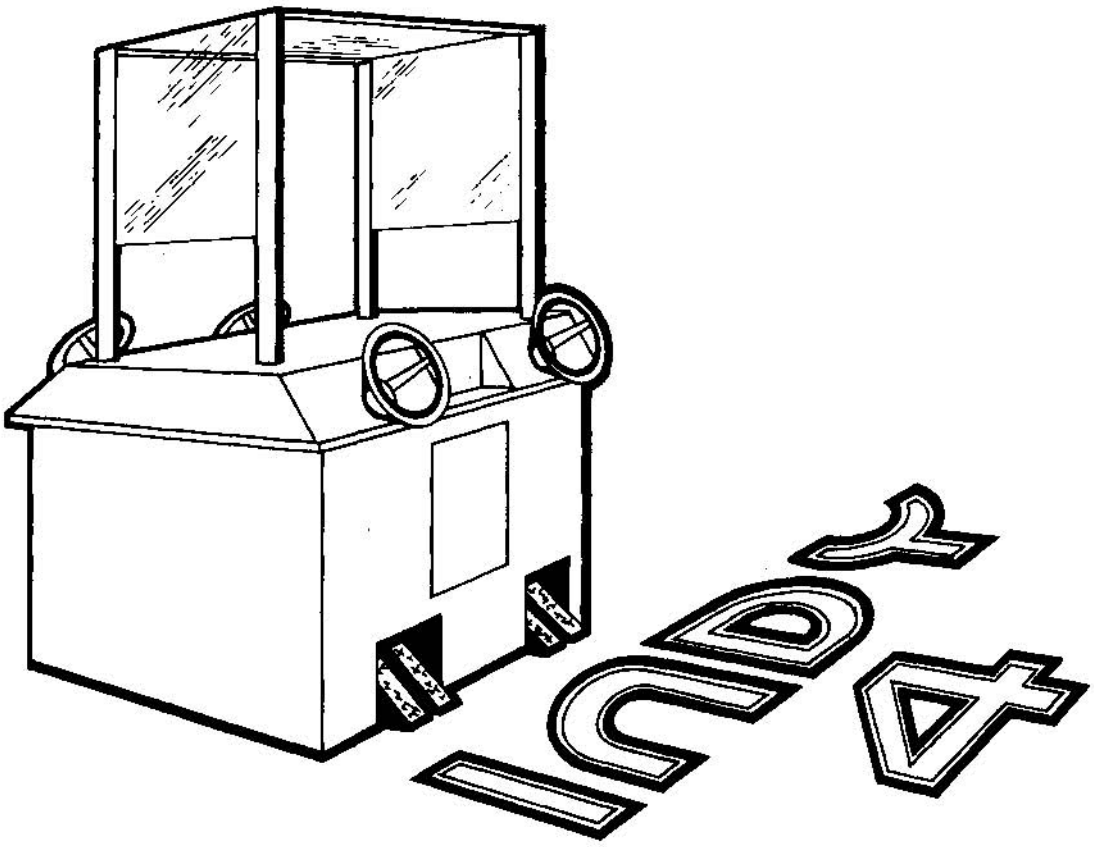
TM-055

Operation • Maintenance • Service Manual

ATARI™
Innovative
leisure



ATARI, INC.
14600 Winchester Blvd.
Los Gatos, CA 95030
Phone 408/374-2440
Telex 357-488

Copyright © 1976 by Atari, Inc.

TABLE OF CONTENTS

I. General Maintenance Information 1

1.1 Introduction 1

1.2 New Machine Set-Up Procedure 1

1.3 New Machine Checkout 1

1.3.1 General Inspection
1.3.2 Interior Inspection
1.3.3 Applying Power
1.3.4 Coin & Bill Acceptors
1.3.5 Start Game
1.3.6 Interlock Switch

1.4 Coin Mech Inc.'s Q-530 Coin Acceptor -- Operation, Adjustment and Maintenance 2

1.4.1 Kicker and Separator
1.4.2 Magnet Gate
1.4.3 Acceptor Maintenance

1.5 General Machine Maintenance 3

II. Indy 4 Circuits 5

2.1 General System Description 5

2.1.1 Parts of the Indy 4 Electronics System
2.1.2 Basic Functional Description of each PCB

2.2 Sync Printed Circuit Board 8

2.3 Score Printed Circuit Board 9

2.4 Coin Control Printed Circuit Board 11

2.5 Car Printed Circuit Board 13

2.6 Power Supply Printed Circuit Board 18

III. Adjustments and Servicing 19

3.1 Operator Adjustments and Operating Instructions 19

3.1.1 Adjustments
3.1.2 Operating Instructions

3.2 Service and Troubleshooting 19

3.3 Test Equipment 21

3.4 Required Equipment 21

3.4.1 Logic Probe
3.4.2 Video Probe

3.5 Optional Equipment 21

3.5.1 Hewlett-Packard 10529A Logic Comparator

3.5.2 Hewlett-Packard 10526T Logic Pulser

3.5.3 Tektronix 465 Oscilloscope

3.6 Logic Types and Functions 22

IV. Schematics, Parts Lists and Drawings 25

I. GENERAL MAINTENANCE INFORMATION

1.1 INTRODUCTION

The Atari Indy 4 game consists of a cabinet, TV monitor, printed circuit boards (PCBs), interconnecting wiring, and various cabinet-mounted circuit components. The TV monitor, a GE 25-inch color unit, is not discussed in this manual, nor is a schematic of its PCB reproduced here. Rather, an in-depth manual has been prepared on this monitor, and it is available from Atari. Ask for TM-053, G.E. #25MB Color Monitor Troubleshooting Manual (for Indy 800 and similar games) from Atari, Inc., Customer Service Dept., 2175 Martin Avenue, Santa Clara, CA 95050.

TV circuit malfunctions can be solved using standard television troubleshooting techniques. However, the PCB computer requires troubleshooting techniques that may be unfamiliar to the average technician. Therefore, the troubleshooting information in this manual is dedicated to the PCBs and their associated cabinet circuitry.

1.2 NEW MACHINE SET-UP PROCEDURE

Before turning this machine on, inspect it carefully for any damage which may have occurred during shipment. Inspect both interior and exterior of the machine for any obvious damage to the cabinet or internal components. Check for cracked or disconnected wires, or foreign objects shorting electrical connections. After the machine has been plugged in and turned on, perform the checkout procedure.

1.3 NEW MACHINE CHECKOUT

As each new machine leaves the factory, every component and subassembly is carefully checked for proper operation. However, since parts may have been damaged or adjustments changed during shipping, the following checkout procedure must be repeated prior to placing the machine on location:

1.3.1 GENERAL INSPECTION: Inspect both the exterior and interior of the machine for obvious shipping damage such as cracked or broken cabinet parts, subassemblies broken loose, etc.

1.3.2 INTERIOR INSPECTION: Carefully inspect the interior of the machine to see that all solder joints, slip-on connectors, and plug-in type connectors are firmly seated. Pay particular attention to the PCB edge connector and the fuses. Also check the connections to the coin switch, the TV monitor, the interlock switches, and all other Molex-type connectors.

1.3.3 APPLYING POWER: Plug the machine in, and pull out the white actuator shafts of the interlock switches if the rear door is open. Inspect the cathode ray tube image for a steady and sharp picture that exhibits the proper levels of brightness and contrast.

1.3.4 COIN & BILL ACCEPTORS: Insert several old and new quarters and $1.00 bills into the acceptors. No genuine money should be rejected, and each insertion should step the counter one digit when using coins (no counter advancing occurs when inserting a bill). Depress the coin

rejector button to make sure that the linkage is operating smoothly.

1.3.5 START GAME: Coin or $1.00 bill insertion should start the game. Check for proper game sequence, making sure that all aspects of the game are functioning correctly.

1.3.6 INTERLOCK SWITCH: The interlock switch must turn off the entire machine when the lower cabinet doors are opened.

1.4 COIN MECH, INC.'S Q-530 COIN ACCEPTOR -- OPERATION, ADJUSTMENT AND MAINTENANCE

All coin acceptors leave the factory adjusted for maximum performance. If, however, more critical adjustments are desired, or if the unit has been completely disassembled for service, the following adjustment procedure is suggested (see Figure 1-1). If the coin acceptor has been removed from the machine, place it in a vertical position on a level surface. If the acceptor is still mounted on the coin door, place the coin door in a vertical position on a level surface.

1.4.1 KICKER AND SEPARATOR:

a. Set the acceptor with the back of the unit facing you in the test position. Loosen the screws holding the kicker (1) and the separator (3), and move both the kicker (2) and the separator (4) as far to the right as they will go. Tighten the screws.

b. Insert several test coins, both old and new, and note that some are returned by striking the separator. Loosen the separator screw and move the separator a slight amount to the left. Tighten the screw.

c. Insert the test coins again, and if some of them are still returned, repeat Step "b" until all the coins are accepted.

d. Loosen the kicker screw and move the locker as far to the left as it will go. Tighten the screw. Insert the test coins and note that some are returned. Now loosen the kicker screw and move the kicker slightly to the right. Tighten the screw.

e. Insert the coins again, and if some are still returned, repeat Step "d" until all the coins are accepted. Be sure that both screws are tight after the adjustments have been made.

1.4.2 MAGNET GATE: Set the acceptor with the front of the unit facing you in the test position. Turn the magnet gate adjusting screw (2) out or counterclockwise until none of the coins will fit through.

With a coin resting in the acceptor, turn the adjuster in or clockwise until the coin barely passes through the magnet gate. Test this adjustment using several other coins, both old and new, and if any of them fail to pass the magnet gate, repeat the above adjustment until all the coins are accepted.

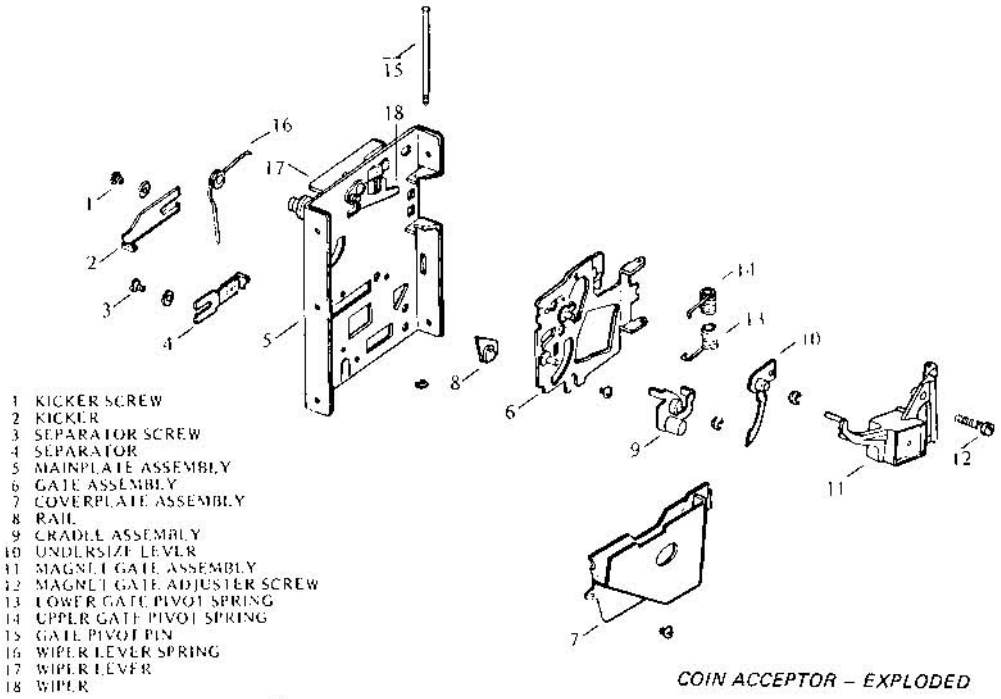
Fix the magnet gate in this position with a drop of glue or Loctite™, if necessary.

1.4.3 ACCEPTOR MAINTENANCE: Depending on the environment in which the acceptor is used, periodic preventive maintenance should be performed. The mainplate (5) may be cleaned with any household cleaner. Thorough rinsing and drying are necessary to remove deposits and/or film. Remove all metal particles from the magnet by guiding the point of a screwdriver or similar tool along the edges of the magnet. You will notice that the particles will cling to the point of the tool.

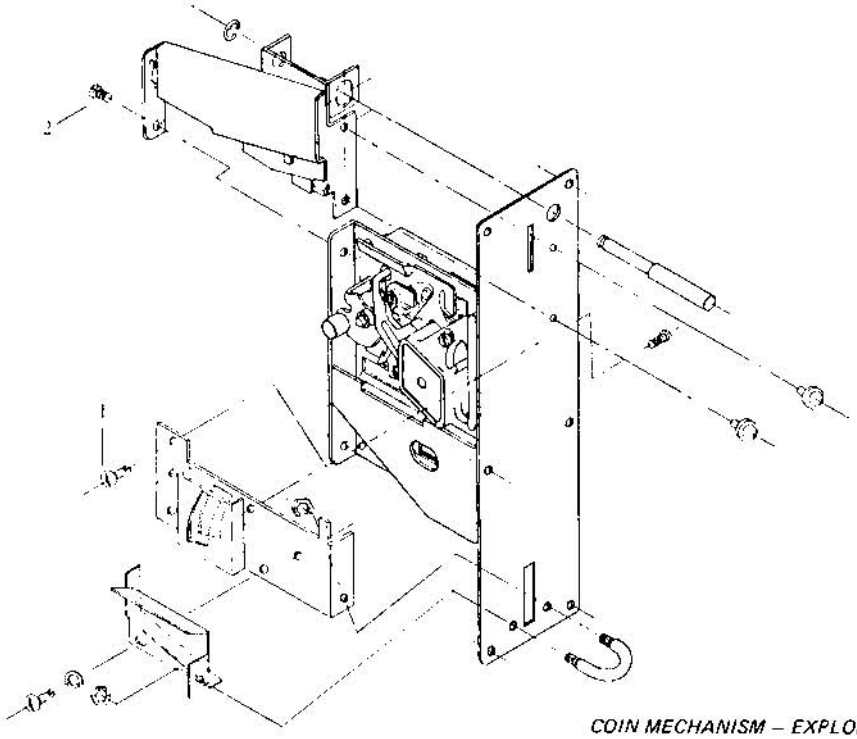
Remove the transfer cradle (9) and the undersize lever (10) and clean the bushings and the pivot pins. A pipe cleaner is an effective cleaning tool. Apply powdered graphite or pencil lead to the pivot pins and bushings, and reassemble. Spray the entire unit lightly with WD-40®, a lubricant.

1.5 GENERAL MACHINE MAINTENANCE

Due to its solid-state circuitry, your machine will require very little maintenance other than periodic cleaning, lubrication and TV monitor adjustment. The cabinet and plexiglass screen may be cleaned with any non-abrasive household cleaner. The coin acceptor and the rejector linkage should be sprayed lightly once every three months with WD-40® or a silicone lubricant. The potentiometer shafts must never be lubricated in any way. The TV monitor is adjusted only when the CRT picture is distorted, or if the contrast or brightness appear to be out of adjustment.



COIN ACCEPTOR – EXPLODED



COIN MECHANISM – EXPLODED

Figure 1-1 Coin Acceptor and Mechanism

II. INDY 4 CIRCUITS

2.1 GENERAL SYSTEM DESCRIPTION

2.1.1 Parts of the Indy 4 electronics system include:

4	Steering PCB*
4	Car PCB*
1	Coin Control PCB*
1	Score PCB*
1	Sync PCB*
1	Backplane PCB
1	Power Supply PCB
1	25" color TV monitor
-	Harness and controls

The sync, score, coin control, and four individual car boards are housed in a card rack within the game. These PCBs are interconnected by the backplane circuit board which is located at the rear of the card rack. The backplane board also provides edge connectors for interfacing with the other system components through the harness. Figure 2-1 shows the locations of the various boards and connectors within the card rack. The car colors and steering wheel locations, as well as locations of the card rack and power supply, are shown in Figure 2-2.

2.1.2 BASIC FUNCTIONAL DESCRIPTION OF EACH PCB:

a. Sync PCB. This includes the system clock, the video sync counters, and timing function generators, the race track video, the score checkpoints, score video windows, and the ORing circuitry for detection of collisions with other cars. The master audio volume control is also located on this board.

b. Score PCB. This includes all the circuitry necessary for detecting, counting, and displaying the score for each car. It also senses which car has the highest score and causes that score to blink. Finally, it contains the video outputs to the TV (except sync) and the TV calibration function circuit.

c. Coin Control PCB. This monitors all coin inputs. It generates the reset and enable for each car. The game time and game turn-off circuitry are also included on this board.

d. Four Identical Car PCBs. These control each of the individual cars. Each board contains all the circuitry necessary to rotate, move, and produce the video and audio for one car when enabled. The skid, collision, and crash detectors are also on this board.

e. Backplane PCB. This has no electronic components and serves only as an interface between the various components of the entire system.

f. Power Supply PCB. This is the source of the unregulated power supplies for the digital and analog circuitry of the other boards. The drivers for the coin mechanism lockout coils are also located on this board.

*All of these come with one additional spare printed circuit board.

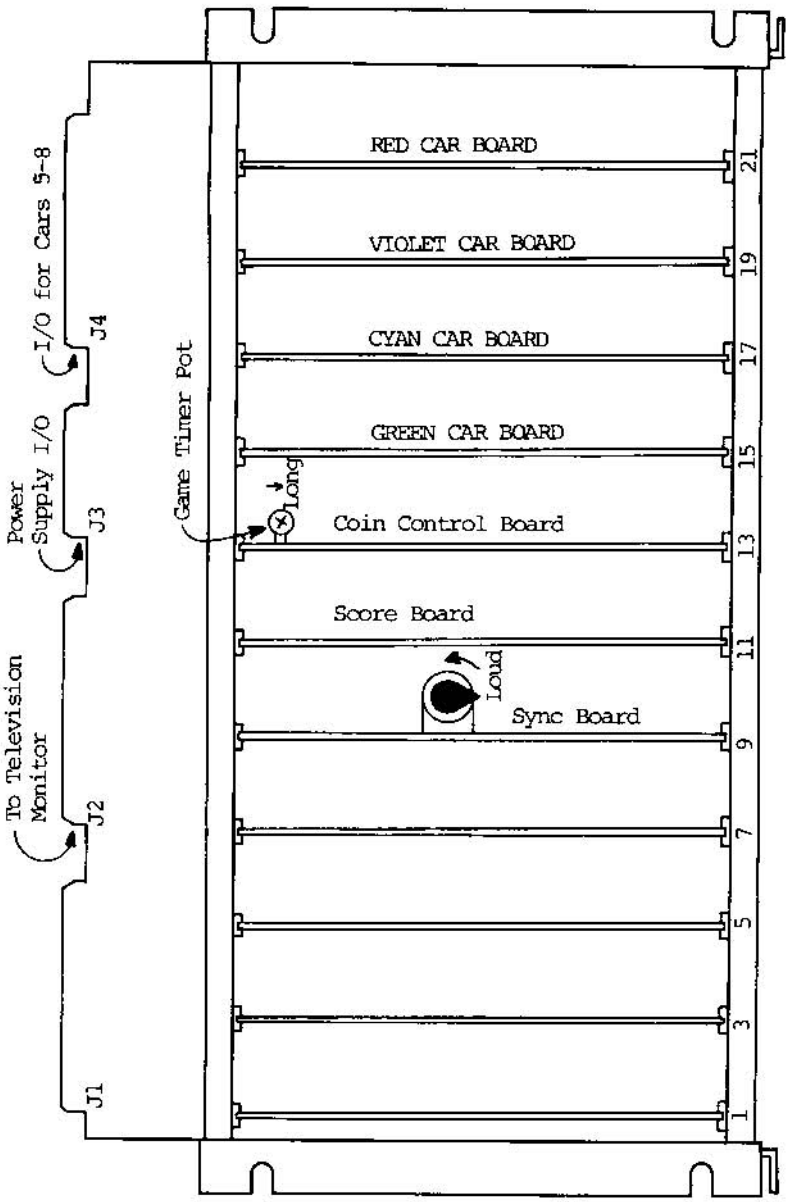


Figure 2-1 Indy 400 Card Rack Layout (Front View)

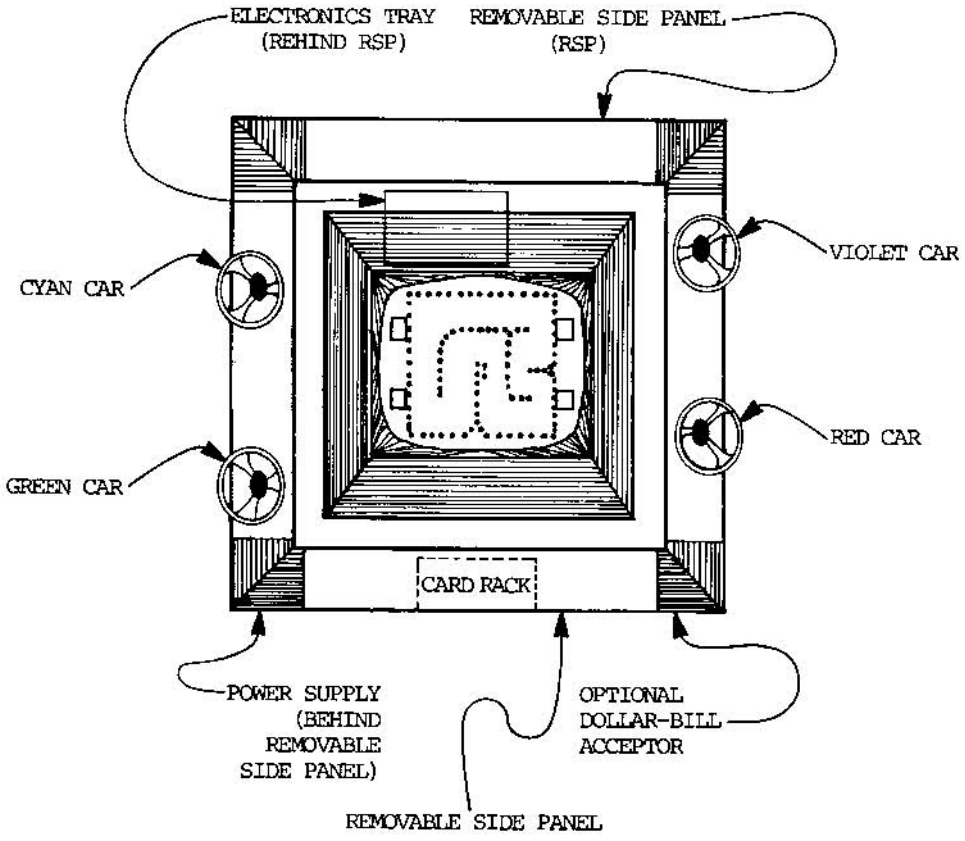


Figure 2-2 Indy 4 Cabinet:
Location of Car Controls and Electronics

g. Steering PCB. These are mounted on the backside of the steering wheel assemblies. The boards use optical sensing to produce two signals in quadrature, which may be decoded into rate and direction of rotation.

2.2 SYNC PRINTED CIRCUIT BOARD

The sync PCB has circuitry to produce the following functions:

- System clock and video countdown chain
- COMP SYNC signal to TV monitor
- Race track video
- Score checkpoints
- SCORE WINDOW signal
- OTHER CARS signal for each car
- +5 volts power for steering boards
- Miscellaneous timing signals to other logic
- Master volume control signals

The system clock runs at 14.3 MHz. The horizontal countdown chain A4, B4, C4 (9316s) divides this basic frequency by 908 for each video line (15.76 KHz). The vertical countdown chain D4, D4 (7493), E3 (74107) divides the line rate by an additional 263 for a video frame (60 Hz).

The horizontal counter starts at 116 (binary 0001110100) and counts to 1024 (1111111111). The horizontal sync pulse (HSYNC) begins at count 256 and is 64 clock pulses wide (4.47 µsec). This is done at C3-9 (7474) where the rising edge of 256H clocks a low through to Q, which is set back to a high 64H later by B3-11 (7400).

The vertical counter counts from zero (binary 000000000) to 262 (100000110), at which time D3-12 (7410) goes low. At the next rising edge of 512H, this low is clocked through to C3-5 (7474). VRESET then resets the vertical counters to zero and the cycle begins again after VRESET is cleared again one line later. The vertical sync pulse (VSYNC) comes from an R/S flip-flop, D3-1 (7202). It begins with VRESET and is 4½ lines long (290 µsec).

The race track signal RT is generated by feeding sync counter signals into a 1K ROM, F4 (003189). The 4-bit output is multiplexed to a single line by F3 (74153) and is gated by 512H and by a signal to produce "dots" from A3-8 (7420).

Similarly, the score checkpoints come from a 256-bit ROM, E5 (003188), which is addressed with functions from the sync counters. The three lowest-order data outputs of this ROM are used to generate the score windows in which the score video will be shown. This generation is accomplished in some random logic including A1 (7400), B1 (7486), and finally out of C1-8 (7420).

COMP RESET CLOCK is a signal that drives the car reset circuitry on the coin control board. It is a signal that occurs at horizontal count 544 through 1024 on one line out of every 12. D1 (74107) is hooked up as a divide-by-3 counter to produce a 4-line signal every 12 lines. B2 (7400)

is hooked up as an R/S flip-flop to produce the proper horizontal timing. These are ANDed together along with 1V and 2V signals to produce the required signal at C1-6 (7420).

BOUNDS is a signal that represents a horizontal boundary. It goes to the car reset circuitry on the coin control board. Any car found coincident with this signal is out of bounds and will be reset back to the starting line.

FLASH is a 4-bit (250 μsec) square wave used to make the score of the leader blink.

16V ⊕ 32H is a timing signal used in the generation of the score video. It is a digit select signal that multiplexes the high- and low-order digits of the score.

The OTHER CARS signals are a three-level ORing of every car except the one to which the signal is sent. They are used on the car boards to detect collisions between cars.

VCLOCK is a two-pulse signal during horizontal sync on each line (except those lines from 256V until the end of VSYNC). It is used to clock the vertical-motion counters on the car boards.

The MASTER VOLUME signals choose one of four possible volume levels for all cars.

See Figure 2-3 for a diagram of the sync functions, race track, etc., as oriented on the Indy 4 television screen.

2.3 SCORE PRINTED CIRCUIT BOARD

The score circuit board includes several subcircuits that detect, count, and display the score as well as detect the leader. Each car has 6 bits of score arranged in two digits of 3 bits each. The three least significant bits (nC, nB, nA, where n = car number) represent an even decimal digit from zero to 8, and are the signals from the divide-by-5 outputs of a 7490 decade counter. The three most significant bits (nF, nE, nD) are the outputs of a divide-by-8 counter configuration, and they represent a decimal digit from zero to 7. Thus, the score for each car runs from 00 to 78, counting by twos.

Score is detected by sensing that the car crosses a series of "checkpoints" in a certain sequence. These checkpoints are generated on the sync board, and are located at appropriate places along the race course (see Section 2.2). The detection of coincidence between car and checkpoints in the proper sequence is provided by a 9312 IC, and eight-input multiplexer. The circuit is shown in Figure 2-4. Depending on the least significant digit (3 bits) of score, the next checkpoint to be crossed is selected.

From the score counters, the score bits are time-multiplexed in another stage of six 9312s, so that each score is present at the output of the multiplexers when it is to be displayed on the screen. This time-multiplexed score

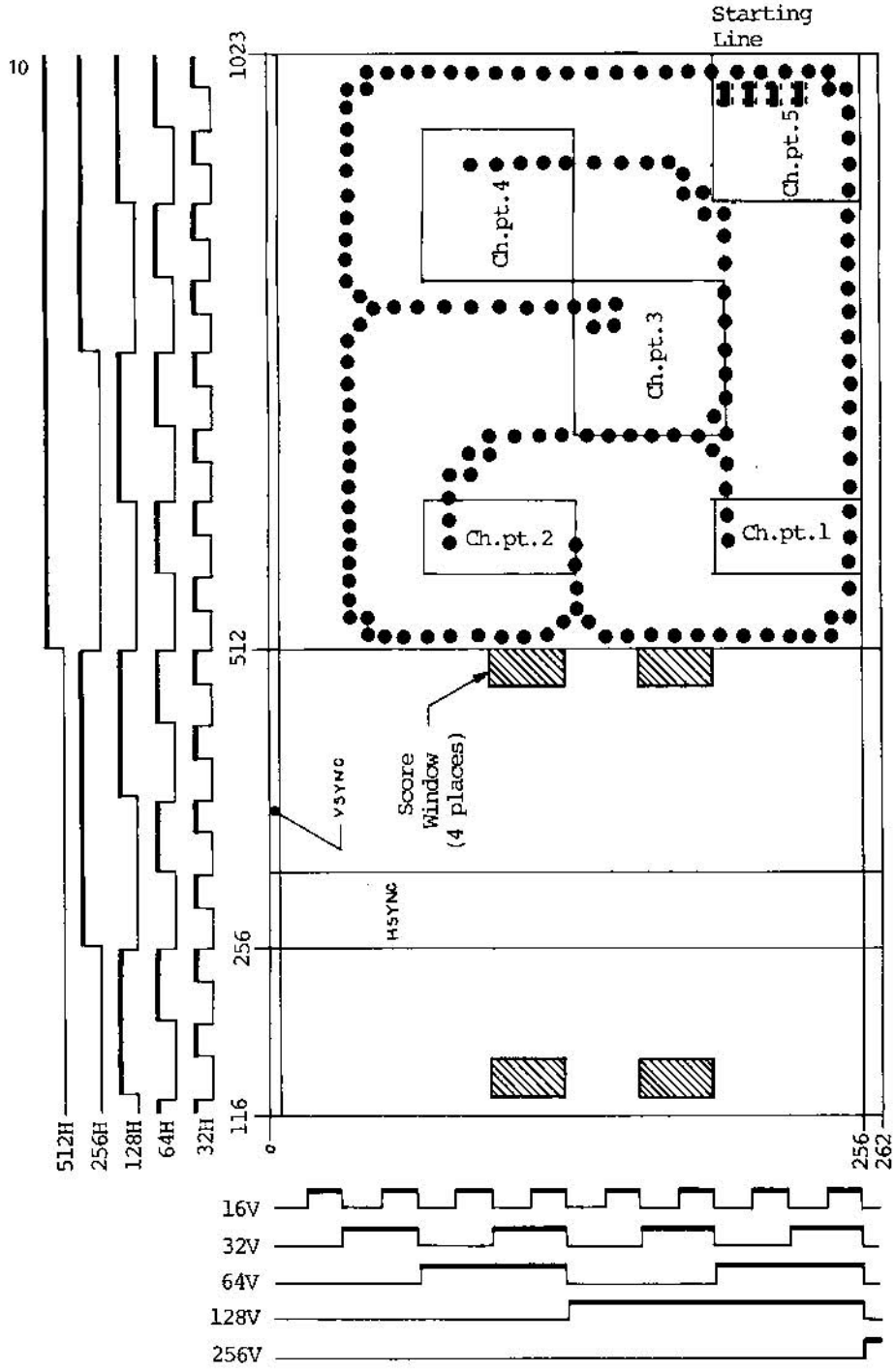


Figure 2-3: Sync PCB Functions

information is then fed into two circuits — the leader detector circuit and the seven-segment decoder.

The leader detector circuit operates as follows (see Figure 2-5). At the start of a game, all of the score counters and the latches K2 (74175) and H2 (74174) are reset. H2 contains the high score bits and K2 contains a code telling which car first achieved that score. At each video frame all the scores are compared to the highest score by comparing the multiplexed score bits (A through F) with the outputs of H2. This comparison is made in the digital comparators J2 and F2 (7485). When the incoming score exceeds the previous high score, an output of the comparator is gated with some sync signals in C6 (7410) to avoid race conditions. The resulting signal clocks H2 and K2 to store the new highest score and new-leader code.

The time-multiplexed score is further multiplexed into two digits in H1 (9322), and this information is fed into a seven-segment decoder, F1 (7448). A digital comparator, L2 (7485) is used to make the score of the leader blink by exciting the blanking input of F1 when the LEADER ID code matches the time-multiplexed sync signals (256H, 64V, 128V).

Two 74153s (A1, D1) and two 9312s (A2, C2) are the function generators that translate the multiplexed seven-segment data into score video information. A1 and D1 form the seven-segment character. D1 (74153) forms the vertical segments b, c, e, and f. A1 (74153), together with a blanking signal from A2 (9312), forms the horizontal segments a, d, and g. These are ORed in C1 (7432): C1-3 has the video for red and violet scores; C1-6 has the video for green and cyan scores. These separate video signals are remultiplexed in C2 (9312), where the score window from the sync board is used to gate the information through at the proper time.

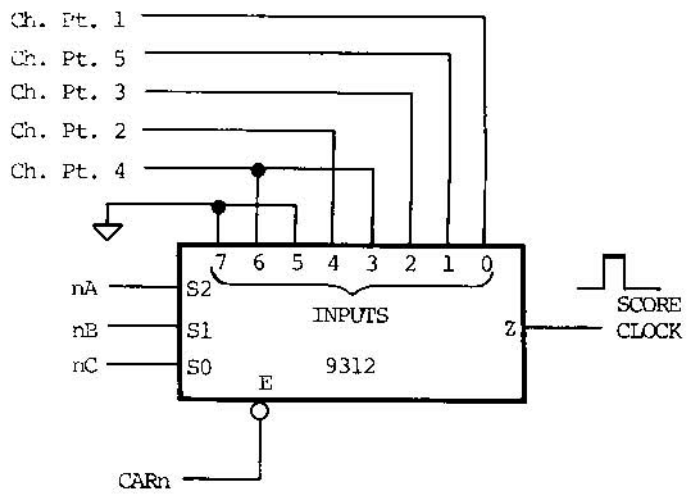
This composite score video signal is then demultiplexed in D6 (9301) into four separate score video signals. These signals are then ORed with the car signals, ANDed with the video function signal, and sent out to the television as video information. There is some slight additional circuitry that creates video test and alignment functions on the white video output line. These functions are: normal operation, all-white screen, all-black screen (no video), and a dot pattern for convergence adjustment. They may be selected by attaching the appropriate jumper as shown on the score board schematic (see region B-2).

2.4 COIN CONTROL PRINTED CIRCUIT BOARD

The coin control circuit board contains the circuitry for the following functions:

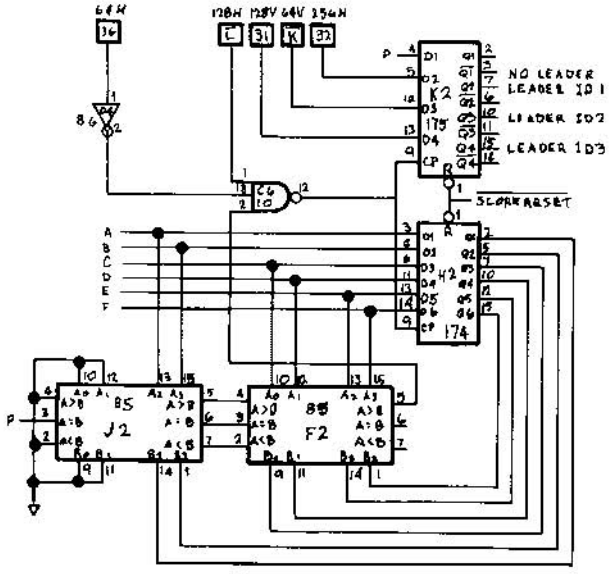
- Coin detection and credit latches
- Game control, game timer
- Car reset circuitry

The heart of the coin detection and credit latch circuitry is the LM339 quad analog comparator. This device is used to sense a proper coin input and to latch and register credit for that coin until the end of the game. Normally



Least Significant Score Bits			Selected Checkpoint
nC	nB	nA	
0	0	0	Ch. Pt. 1
0	0	1	2
0	1	0	3
0	1	1	4
1	0	0	Ch. Pt. 5

Figure 2-4 Score Detection Circuit



Leader ID Signals			No-Leader Signal	Car in Lead
3	2	1		
X	X	X	1*	None
0	1	0	0	3
0	1	1	0	8
1	0	0	0	4
1	0	1	0	7

*No-leader condition is present only at start of game.

Figure 2-5 Leader Detector Circuit

open and normally closed coin inputs are brought into an inverter latch, where the coin signal is debounced.

When the coin switch is closed, the 0.1 µf capacitor on the non-inverting (+) terminal of the LM339 is discharged through a 68K resistor. If the switch is closed for more than 12 msec, the voltage at the non-inverting terminal of the LM339 will go negative with respect to the inverting (-) terminal voltage (ref. Voltage). When this occurs, the output of the LM330 changes state. Through positive feedback, this state is latched into the comparator. If the coin switch is closed for less than 6 msec, the capacitor will not discharge sufficiently to allow the output of the LM339 to change state. Between 6 and 12 msec, the latching may or may not take place, depending on device tolerances. The typical duration of coin pulse needed to toggle the latch is 10 msec. At the end of the game, or in case of a power or static interrupt, the ref. voltage at the inverting (-) comparator input is pulled low. The output again goes high, and the 0.1 µf capacitor is quickly recharged through a diode.

The game control circuitry determines which cars are to be enabled.

If a coin is put into the machine, CREDIT goes high. When this happens, the game counters K1, J1 (7493s) start counting. After eight pulses from the 1 SEC oscillator, L1 (555), the PLAY 1 latch H1-10 and K1-13 (7402) changes state and the game starts.

If the game is in the play mode and car n has credit (Qn is high), then ATTRACT n will go low (IC F4, 7400). This enables the controls on car n, so that it may be driven. During the eight-second waiting period, the $\overline{\text{SCORE RESET}}$ signal is driven low by C2-8 (7410). At the end of the game, after 128 pulses from the one-second clock, the END GAME latch H1-4 (7402) produces a pulse to reset the credit latches.

The car reset circuitry resets each car at the start of the game and if it travels out of bounds. COMP RESET CLOCK shifts a series of high signals through the 8-bit parallel out-shift register, C4 (74164). As the high signal ripples through the shift register on consecutive pulses from COMP RESET CLOCK, the individual car reset clocks (CRCn) are produced. These are used to clock the car reset flip-flops A3, A4, B3 (7474s). If coin switch n is closed or if car n is out of bounds, the set input of car reset flip-flop n will be pulsed low, and CAR RESET n will go high. If the game has credit but car n does not, then the D-input to the reset flip-flop will be held high and CAR RESET n will be continuously clocked high by CRC n. As long as the CAR RESET signal is high, car n will disappear. Then credit for car n is established, CAR RESET n will be clocked low, and the car will reappear at the starting line.

2.5 CAR PRINTED CIRCUIT BOARD

The car board contains the following circuits:

- Car steering processor
- Car acceleration processor
- Car motion counters
- Car video processor

- Crash and collision detection
- Sound synthesis and power amp

The steering processor is a two-stage up/down counter (E2 and F2, 74193s) with decoding circuitry in front (E3, 7474, and E1, 7300) and the skid detector (C1, 7400) and latch (D1, 7475) after. When the circuit is enabled (ATTRACT goes low), the decoder circuitry translates a quadrature signal from the steering board into direction and rate of turn information -- see Figure 2-6. $\overline{\text{VTC}}$ on E3-13 (7474) serves as a maximum turning rate signal.

When there is a collision between cars, E1-6 (7400) forces the car to turn for the duration of the COLLISION signal at the maximum turning rate. The red LEDs on the outputs of H4-10, 12 (7414) serve only as visual indicators of the operation of the quadrature signal from the steering board. E2 and F2 (74193s) divide the rotation pulses or the decoder circuit by 128. The last five bits of this division become the rotation code R4-R0* that represents a specific car orientation. Binary 00000 is straight up; the count continues clockwise through 32 consecutive positions up to binary 11111, which is just left of straight up. The skid latch D1 (7475) contains the direction code* of the car or D4-D1 (the lowest-order direction bit is R0).

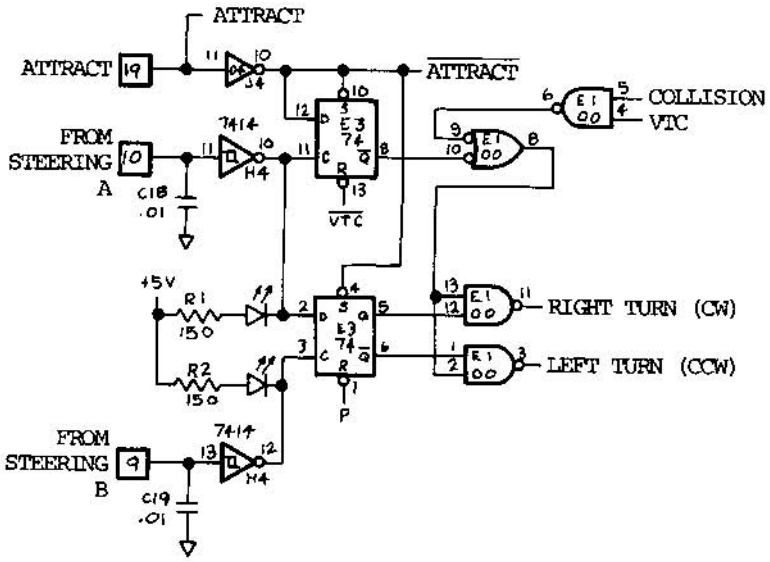
This code differs from the rotation code only when the car is in a skid. The skid condition is determined by C1 (7400). If the car is at quarter-speed or greater when the brake is depressed, or if the car collides with another car, a skid condition exists, and $\overline{\text{SKID}}$ goes low to latch the last rotation into D1.

The acceleration processor consists of some preprocessing circuitry (D3, 74153) to create acceleration and deceleration pulses, an up/down counter (C2, 74193) to count these pulses and keep track of the speed, and a circuit (D2, 7485) that translates this speed information into speed pulses in the GO signal.

With only the gas pedal depressed, the car will accelerate at the rate of one unit per 16 frames (signal from C3-6, 7420 gates with 8F at D3-4). With no pedal depressed or with only the brake depressed, the car will decelerate at the rate of one unit per eight frames. With both gas and brake pedals depressed, the car will decelerate one unit per 16 frames. The up/down counter, C2 (94193) with a fifth stage A1-5 (7407), counts these acceleration units. At speed 14 (binary 11110), C3-8 (7420) gates out any further acceleration pulses, and maximum speed is attained. At speed zero, in the attract mode, or after a crash into the pylons, the STOP signal resets the counter outputs to zero. The digital comparator D2 (7485) compares the speed code (SPEED 5-SPEED 1) against frame bits (1F-16F) from B1 (7493) and A1-3 (74107). The result is shown in Figure 2-7.

The motion circuit operates on the principle of the Atari patented "slipping counter" method of moving objects on a raster scan display (Patent No.

*The rotation code R4-R0 tells in which direction the car is pointed; the direction code D4-D1, R0 tells the direction of motion.



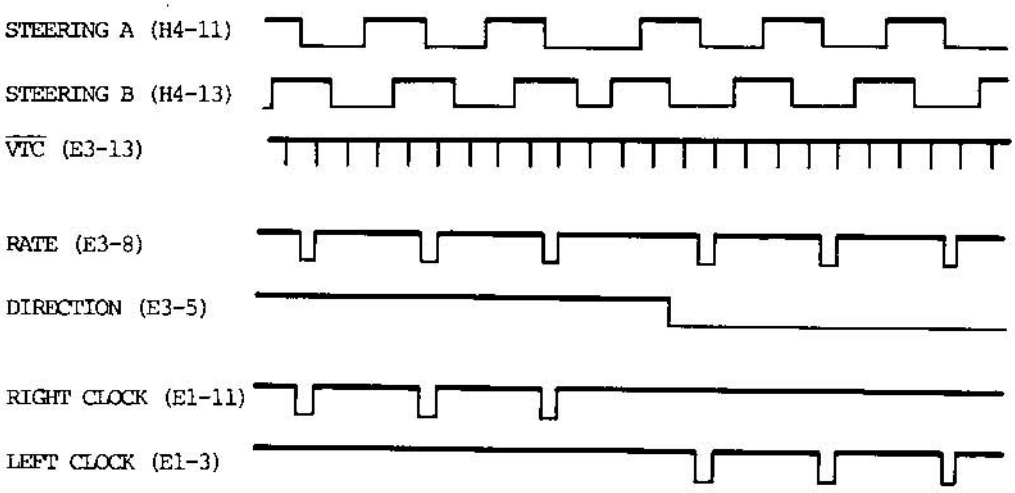


Figure 2-6 Steering Decoder Circuit with Sample Waveforms

3,793,483). The motion counters count in parallel with the sync counters on the sync board. In order to move vertically, the vertical motion counter K3 (9316), L3 (9316) and J1-5 (74107) is forced to count short (up) or long (down) with respect to the sync vertical counter. Similarly, the horizontal motion counter H3, J2, H2 (9316s) causes horizontal motion by counting short (left) or long (right) with respect to the sync horizontal counter.

Each frame in which the GO signal is high causes the motion counters to make a unit move in the direction specified by the direction code (D4-D1, R0). To move faster, GO is high more often. A table of approximate sine/cosine values for the 32 different directions is contained in a PROM (K4, 003187). This motion code goes to the motion counters when GO enables the PROM. The horizontal motion code is gated with $\overline{\text{VRESET}}$ in F3 (7402). This limits the long or short count to one line of the frame. A table of the horizontal and vertical motion codes for all 32 directions, as seen at the load inputs of H3 and K3 (9316s), is given in Table 2-1. The horizontal counter is clocked at the system clock rate of 14.318 MHz.

In order to maintain the same amount of motion resolution vertically as well as horizontally, the vertical motion counter is clocked by VCLOCK. This signal is two pulses per line and is gated out during vertical sync, so that the vertical motion counter requires one less stage. Using the terminal count outputs of the counters, a car window is formed of 16 clock pulses by 8 lines.

The video processor uses line, column, and rotation information to address video information in a 4K ROM, K2 (003186). Further column information from the horizontal motion counter is used to multiplex the ROM outputs to a single line from L2 (9312). This video is then clocked into J1-3 (74107) to remove edge effects and race problems. The result is the car video information.

When the car collides with another car, L1 (555) produces a half-second pulse during which the car will skid and spin. If the car crashes into the pylons, a low pulse is made at $\overline{\text{CRASH}}$ (H1-8, 7400). This signal stops the car and triggers the crunch sound. $\overline{\text{CRASH SEQ}}$ remains low and prevents further crashes until the car is no longer in contact with the pylons.

The sounds that are synthesized are the motor sound, horn, crunch (crash), and screech (skid). The motor sound is produced by performing a D/A conversion on the speed code (SPEED 5-SPEED 1), and using the result to drive a current source that controls the oscillation frequency of B3 (555). This frequency is divided by both 6 and 4, and various divisions are mixed. HORN is a 760-Hz signal gated by the horn button input. CRUNCH is made by gating noise from a noise source (D5-1, LM324) with a discrete one-shot, triggered by $\overline{\text{CRASH}}$. The screech sound is formed by an op amp (D5-14, LM324) configured as a free-running multivibrator. This oscillator is also perturbed by the noise source to give it a "gritty" quality, and it is turned on and off by the SKID signal F4-8 (7406). The sounds are then mixed, buffered, and fed into a digitally controlled four-position master attenuator. The audio volume trimpot should be adjusted so that with the horn turned on, the signal at D5-8 (LM324) is 0.75 volt peak to peak. Finally, the audio signal is amplified by the LM380 power amp.

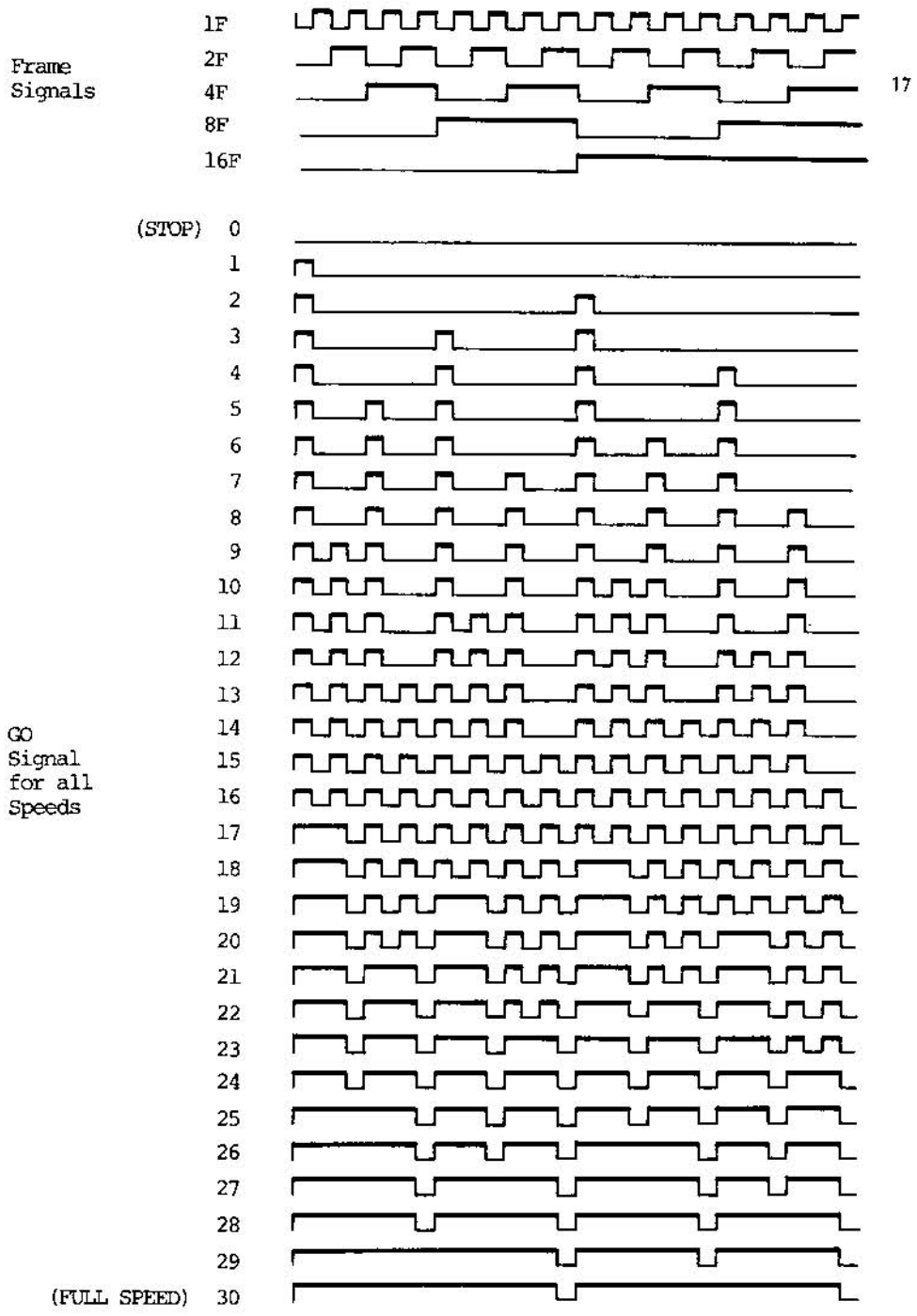


Figure 2-7 GO Signal (Speed Pulses)

2.6 POWER SUPPLY PRINTED CIRCUIT BOARD

The power supply board has the circuitry for the unregulated supplies and for driving the coin mechanism lockout coils.

The unregulated supplies are both full-wave center-tap rectified configurations. The +9V supply may vary from 7.5V to nearly 11V, depending on line voltage at the transformer primary and the load current. It supplies the power for the +5V regulators on the logic PCBs. The +20V supply may vary from 8V to 22V, again depending on line and load conditions. It supplies power for the audio electronics on the car boards and for the lockout coil drivers.

The lockout coil driver should be active when the $\overline{LOn}$ signal is high, i.e., when car n does not yet have credit. This causes switching transistor 2N3643 to turn on power transistor 2N5190, allowing current to flow through the lockout coil. This enables a coin to be entered. The entry of a coin for car n causes $\overline{LOn}$ to go low. This signal going low turns off the 2N3643, and the latter device then turns off the 2N5190. The lockout coil is released by the 2N5190, and further coins are locked out until the end of the present game, i.e., when $\overline{LOn}$ goes back high.

DIRECTION CODE D4-D1, R0	HORIZONTAL INPUTS (H3) D C B A	VERTICAL INPUTS (K3) D C B A
0 0 0 0 0	0 1 0 0	1 1 0 0
0 0 0 0 1	0 0 1 1	1 1 0 0
0 0 0 1 0	0 0 1 1	1 0 1 1
0 0 0 1 1	0 0 1 0	1 0 1 1
0 0 1 0 0	0 0 0 1	1 0 1 1
0 0 1 0 1	0 0 0 1	1 0 1 0
0 0 1 1 0	0 0 0 1	1 0 0 1
0 0 1 1 1	0 0 0 0	1 0 0 1
0 1 0 0 0	0 0 0 0	1 0 0 0
0 1 0 0 1	0 0 0 0	0 1 1 1
0 1 0 1 0	0 0 0 1	0 1 1 1
0 1 0 1 1	0 0 0 1	0 1 1 0
0 1 1 0 0	0 0 0 1	0 1 0 1
0 1 1 0 1	0 0 1 0	0 1 0 1
0 1 1 1 0	0 0 1 1	0 1 0 1
0 1 1 1 1	0 0 1 1	0 1 0 0
1 0 0 0 0	0 1 0 0	0 1 0 0
1 0 0 0 1	0 1 0 1	0 1 0 0
1 0 0 1 0	0 1 0 1	0 1 0 1
1 0 0 1 1	0 1 1 0	0 1 0 1
1 0 1 0 0	0 1 1 1	0 1 0 1
1 0 1 0 1	0 1 1 1	0 1 1 0
1 0 1 1 0	0 1 1 1	0 1 1 1
1 0 1 1 1	1 0 0 0	0 1 1 1
1 1 0 0 0	1 0 0 0	1 0 0 0
1 1 0 0 1	1 0 0 0	1 0 0 1
1 1 0 1 0	0 1 1 1	1 0 0 1
1 1 0 1 1	0 1 1 1	1 0 1 0
1 1 1 0 0	0 1 1 1	1 0 1 1
1 1 1 0 1	0 1 1 0	1 0 1 1
1 1 1 1 0	0 1 0 1	1 0 1 1
1 1 1 1 1	0 1 0 1	1 1 0 0
STOP CODE	0 1 0 0	1 0 0 0

Table 2-1: Unit Motion Codes for All 32 Directions

III. ADJUSTMENTS AND SERVICING

3.1 OPERATOR ADJUSTMENTS AND OPERATING INSTRUCTIONS

3.1.1 ADJUSTMENTS: There are several adjustments available to the operator. These are:

- Master volume switch (on sync PCB)
- Game time adjustment (on coin control PCB)
- Lockout coil power switch (on power supply PCB)

The master volume switch adjusts the overall audio volume level to one of four possible levels. It is located on the sync PCB as shown in Figure 2-1. Clockwise adjustment decreases volume; counterclockwise adjustment increases the sound level. All of the car PCBs have their own separate volume controls. These are preset at the factory for balanced output levels, and should be changed only by service personnel making repairs or adjustments to the car PCBs.

The game timer potentiometer is located on the coin control PCB in the upper corner near the front of the card rack. It adjusts the length of the game from approximately 75 seconds to nearly three minutes. Game time is increased by turning the pot downward or clockwise, as seen from the front of the card rack.

The lockout coil power switch is located near the edge connector of the power supply PCB. If switched to the "off" position, all of the coils will go into the coin lockout mode, and the machine will not accept coins. In order to use the coin mechanisms in the machine, this switch must be in the "on" position and power must be on.

3.1.2 OPERATING INSTRUCTIONS (UNATTENDED OR AUTOMATIC MODE): After insuring that the machine is properly assembled and secure, apply power by inserting the power plug into a 105-125 VAC, 60-cycle, three-pronged or grounded receptacle rated for at least 5 amperes (600 watts). It will take a few minutes for the TV monitor to warm up. The game should come on in the attract mode (no sound or car motion). A coin in any slot will increment that coin counter, cause the lockout coil to engage, and reset that car to the starting line.

After approximately eight seconds, the game will start: sound will come on and the cars may be driven. All cars that have not received credit will disappear from the TV screen. The eight-second delay allows all players to deposit their money before the game starts. Any player depositing money after the game starts will also get his car reset to the starting line and may play for the remainder of the game.

3.2 SERVICE AND TROUBLESHOOTING

Indy 4 is sold with one spare PCB for each kind of circuit board in the card rack, and one spare steering PCB. When inserting circuit boards into the card rack, take the following steps to insure that the game will not be damaged:

3.2.1 Be certain that the board is the proper type for that position and that it is not reversed. See Figure 2-1 for location of board types. Heat-sinks should always be at the top of the board and to the right.

3.2.2 Be certain that the board is inserted straight into position in the card guides.

3.2.3 Pushing gently, wobble the board slightly until it begins to seat into the connector. If it does not begin to seat, recheck the above two steps, and check for warpage of the board. Correct any problem.

3.2.4 Applying firm, constant pressure, push the board into place until it is seated fully. The front edge of the board should be flush with adjacent circuit boards. DO NOT use fast, jerky motions, as this could damage the backplane board or the edge connector.

When removing boards, always use the card ejector tool provided with the game. Hook the bolt of the tool into the hole in the uppermost corner of the circuit board. Using the frame of the card rack as a pivot, pull gently up to disengage the card from the backplane (see Figure 2-8). Remove the ejector tool, and pull the card out by hand.

When troubleshooting, the short description of each board in Section II of this manual should help in quickly locating a problem. Replacing a suspect circuit board with a replacement gives quick verification of the source of the problem. To fix a circuit board, refer to the schematic and technical description provided in this manual. Repair of circuit boards should be attempted only by qualified technical personnel with proper equipment. As an additional aid to maintenance, the system has been designed so that all four car PCBs are interchangeable. Also, removing one car board will only disable that car, without affecting any others.

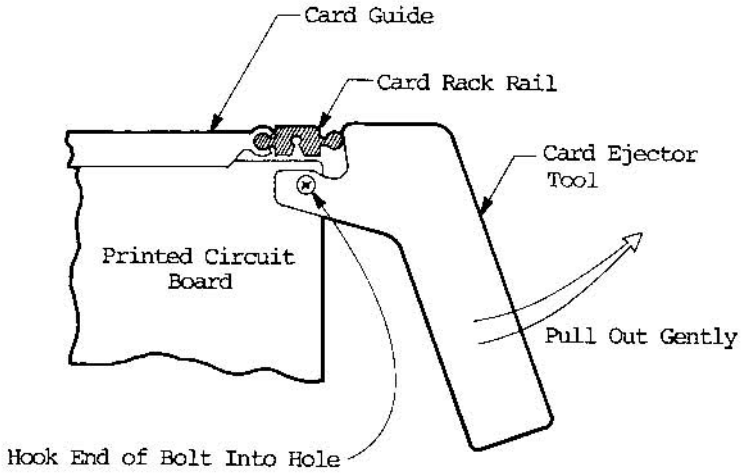


Figure 3-1 Use of Card Ejector Tool

3.3 TEST EQUIPMENT

In order to test any Atari PCB, some items such as the logic probe are absolutely essential. Others are desirable and will make the test procedure easier, but are not absolutely essential. Some of these instruments are available from the Atari Customer Service Department and are: the Kurz-Kasch 520 Logic Probe, the Atari Video Probe, and the Hewlett-Packard 10529A Logic Comparator. Other instruments that are very useful are the HP 10526T Logic Pulser and the Tektronix 465 Oscilloscope. These two items are available through your local electronics supply house. You may write to the Customer Service Dept. at Atari, Inc., 2175 Martin Avenue, Santa Clara, CA 95050 or call at (408) 984-1900.

3.4 REQUIRED EQUIPMENT

The following items are absolutely essential to perform the test procedures presented in this manual.

3.4.1 LOGIC PROBE: The logic probe is an instrument designed for checking the outputs of integrated circuits. The Kurz-Kasch Logic Probe, Model No. LP-520, which is available through the Atari Customer Service Department or most large electronics supply houses, is recommended. This logic probe is indicated if a signal is logic high, logic low, or changing from one state to another. Consult the operating instructions included with the probe for further details about its operation.

3.4.2 VIDEO PROBE: The video probe is a very simple but extremely useful device, and consists of two test clips, a length of rubber-coated test lead wire, and a 4.7K, ¼-watt carbon resistor. Video probes may be obtained from the Atari Customer Service Dept. or, if necessary, they can be assembled from standard components available at all electronics supply houses.

3.5 OPTIONAL EQUIPMENT

It is possible to find 90% of the possible PCB computer malfunctions without the following items. However, if a complete set of troubleshooting equipment is desired, Atari recommends:

3.5.1 HEWLETT-PACKARD 10529A LOGIC COMPARATOR: This device is used to verify correct IC operation. This device simply clips onto in-circuit ICs and instantly displays any logic state difference between the in-circuit test IC and the reference IC in the comparator. Logic differences for each pin of a 14 or 16 dual in-line package (DIP) are indicated by a lamp on the comparator. If the logic comparator is purchased form the Atari Customer Service Dept., it is shipped with 20 preprogrammed reference PCBs. If the device is purchased elsewhere, these PCBs must be specially programmed.

3.5.2 HEWLETT-PACKARD 10526T LOGIC PULSER: This device is used to stimulate in-circuit ICs, so that they are driven to their opposite states. This device is available from the Atari Customer Service Dept. or can be obtained from most large electronics supply houses.

3.5.3 TEKTRONIX 465 OSCILLOSCOPE: This scope is used for viewing various wave forms, and should be ordered from Tektronix. Consult the manufacturer's operating instructions for details on oscilloscope operation.

3.6 LOGIC TYPES AND FUNCTIONS

Type	Function
7400	Quad 2-input NAND gate
7402	Quad 2-input NOR gate
7404	Hex inverter
74S04	Hex inverter
7408	Quad 2-input AND gate
7410	Triple 3-input NAND gate
7413	Dual NAND Schmitt trigger
7420	Dual 4-input NAND gate
7425	Dual 4-input NOR with strobe
7427	Triple 3-input NOR gate
7430	Single 8-input NAND gate
7448	BCD to 7-segment decoder
7450	Dual AND/OR gate (inverter/expander)
7474	Dual D flip-flop
7483	4-bit full adder
7486	Quad exclusive OR gate
7490	Decade counter
7492	Divide-by-12 counter
7493	4-bit binary counter
74107	Dual JK M/S flip-flop
74153	Dual 4-bit multiplexer
74157	Quad 2-input data selector/multiplexer
74165	Parallel-load 8-bit shift register
74192	Synchronous decade up/down counter
74193	Synchronous binary up/down counter
LM380	Amplifier
NE555	Timer
NE566	Function generator

Type	Function
747	Dual operational amplifier
RC4136D	Quad operational amplifier
MFC6040	Voltage-controlled operational amplifier
8098	Hybrid
8103	Hybrid
8099	Hybrid
9311	One-of-sixteen decoder/demultiplexer
9312	8-input multiplexer
9314	Quad latch
9316	4-bit binary counter
9321	Dual one-of-four decoder
9602	Dual monostable multivibrator
74186	Read-only memory (ROM)

Number	Title
A004793	Parts List and Drawing Cabinet Top Assembly
A004792	Parts List and Drawing Cabinet Lower Assembly
A005082	Parts List and Drawing Dashboard Assembly
A004797	Parts List and Drawing Double Foot Pedal Assembly
005488	Drawing Harness Installation
005480	Schematic (Wiring Diagram) Harness
A005486	Parts List and Drawing Electronics Tray Assembly
001151 A000607	Schematic, Steering PCB Parts List and Drawing, Steering PCB
A003000	Schematic, Parts List and Drawing Car PCB
A003184-02	Schematic, Parts List and Drawing Coin Control PCB
A003170-02	Schematic, Parts List and Drawing Score PCB
A003182-02	Schematic, Parts List and Drawing Sync PCB
A003199	Parts List and Drawing Backplane PCB
A003191-02	Schematic, Parts List and Drawing Power Supply PCB
(none)	Schematic G.E. Color TV, Chroma Input PCB

INDY 4

ATARI™ Innovative leisure

ASSEMBLY TITLE / CABINET TOP ASSEMBLY **P/L** 004793

PARTS LIST SPECIFICATION Page 1 of 1

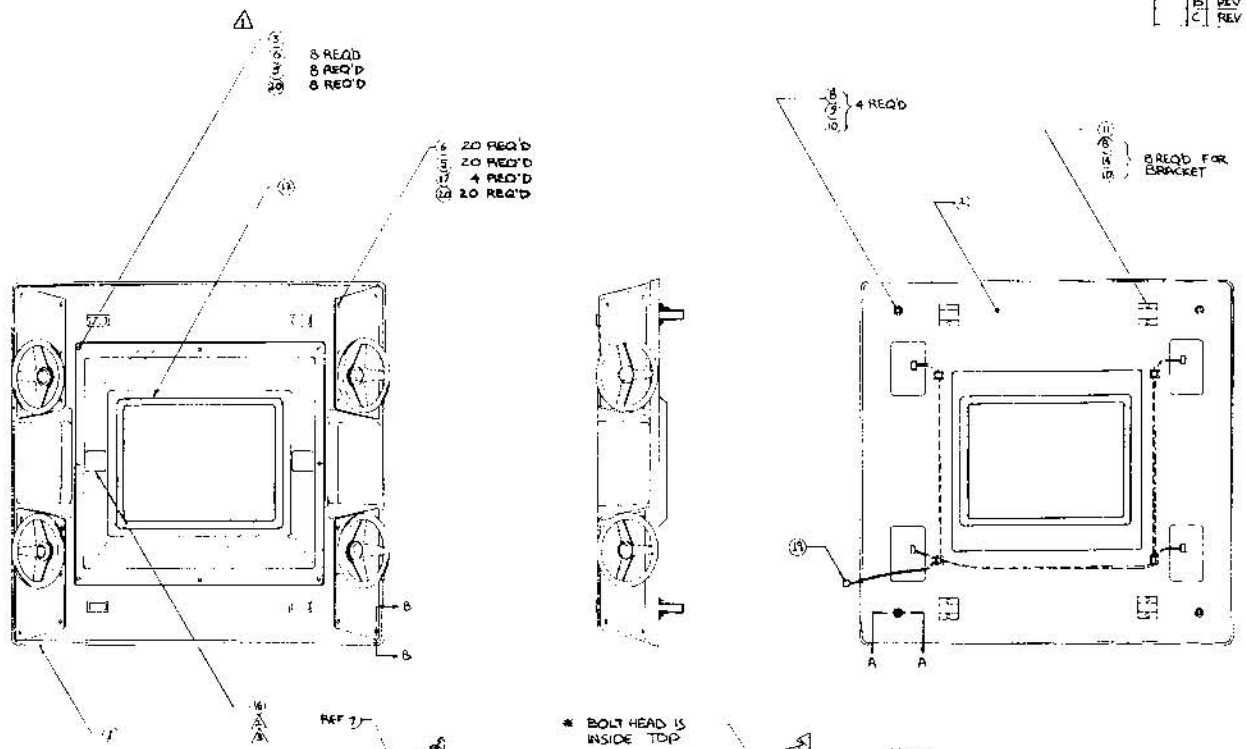
Drawn			
Checked	4/22/76	Mech. Eng.	
Proj. Eng.		Elec. Eng	REV. C

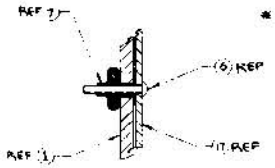
Rev.	Description	Date	Apprv.	Rev.	Description	Date	Apprv.
A		4/13/76					
B	Rev per ECN 2464	4/21/76					
C	Rev per ECN 2473	4/22/76					

Item	Part Number	Qty.	DESCRIPTION
1	004578	1	Top Cabinet
2	004579	Ref	Base
3	004580-01	1	Screen Cover
4			
5	75-99090006	28	Well-Nut, Blind Hole Fastener
6	82-8014B	28	Screw, Button Hd, Socket Cap, 10-32 x 7/8" Lg
7			
8	75-5524NX	12	Bolt, Carriage, Rd Hd, Sq. Neck, Stl, ¼-20 x 1½ Lg
9	75-015S	4	Washer, Flat, Plain Pattern, #¼
10	75-915S	12	Nut, Mach, Hex, STD Pattern, #¼-20
11	004605	4	Bracket - Canopy Pole
12	005138-01	1	Bezel, 25" Monitor
13			
14	75-045	8	Washer, Split-Lock, Cres, #¼
15			
16	005081-01 or 02	2	Instructions - , 005081-02 to be used without Dollar Bill Acceptor
17	A005082	4	Dash Board Assembly
18	78-6900401	A/R	Tape, Foam, Adhesive Approx. 15'-0"
19	A005482	1	Top - Steering Harness
20	75-07021	28	Nylon Black Washers

* Optional: Double Coated Scoth Tape P/N 78-603116

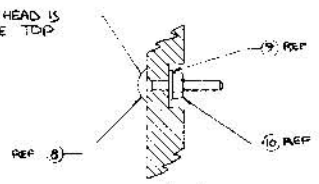
REVISIONS			
	A	PROD RELEASE	
	B	REV PER ECN 2464	
	C	REV PER ECN 2473	





SECTION "B-B"

* BOLT HEAD IS INSIDE TOP



SECTION "A-A"

NOTES:

1. SEAL SCREEN COVER WITH FOAM TAPE SEAL ALONG 4 UNDER-SIDES BEFORE BOLTING DOWN (ITEM 18)
2. CENTER INSTRUCTION & CONTROL CARDS APPROX. AS SHOWN
   - 005081-01 WITH BALL ACCEPTOR
   - 005081-02 WITHOUT BALL ACCEPTOR
3. * DOUBLE SIDE TAPE AS REQUIRED P/N 78-6701GT

NOTES: UNLESS OTHERWISE SPECIFIED

DRAWING NO.	REV

A004793	INDY 4		

SEE P/L 004793

DO NOT SCALE DRAWING

1:2.07

ATARI

ATARI INCORPORATED

CABINET TOP ASSEMBLY

SIZE D | A004793 | REV C

INDY 4

ATARI™ Innovative leisure

ASSEMBLY TITLE / CABINET ASSEMBLY, LOWER **P/L** A004792

PARTS LIST SPECIFICATION

Drawn

Checked 4/22/76 Mech. Eng.

Proj. Eng. Elec. Eng

REV. C

Rev.	Description	Date	Apprv.	Rev.	Description	Date	Apprv.
A	PROD REL	4/13/76					
B	Rev per ECN 2463	4/22/76					
C	Rev per ECN 2502	4/26/76					

Item	Part Number	Qty.	DESCRIPTION
1	48-004	4	5" Arkay Speakers
2	004723	1	Panel, Left Side
3	A003637 -12	2	Coin Door Assembly
4	000869	4	Alum. Speaker Mesh Cover
5	73-77004	16	Rivets, 3/16 x .68 Lg
6	004724	1	Panel, Right Side
7	72-6810	16	Screw, Self-Tapping, #8 x 5/8, Phil, Pan Hd
8	75-5124B	12	Carriage Bolt, #10-24 x 1½ Lg
9	75-010S	12	#10 Flat Washer
10	75-040	28	#10 Lock Washer
11	75-911S	20	#10-24 Hex Nut
12	72-6812	32	Screw, Self Tapping, #8 x 3/4, Phil, Pan Hd
13	A004778	1	Frame Weldment
14			
15	A004797	4	Double Foot Pedal Assembly
16	72-5524	4	Scr, Mach, Hex Hd, Stl Cd Plate, #¼-20 x 1½ Lg
17			
18	A005173	4	Enclosure, Foot Pedal
19	75-5516B	8	Bolt, Carriage, #¼-20 x 1" Lg
20	75-045	14	Washer, Lock, Split, #¼
21	75-915S	10	Nut, Hex, Steel, #¼-20
22	78-3201	4	Adjustable Swivel Guide
23	68-001	2	Interlock Switches
24	72-5512	2	Screw, Mach, Hex Hd, Stl, Cad Plate, #¼-20 x 3/4" Lg
25	75-025S	2	Washer, Flat, Plain Pattern (Narrow), #¼
26	71-803	1	Assembly, Control
27	71-801U1	1	Assembly, Transport
28	71-802U1	1	Assembly, Stacker
29	72-1608	6	Scr, Mach, Pan Hd, CRES, #6-32 x ½" Lg
30	72-1610S	2	Scr, Mach, Pan Hd, Rec, #6-32 x 5/8" Lg
31	75-016S	8	Washer, Flat, #6
32	75-046	8	Washer, Split-Lock, #6
33	75-916S	8	Nut, Hex, #6-32
34	004086	1	Bar, Cross
35	72-5108	16	Scr, Mach, Hex Hd, Steel, #10-24 x 1/2" Lg
36			
37	75-010S	8	Washer, Flat, Reg Pattern, #10
38			
39	A005666	1	Assembly, Monitor Frame
40	* 003195	1	44 Pin Extender Board

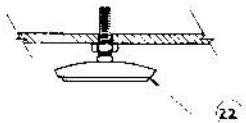
ASSEMBLY TITLE CABINET ASSEMBLY, LOWER **P/L** A004792

PARTS LIST SPECIFICATION

Item	Part Number	Qty.	DESCRIPTION
41	*003197	1	86 Pin Extender Board
42	78-0901	1	Card Rack Ket CR2966
43	78-0902	2	Connector Support Rail CR1407
44	72-6612	4	Self-Tapping Screws, #6 x 3/4 Pan Hd, Sht Mtl
45	002974-01	1	Angle Bracket
46	002974-02	1	Angle Bracket
47	*A003000	5	Car Boards
48	*A003184-02	2	Coin Control Boards
49	*A003170-02	2	Score Board
50	*A003182-02	2	Sync Board
51	*A000607	1	STeering PCB Assembly
52	A003199	1	Backplane P.C. Board
53	003517	4	Backplane Board Support Bar
54	003518	4	Fish Paper, Insulator
55	A005486	1	Electronics Tray Assembly
56	A003191-02	1	Power Supply Board
57	A005238	1	Harness Assembly & Modification
58	005480	Ref	Harness Schematic
59	A005481	1	Main Harness
60	A005483	1	T.V. Video Harness
61	A005484	1	Lock Out Power Harness
62	A005485	1	Power Supply Harness
64	A005488	Ref	Harness Installation

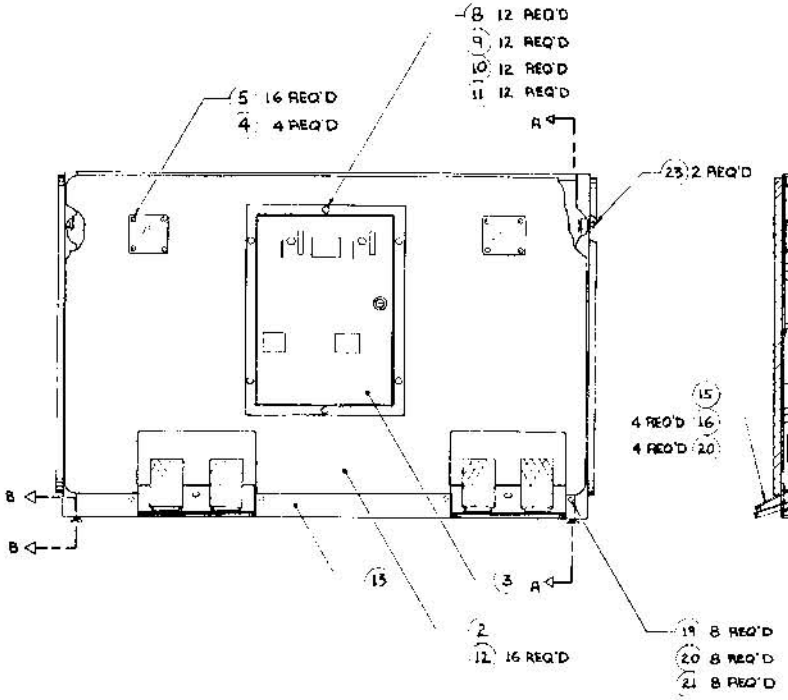
* EXTRA BOARDS TO BE SHIPPED AS SPARED BOARDS

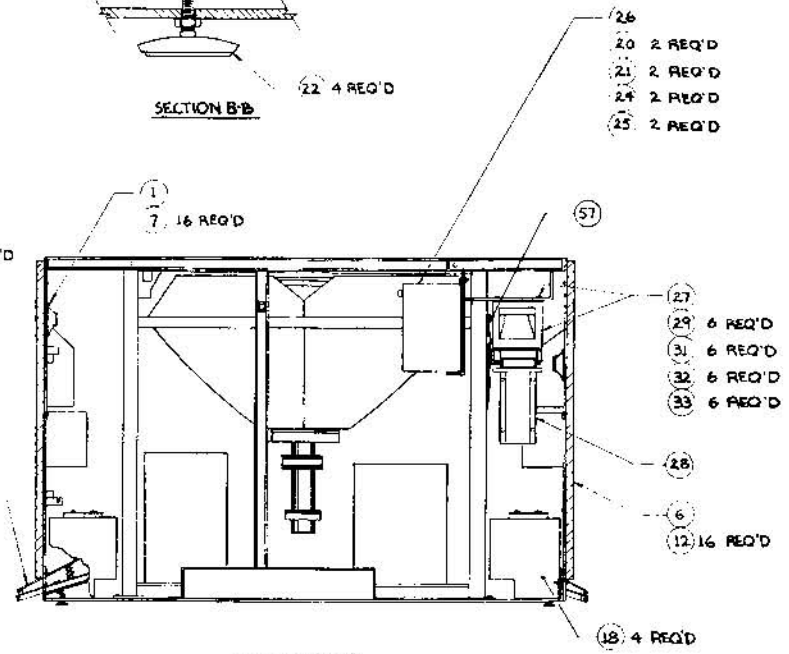
REV	DESCRIPTION	DATE	APPROVED
A	PRODUCTION RELEASE		
B	REV PER ECN 2463		
C	REV PER ECN 2502		



SECTION B-B

22 4 REQ'D





SECTION A-A

OUTSTANDING ECN'S	

NOTES: UNLESS OTHERWISE SPECIFIED

A004791 INDY 4	SEE P/L A004792	DO NOT SCALE DRAWING

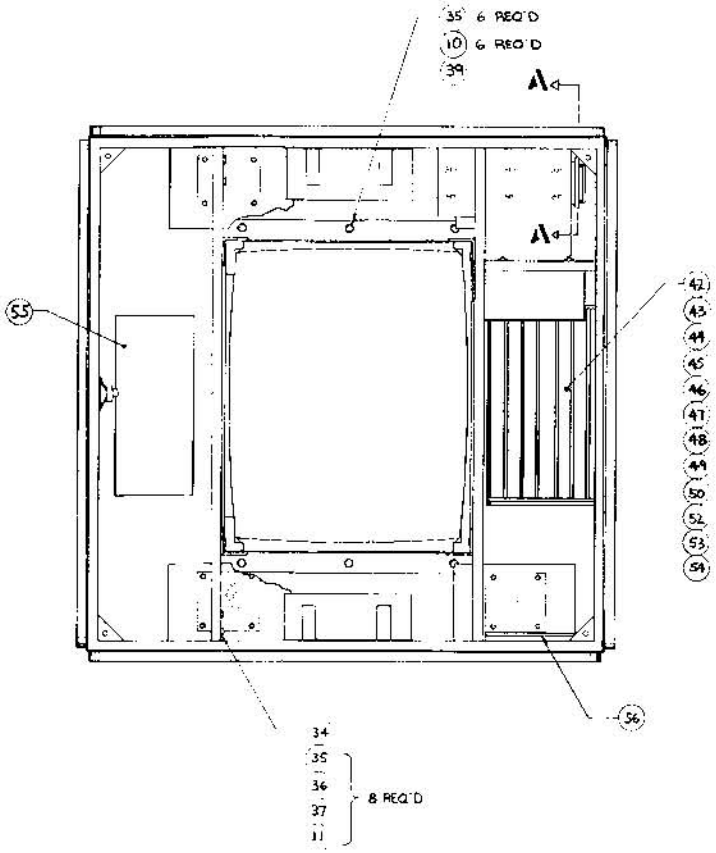
ATARI INCORPORATED

TITLE: CABINET ASSEMBLY, LOWER

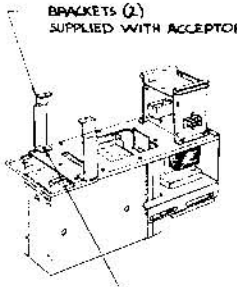
SIZE D | A004792-XX | REV C

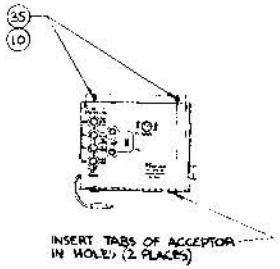
SHEET 1 OF 2

ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	PRODUCTION REL		
	B	REV PER ECN 2463		
	C	REV PER ECN 2502		



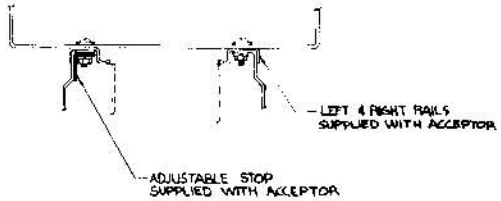
A004792-01 SHOWN





A004792-02 LOWER CAB. ASS'Y-WITHOUT BILL ACCEPTOR.

NOTE:
1. A004792-01 LOWER CAB. ASS'Y-WITH BILL ACCEPTOR



VIEW A - A

OUTSTANDING ECNs	

A004791	NOV 4	SEE P/L A004792	DO NOT SCALE DRAWING

ATARI

ATARI INCORPORATED

TITLE: CABINET ASSEMBLY, LOWER

SIZE D | DRAWING A 004792-XX | REV C

SHEET 2 OF 2

ATARI
Innovative leisure

ASSEMBLY TITLE / DASHBOARD ASSEMBLY **P/L** 005082

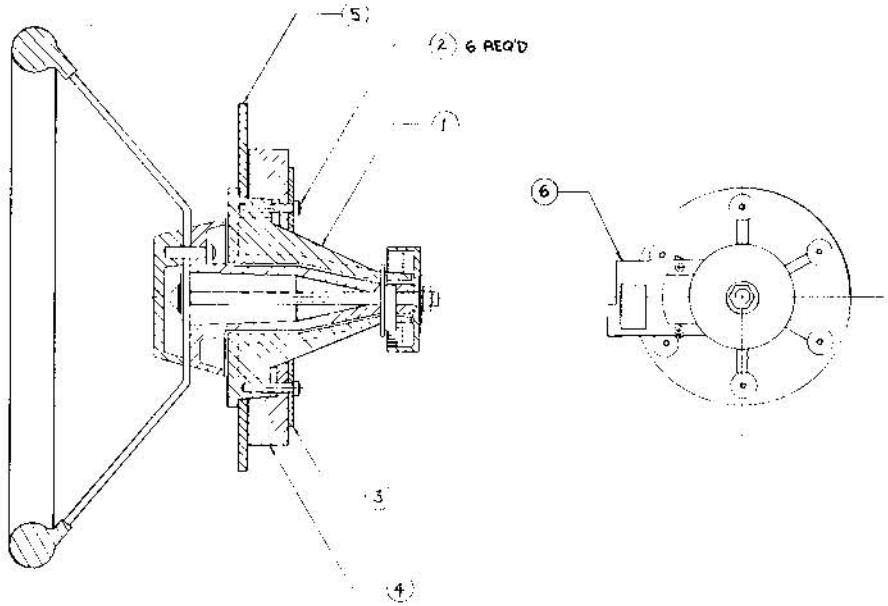
PARTS LIST SPECIFICATION Page 1 of 1

Drawn		
Checked	Mech. Eng.	
Proj. Eng.	Elec. Eng	REV. A

Rev.	Description	Date	Apprv.	Rev.	Description	Date	Apprv.
A	PROD REL	4/13/76					

Item	Part Number	Qty.	DESCRIPTION
1	000598-03	Ref	Steering Wheel Assy (10" Dia. Wheel)
2	72-1112S	6	Screw, Mach, Pan Hd, Phil, #10-24 x 3/4" Lg
3	000567	1	Bow Washer
4	004805	1	Backing Plate - Wood
5	004582-XX	1	Plate - Mounting (Alum)
6	A000607	1	Steering PCB Assembly

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	PROD. RELEASE	4-1-76	



OUTSTANDING ECNs

ACCEPTED	INDY 4
NEXT ASSY	USED ON

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES FOR MACHINED PARTS ANGLES ± SURFACE FINISH ± DECIMALS .XX ± .XXX ± MATERIAL SEE P/L ACCESSORIES

DO NOT SCALE DRAWING

DRAWN DATE 12-2-76

CHECKED

ENGINEER

PROJECT

ATARI

ATARI INCORPORATED 1400 Woldorf Boulevard Los Gatos, California 95030

TITLE DASHBOARD, ASSEMBLY

SIZE D DRAWING NO A 005082 REV A

SHEET 1 OF 1

NOTES: UNLESS OTHERWISE SPECIFIED

INDY 4

ATARI™ Innovative leisure

ASSEMBLY TITLE	DOUBLE FOOT PEDAL ASSY	P/L 004797

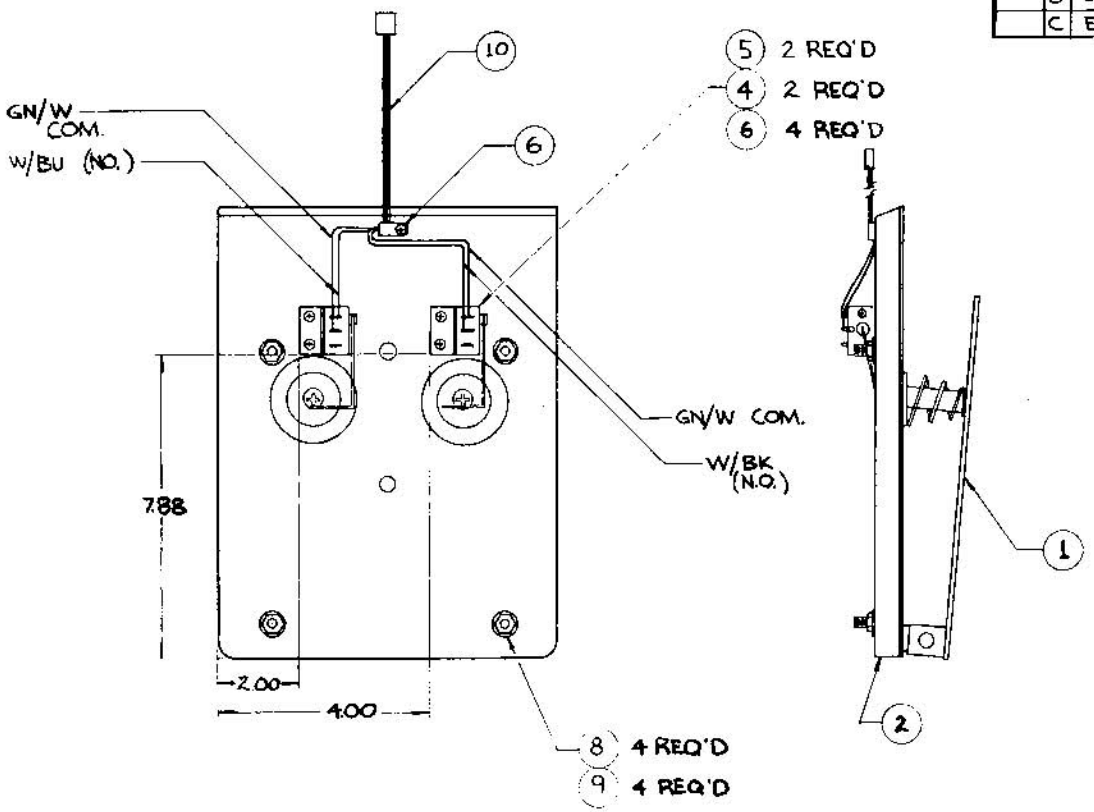
PARTS LIST SPECIFICATION — Page 1 of 1

Drawn			
Checked		Mech. Eng.	
Proj. Eng.		Elec. Eng	REV. C

Rev.	Description	Date	Apprv.	Rev.	Description	Date	Apprv.
A	--	4/12/76					
B	ECN 2427	4.14.76					
C	ECN 2449	7/20/76					

Item	Part Number	Qty.	DESCRIPTION
1	A004798	1	Double Metal Foot Pedal Assy
2	004801	1	Mount Board, Foot Pedal
4	002191	2	Foot Pedal Switch Brkt
5	65-0 1C	2	Switch, Cherry E51-60B
6	75-8810	5	Screw, Wood, Flat Head, Steel #8 x 5/8" Lg.
8	75-914S	4	Nut, Machine, Hexagon, 4-40
9	75-048	4	Washer, Split-Lock, Cres #8
10	A003157-02	1	Foot Pedal Harness

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	PRODUCTION RELEASE	4-12-76	
	B	ECN NO 2427	4-14-76	
	C	ECN NO 2449	4-20-76	



OUTSTANDING ECNs	

NOTES: UNLESS OTHERWISE SPECIFIED

004778	INDY 4
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON ANGLES ±1/2° .XX = ± .03 .XXX = ± .010 SURFACE FINISH ✓

DO NOT SCALE DRAWING

DRAWN BY — DATE 4-26-76

CHECKED

ENGINEER

PROJECT ENGINEER

MFG ENGINEER

MATERIAL SEE P/L A004797

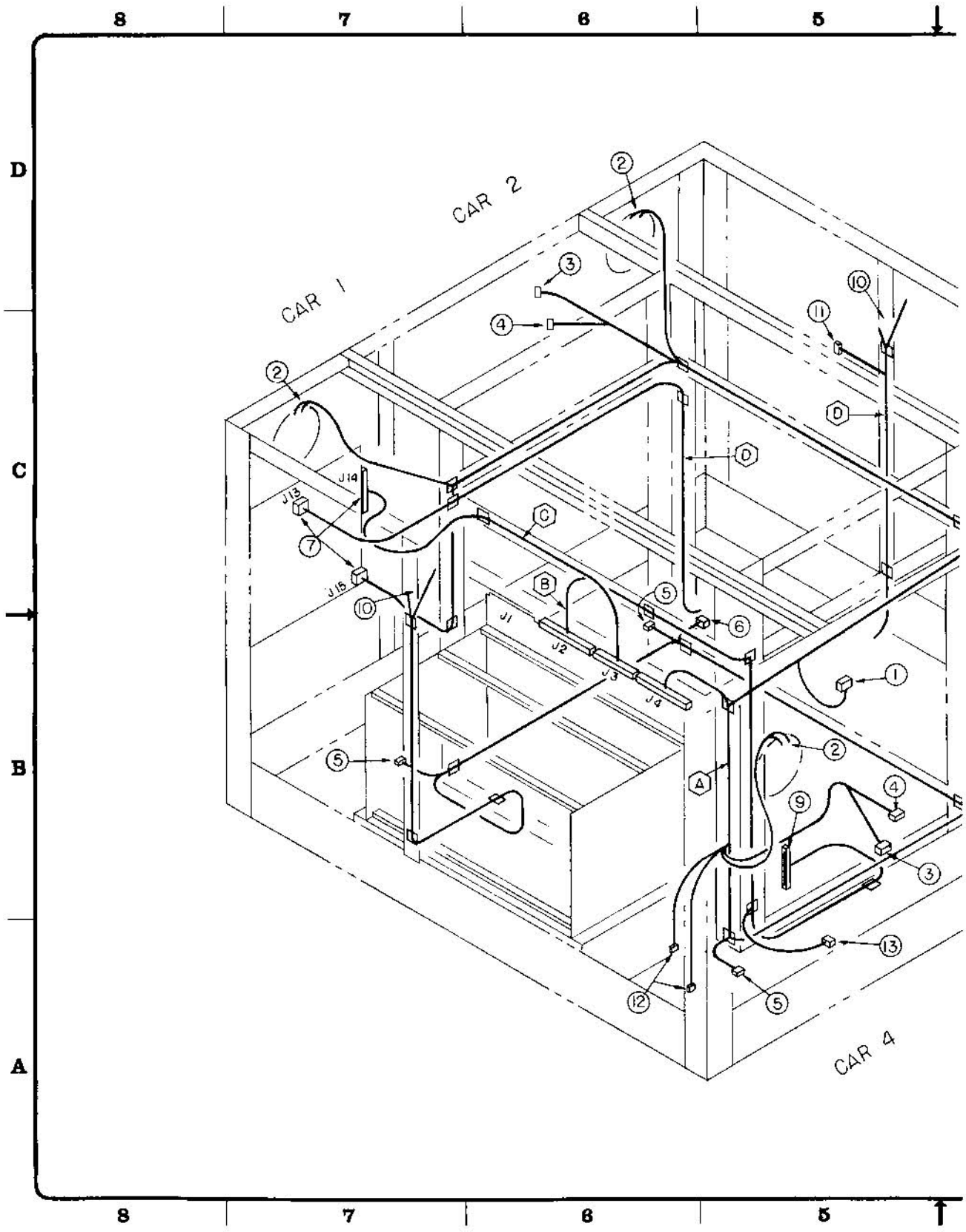
FINISH

ATARI INCORPORATED
14600 Winchester Boulevard
Los Gatos, California 95030

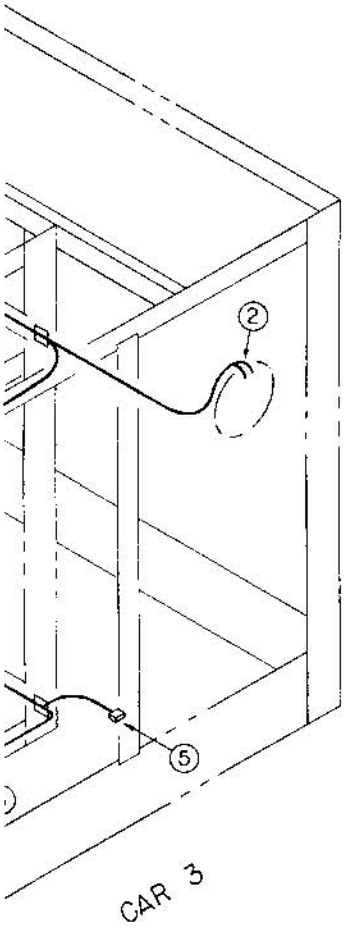
TITLE DOUBLE FOOT PEDAL ASSEMBLY

SIZE C | DRAWING NO A 004797 | REV C

SCALE | SHEET 1 OF 1


8
7
6
5
D
C
B
A
CAR 1
CAR 2
CAR 4
J1
J2
J3
J4
J13
J14
J15

REVISIONS				
SYM	DESCRIPTION	INITIALS and DATE		
		ORIG	CHECK	ENGRG
A	PROD REL	5/3/76		



HARNESSES

A MAIN A005481-01
B TV-VIDEO A005483-01
C LOCKOUT POWER A005484-01
D POWER SUPPLY A005485-01

CONNECTIONS

1 STEERING
2 SPEAKER
3 COIN MECH
4 LOCKOUT COILS
5 FOOT PEDALS
6 ELECTRONICS TRAY
7 POWER SUPPLY BOARD
8 MOTHER BOARD
9 T.V.
10 INTERLOCK SWITCH
11 A C POWER TO FAN
12 A C POWER TO BILL ACCEPTOR
13 BILL ACCEPTOR CREDIT

INTERPRET THIS DRAWING PER USAS Y14.5

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/16 .x ± .3
ANGLES ± 1° .xx ± .02
SURFACE FINISH √ .xxx ± .010

MATERIAL

NEXT ASSY | USED ON
APPLICATION

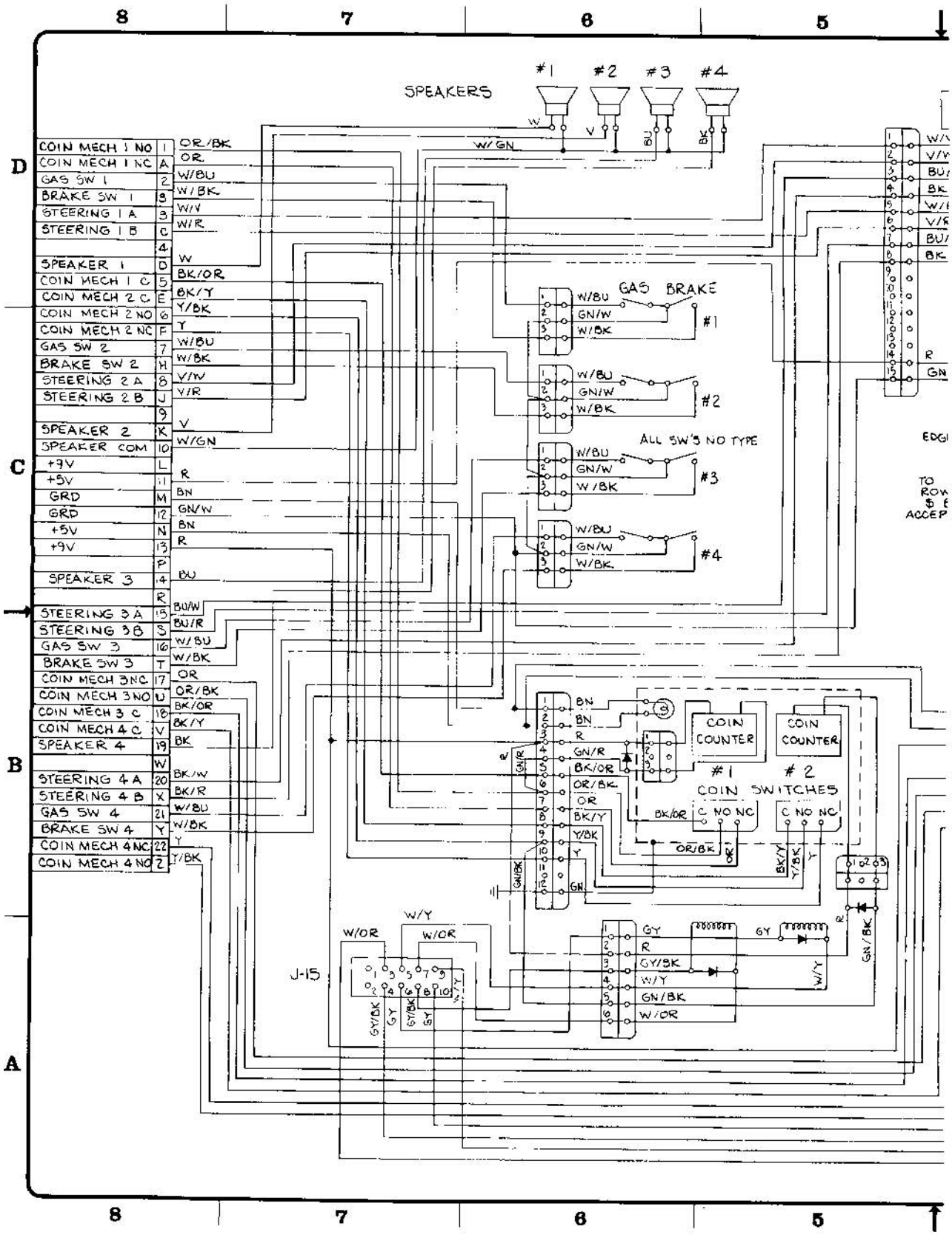
DRAWN BY B.R.R. DATE 4-28-76
CHECKED
DESIGN ENGINEER
PROJECT ENGINEER
DOCUMENT CONTROL
APPROVED

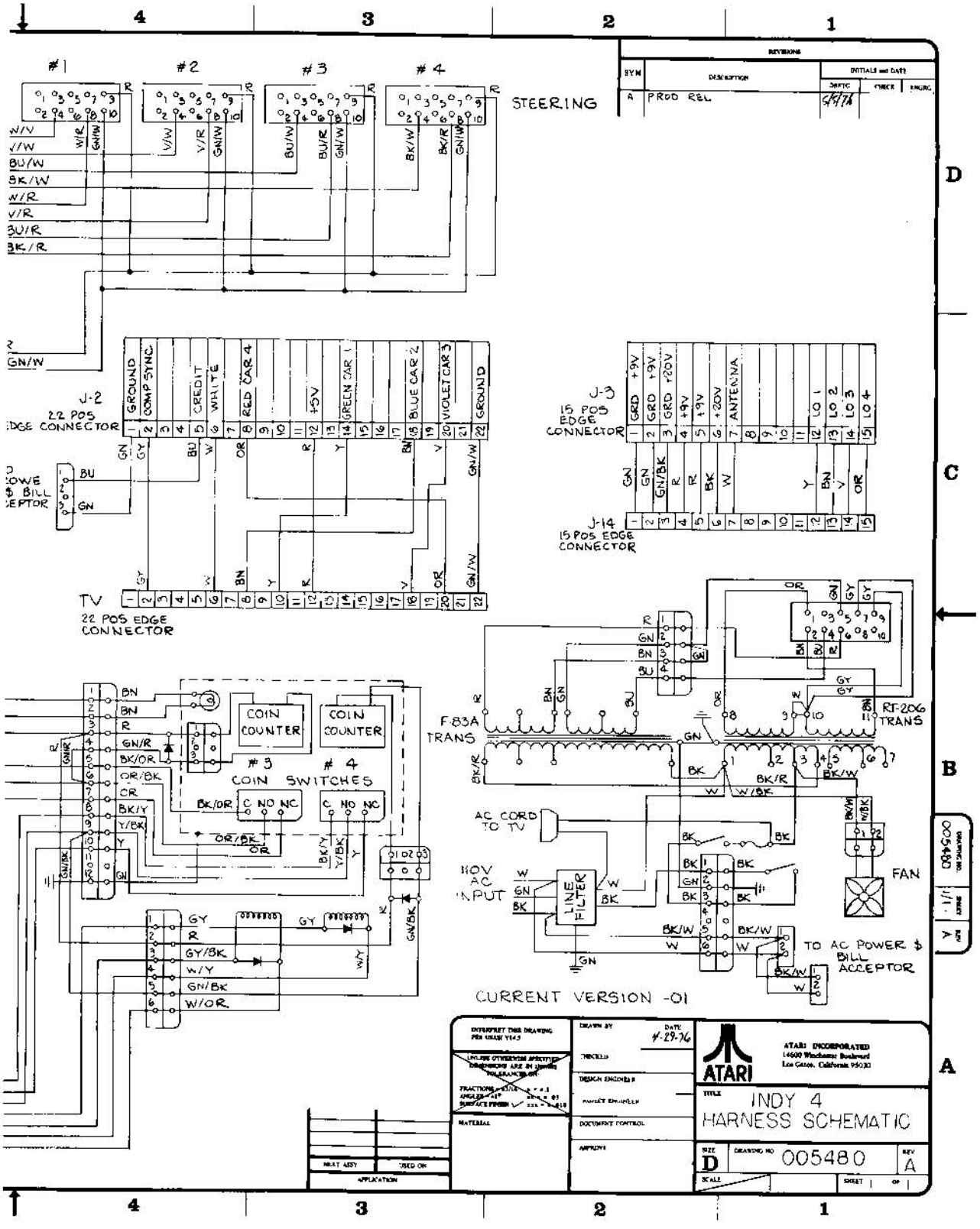
ATARI

ATARI INCORPORATED
14600 Winchester Boulevard
Los Gatos, California 95030

TITLE
INDY 4
HARNESS INSTALLATION

SIZE D | DRAWING NO 005488 | REV A
SCALE — | SHEET 1 OF 1


8
7
6
5
D
C
B
A
SPEAKERS
#1
#2
#3
#4
COIN MECH 1 NO 1 OR/BK
COIN MECH 1 NC A OR
GAS SW 1 2 W/BU
BRAKE SW 1 B W/BK
STEERING 1 A 3 W/V
STEERING 1 B C W/R
4
SPEAKER 1 D W
COIN MECH 1 C 5 BK/OR
COIN MECH 2 C E BK/Y
COIN MECH 2 NO 6 Y/BK
COIN MECH 2 NC F Y
GAS SW 2 7 W/BU
BRAKE SW 2 H W/BK
STEERING 2 A 8 V/W
STEERING 2 B J V/R
9
SPEAKER 2 K V
SPEAKER COM 10 W/GN
+9V L
+5V 11 R
GRD M BN
GRD 12 GN/W
+5V N BN
+9V 13 R
P
SPEAKER 3 14 BU
R
STEERING 3 A 15 BU/W
STEERING 3 B S BU/R
GAS SW 3 16 W/BU
BRAKE SW 3 T W/BK
COIN MECH 3 NC 17 OR
COIN MECH 3 NO U OR/BK
COIN MECH 3 C 18 BK/OR
COIN MECH 4 C V BK/Y
SPEAKER 4 19 BK
W
STEERING 4 A 20 BK/W
STEERING 4 B X BK/R
GAS SW 4 21 W/BU
BRAKE SW 4 Y W/BK
COIN MECH 4 NC 22 Y
COIN MECH 4 NO Z Y/BK
GAS
BRAKE
W/BU
GN/W
W/BK
ALL SW'S NO TYPE
COIN COUNTER
#1
#2
COIN SWITCHES
C NO NC
J-15
W/OR
W/Y
GY
GY/BK
R
GN/BK
TO ROW
ACCEP
EDGI


#1
#2
#3
#4
STEERING
REVISIONS
SYM
DESCRIPTION
INITIALS and DATE
DRFTG
CHECK
ENGRG
A
PROD REL
W/V
V/W
BU/W
BK/W
W/R
V/R
BU/R
BK/R
GN/W
J-2
22 POS EDGE CONNECTOR
GROUND
COMP SYNC
CREDIT
WHITE
RED CAR 4
+5V
GREEN CAR 1
BLUE CAR 2
VIOLET CAR 3
GROUND
J-3
15 POS EDGE CONNECTOR
GRD +9V
GRD +9V
GRD +20V
+9V
+9V
+20V
ANTENNA
LO 1
LO 2
LO 3
LO 4
J-14
15 POS EDGE CONNECTOR
TV
22 POS EDGE CONNECTOR
BU
GN
BOWE & BILL CEPTOR
COIN COUNTER
COIN COUNTER
#3 #4
COIN SWITCHES
C NO NC
F-83A TRANS
RT-206 TRANS
AC CORD TO TV
LINE FILTER
FAN
TO AC POWER & BILL ACCEPTOR
CURRENT VERSION -01
ATARI
ATARI INCORPORATED
14600 Winchester Boulevard
Los Gatos, California 95030
TITLE
INDY 4
HARNESS SCHEMATIC
DRAWN BY
DATE 4-29-76
CHECKED
DESIGN ENGINEER
PROJECT ENGINEER
DOCUMENT CONTROL
APPROVED
MATERIAL
NEXT ASSY
USED ON
APPLICATION
SIZE D
DRAWING NO 005480
REV A
SCALE
SHEET 1 OF 1
005480
REVISIONS
SHEET 1/1
REV A

INDY 4

ATARI™ Innovative leisure

ASSEMBLY TITLE / ELECTRONICS TRAY **P/L** A005486-01

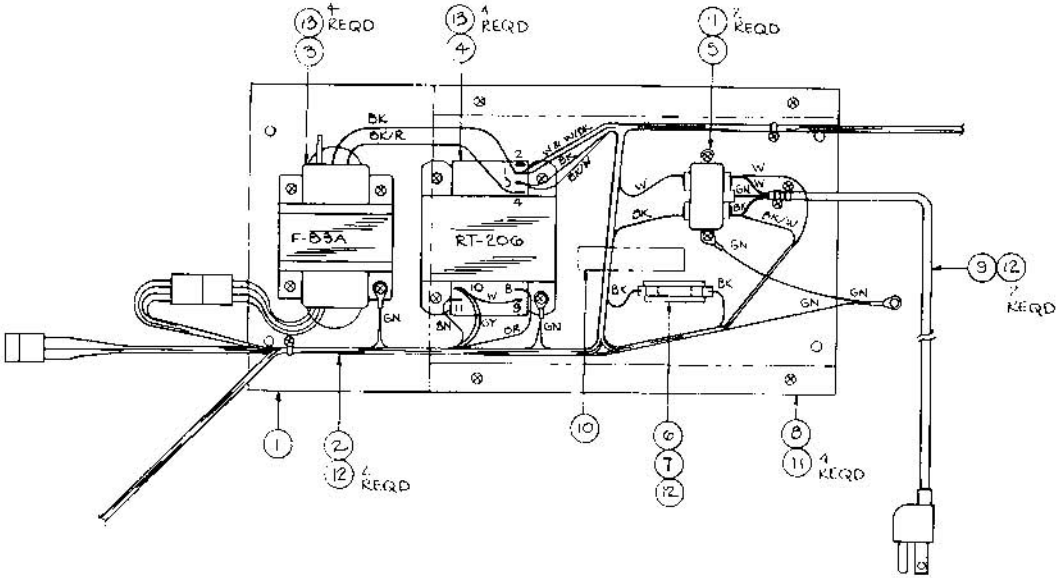
PARTS LIST SPECIFICATION Page 1 of 1

Drawn		
Checked	Mech. Eng.	
Proj. Eng.	Elec. Eng.	REV. B

Rev.	Description	Date	Apprv.	Rev.	Description	Date	Apprv.
A	PROD REL	4/21/76					
B	Rev per ECN 2509	4/29					

Item	Part Number	Qty.	DESCRIPTION
1	005478	1	Electronics Tray
2	A005485-01	1	Power Supply Harness
3	A005164-02	1	Transformer, Triad F83A
4	42-7112	1	Transformer, Stancor RT-206
5	41-2001	1	Filter Power Line
6	46-202501	1	Fuse, 5 AMP
7	79-3201	1	Fuse Holder
8	005507-01	1	Electronics Tray Cover
9	A004381-01	1	Power Cord 8' Assy
10	000871-01	1	Label
11	72-6608	6	Screw, SM, Pan Hd, Phil #6 x ½ Lg
12	72-6612	5	" " " " " #6 x 3/4 Lg
13	72-6812	8	" " " " " #8 x 3/4 Lg

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVED
	A	PROD REL		
	B	REV PER ECN 2509		



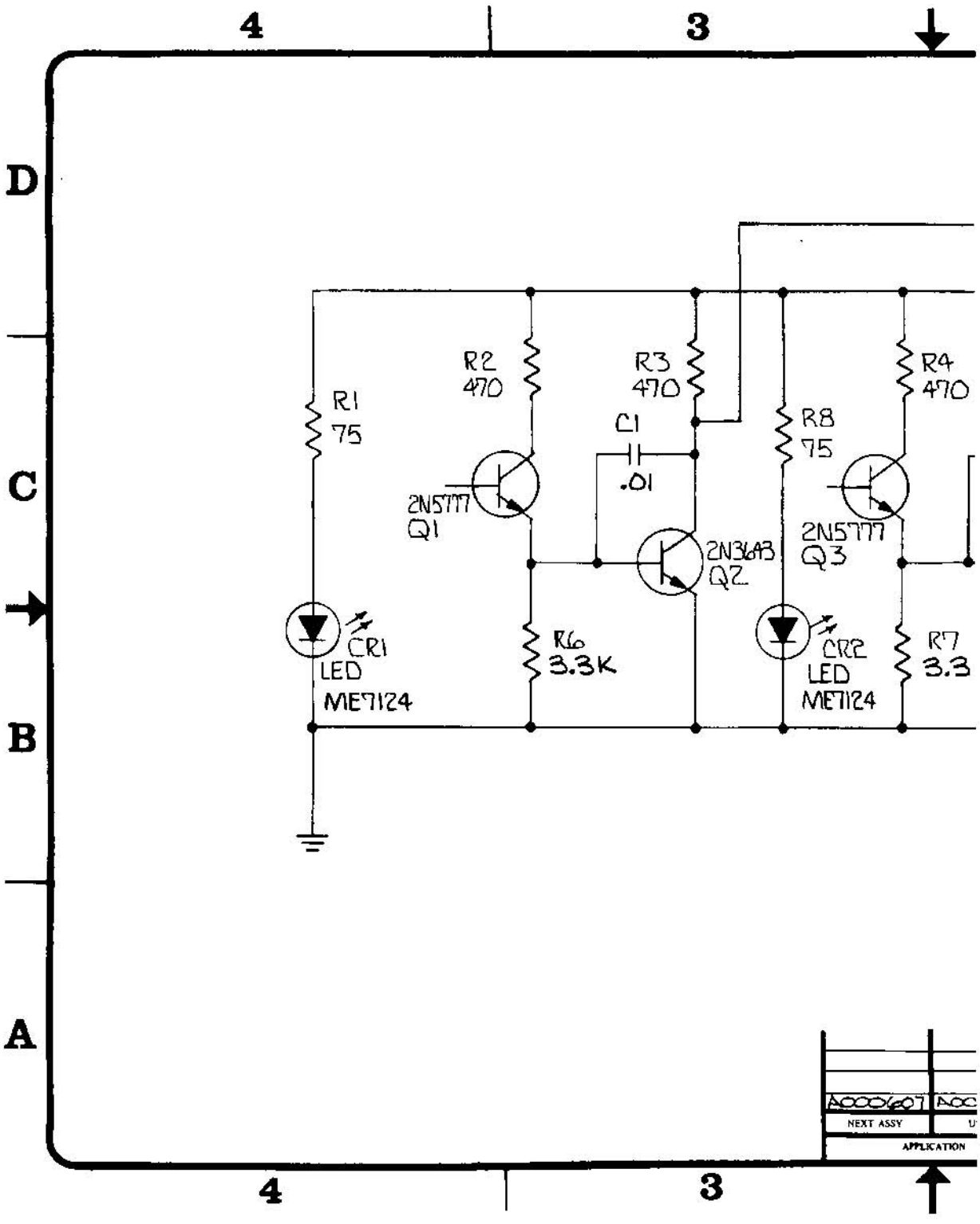
OUTSTANDING ECNs	

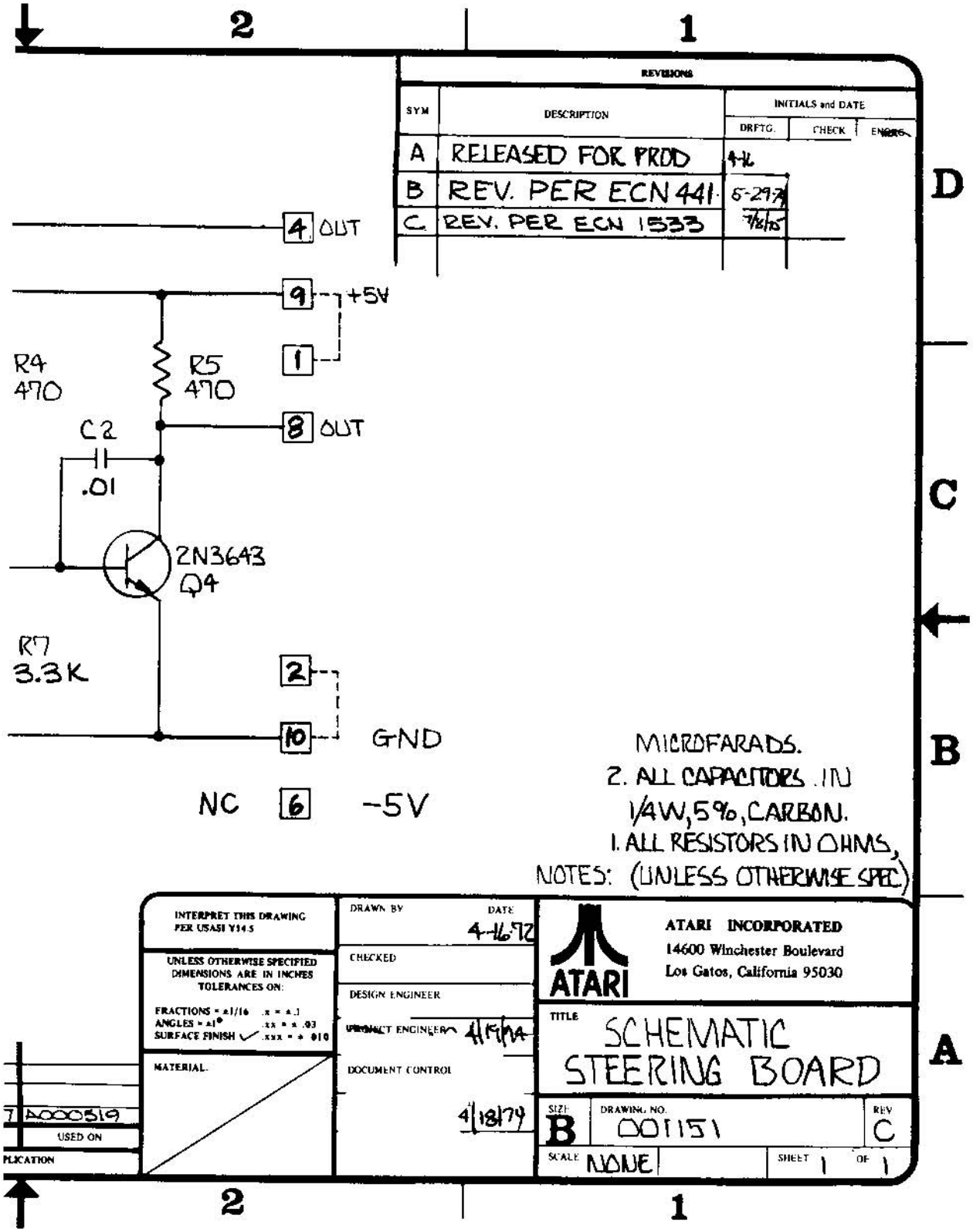
CURRENT VERSION A005486 01

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON: ANGLES ±1/2° SURFACE FINISH	DO NOT SCALE DRAWING	ATARI INCORPORATED 14600 Winchester Boulevard Los Gatos, California 95030	
MATERIAL	DRAWN BY / DATE 4-30-76	TITLE INDY 4 ELECTRONICS TRAY ASSEMBLY	
FINISH	CHECKED / ENGINEER / PROJECT ENGINEER / MFG ENGINEER	SIZE C / DRAWING NO A005486 / REV B	
NEXT ASSY / USED ON: INDY 4 / APPLICATION		SCALE HALF / SHEET / OF	

NOTES : UNLESS OTHERWISE SPECIFIED

DRAWING NO A005486 SHEET 1/1 REV B


4
3
D
C
B
A
R1
75
R2
470
R3
470
R4
470
C1
.01
R8
75
2N5777
Q1
2N3643
Q2
2N5777
Q3
CR1
LED
ME7124
R6
3.3K
CR2
LED
ME7124
R7
3.3
NEXT ASSY
APPLICATION


2
1
REVISIONS
SYM
DESCRIPTION
INITIALS and DATE
DRFTG.
CHECK
ENGRG.
A
RELEASED FOR PROD
4-16
B
REV. PER ECN 441
5-29
C
REV. PER ECN 1533
7/8/15
D
4 OUT
9 +5V
1
R4
470
R5
470
8 OUT
C2
.01
2N3643
Q4
R7
3.3K
2
10 GND
NC 6 -5V
C
B
MICROFARADS.
2. ALL CAPACITORS IN
1/4W, 5%, CARBON.
1. ALL RESISTORS IN OHMS,
NOTES: (UNLESS OTHERWISE SPEC.)
INTERPRET THIS DRAWING PER USASI Y14.5
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON:
FRACTIONS ±1/16 .x ± .1
ANGLES ±1° .xx ± .03
SURFACE FINISH .xxx ± .010
MATERIAL
DRAWN BY
DATE
4-16-72
CHECKED
DESIGN ENGINEER
PRODUCT ENGINEER 4/19/74
DOCUMENT CONTROL
4/18/74
ATARI INCORPORATED
14600 Winchester Boulevard
Los Gatos, California 95030
TITLE
SCHEMATIC
STEERING BOARD
A
A000519
USED ON
PLICATION
SIZE
B
DRAWING NO.
001151
REV
C
SCALE NONE
SHEET 1 OF 1
2
1

ATARI

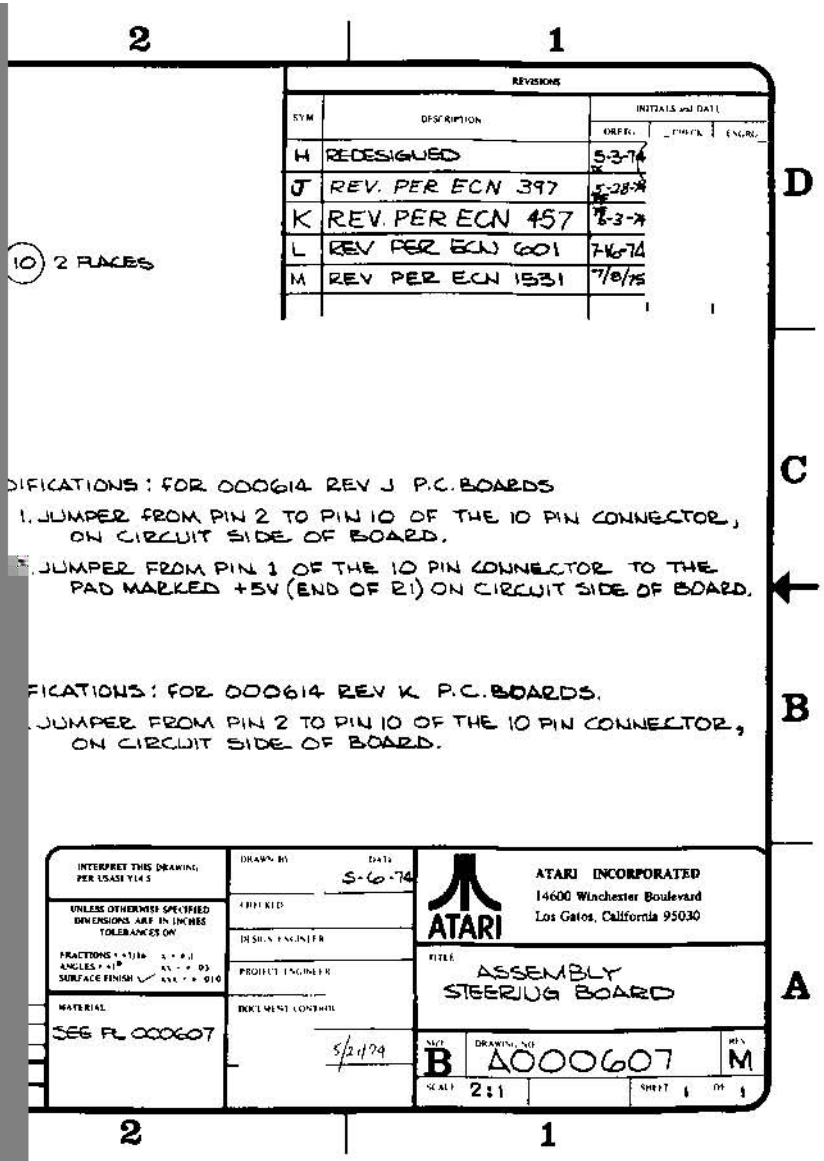
Job Title	Dwg.
RACETRAK STEERING PCB ASSY	P/L 000607

Parts List Specification **sheet 1 of** 1

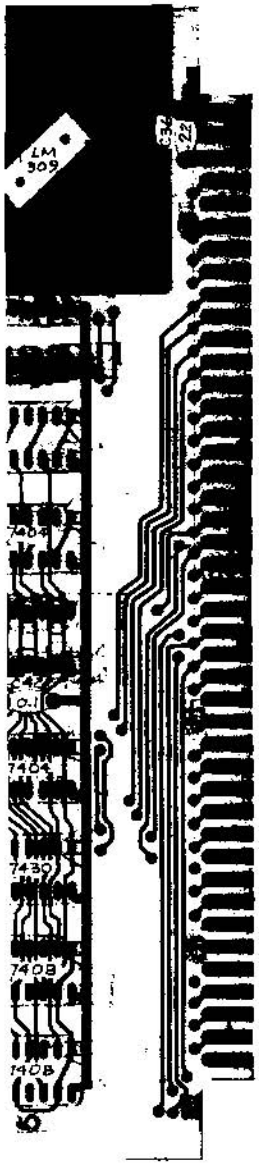
Drawn		
Checked	Mech. Eng.	Rev.
Proj. Eng	Elec. Eng.	M

Rev.	Description	Apprv.	Rev.	Description	Apprv.
H	Redesigned	5-8-74			
J	Rev per ECN 397 5/28/74				
K	Rev per ECN 457 6/3/74				
L	Rev per ECN 601 7/15/74				
M	Rev per ECN 1531				

Item	Part. No.	Qty.	Description
1	000614	1	Printed Circuit Board (E)
2	001092	1	Light Mount
3	001151	Ref	Schematic Diagram
4	11750/10-5750	2	Resistor, Comp., 75 ohm, ¼ watt, 5%
5	11471/10-5471	4	Resistor, Comp, 470 ohm, ¼ watt, 5%
6	11332/10-5332	2	Resistor, Comp, 3.3Kohm, ¼ watt, 5%
7	34104 /27-101103	2	Capacitor, Ceramic, .01uf
8	70006/38-2N5777	2	Transistor, 2N 5777 (Photo Darlington)
9	70000/34-2N3643	2	Transistor, 2N 3643
10	71008/38-ME7124	2	Light Emitting Diode, I.R. ME 7124
11			
12			
13			
14	80089 /79-58005	1	Connector, 10 pin, PC Mount, Amp #1-380991
15	72-1212S	1	Screw, Machine, Pan Head Phil, #2-56 x 3/4 Lg.
16	75-042	1	Washer, Split Lock #2
17	75-912S	1	Nut, Hex, #2-56
18	003749	1	Retainer, Led Light Mount

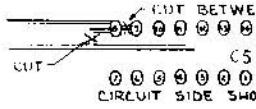

2
1
REVISIONS
SYM
DESCRIPTION
INITIALS and DATE
ORIG.
CHECK
ENGR.
H REDESIGNED 5-3-74
J REV. PER ECN 397 5-28-74
K REV. PER ECN 457 6-3-74
L REV PER ECN 601 7-16-74
M REV PER ECN 1531 7/8/75
D
(10) 2 PLACES
C
DIFICATIONS: FOR 000614 REV J P.C. BOARDS
1. JUMPER FROM PIN 2 TO PIN 10 OF THE 10 PIN CONNECTOR, ON CIRCUIT SIDE OF BOARD.
JUMPER FROM PIN 1 OF THE 10 PIN CONNECTOR TO THE PAD MARKED +5V (END OF R1) ON CIRCUIT SIDE OF BOARD.
B
FICATIONS: FOR 000614 REV K P.C. BOARDS.
JUMPER FROM PIN 2 TO PIN 10 OF THE 10 PIN CONNECTOR, ON CIRCUIT SIDE OF BOARD.
INTERPRET THIS DRAWING PER USASI Y14.5
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON
FRACTIONS ± 1/16 .X ± .1
ANGLES ± 1° .XX ± .03
SURFACE FINISH √ .XXX ± .010
MATERIAL
SEE PL 000607
DRAWN BY
DATE
5-6-74
CHECKED
DESIGN ENGINEER
PROJECT ENGINEER
DOCUMENT CONTROL
5/21/74
ATARI
ATARI INCORPORATED
14600 Winchester Boulevard
Los Gatos, California 95030
TITLE
ASSEMBLY
STEERING BOARD
A
SIZE
B
DRAWING NO
A000607
REV
M
SCALE 2:1
SHEET 1 OF 1
2
1

REVISIONS				
SYM	DESCRIPTION	INITIALS and DATE		
		DRFTG	CHECK	ENGRG
A	PRODUCTION RELEASE		4/23/76	



NOTES:
1. THIS ASSEMBLY DRAWING TO BE USED WITH 003185 REV 'B' P.C. BOARD.
2. ALL DIODES ARE IN914.

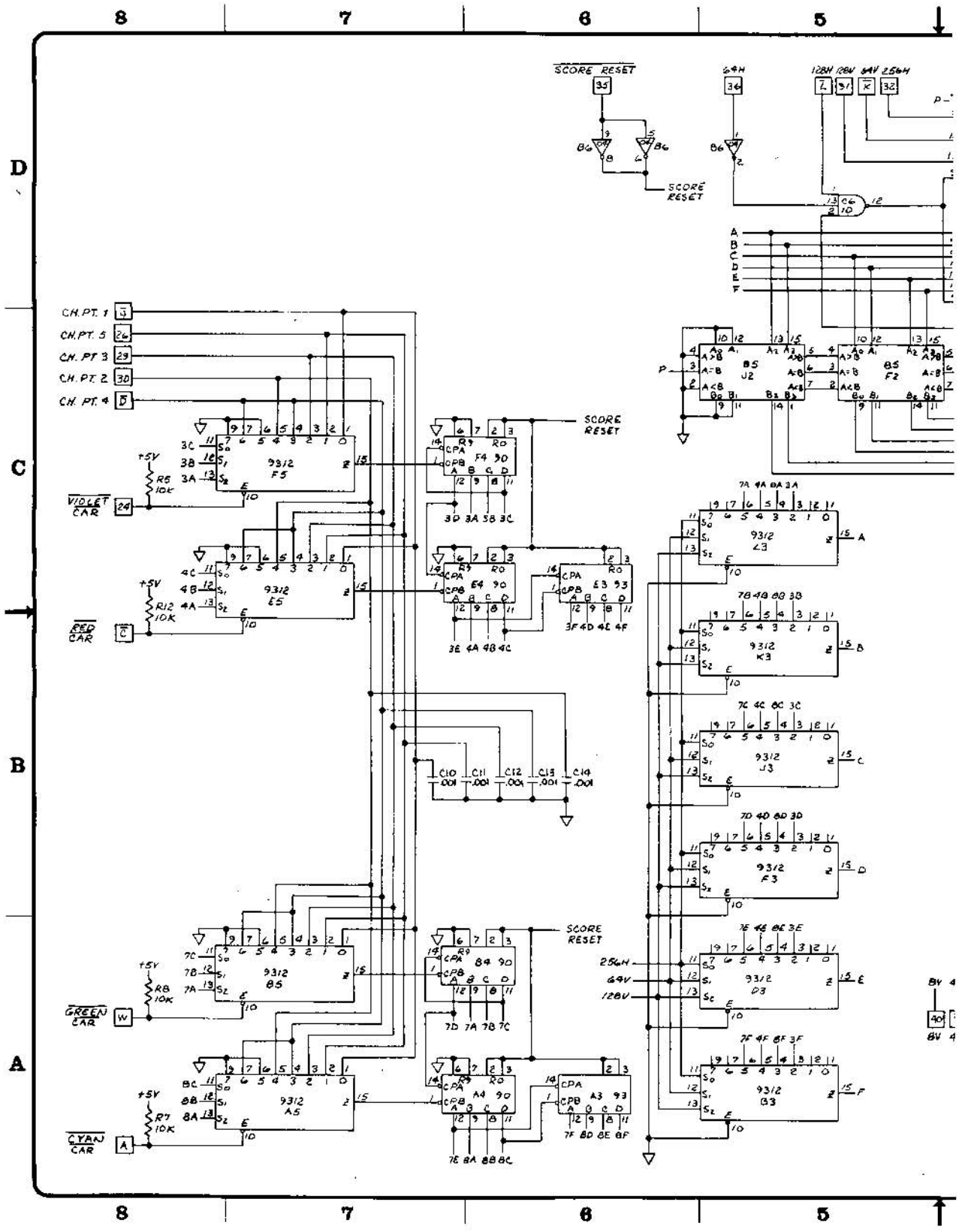
MODIFICATIONS: (TO BE DONE TO 003185 REV 'B' P.C. BOARD)
1. ON CIRCUIT SIDE, CUT TRACE BETWEEN PINS 8 AND 9 OF C5, AND CUT L-SHAPED TRACE GOING TO PIN 8 OF C5, AS SHOWN:

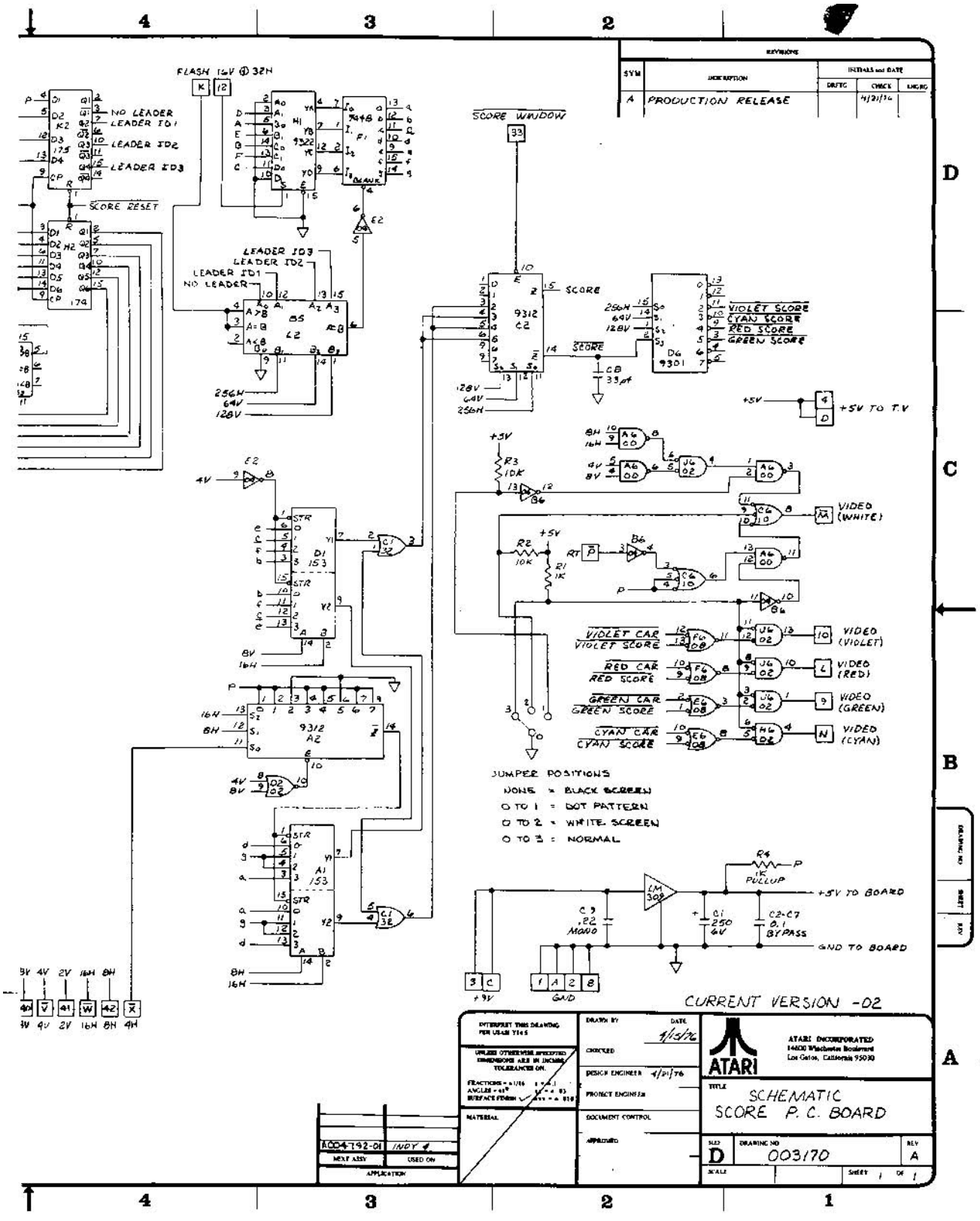


2. JUMPER EDGE CONNECTOR PIN 'P' TO F1 PIN 3.
3. CUT & LIFT F1 PIN 10.
4. JUMPER J4 PIN 9 TO E4 PIN 1, 4, 10 & 13.
5. JUMPER C5: PIN 1 TO PIN 2; PIN 3 TO PIN 4; PIN 5 TO PIN 6; AND PIN 11 TO PIN 12.
6. CUT & LIFT D5 PIN 8.
7. JUMPER D2: PIN 3 TO PIN 4; PIN 6 TO PIN 7; AND PIN 13 TO PIN 12.
8. CUT AND LIFT C2 PIN 13.
9. JUMPER C2 PIN 13 TO F1 PIN 4.

CURRENT VERSION -02

INTERPRET THIS DRAWING PER USASI Y14.5	DRAWN BY	DATE 4/20/76	ATARI INCORPORATED 14600 Wichester Boulevard Los Gatos, California 95030
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± 1/16 ANGLES ± 1° SURFACE FINISH ✓	CHECKED		
	DESIGN ENGINEER		
	PROJECT ENGINEER 4/24/76		TITLE ASSEMBLY, COIN CONTROL BOARD
MATERIAL SEE P/L A003184-02	CONTRACT CONTROL		SIZE D DRAWING NO A003184 REV A
	APPROVED		SCALE 2/1 SHEET 1 OF 1
NEXT ASSY (NOT 3) USED ON APPLICATION			


8
7
6
5
D
C
B
A
SCORE RESET
64H
128H 128V 64V 256H
CH. PT. 1
CH. PT. 5
CH. PT. 3
CH. PT. 2
CH. PT. 4
VIOLET CAR
RED CAR
GREEN CAR
CYAN CAR
+5V
R5 10K
R12 10K
R8 10K
R7 10K
9312 F5
9312 E5
9312 B5
9312 A5
F4 90
E4 90
B4 90
A4 90
E3 93
A3 93
9312 L3
9312 K3
9312 J3
9312 F3
9312 D3
9312 B3
BS J2
BS F2
C10 .001
C11 .001
C12 .001
C13 .001
C14 .001
256H
64V
128V
8V


REVISIONS
SYM
DESCRIPTION
INITIALS and DATE
DRFTG
CHECK
ENGRG
A
PRODUCTION RELEASE
4/21/76
FLASH 16V @ 32H
NO LEADER
LEADER ID1
LEADER ID2
LEADER ID3
SCORE RESET
SCORE WINDOW
SCORE
256H
64V
128V
+5V
+5V TO T.V
VIOLET SCORE
CYAN SCORE
RED SCORE
GREEN SCORE
VIDEO (WHITE)
VIDEO (VIOLET)
VIDEO (RED)
VIDEO (GREEN)
VIDEO (CYAN)
VIOLET CAR
RED CAR
GREEN CAR
CYAN CAR
JUMPER POSITIONS
NONE = BLACK SCREEN
O TO 1 = DOT PATTERN
O TO 2 = WHITE SCREEN
O TO 3 = NORMAL
+5V TO BOARD
GND TO BOARD
GND
CURRENT VERSION -02
ATARI INCORPORATED
14600 Winchester Boulevard
Los Gatos, California 95030
ATARI
SCHEMATIC
SCORE P. C. BOARD
DRAWING NO
003170
SIZE
D
REV
A
SHEET 1 OF 1
DRAWN BY
CHECKED
DESIGN ENGINEER 4/21/76
PROJECT ENGINEER
DOCUMENT CONTROL
APPROVED
MATERIAL
A004792-01
INDY 4
NEXT ASSY
USED ON
APPLICATION

INDY 4

ATARI™ Innovative leisure

ASSEMBLY TITLE / SCORE BOARD, P.C. BOARD **P/L** A003170-02

PARTS LIST SPECIFICATION Page 1 of 2

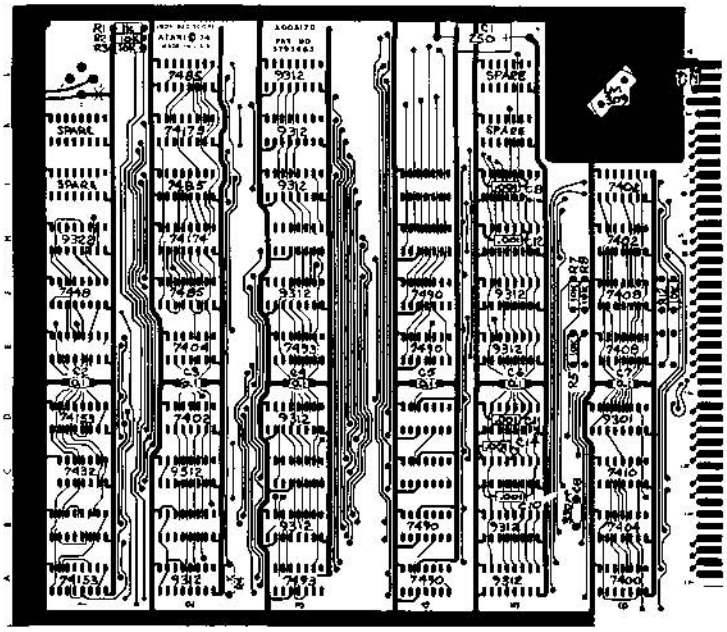
Drawn		REV. A
Checked	Mech. Eng.	
Proj. Eng.	Elec. Eng.	

Rev.	Description	Date	Apprv.	Rev.	Description	Date	Apprv.
A	PROD. REL.	4/21/76					

Item	Part Number	Qty.	DESCRIPTION
1	003171-01	1	Printed Circuit Board
2	37-LM309	1	LM309K Positive 5-Volt Regulator
3	78-06005	1	Heatsink, Wakefield 680-1.0A
4	72- 1610C	2	Screw, Mach., Pan Hd, Phil, 6-32 x 5/8
5	75-916C	2	Nut, Machine, Hex, 6-32
6	78-16005	1	Silpad
7	75-056	2	Lock Washer, Internal Star, #6
8	75-016S	2	Washer, Flat, Reg. Pattern, #6 Steel
9			
10	37-7400	1	7400 Integrated Circuit A6
11	37-7402	3	7402 " " D2, H6, J6
12	37-7404	2	7404 " " E2, B6
13	37-7408	2	7408 " " E6, F6
14	37-7410	1	7410 " " C6
15	37-7432	1	7432 " " C1
16	37-7448	1	7448 " " F1
17	37-7485	3	7485 " " F2, J2, L2
18	37-7490	4	7490 " " A4, B4, E4, F4
19	37-7493	2	7493 " " A3, E3
20	37-74153	2	74153 " " A1, D1
21	37-74174	1	74174 " " H2
22	37-74175	1	74175 " " K2
23	37-9301	1	9301 " " D6
24	37-9312	12	9312 " " A2,C2,B3,D3,F3,J3,K3,L3,A5, B5,E5,F5

ASSEMBLY TITLE	SCORE BOARD, P.C.BOARD	P/L A003170-02
PARTS LIST SPECIFICATION	REV. A	Page 2 of 2

Item	Part Number	Qty.	DESCRIPTION
25	37-9322	1	9322 Integrated Circuit H1
26	10-5102	2	Resistor, Carbon, 5%, ¼W, 1K OHM R1, 4
27	10-5103	6	Resistor, Carbon, 5%, ¼W, 10K OHM R2,3,5,7,8,12
29	28-101331	1	Capacitor, Mica, 330pf, 100V C8
30	27-250104	6	Capacitor, Ceramic, 0.1uf, 25V, C2-7
31	29-011	1	Capacitor, Monolythic, .22uf, 12V C9
32	24-250257	1	Capacitor, Electrolytic, 250uf, 25V C1
33	27-250102	5	Capacitor, Ceramic, 0.001uf, 25V, C10-14


SPARE
SPARE
SPARE
SPARE
7485
74175
7485
74174
7404
7402
74153
74153
9312
9312
9312
9312
9312
9312
9312
9312
9312
9312
9312
9312
7490
7490
7490
7490
7400
7402
7408
7408
9301
7410
7404
7400

REVISIONS				
SYM	DESCRIPTION	INITIALS and DATE		
		DRAFTG	CHECK	ENGRG
A	PRODUCTION RELEASE		4/21/76	

NOTES.

1 THIS ASSEMBLY DRAWING TO BE USED WITH 003171 REVISION 'B' P.C. BD.

MODIFICATIONS:

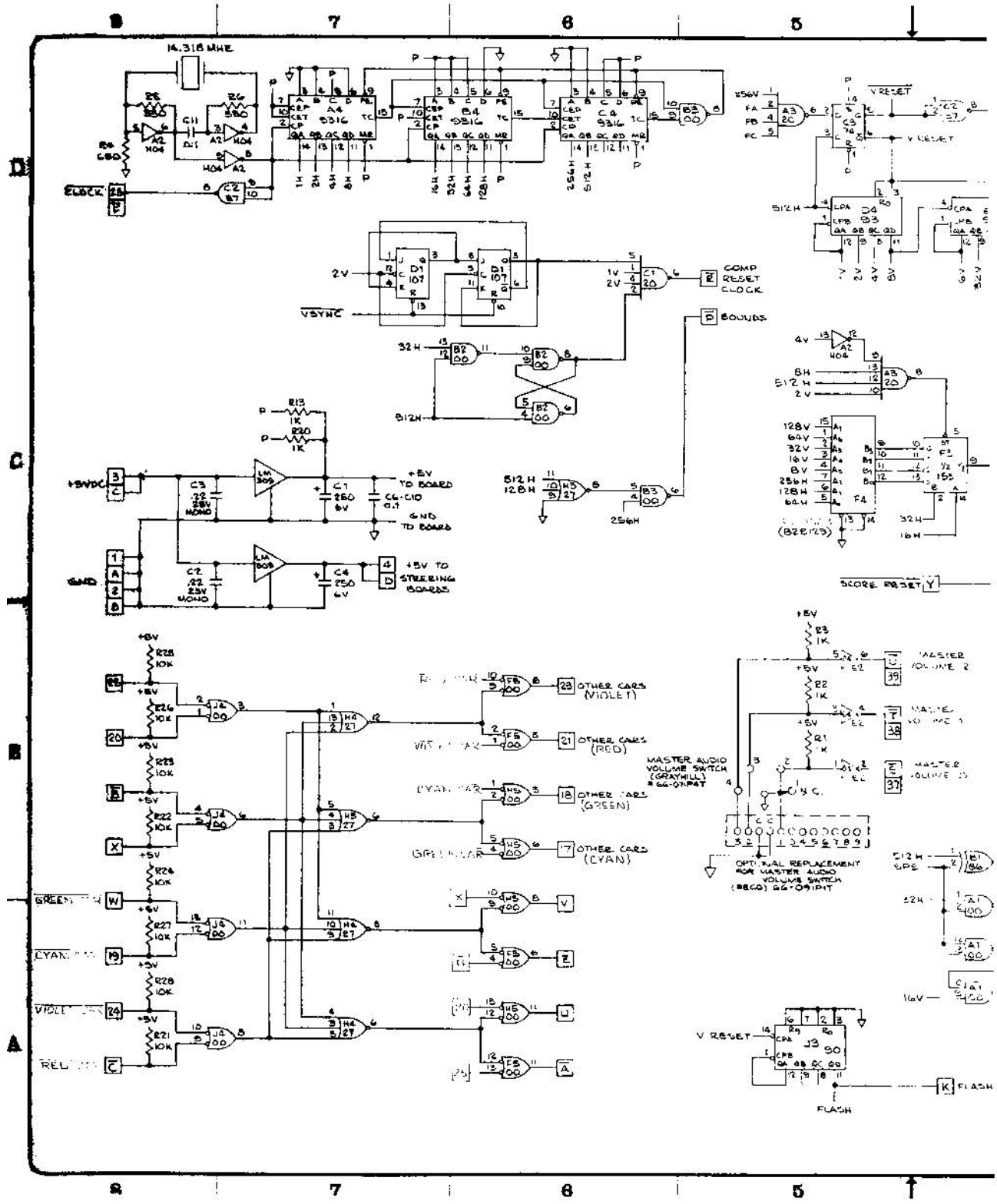
1. CUT TRACE THAT GOES TO '0' PAD IN UPPER LEFT CORNER OF BOARD.
2. JUMPER '0' PAD TO LARGE GROUND TRACE.
3. JUMPER '3' PAD TO LARGE GROUND TRACE.
4. CUT TRACE GOING TO EDGE CONNECTOR PIN Z0.
5. CUT TRACE GOING TO EDGE CONNECTOR PIN 24.
6. CUT TRACE GOING TO EDGE CONNECTOR PIN X.
7. CUT TRACE GOING TO EDGE CONNECTOR PIN $\overline{B}$.
8. CUT TRACE GOING TO EDGE CONNECTOR PIN $\overline{C}$.
9. JUMPER EDGE CONNECTOR PIN Z4 TO F5 PIN 10.
10. JUMPER EDGE CONNECTOR PIN $\overline{C}$ TO E5 PIN 10.
11. JUMPER A5 PIN 10 TO C5 PIN 10.
12. JUMPER B5 PIN 10 TO D5 PIN 10.
13. CUT & LIFT C6 PINS 4 & 5.
14. JUMPER C6 PIN 4 & 5 TO 1K PULLUP (R4).
15. CUT & LIFT D6 PIN 12.
16. JUMPER TRACE GOING TO D6 PIN 12 TO D6 PIN 11.
17. JUMPER TRACE GOING TO C6 PIN 5 TO F6 PIN 12.
18. INSERT: .001 CAP BETWEEN C5 PINS 1 & 7.
19. INSERT: .001 CAP BETWEEN C5 PINS 5 & 8.
20. INSERT: .001 CAP BETWEEN D5 PINS 2 & 8.
21. INSERT: .001 CAP BETWEEN H5 PINS 3 & 8.
22. INSERT: .001 CAP BETWEEN J5 PINS 4 & 8.

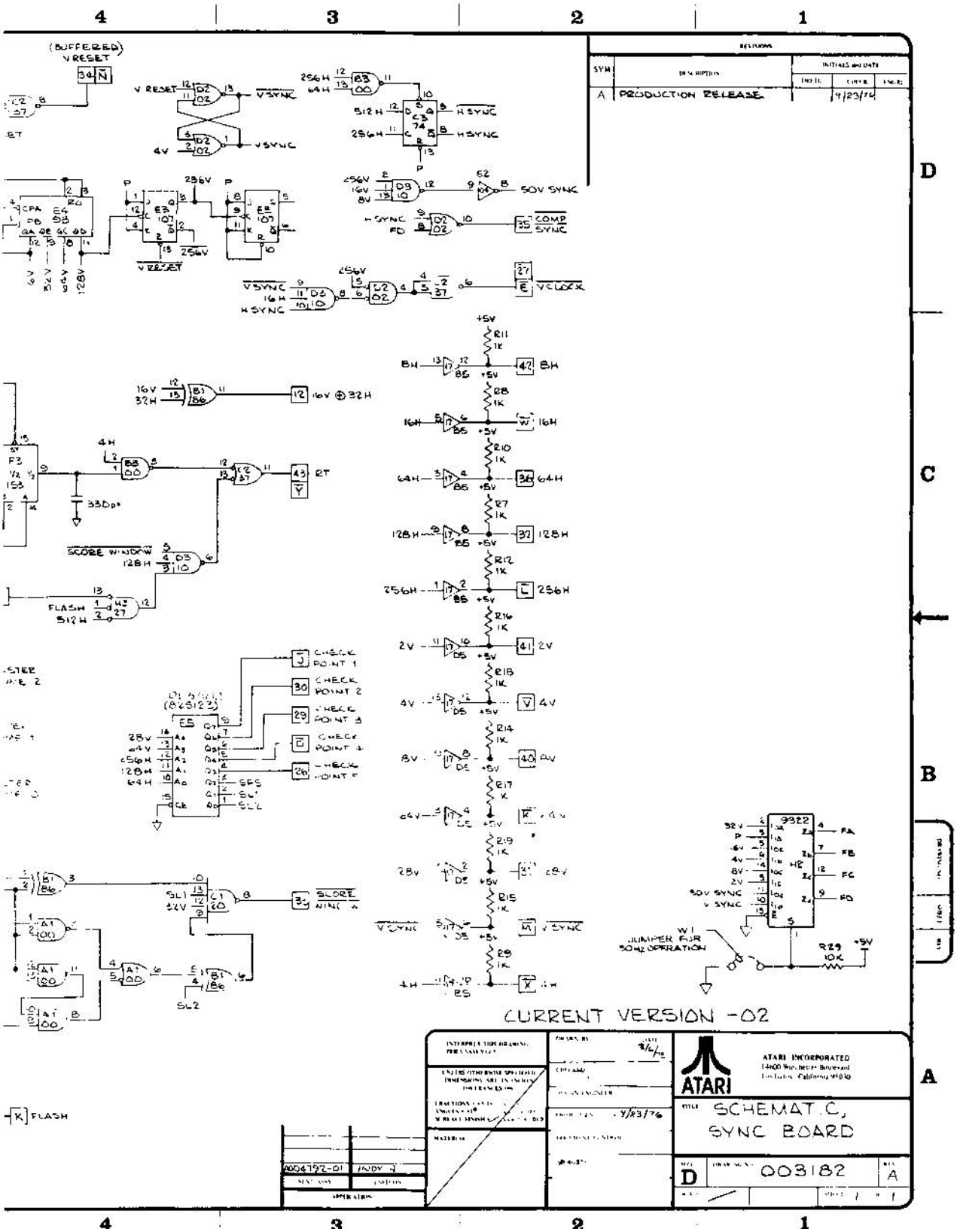
CURRENT VERSION -02

INTERPRET THIS DRAWING PER ASA Y14.5	DRAWN BY	DATE 4/19/76	ATARI INCORPORATED 14600 Winchester Boulevard Los Gatos, California 95030
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± 1/16 .x ± .1 ANGLES ± 1° .xx ± .03 SURFACE FINISH ✓ .xxx ± .010	CHECKED		
	DESIGN ENGINEER	4/21/76	TITLE ASSEMBLY, SCORE BOARD
MATERIAL SEE P/L A003170-02	PROJECT ENGINEER		
	DOCUMENT CONTROL		
	APPROVED		SIZE D DRAWING NO A003170 REV A
			SCALE 1/1 SHEET 1 OF 1

NEXT ASSY	USED ON
A004792-01	MUNDY 4

APPLICATION


14.318 MHz
CLOCK
VSYNC
2V
1V
COMP RESET CLOCK
BOUNDS
32H
512H
256H
128H
64H
16H
8H
4V
2V
1V
+5VDC
+5V TO BOARD
GND TO BOARD
+5V TO STEERING BOARDS
SCORE RESET
V RESET
FLASH
MASTER AUDIO VOLUME SWITCH (GRAYHILL) # 66-01P-01
OPTIONAL REPLACEMENT FOR MASTER AUDIO VOLUME SWITCH (BECO) 66-01P-1
OTHER CARS (VIOLET)
OTHER CARS (RED)
OTHER CARS (GREEN)
OTHER CARS (CYAN)


4
3
2
1
D
C
B
A
REVISIONS
SYM
DESCRIPTION
INITIALS AND DATE
A
PRODUCTION RELEASE
9/23/76
(BUFFERED) VRESET
V RESET
VSYNC
HSYNC
4V
2V
8V
16V
32V
64V
128V
256V
256H
512H
50V SYNC
COMP SYNC
VCLOCK
16V ⊕ 32H
4H
2T
330pf
SCORE WINDOW
128H
FLASH
512H
+5V
R11 1K
R8 1K
R10 1K
R7 1K
R12 1K
R16 1K
R18 1K
R14 1K
R17 1K
R19 1K
R15 1K
R9 1K
BH
16H
64H
128H
256H
2V
4V
8V
CHECK POINT 1
CHECK POINT 2
CHECK POINT 3
CHECK POINT 4
CHECK POINT 5
SCORE WINDOW
SL1
SL2
SL'
SL''
9322
FA
FB
FC
FD
50V SYNC
V SYNC
W1
JUMPER FOR 50Hz OPERATION
R29 10K
CURRENT VERSION -02
[K] FLASH
ATARI INCORPORATED
SCHEMATIC, SYNC BOARD
D
003182
A

INDY 4

ATARI™ Innovative leisure

ASSEMBLY TITLE / SYNC BOARD — P/L A003182-02

PARTS LIST SPECIFICATION — Page 1 of 2

Drawn		REV. A
Checked	Mech. Eng.	
Proj. Eng.	Elec. Eng	

Rev.	Description	Date	Apprv.	Rev.	Description	Date	Apprv.
A	PROD. REL.	4/23/76					

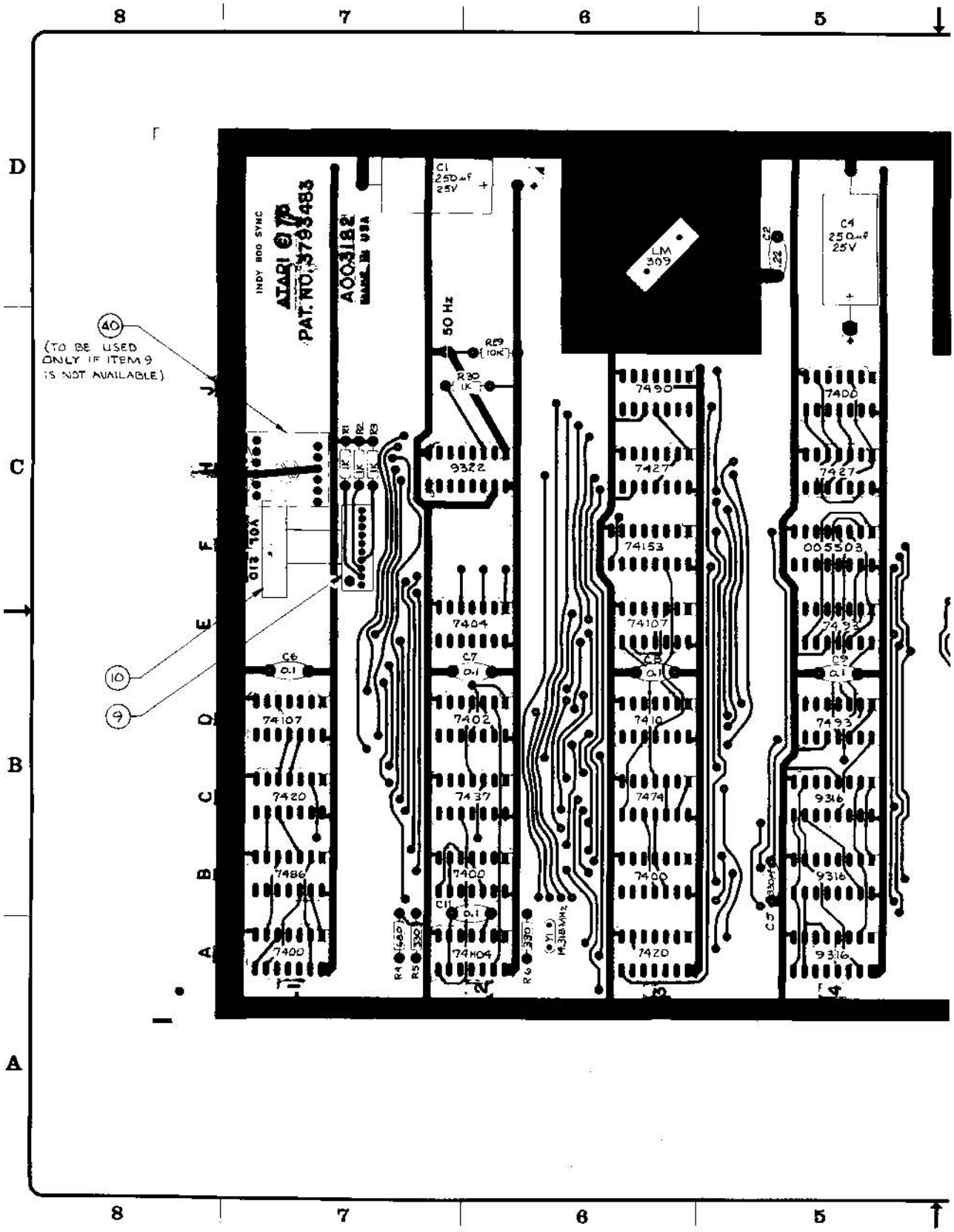
Item	Part Number	Qty.	DESCRIPTION
1	003183-01	1	Printed Circuit Board
2	37-LM309	2	LM309K Positive 5-Volt Regulator
3	78-06004	2	Heatsink, Wakefield 680-.75A
4	72-1610C	4	Screw, Mach, Pn Hd, Phil, 6-32 x 5/8
5	75-916C	4	Nut, Machine, Hex, 6-32
6	78-16005	2	Silpad
7	75-016S	4	Washer, Flat, Reg Pattern, #6 Steel
8	75-056	4	Lock Washer, Internal Star, #6
9	66-071P4T	1	Rotary Switch, P.C. Mount, 1P-4T, Grayhill #71AF36-01-1-04-N
10	73-802	1	Switch Knob(Raytheon #50-5-1)
11	37-7400	6	7400 Integrated Circuit A1,B2,B3,J4,F5,H5
12	37-7402	1	7402 " " D2
13	37-74H04	1	74H04 " " A2
14	37-7410	1	7410 " " D3
15	37-7417	2	7417 " " B5, D5
16	37-7420	2	7420 " " C1, A3
17	37-7427	2	7427 " " H3, H4
18	37-7437	1	7437 " " C2
19	37-7474	1	7474 " " C3
20	37-7486	1	7486 " " B1
21	37-7490	1	7490 " " J3
22	37-7493	2	7493 " " D4, E4
23	37-74107	2	74107 " " D1, E3
24	37-74153	1	74153 " " F3
25	37-9316	3	9316 " " A4, B4, C4

ASSEMBLY TITLE SYNC BOARD, INDY 4 **P/L** A003182-02

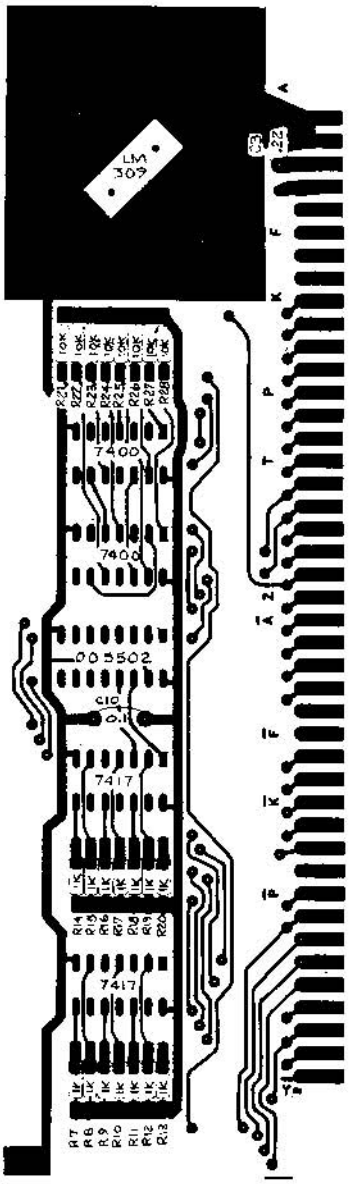
PARTS LIST SPECIFICATION REV A

Item	Part Number	Qty.	DESCRIPTION	
26	005502-01	1	P-ROM, RT4 Check Points, 32 x 8, 256 Bit	E5
27	005503-01	1	P-ROM, Racetrack, 256 x 4, 1024 Bit	F4
28	90-101	1	14.318MHZ Crystal	Y1
29	10-5331	2	Resistor, Carbon, 5%, ¼W, 330 OHM	R5,6
30	10-5681	1	" " " " 680 OHM	R4
31	10-5102	18	" " " " 1K OHM	R1-3,7-20,30
32	10-5103	9	" " " " 10K OHM	R21-29
33	28-101331	1	Capacitor, Mica, 330pf, 100V	C5
34	27-250104	6	Capacitor, Ceramic, 0.1uf, 25V	C6-11
35	29-011	2	Capacitor, Monolythic, .22uf, 12V	C2,3
36	24-250227	2	Capacitor, Electrolytic, 220uf, 25V	C1,4
37	37-7404	1	7404 Integrated Circuit	E2
38	79-42116	2	Socket, I.C., 16 Pin	F4,E5
39	37-9322	1	9322 Integrated Circuit	H2
*40	66-091P10T	1	Stripswitch, P.C. Mount, EECO, #1A211001G	

*NOTE: Item 40 is to be used only if items 9 & 10 are not available


8
7
6
5
D
C
B
A
(40)
(TO BE USED ONLY IF ITEM 9 IS NOT AVAILABLE)
(10)
(9)
INDY 800 SYNC
ATARI ©
PAT. NO. 3793483
A003182
C1 250uf 25V
C2 22
C4 250uf 25V
LM 309
50 Hz
R29 (10K)
R30 1K
9322
7404
7402
7437
7400
74H04
7420
7486
74107
7490
7427
74153
74107
7410
7474
7400
7420
7400
7427
005503
7493
7493
9316
9316
9316
C6 0.1
C7 0.1
C8 0.1
C9 0.1
C11 0.1
R4 (680)
R5 330
R6 330
Y1 @ 14.318MHz

REVISIONS				
SYM	DESCRIPTION	INITIALS and DATE		
		DRAFTG	CHECK	ENGRG
A	PRODUCTION RELEASE		4/23/76	



NOTES:

1. INSTALL ITEM 38 (16 PIN I.C. SOCKET) IN POSITION E4 AND E5.
2. THIS ASSEMBLY DRAWING TO BE USED WITH D03183 REV 'C' P.C. BOARD.

CURRENT VERSION -02

INTERPRET THIS DRAWING PER USASI Y14.5	DRAWN BY	DATE 4/22/76	ATARI INCORPORATED 14600 Winchester Boulevard Los Gatos, California 95030
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± ANGLES ± SURFACE FINISH	CHECKED		
	DESIGN ENGINEER		
	PROJECT ENGINEER 4/23/76		TITLE ASSEMBLY - SYNC BOARD
MATERIAL SEE P/L A003182-02	DOCUMENT CONTROL		
	APPROVED		SIZE D DRAWING NO A003182 REV A
ACC 4792-01 JANDY 4			SCALE 2/1 SHEET 01 1
NEXT ASSY USED ON			
APPLICATION			

INDY 800

ATARI
Innovative leisure

ASSEMBLY TITLE / RT8 BACKPLANE BOARD **P/L** 003199

PARTS LIST SPECIFICATION Page 1 of 1

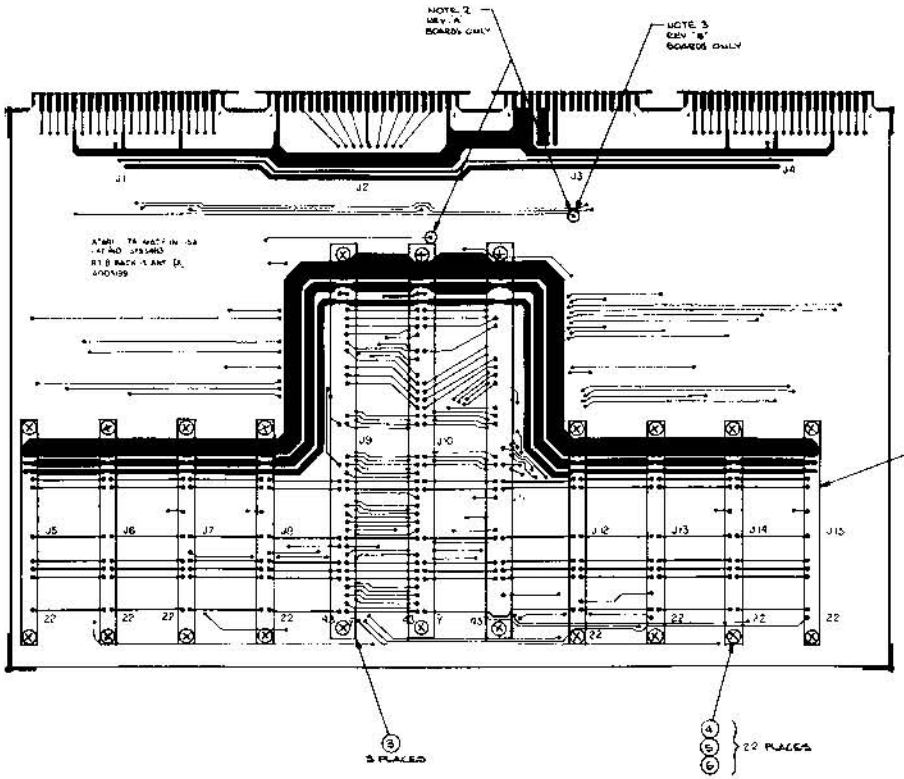
Drawn			
Checked	8/25/7	Mech. Eng.	
Proj. Eng.	[illegible]	Elec. Eng	[illegible]

REV. D

Rev.	Description	Date	Apprv.	Rev.	Description	Date	Apprv.
A	PROD RFI	2-3-75					
B	REV PER ECN 1253	3/25/75					
C	REV PER ECN 1392	4/30/75					
D	REV PER ECN 1436	5/14/75					

Item	Part Number	Qty.	DESCRIPTION
1	003200	1	Printed Circuit Board (Backplane)
2	79-514222	8	44 Pin Edge Connector, .156, Dip Solder
3	79-514243	3	86 Pin Edge Connector, .156, Dip Solder
4	75-1408	22	Screw, Mach., Pan Hd., Phil., 4-40 x ½"
5	75-914	22	Nut, Machine, Hex, 4-40
6	75-054	22	Lock Washer, Internal Star, #4
7	79-511001	3	CONNECTOR KEY

SYM	DESCRIPTION	DATE
A	PRODUCTION RELEASE	8/11/78
B	REVISED PER ECN 1253	9/29/78
C	REVISED PER ECN 1282	12/5/78
D	REVISED PER ECN 1434	10/14/79



NOTE:

1. ALL CONNECTORS MUST BE HAND SOLDERED TO P.C. BOARD.
2. APPLY DENNISON #43-146-1 SIGNAL DOTS TO THE TWO PLACES INDICATED, ON ALL REVISION 'A' 003200 P.C. BOARDS (COMPONENT SIDE).
3. APPLY DENNISON #43-146-1 SIGNAL DOT TO THE ONE PLACE INDICATED, ON ALL REVISION 'B' 003200 P.C. BOARDS (COMPONENT SIDE).
4. ADD A CONNECTOR KEY TO CONN. J9 (SYNC BD) BETWEEN PINS 31 & 32.
5. ADD A CONNECTOR KEY TO CONN. J10 (SCORE BD) BETWEEN PINS 29 & 30.
6. ADD A CONNECTOR KEY TO CONN. J11 (CONN BD) BETWEEN PINS 33 & 34.

MODIFICATIONS: (TO REVISION 'A' 003200 P.C. BOARDS ONLY)

1. JUMPER CONNECTOR J9 PIN Y TO CONNECTOR J10 PIN 35

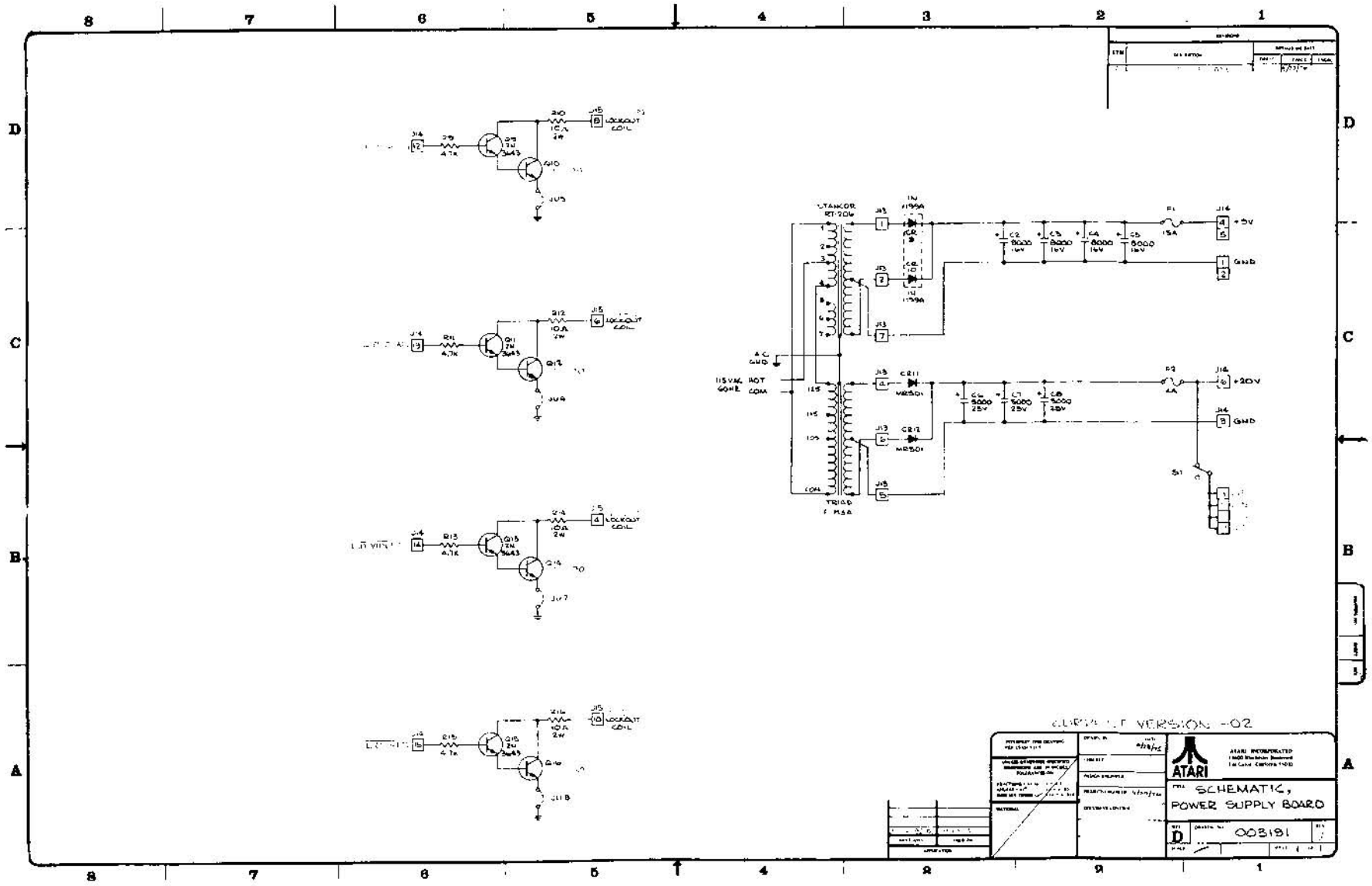
DRAWN BY	8/11/78
MATERIAL	SEE P/L 002199
FINISH	INDY 300

ATARI INCORPORATED
1400 Northern Boulevard
Los Gatos, California 95030

TITLE: ASSEMBLY, BACK PLANE BD.

SIZE D | A003199 | REV D

SHEET 1


SCHEMATIC,
POWER SUPPLY BOARD
ATARI
D
003191
+5V
GND
+20V
GND
115 VAC HOT
115 VAC COM
LOCKOUT COIL
TRIAD F-156A

INDY 4

ATARI™ Innovative leisure

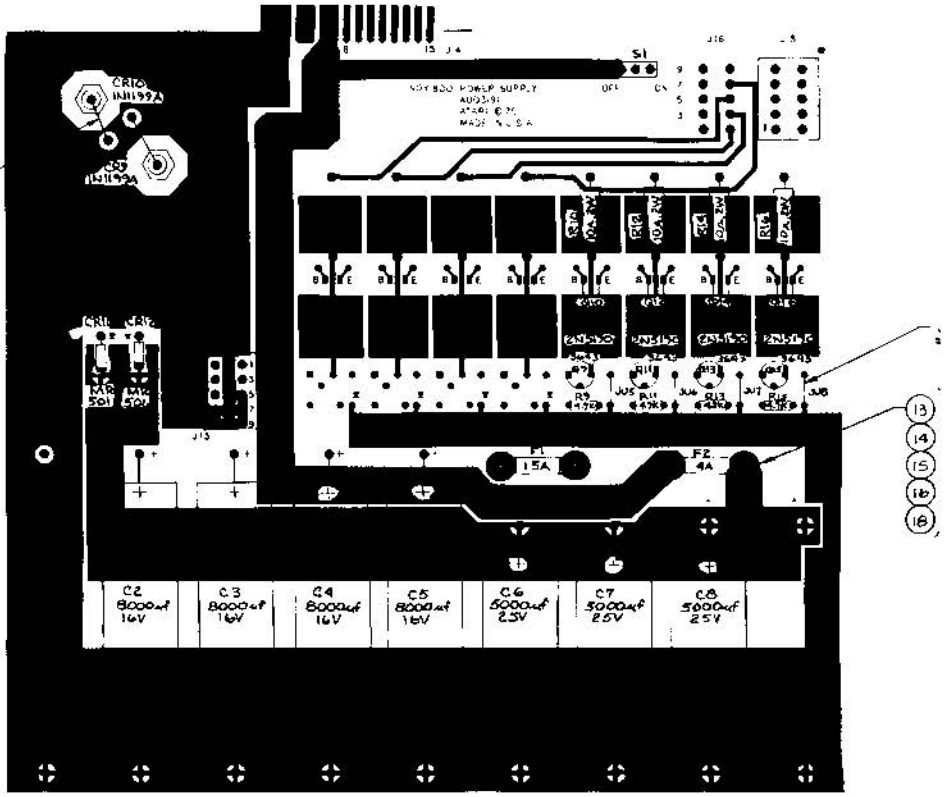
ASSEMBLY TITLE / POWER SUPPLY P.C.B. **P/L** A003191-02

PARTS LIST SPECIFICATION Page 1 of 1

Drawn		
Checked	Mech. Eng.	
Proj. Eng.	Elec. Eng	REV. A

Rev.	Description	Date	Apprv.	Rev.	Description	Date	Apprv.
A	PROD. REL.	4/23/76					

Item	Part Number	Qty.	DESCRIPTION
1	003192-01	1	P.C.B., Indy 4 Power Supply
2	24-160808	4	Capacitor, Electrolytic, 8000uf, 16V, 85°C C2-5
3	24-250478	3	Capacitor, Electrolytic, 4700uf, 25V, 85°C C6-8
4	31-MR501	2	Diode, Type MR501 (3A) CR11, 12
5	31-1N1199A	2	Diode, Type 1N1199A (12A) CR9,10
6	78-06006	1	Heatsink, Wakefield 680-1.25
7	61-011C	1	SPDT Toggle Switch, C & K 7101, S1
8	10-5472	4	Resistor, Carbon, 5%, ¼W, 4.7K OHM R9,11,13,15
9	13-0100	4	Resistor, Carbon, 10%, 2W, 10 OHM R10,12,14,16
10	34-2N3643	4	NPN Transistor, Type 2N3643 Q9,11,13,15
11			
12	34-2N5190	4	NPN Power Transistor, Type 2N5190 Q10,12,14,16
13	72-1406C	8	Machine Screw, 4-40 x 3/8, Stainless
14	75-914C	8	Hex Nut, 4-40
15	75-054	8	Lock Washer, Internal Star, #4
16	75-014S	8	Flat Washer, #4
17	79-58005	2	Connector, 10 pin, P.C. Mount, AMP #1-380991 J13,15
18	79-3202	4	Fuse Clip, 3AG, Beryllium Copper, Silver Plate, Little Fuse #121001
19	46-2031503	1	Fuse, 3AG, 15A, 32V, Fast-Blow F1
20	46-203401	1	Fuse, 3AG, 4A, 125V, Fast-Blow F2
21	78-16007	4	Silpad


#14 AWG WIRE,
2 PLACES
S1
CR1
1N1199A
CR2
1N1199A
F1
15A
F2
4A
C2
8000uf
16V
C3
8000uf
16V
C4
8000uf
16V
C5
8000uf
16V
C6
5000uf
25V
C7
5000uf
25V
C8
5000uf
25V
13
14
15
16
18

REVISIONS				
SYM	DESCRIPTION	INITIALS and DATE		
		DRFTG	CHECK	ENGRG
A	PRODUCTION RELEASE		4/23/76	

NOTES:
1. THIS ASSEMBLY DRAWING TO BE USED WITH 003192 REV'E' P.C. BOARD.
2. REMOVE PINS 3 AND 8 FROM J13 BEFORE MOUNTING.
3. REMOVE PINS 1 AND 2 FROM J15 BEFORE MOUNTING.

— JUMPER 4 PLACES
#22 AWG WIRE

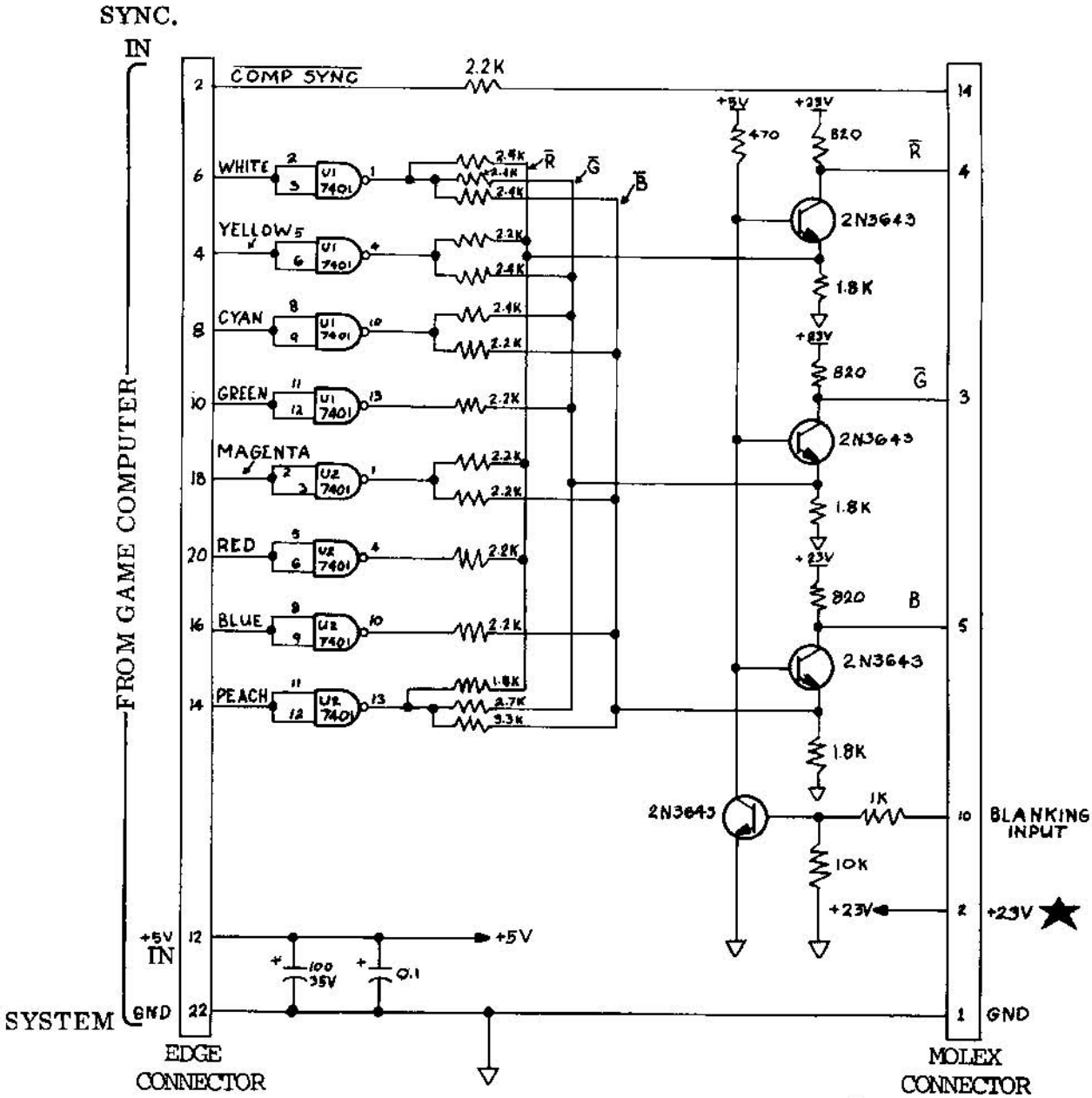
4 PLACES

CURRENT VERSION -02

INTERPRET THIS DRAWING PER USASI Y14.5	DRAWN BY	DATE 4/21/76	ATARI INCORPORATED 14400 Winchester Boulevard Los Gatos, California 95030
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCE ON FRACTIONS ±1/16 ANGLES ±1° SURFACE FINISH ✓ .XX ± .02 .XXX ± .010	CHECKED		
	DESIGN ENGINEER		
	PROJECT ENGINEER 4/23/76		TITLE ASSEMBLY, POWER SUPPLY BOARD
MATERIAL SEE P/L A003191-02	DOCUMENT CONTROL		SIZE D DRAWING NO A003191 REV A
	APPROVED		SCALE 1/1 SHEET 1 OF 1

A004792-01	INDY 4
NEXT ASSY	USED ON
APPLICATION	

Schematic Diagram
Indy 4, TV Chroma Input Board
(G.E. 25" Color TV)



NOTES:

1. Color Inputs Are Positive-Going TTL
2. COMP SYNC Input Is Negative-Going TTL
3. Yellow, blue and peach colors not used in Indy 4 game.