

I. TURBO DRIVE GAME PLAY

The TURBO DRIVE tm game has been designed to incorporate risk, entertainment, and the thrill of high speed racing. The object of the game is to complete the highest number of laps at the fastest speed possible before time runs out.

The speed of the cars is regulated by manipulating the joysticks through four positions, (first, second, third, and Turbo). The cars speed increases according to the following table:

FIRST GEAR.....	maximum	75	mph
SECOND GEAR.....	maximum	125	mph
THIRD GEAR.....	maximum	200	mph
TURBO.....	maximum	305	mph

To obtain maximum acceleration, the car must be shifted through the gears progressively. To slow the cars down reduce gearing by reversing the above, or to stop the car take your hand off the joystick.

II. OUTSTANDING FEATURES

SPEED LIMITS

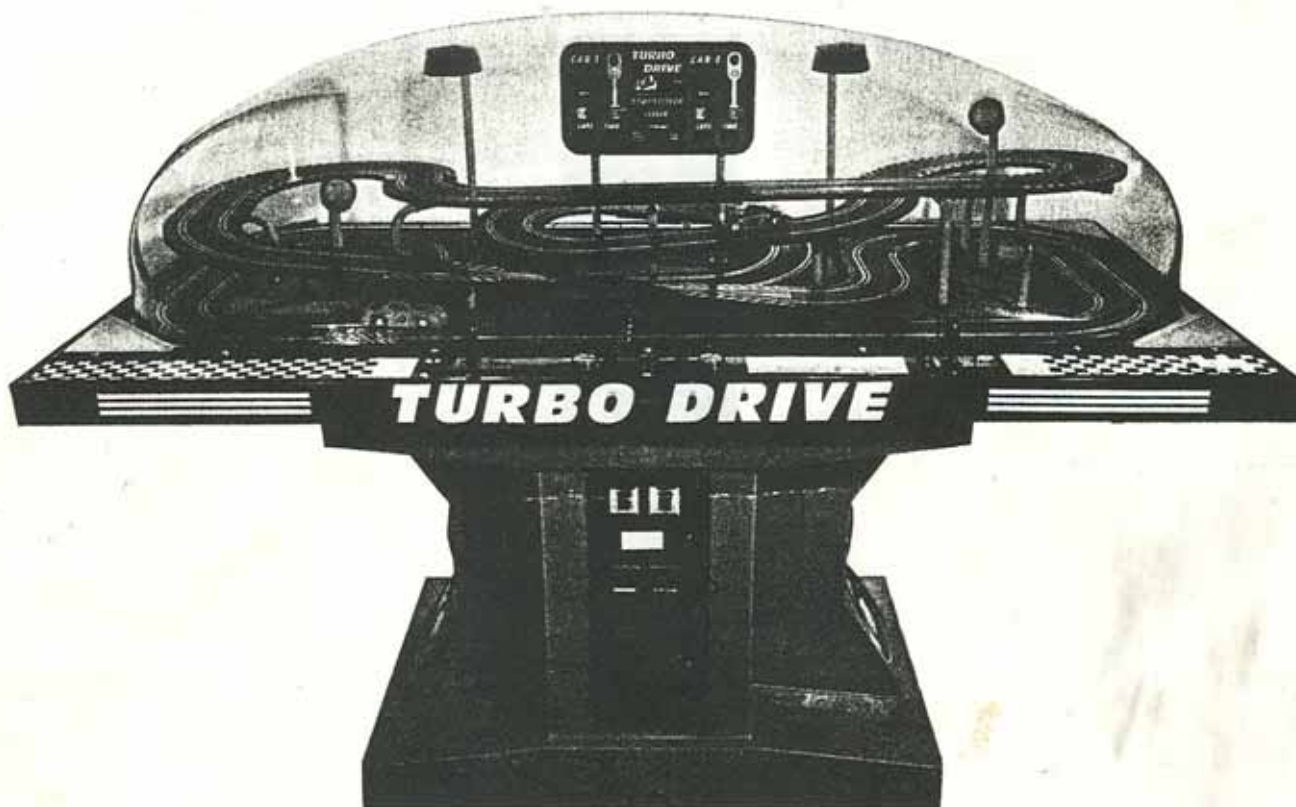
There are three speed limit signs on the track, one at the start of each major curve. The speed limits posted on these signs change randomly while the game is in play. If a car is traveling faster than the posted speed limits when it passes the sign it will automatically be stopped for approximately one second.

CHICANE

In the center straight away of the track is a "Chicane" or merge. Only one car at a time can pass through the Chicane. If the second car is approaching the Chicane while the first car is in it, the second car will be automatically stopped at the first turn. (we also offer a game without the chicane for those who feel the non-stop action is more exciting.)

TURBO DRIVE T.M.

OWNERS AND SERVICE MANUAL



ICE

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I. TURBO DRIVE GAME PLAY

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SCORE BOARD

Located above the center of the track is the score board, which is divided into three sections. The center section shows the game credits, leader (car one or car two) and seconds\laps advantage. In the attract mode the seconds\laps shows high score to date for all the categories.

The two panels on either side of the center panel show the current statistics for the race in progress for car one and car two. The traffic light in the upper right hand corner of each panel flashes either red or green to indicate whether your car is moving or has been stopped due to excess of speed or has been caught in the Chicane. Also at the very beginning of each race the traffic light will change from red to green to indicate the race has begun. On the panels on either side of the center panel of the scoreboard (the blue or the yellow side) there is indicated last lap times \ fastest lap time. This shows the time elapsed in the most recent lap. At the end of the game this will flash to indicate the fastest lap of the entire game.

At the bottom of these two outside panels are the laps and time displays. These show how many laps have been completed and how much time is remaining. In the attract mode these displays show the number of laps completed in the last game and the time will show zeros. Before the first game is played after the power is turned on, most of the displays will remain blank, until the first game begins.

III. GAME OPERATION / TEST

The game has been pre-set at the factory for a ~~twenty~~ ^{sixty} second game and a cost of twenty-five cents (or one token) per player. The game can be played either as a two player game or one player against the computer. For two player competition insert \$.50 (or two tokens) and depress the red (competition) button. To play against the computer insert \$.25 (or one token) and depress either the blue or the yellow button depending on which car the player prefers to take control of.

Each car will take a warm-up lap which also acts as a positioning lap for them to start the game. Once they have completed their initial warm-up lap there will be a audible count-down (three, two, one , "go") at which time the traffic lights on the score board will turn from red to green, signaling the start of the race.

THE ATTRACT MODE

The game comes equipped with a attract mode wherein the cars will automatically take a lap around the race track from time to time while the game is not being played. This acts, obviously, as an attraction to those around as well as a maintenance feature of the game. As the cars go around in the attract mode, the brushes will help clean off any dirt or debris or oxidation that has occurred while the game was sitting, and will keep the copper portion of the track in good working order.

TROUBLE MODE

The game will automatically revert to trouble mode if there is an operational problem. The unit will repeat an audible warning signal to indicate that there is a problem either with the game electronics or with the cars. Should this occur, please refer to the trouble-shooting guide in the back of this manual.

TEST MODE

The unit has a built in self test mode which tests: scoreboard displays and lights, speed limit displays, coin switches, joystick controls, push button and push button lights, cars, and sensors. To put the unit into test mode, TURN OFF THE POWER and move the number 6 dip switch located on the main logic board to the off position. When the unit is turned back on, it will run through the following test.

1. The scoreboard will sequentially flash the numbers 0 through 9 on all displays.
2. The speed limit displays will flash all numbers within the scoreboard.
3. The three control buttons will flash
4. By moving the joystick (one at a time) the game unit will announce the position the joystick is in.
5. The cars and sensors are tested by the blue button (car 1) or the yellow button (car 2) one at a time. The car will complete a lap and a tone will sound at each of the six sensors. Sensors are located at each of the three speed limit signs, two

before the chicane and one at the finish line. Each car as it is completing the laps in test mode will give a different audible sound or tone for each car.

IV. GENERAL CARE AND MAINTENANCE

ACRYLIC DOME

The unit is shielded by a specially designed 9 mill plastic dome. The dome should be cleaned regularly with a non-waxy lubricant polish and clean (lint free) cloth. Small scratches can be removed by buffing with a plastic polish and a clean cloth. To open the dome, remove the 7 screws along the front edge using a standard 3/16" allen wrench. The dome can be tilted back 90 degrees and held by the cable located in the front right hand corner of the playfield.

TRACK

The track is approximately 42 feet in overall length. The track is made out of a copper clad material which is laminated to a fiber board backing, routed, and then masked off and painted. In the course of time the track will become covered with debris either from dust that has accumulated or from the wear of the tires on the cars. It will become necessary to clean off the track periodically to assure good electrical contact between the brushes of the car and the copper track. To clean the track, simply put some 70% isopropyl alcohol on a clean cloth and wipe gently over the entire length of the track. If this is done on a regular basis (once every one or two weeks) this will keep the track in good working order). CAUTION: DO NOT USE A RAG THAT WILL LEAVE LINT ON THE TRACK THAT CAN BE PICKED UP BY THE BRUSHES OR THE TIRES. ALSO, CLEAN THE TIRES WHENEVER CLEANING THE TRACK.

CARS

The cars are the only moving part of the game and therefore will require the most attention. There should be a regular maintenance check of the cars every time that the operator goes to the location to either clean the track or to empty the cash box. When the operator is maintaining the cars, there are several parts that he should be looking at and inspected:

1. There are two braids (brushes) mounted on the front flag only. These should be cleaned and examined for excessive wear or loosening. To clean these, simply take a clean cloth and just wipe each of the flags. To replace, just pull out the braid and insert a new braid that is provided in the spare parts package. These braids are very important as they are the sole contact between the car and the track. You will find that from time to time a little dust or lint will develop on the braid which will possibly cause the cars to slow or to stop. In most cases, just a simple wiping off of the brushes or an easy replacement will cause the stopped car to run again. Use a pair of pliers to firmly seat the braid into the flags.

2. The flags (front and rear) are the two plastic pieces at the front and the rear of the car and are responsible for guiding the car and holding the car onto the track. This is done by inserting two small roll pins at the base of each flag that will act as a "key" that locks the car in place and prevents it from ever coming off during the course of play. These flags acting as guides are in constant contact with the track itself. During the course of several months these flags will begin to wear at the front and rear of the car. During normal maintenance checks please examine these flags and replace if excessive wear occurs. The replacement of these flags is very simple and very quick and should be done on a regular basis to make sure that excessive wear does not occur, causing the car to not operate properly. When replacing flags avoid over tightening the retaining nut. The flags should move freely but should not be loose. When changing the rear flag, remember to use the spacer washer.

3. The front tires of the car should never require replacement as they seldom, if ever, come in contact with the track. The rear tires are the two tires that will exhibit some wear over the course of time. If excessive wear occurs, it will cause decreasing speeds of the car and should be replaced when necessary. The replacement of these tires is simple as they are a quick push off and push on. Make sure the tires are pushed on straight, and don't wobble.

4. There are two gears that operate the car. The pinion gear which is attached to the motor and the crown gear which is attached to the rear axle. If these gears show any sign of wear they will cause slowing of the car and eventually immobilize the car. These should be replaced as necessary and again, it is a very simple procedure to loosen the set screw for the crown gear

and replace from the parts provided in the spare parts package. To remove the cars from the track, first turn off the power and then bring the cars to the right end of the track between turns one and two. There is a small slot perpendicular to the track between the curves. Advance the car toward the slot while raising the front end of the car. The front end roll pin which is attached to the front flag will come up through the slot. Repeat this procedure to free the rear of the car. To remove the body, straighten the body clips located on either side of the car and carefully pull them away from the chassis. The crown gear has a retaining collar which must be kept against the gear to help keep the gear from flexing away from the pinion gear. When replacing, leave gears loose until axle is retightened. The axle should spin freely with as little side to side free play as possible. The crown gear (large gear) should then be snugged up to the pinion gear, and tightened, without causing it to bind when the axle is rotated. Next, tighten the retaining collar. When replacing the cars on the track make sure that the cars are in the proper lanes (car 1 outside and car 2 inside) as indicated on the track. If the cars are placed on the wrong track they will run backwards instead of forwards.

MOTORS

The motors should last a long time and require no maintenance. They should not be lubricated. If, after braids have been replaced or cleaned, and track has been cleaned, a chattering or jerking motion is noticed from the cars, the motor is probably wearing out. Also, if the car does not move, and then moves if pushed slightly, the motor should be replaced. THE MOTORS ARE NOT REPAIRABLE. CAUTION: USE ONLY MOTORS SUPPLIED BY I.C.E. USE OF OTHER MOTORS COULD DESTROY THE ELECTRONICS, OR CAUSE SEVERE HEAT DAMAGE TO THE GAME. WHEN REPLACING FUSES FOR THE CARS ON THE POWER SUPPLY P.C. BOARD, NEVER USE A RATING HIGHER THAN THE ORIGINAL AVERAGE RATING.

CIRCUIT BOARDS

1. Display PC Board (Scoreboard) - To remove the display board unscrew the two screws on either side of the scoreboard cover and remove the cover. The Display PC Board has four flanges on the back that attach to the tube like supports. Release the circuit board by pulling it toward you to release it from the flanges. Reverse this process to install the circuit board.

2. Speed limit displays - There are three speed limit displays that are located at each of the turns of the game. Remove the plastic cover so that it releases from the metal frame. This is a connector that is holding the speed limit PC Board and when disconnected will allow you to repair or replace this board.

3. Main Logic Board - The main logic board is located on the inside of the base to the left. This logic board can be removed by unscrewing the retaining screw that holds the Main PC Board in place and by lifting up on the board and sliding it out of its two PC Board guides. Then disconnect it and access it through the coin door.

4. Power Supply - The power supply is located to the right inside of the base and can be removed in the same fashion as the main logic board.

OPTION SWITCHES

This unit has been pre-set at the factory for maximum play value and profit, however, there are several changes you can make if you so desire. The switches are located on the Main PC Board and can be arranged in the following configurations.

	1	3	4	5	6
ONE COIN, ONE PLAY	ON				
TWO COINS, ONE PLAY	OFF				
60 SECOND PLAY		ON	ON		
75 SECOND PLAY		ON	OFF		
90 SECOND PLAY		OFF	ON		
120 SECOND PLAY		OFF	OFF		
60 SECOND GAME, 15 LAPS					ON
60 SECOND GAME, 18 LAPS					OFF
75 SECOND GAME, 20 LAPS					ON
75 SECOND GAME, 22 LAPS					OFF
90 SECOND GAME, 23 LAPS					ON
90 SECOND GAME, 26 LAPS					OFF
120 SECOND GAME, 30 LAPS					ON
120 SECOND GAME, 35 LAPS					OFF
NORMAL PLAY					ON
TEST MODE					OFF
THIS GAME WAS PRESET IN THIS CONFIGURATION	ON	ON	(ON)	OFF	ON

!!! IMPORTANT !!!

**ALWAYS TURN OFF POWER TO GAME
BEFORE MOVING SWITCHES!!!**

THIS CHART IS ALSO LOCATED ON THE CASH BOX ENCLOSURE, RIGHT NEXT TO THE MAIN P.C. BOARD.

SOUND ADJUSTMENT

The volume adjustment control is a small potentiometer located on the Main PC Board at the center top . Using a small slotted screwdriver change the volume clockwise for softer, counterclockwise for louder. Be careful not to damage any other components by shorting them out with the screwdriver tip.

V. TROUBLESHOOTING

SYMPTOM:

No lights, game is dead

AREA TO CHECK:

- Is AC outlet live (115VAC)?
- Is On/Off Switch On?
- Is main fuse (1 Amp on coin counter panel) ok?
- Is power cord & wiring ok?

SYMPTOM:

Game functions properly but no general illumination

AREAS TO CHECK:

The fluorescent lights in this game are wired in series. If one burns out, the other will not light. It is recommended that both be replaced at this time for the reason that the other will also reach the end of its life soon.

- Check all connectors & wiring
- 220 VAC from transformer
- Ballast should read as a closed circuit on ohmeter.

SYMPTOM:

One or both cars won't run, no speed limit displays, no scoreboard displays, repetitive "charge" melody heard.

AREAS TO CHECK:

- Failure of either car to complete the initial game on, warm up, or end of game laps will cause these symptoms.
- See that brushes on the bottom of the cars are free of dirt and that the motor connections are in tact and not shorted to frame or each other.
- Are the gears worn out or missing teeth?
- Is there power to the track? With the game in test mode and after pressing 1 and 2 start buttons you should read approximately 4-6 volts DC across the track with your meter. Check for same at K2 on power supply.
- Fuse F2 (6.3 amp) on Power Supply blown? May indicate short circuit in power supply, wiring, track, or car.
- Transistors T4 & T5 (TIP 132) Good? If shorted they will burn up to T2 or T3 (TIP 120).

SYMPTOM:

Cars run slow or intermittently.

AREAS TO CHECK:

- Brushes on cars clean and straight?
- Is car wiring intact?
- Are the gears worn or missing teeth?
- Are the track slots clean of debris?
- Is the track surface and contact area clean from dust, lint, or oil? The recommended procedure for cleaning the track is to (with the game off) apply 70% isopropyl alcohol to a lint free cloth, wipe down the entire track, and dry thoroughly with a clean lint free cloth. The rear tires on the cars should also be cleaned with alcohol at this time. Use no other solutions or cleaners.

CAUTION: Alcohol is flammable. A fire hazard exists if the cars are run before the alcohol has completely evaporated, wait atleast 10 minutes for this to occur before turning the game on. The area should be properly ventilated. Run the cars for 20 laps each in test mode before returning game to normal play.

SYMPTOM:

Cars run continuously.

AREAS TO CHECK:

- Finish line sensor reading magnet on car? Use test mode to confirm this.
- Is T4 or T5 on Power Supply shorted? If so, T2 or T3 may be burned out as well.

SYMPTOM:

Cars crash in chicane, cars ignore speed limits.

AREAS TO CHECK:

- A solid state magnetic sensor called a Hall Effect Switch is used to detect the position of the cars. There are 6 sets of these located around the track.
- The cars may be missing a sensor. In test mode run the cars one at a time and listen for 6 separate bell tones as each car runs the course of a lap. If these tones are not heard, check the magnets on the bottom of the cars, check sensor wiring, and connectors.

** The cars may be coasting or sliding into the chicane. If IC22 is labeled TU-4 and problem persists, call our customer service department for an updated E prom.

SYMPTOM:

Speed limit displays blank even during test mode.

AREAS TO CHECK:

- Is +5 VAC present on Power Supply at K3-A pins 1 or 2?
- Check connection on voltage regulator (T6 on Power Supply) from case to heat sink to PCB Trace to K3-A. Loose hardware will make T6 appear bad.
- The individual segments share common lines. One bad speed limit display will cause erroneous numbers to show on the other two. disconnect and reconnect each unit one at a time to locate faulty unit.
- Is connector K6 on the CPU seated firmly.
- IC9 (UDN 2981) on the CPU PC Board may be bad. Replace and check all wiring for possible short to game cabinet.

SYMPTOM:

Scoreboard malfunctions.

AREAS TO CHECK:

- Is +5VAC present at connector K7 pin 5 of the scoreboard?
- Are any wires shorted to the inside of the scoreboard support posts?
- Is connector K6 on the CPU seated firmly?

If you are experiencing difficulty locating a problem, have questions or comments you may contact our customer service, sales, or parts departments at:

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VI. PARTS LISTING

PARTS NUMBER	PART NAME
201002	DOME HINGE
201005	DOME FASTENING PLATE
202001	MAIN PC BOARD
202002	POWER SUPPLY PC BOARD
202003	SCOREBOARD PC BOARD
202004	SENSOR PC BOARD
202005	SPEED LIMIT PC BOARD
202009	PL 5 TRANSFORMER
202010	12 VOLT CAR TRANSFORMER
202011	10 VOLT GAME TRANSFORMER
202032	2 AMP FUSE
202034	CAR #1 BUTTON (BLUE)
202035	CAR #2 BUTTON (YELLOW)
202036	COMPETITION BUTTON (RED)
202037	JOYSTICK
202038	PC BOARD CAR HOLDER
203001	DOME
203003	SCOREBOARD FRONT
203004	SCOREBOARD BACK
203005	SCOREBOARD FACE PANEL
203008	LIGHT HOUSING
203009	PL 5 BULB
303026	CONTROL PANEL

CAR PARTS: (See fig. A for easy identification of these parts.)

205005	CAR MOTOR
205006	CAR CHASSIS
205010	CAR AXLE
205011	FRONT WHEELS
205012	FRONT TIRES
205013	REAR WHEELS
205014	REAR TIRES
205015	SET SCREWS
205016	BRAIDS (BRUSHES)
205017	FLAG
205018	FLAG NUT
205019	BODY SIDE CLIPS
205020	31 TOOTH CROWN GEAR
205021	8 TOOTH PINION GEAR
205022	BRASS AXLE BUSHING
205023	FLAG SPACER

205024	MAGNET
205025	ROLL PIN
205027	ALLEN WRENCH
205028	KEP NUT
205030	COPPER BRAID
205031	NYLON BRAID
205032	AXLE GEAR COLLAR
205033	MOTOR MOUNTING BRACKET
205034	YELLOW FORMULA BODY
205035	BLUE FORMULA BODY
205036	YELLOW STOCK CAR BODY
205037	BLUE STOCK CAR BODY
205050X	COMPLETED CAR (ANY MODEL)
206001	DOME BOLT
206012	DOME CABLE
206016	DOME WASHERS
206026	BASE TO CABINET WASHER
207005	CABINET LINE DECAL
207006	TURBO DRIVE DECAL - LARGE
207007	TURBO DRIVE DECAL - SMALL
207009	SPEED LIMIT DECAL
207011	SWITCH SETTING DECAL
209005	TURBO DRIVE MANUAL

ELECTRONIC COMPONENTS:

208000	6940 2 DIGIT DISPLAY
208001	6980 SINGLE DIGIT DISPLAY
208002	3403 SINGLE DIGIT DISPLAY
208003	CD 4094
208004	ULN 2003
208005	TIP 120
208006	TIP 132
208007	6 AMP FUSE (5 x 20 mm)
208008	PC 829 OPTO ISOLATOR
208009	LM 338K VOLTAGE REGULATOR
208010	UDN 2981
208011	4538
208012	Z80A CPU
208013	8255
208014	AY-3-8910
208015	MEA 8000
208016	27128 GAME PROGRAM
208017	6116 / TC5517

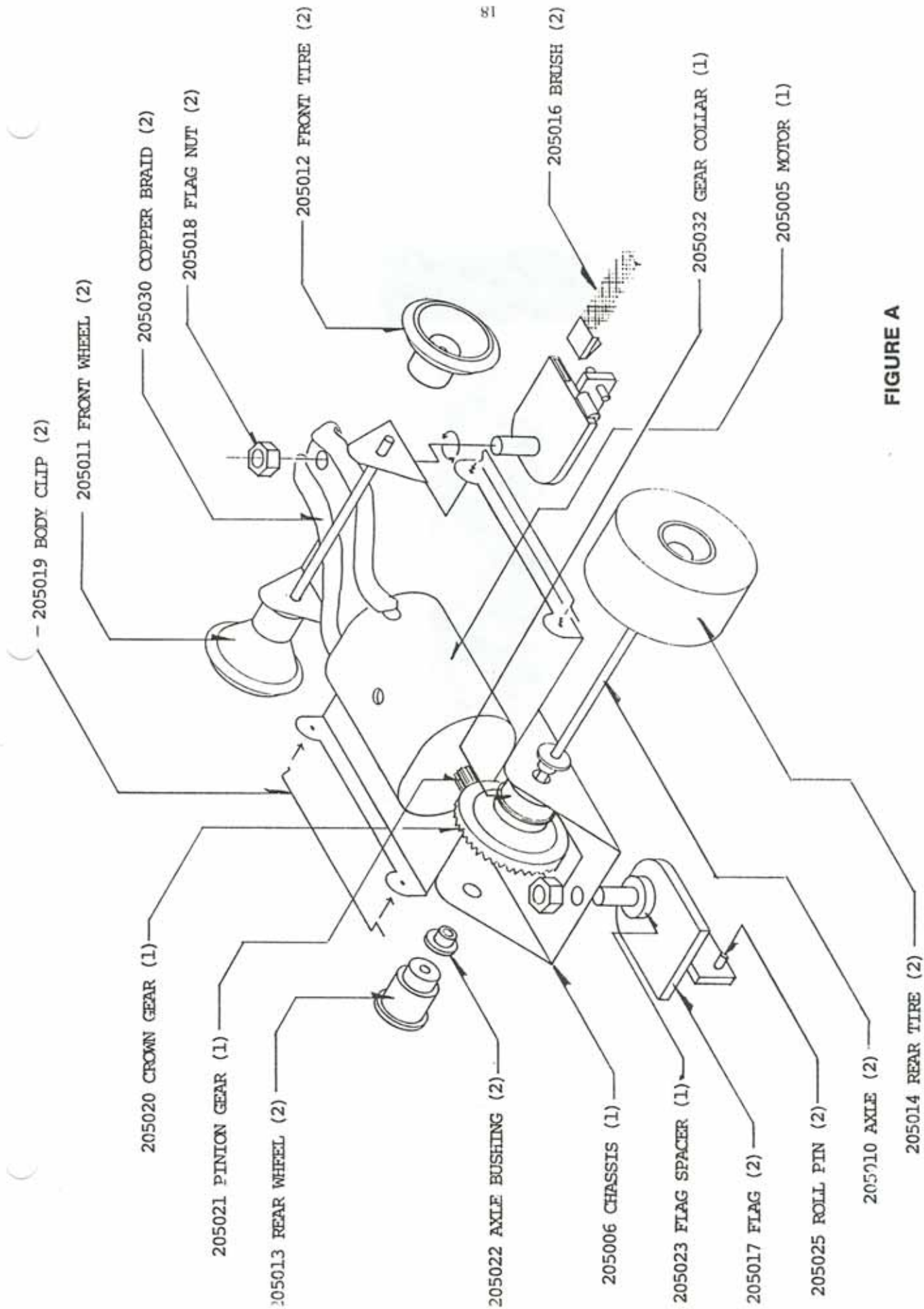
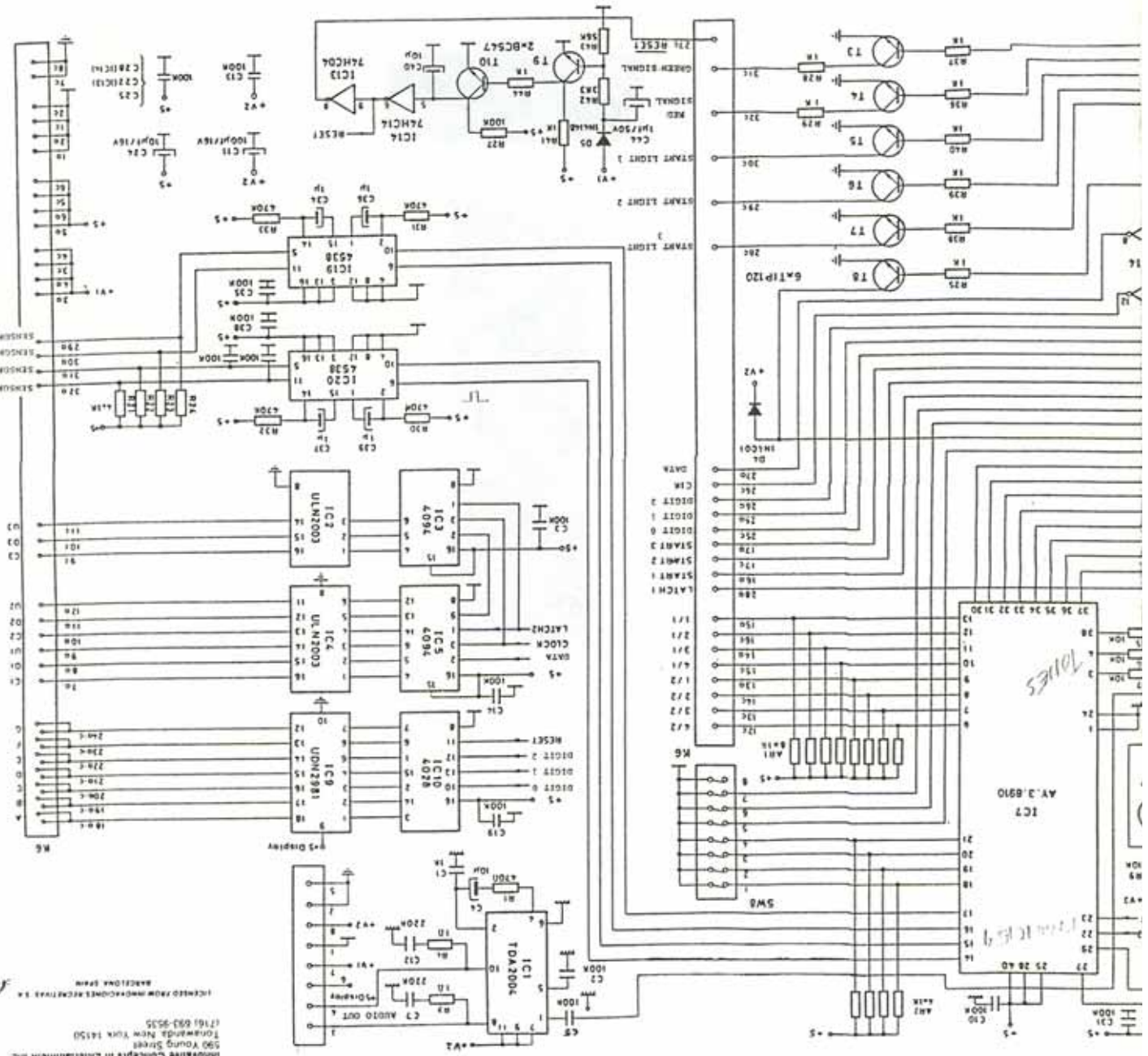


FIGURE A

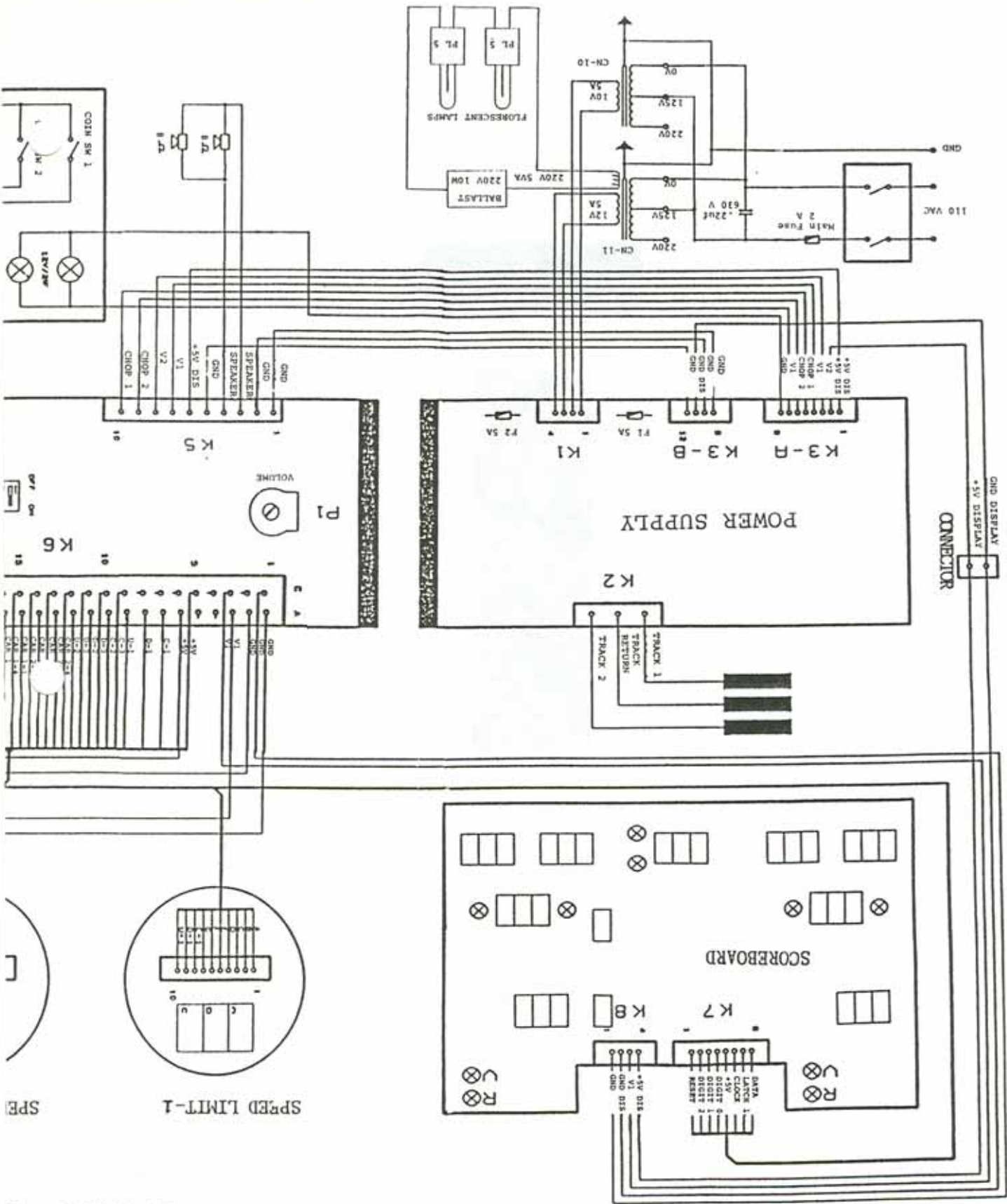
TURBO DRIVE MAIN CPU



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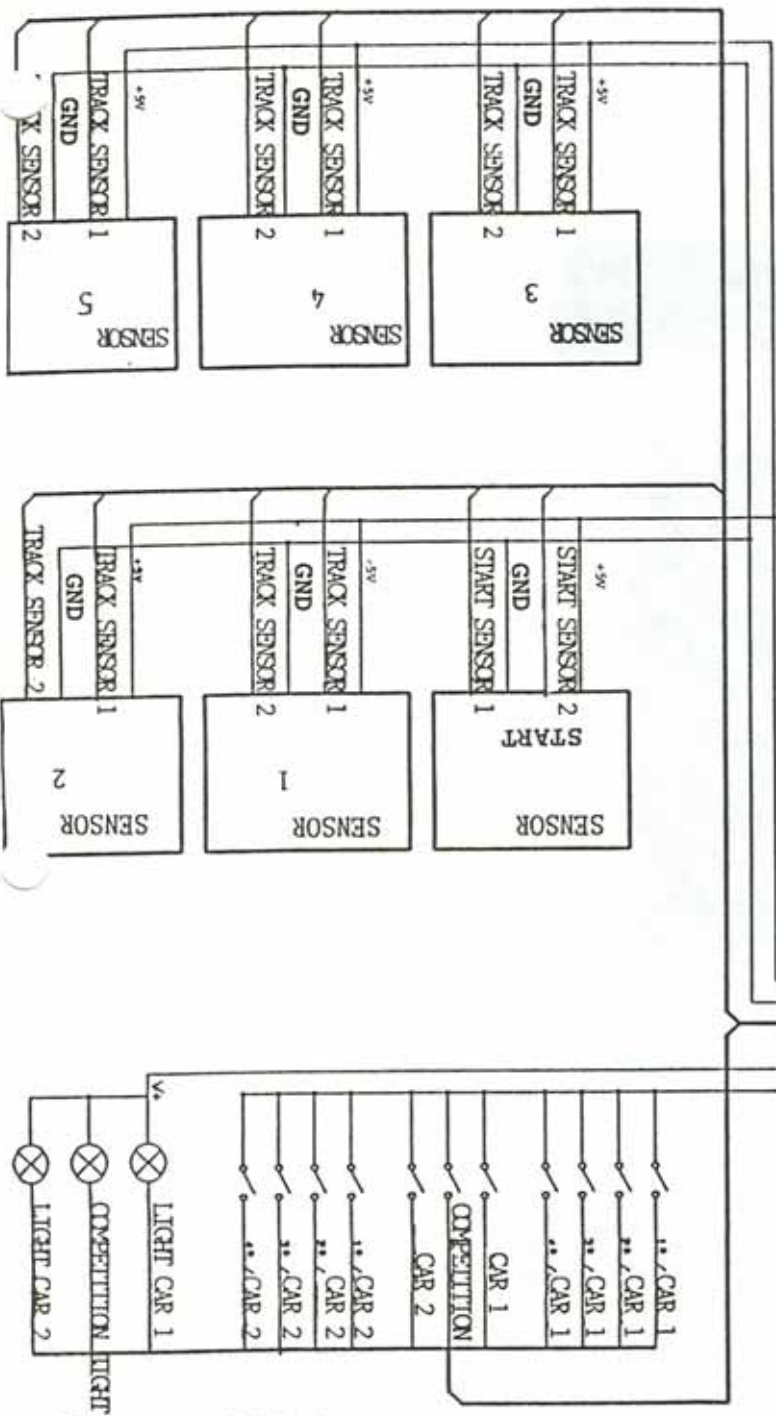
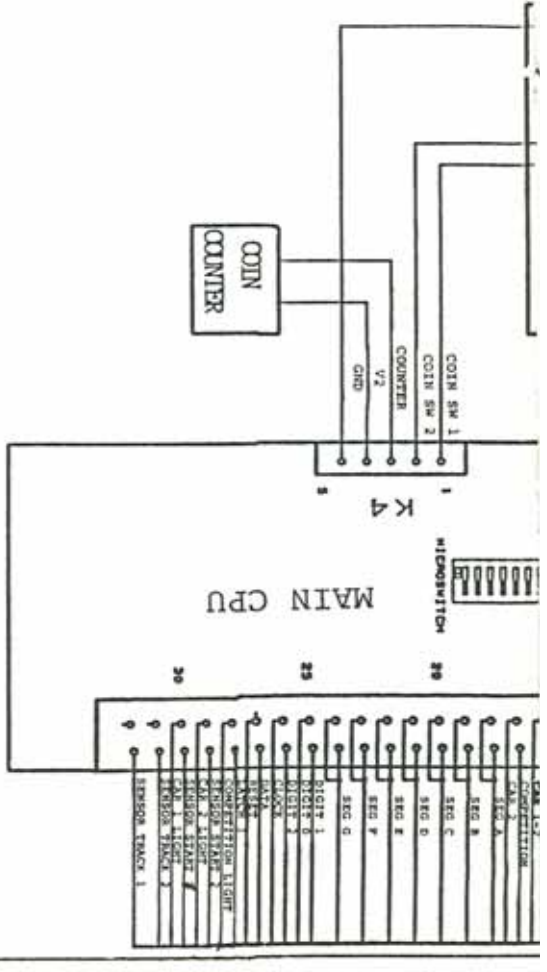
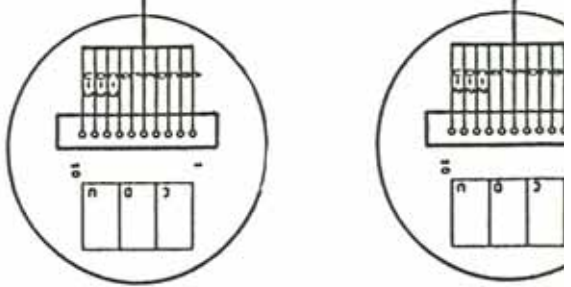
WIRING



DIAGRAM

SPEED LIMIT-3

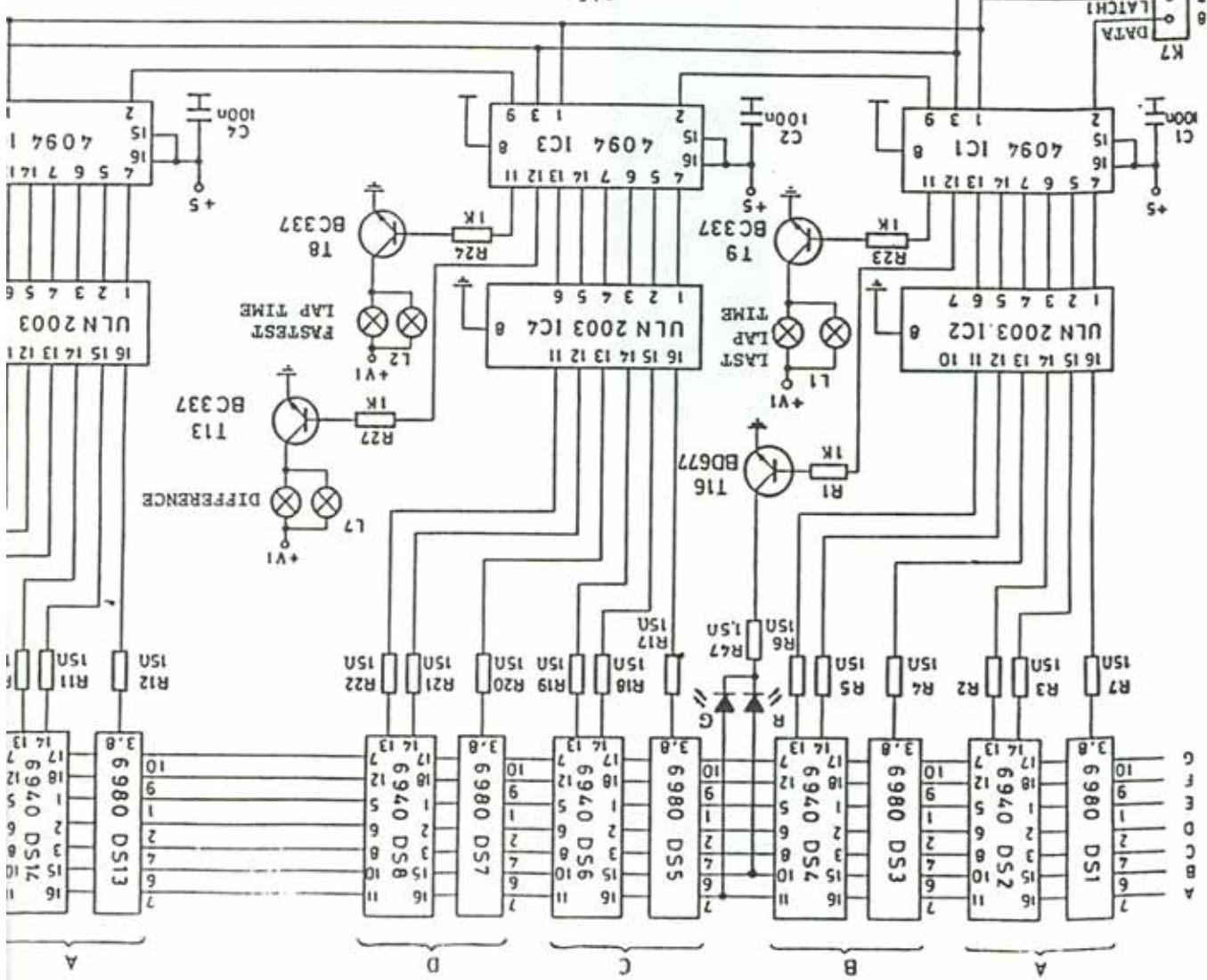
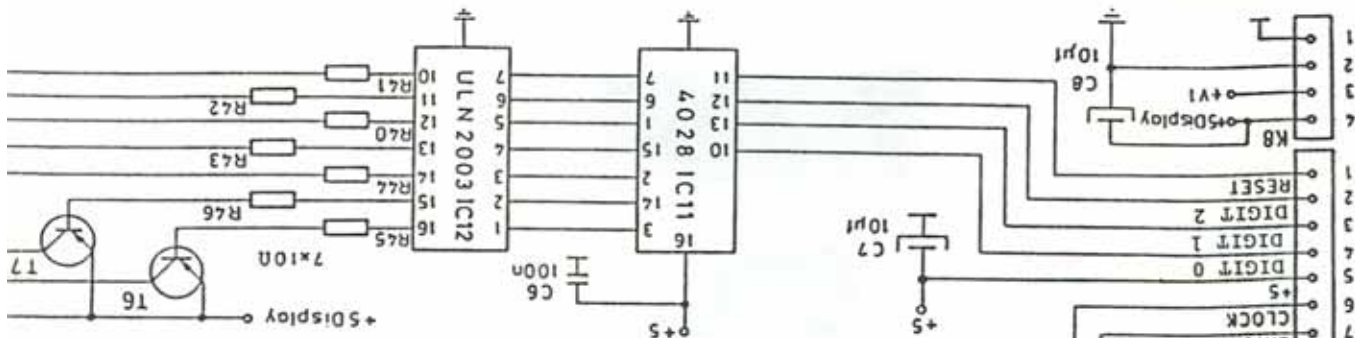
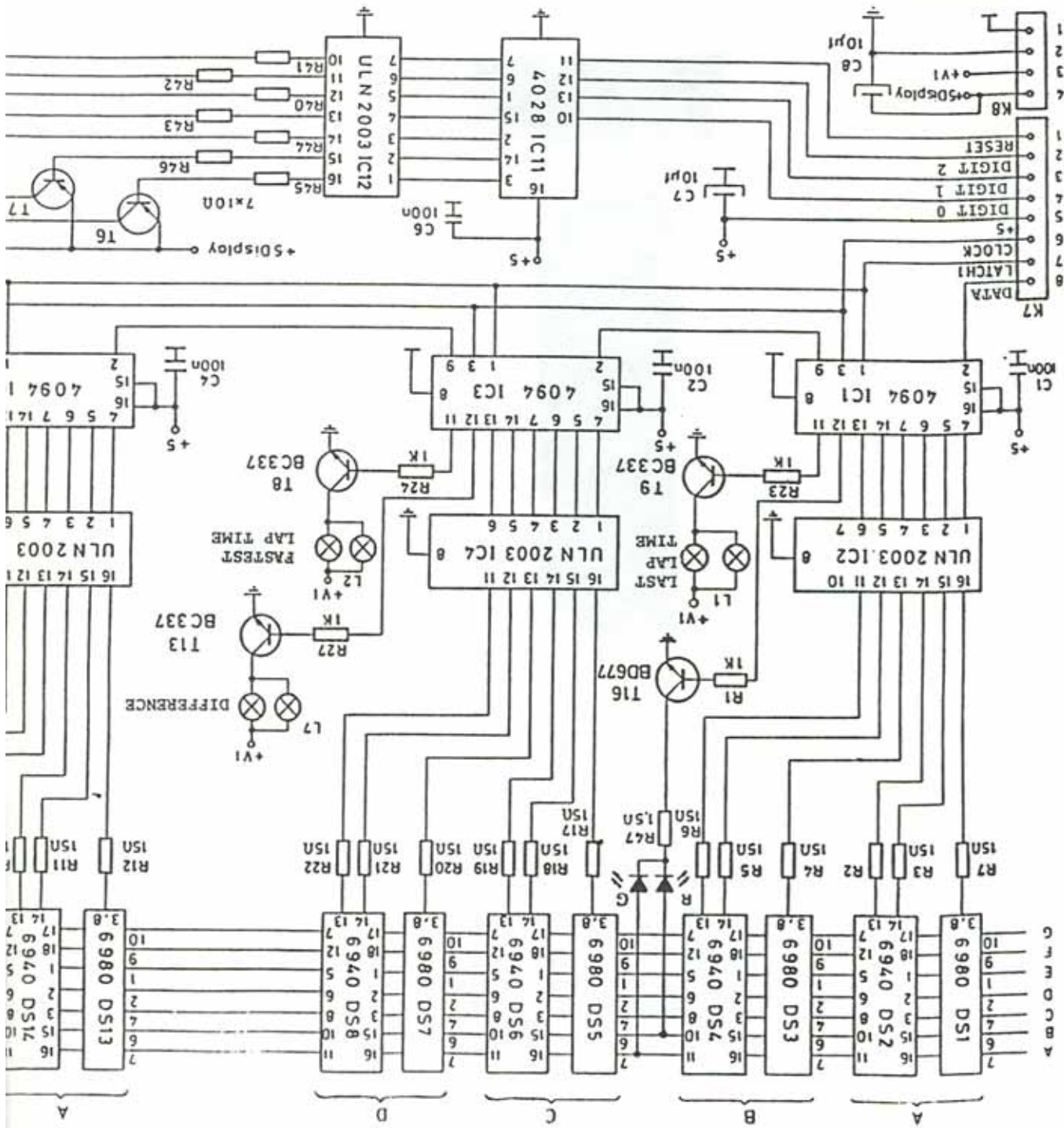
D LIMIT-2

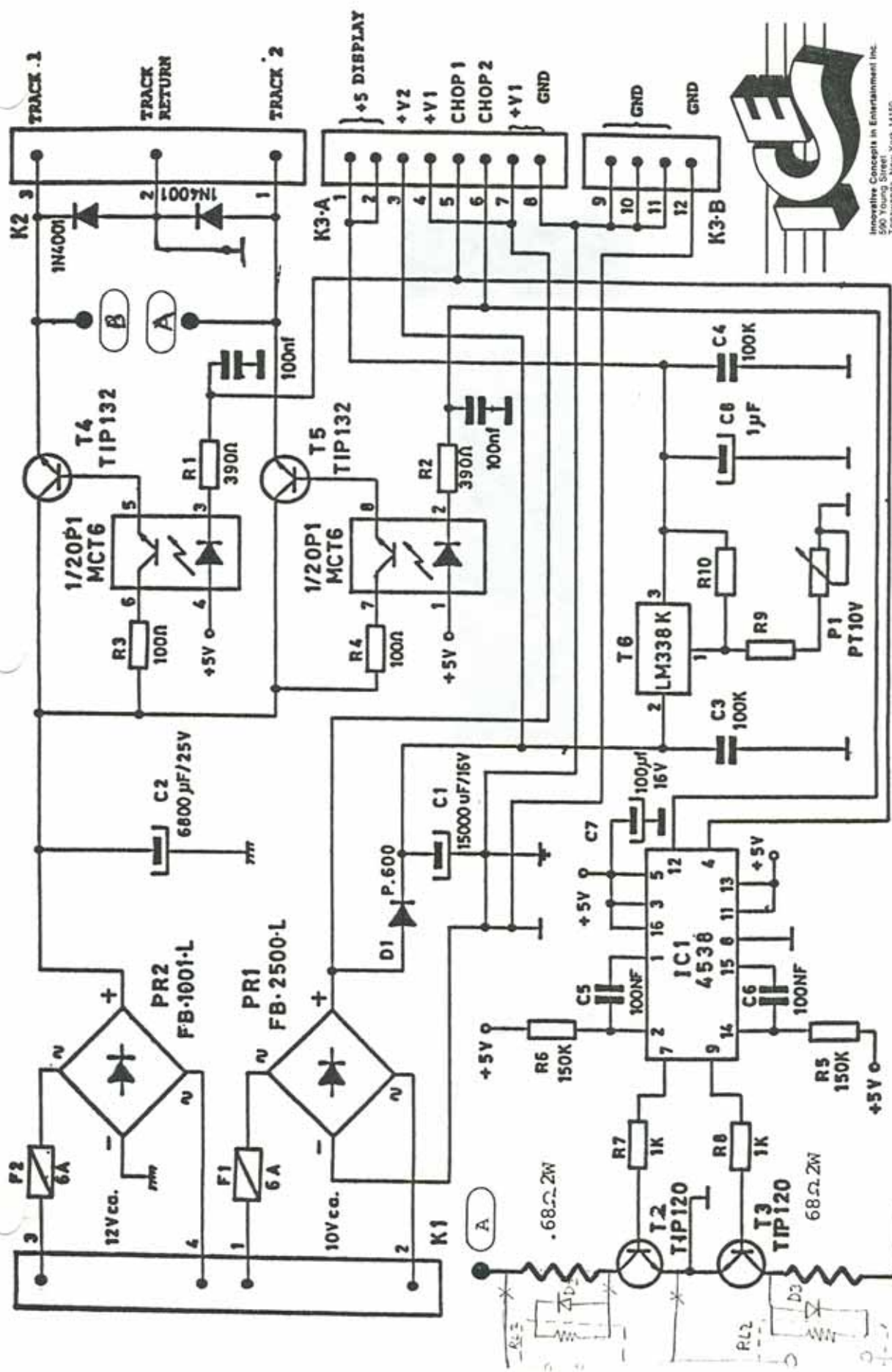


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CAR 1





TURBO DRIVE POWER SUPPLY

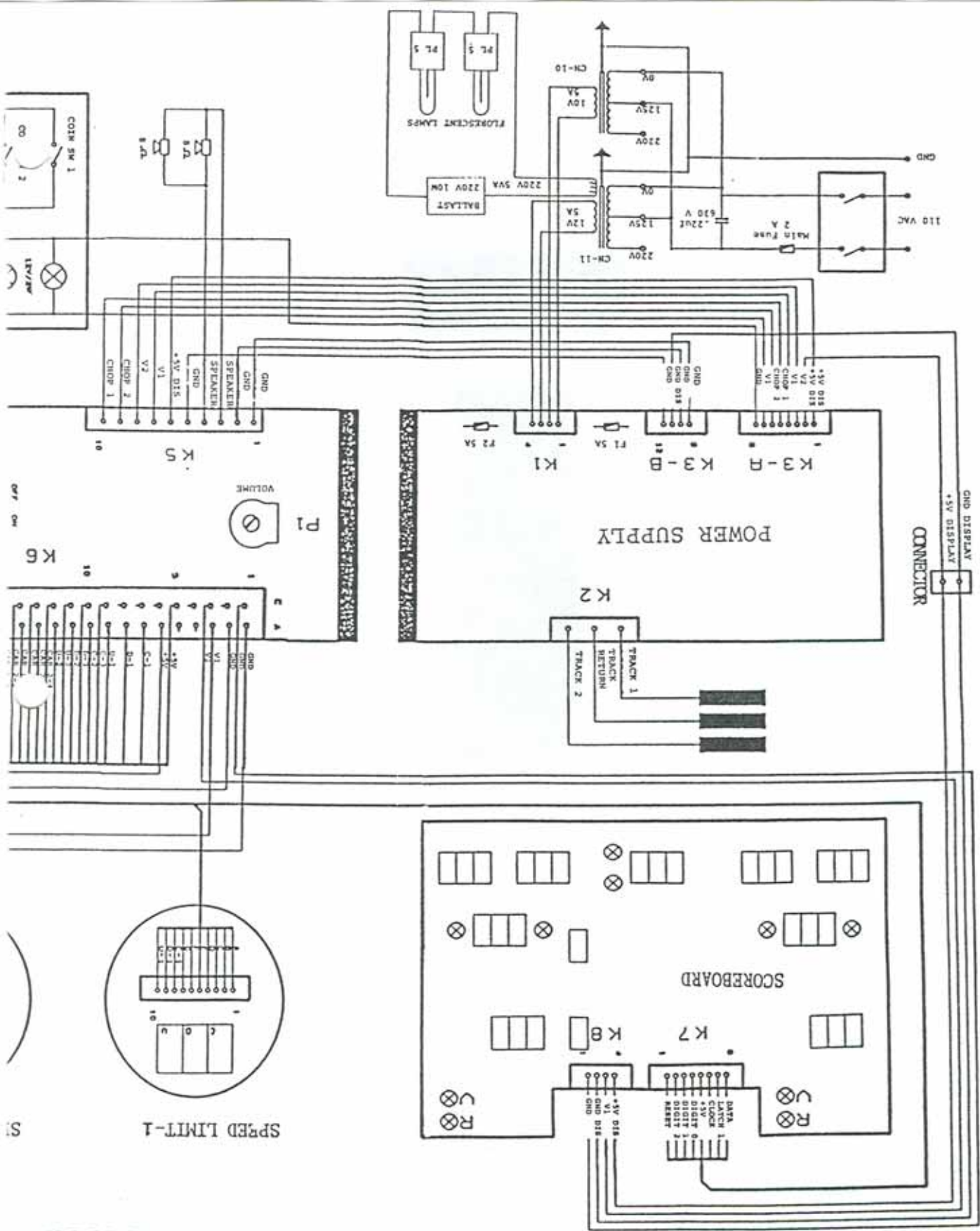
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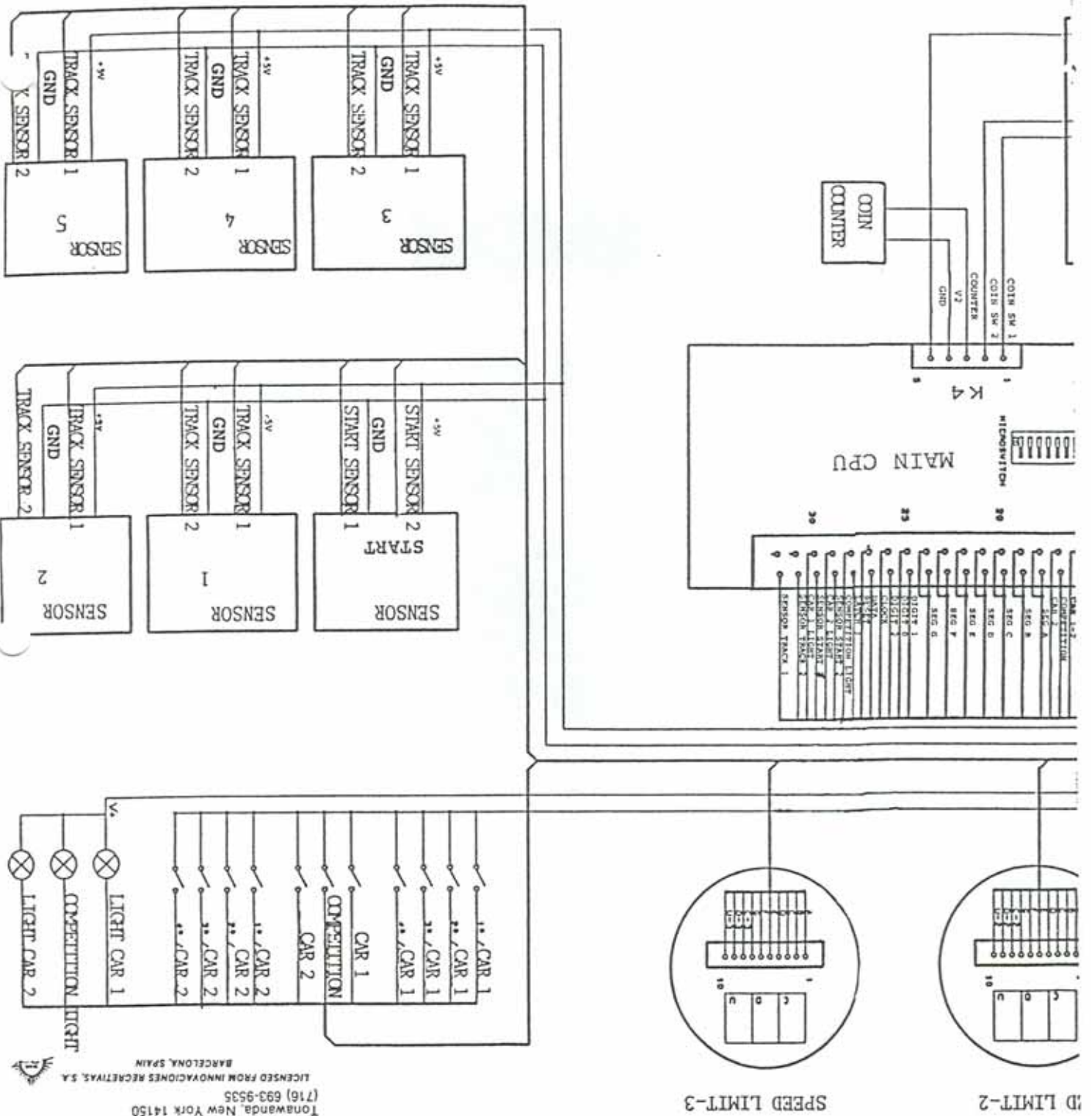
WIRING



SPEED LIMIT-1

SI

DIAGRAM



SPEED LIMIT-3

LD LIMIT-2

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