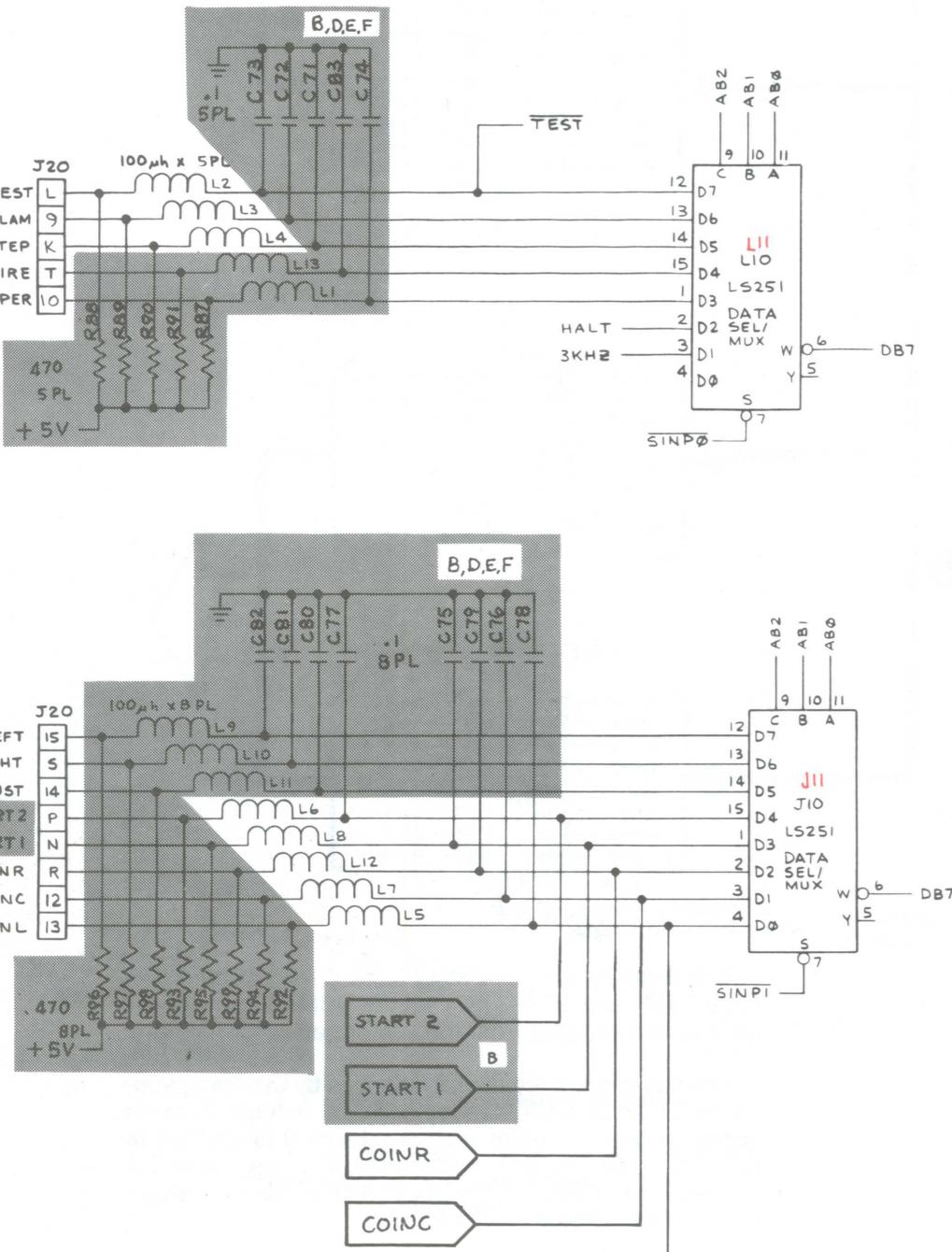


## INPUTS

### PLAYER INPUT CIRCUITY

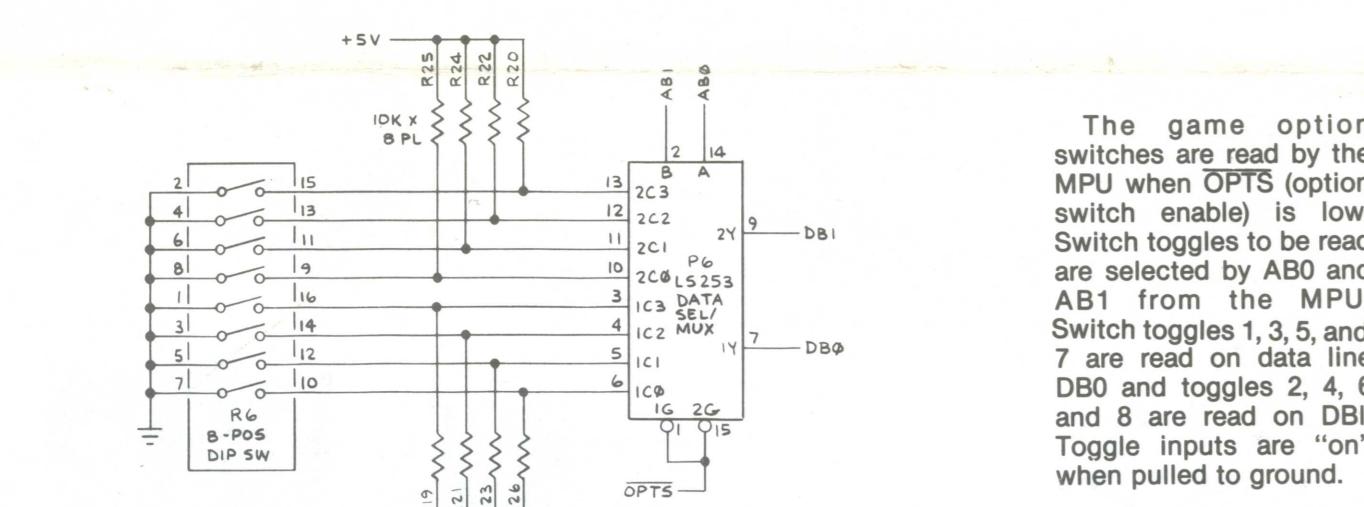


**DIAG STEP** (diagnostic step), 3 KHz, SELF-TEST, SLAM, HALT, FIRE and HYPER inputs are read by the MPU when SINP0 (switch input zero enable) is low. Switches to be read are selected by AB0 thru AB2 from the MPU. All inputs are read on DB7. Switch inputs are active when pulled to ground. **DIAG STEP**, 3 KHz, and SELF-TEST are signals read by the MPU to initiate and control the game's self-test procedure. SLAM is a signal read by the MPU to indicate the status of the antislam switch mounted on the coin door. The MPU reads HALT to determine the state of the vector generator.

The coin door and some control panel switches are read by the MPU when SINP1 (switch input one enable) is low. Switches to be read are selected by AB0 thru AB2 from the MPU. All inputs are read on data line DB7. Switch inputs are "on" when pulled to ground.

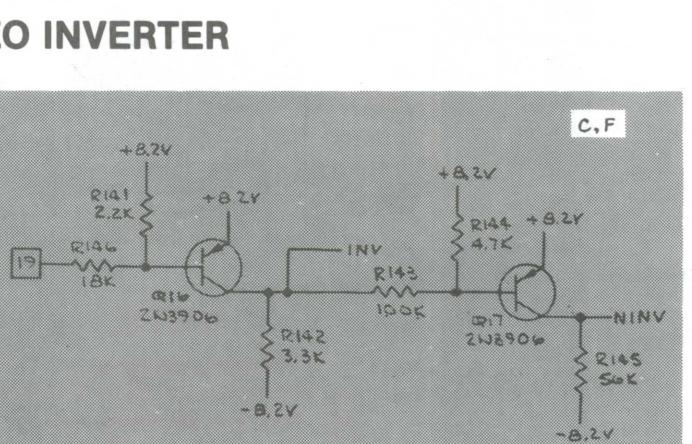
## OUTPUTS

### OPTIONS INPUT CIRCUITY



## AUDIO OUTPUT

### VIDEO INVERTER

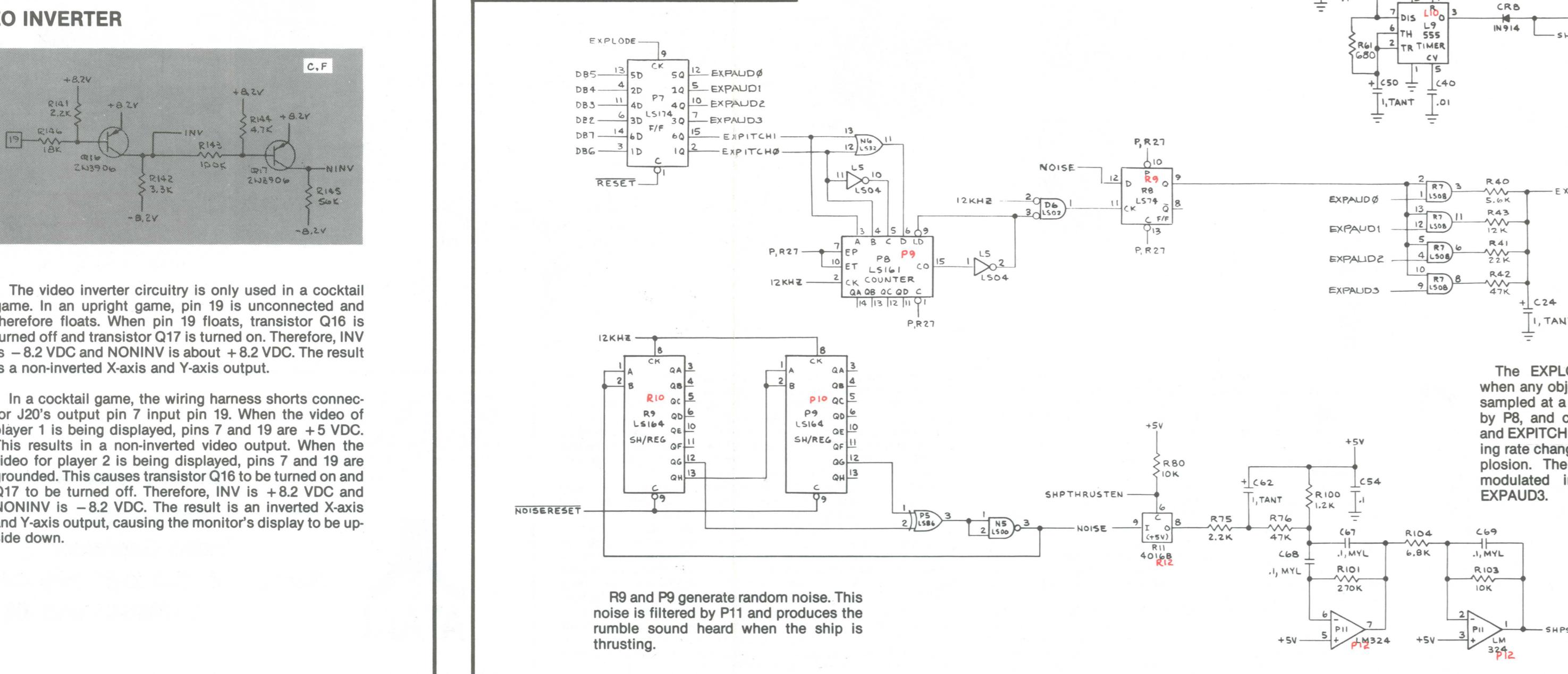


The video inverter circuitry is only used in a cocktail game. In an upright game, pin 19 is unconnected and therefore floats. When pin 19 floats, transistor Q16 is turned off and transistor Q17 is turned on. Therefore, INV is -8.2 VDC and NONINV is about +8.2 VDC. The result is a non-inverted X-axis and Y-axis output.

In a cocktail game, the wiring harness shorts connector B20's output pin 7 input pin 19. When the video for player 1 is being displayed, pins 7 and 19 are +5 VDC. This results in a non-inverted video output. When the video for player 2 is being displayed, pins 7 and 19 are grounded. This causes transistor Q16 to be turned on and Q17 to be turned off. Therefore, INV is +8.2 VDC and NONINV is -8.2 VDC. The result is an inverted X-axis and Y-axis output, causing the monitor's display to be upside down.

R9 and P9 generate random noise. This noise is filtered by P11 and produces the rumble sound heard when the ship is thrusting.

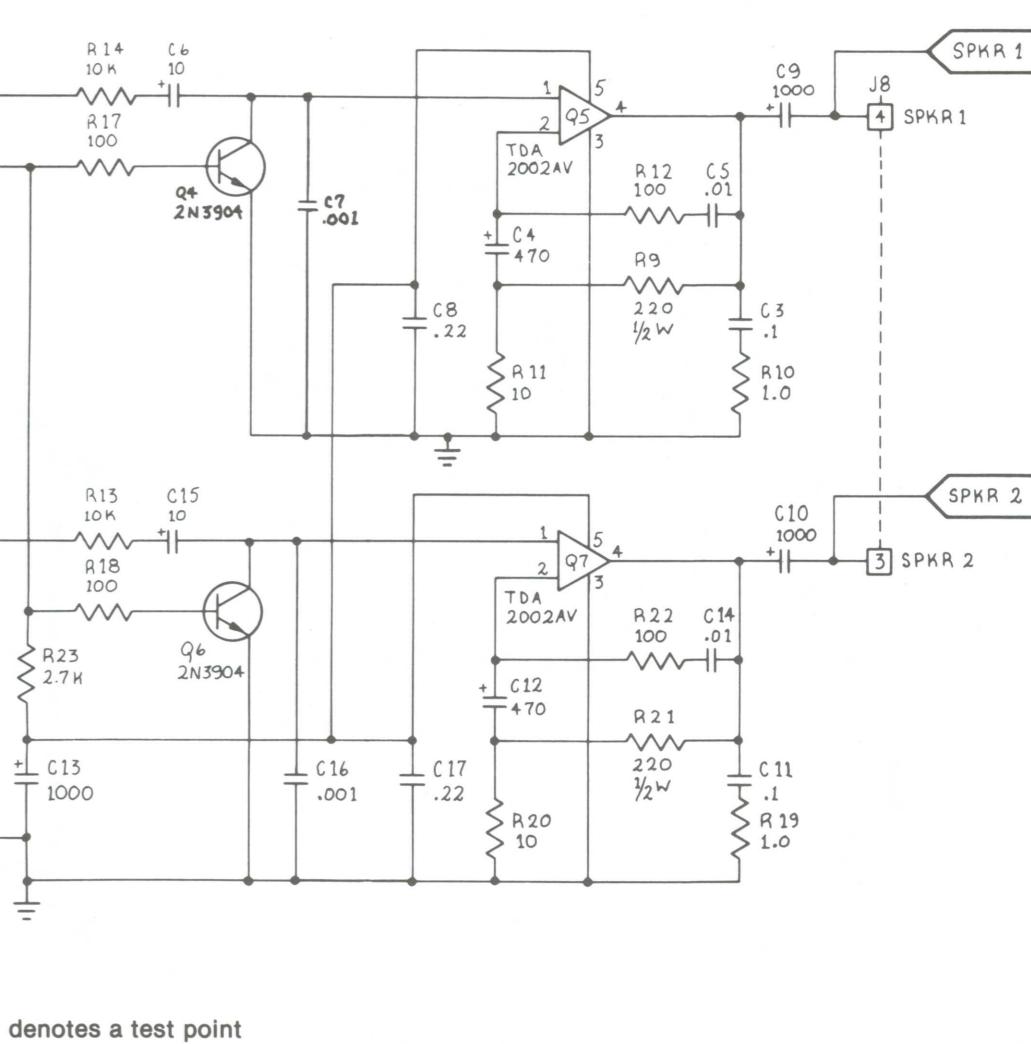
## AUDIO OUTPUT



All sounds are mixed in 1/4 of P11. This is AUDIO 1. The signal is then inverted by another 1/4 of P11 and becomes AUDIO 2. These cut-off phase signals provide a push-pull output to the audio section of the Regulator/Audio PCB.

## PART OF REGULATOR/AUDIO PCB

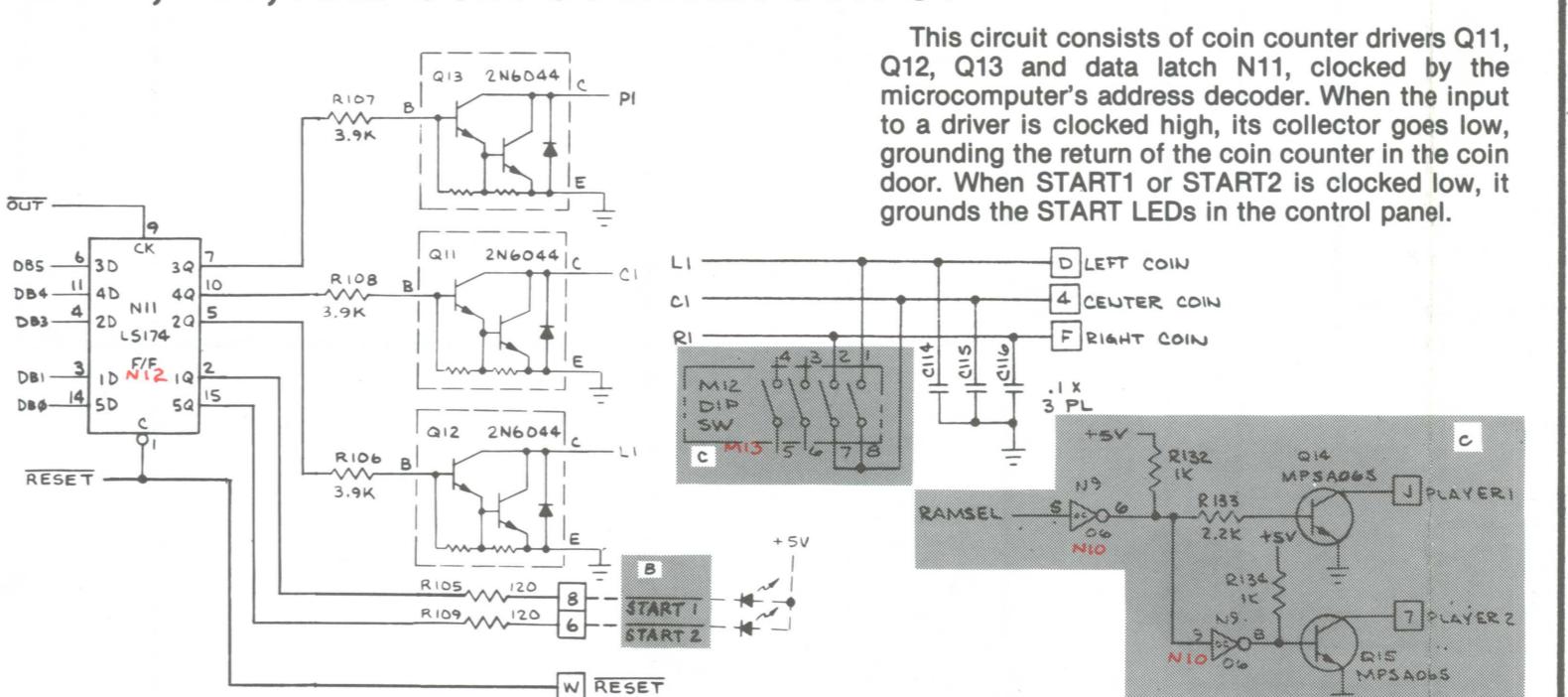
NOTE: AUDIO AMPLIFIER IS PART OF REGULATOR/AUDIO PCB AND IS REPEATED ON SHEET 1, SIDE A.



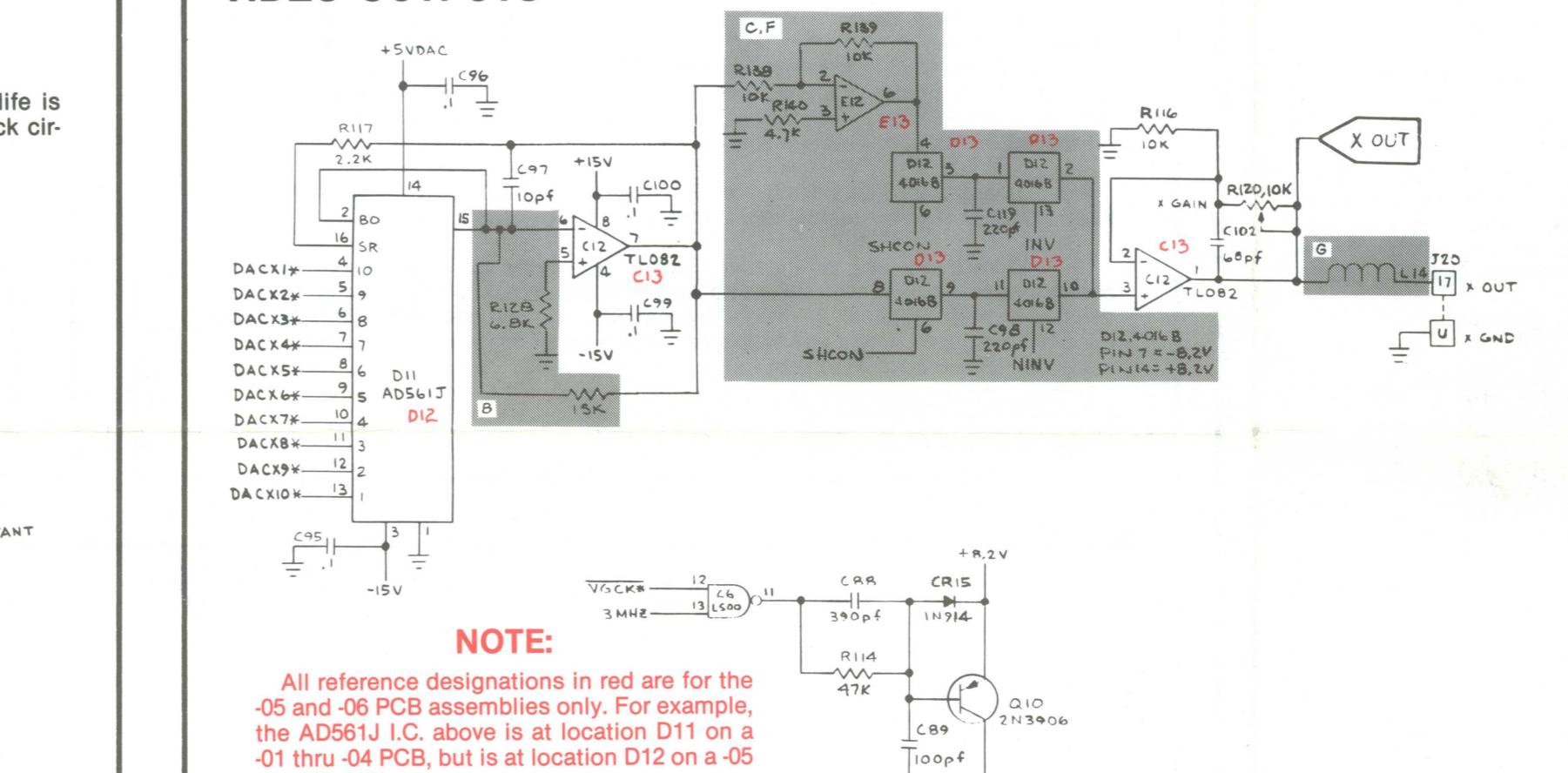
The audio inputs AUDIO 1 and AUDIO 2 receive out-of-phase signals for push-pull operation. AUDIO DISABLE is permanently grounded for continuous audio amplification.

denotes a test point

## LAMP, LED, AND COIN COUNTER OUTPUT



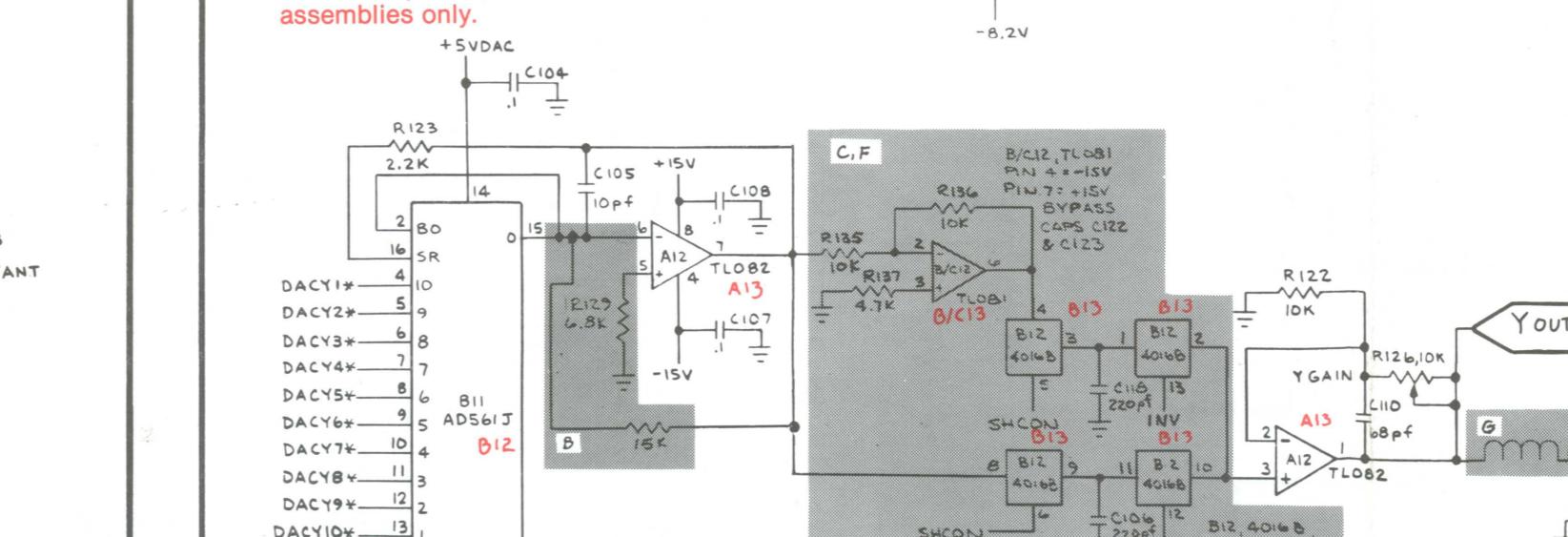
## VIDEO OUTPUTS



### NOTE:

All reference designations in red are for the -05 and -06 PCB assemblies only. For example, the AD561J I.C. above is at location D11 on a -01 thru -04 PCB, but is at location D12 on a -05 and -06 PCB.

The reference designations, used in the circuit descriptions, refer to the -01 thru -04 PCB assemblies only.



### Z Output

The Z axis video output receives six inputs. BVLD (beam valid), from the output of the vector generator's position counters, tells the Z axis to draw a line. BLANK (vector line blank), from the vector generator's state machine, tells the Z axis to stop drawing a line. SCALE0 thru SCALE3 (grey level shading scale), from the output of the vector generator's data latch, tells the Z axis the grey level shading of the line that is being drawn on the monitor.

When BVLD and BLANK are both high, a high is clocked through shift register K9 that turns transistor Q3 off. This allows the scale inputs to be passed through transistor Q2. When BLANK goes low, a low is clocked through K9, transistor Q3 turns on, and the signal is grounded at the base of transistor Q2.

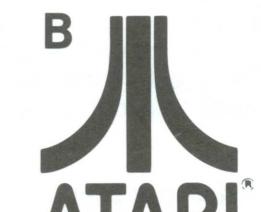
The scale inputs at the base of transistor Q1 determine Q1's emitter voltage, during the line draw period. The Q1 output thru SCALE3 resistor R36 thru R39, resistor R35, and resistor R40 fall in a range of about +1.0 to 4.0 VDC when all are low and +4.0 VDC when all are high. The emitter of Q1 falls at about +1.0 to 4.7 VDC, while the emitter of transistor Q2 follows at about +1.0 to 4.0 VDC. This output is applied to the Z input of the monitor. Since there are brightness and contrast controls in the monitor, there are no adjustments in this circuit.

## Sheet 2, Side B

### ASTEROIDS

#### Switch Inputs, Coin Counter, LED and Audio Outputs

Section of 034986-01 thru -04 H  
034986-05 and -06 B



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