### CONNECTING THE EXORCISER TO THE SIGNATURE ANALYZER

Connections from the Signature Analyzer to the Exorciser are straight forward. Both the start and stop leads on the Signature Analyzer connect to the test point labeled "S" on the Exorciser (309C). Also connect the clock and ground leads from the analyzer to their respective test points on the Exorciser, "C" & "G".

The spare clock terminal on the front panel should be connected to the clock test point on the logic board located between J4 and K4. This can easily be done with a cable terminated at both ends with E-Z hoods.

## SIGNATURE ANALYZER OPERATING MODE

To achieve the proper signature the Signature Analyzer must be set up to trigger on the proper pulse edge. Both the start and clock trigger on the trailing edge. The stop triggers on the leading edge.

NOTE: Before trouble shooting the logic board with the exorciser and Signature Analyzer, a jumper wire must be installed from A8, Pin 8 to U2, Pin 4 on the main logic board, unless the board comes from a Star Hawk game. Once installed, leave it in place permanently as it will not affect Space Wars normal operation. This addition is already incorporated in all Star Hawk CPU logic boards.

Also, a temporary jumper grounding TP8 which is located in the upper left corner above U2 should be installed. Remove this jumper after repair.

### OPERATING INSTRUCTIONS

Once all the set up connections are made and power applied, check C8 Pin 12 for the signature U6HH. If this signature is unstable then recheck all the connections, especially the 3 16-pin dip clips. When stability is achieved, check the signatures at C8, Pins 5 and 6. They should be C32P. If they are not, recheck the connections at D-8. The header may have been installed improperly.

Trouble shooting the electronics on the main logic board with the Exorciser and Signature Analyzer should be done in the same manner as when using an oscilloscope. When a bad output is encountered, one should first investigate the input(s) before assuming that the particular I.C. is bad. If one or more inputs are incorrect, continue back tracking until the problem is isolated to a bad output with good inputs. The problem would then be confined to either the I.C. with the bad output or to any I.C. it connects to.

The following is a list containing the locations, signatures, and page number of key I.C.'s which will aid in narrowing down the circuit in which the problem exists. Refer to the I.C. location layout in the index of this manual and the specially prepared schematics of all useable board "Signatures."

<u>I.C. LOCATION</u>	<u>I.C. TYPE</u>	<u>PIN NO.</u>	<u>SIGNATURE</u>	<u>PAGE NO.</u>
F 14	74S287	9	1846	4
F 14	74S287	10	FP05	4
F 14	74S287	11	8399	4
F 14	74S287	12	61C3	4
F 2	74LS259	1	PH07	1
F 2	74LS259	2	29A9	1
F 2	75LS259	3	80HP	1
N 9	74LS85	5	A197	2
N 9	74LS85	6	237P	2
L 4	74S182	9	AH4H	2
J 6	74LS00	8	F12C	2
C 6	74LS163	15	0109	5
J 2	74LS32	8	9820	5
J 2	74LS32	11	2873	5
H 8	74LS02	13	U97A	5
I 8	74LS04	2	204A	5
A 12	74LS32	3	390P	4
H 14	74S02	10	07U2	3
U 7	PROM	1	C443	3
U 7	PROM	2	FC92	3
U 7	PROM	3	5PF5	3
U 7	PROM	4	A7U5	3

CONT.

<u>J. C. LOCATION</u>	<u>I.C. TYPE</u>	<u>PIN NO.</u>	<u>SIGNATURE</u>	<u>PAGE NO.</u>
U 7	PROM	5	UPAP	3
U 7	PROM	6	HA00	3
U 7	PROM	7	8066	3
U 7	PROM	8	7211	3
U 7	PROM	23	U62F	3
U 7	PROM	22	0499	3
U 7	PROM	19	578F	3
B 12	74LS10	6	077H	4



Below is a trouble shooting chart containing the most common logic board symptoms and cures encountered by our customer service department.

<u>SYMPTOM</u>	<u>CAUSE</u>	<u>LOCATION</u>
1. "X" in the middle of CRT	Drom 1	F 14
2. Flasing or resetting picture	Drom 1	F 14
3. Horizontal line $\frac{1}{2}$ length of picture tube in the center of the screen	Drom 1	F 14
4. Fragmented Picture	Drom 1	F 14
5. Stars only	Drom 1	F 14
6. Good Picture-Bad Sound	74LS259	F 2
7. Good Picture-no player control	74LS151	C4, D4, E4
8. No time displayed following a credit	74LS259	E 4
9. Time accumulates without giving a credit	74LS259	F 2
10. No double intensity	74LS32	J 2
11. Interconnecting lines between all objects on screen	74LS32	J 2

# NEWS FROM KURZ-KASCH

MAY 2, 1980

## ENGINEERING NEWS FLASH

ON 309 CARD SET (CINEMATRONICS & VECTORBEAM) CONNECT SIGNATURE II CLOCK LEAD (WHITE) TO TEST POINT BETWEEN J4 & IC4. GROUND FROM SIGNATURE II (BLACK) SHOULD BE CONNECTED TO J4-7.

THE ABOVE STABILIZES THE SIGNATURES.

JIM SNEED