



THE PREMIER NAME IN PINBALL



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INSTRUCTION MANUAL



GAME #745

(INSTALL 4 BALLS IN OUTHOLE)

INSTRUCTION MANUAL

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GAME PROM:	DISPLAY PROM:	SOUND PROM:	
(TYPE 27C512)	(TYPE 27C040-25)	(TYPE 27C256)	(TYPE 27C040-25)
745/GPROM	745/DSPROM	745/DROM1	745/AROM1
		745/YROM1	745/AROM2

NOTE: ANY PROM CHANGES DURING PRODUCTION WILL BE INDICATED BY A REVISION NUMBER FOLLOWING THE GAME NUMBER. CONSULT YOUR DISTRIBUTOR FOR ANY PROM CHANGE UPDATE.

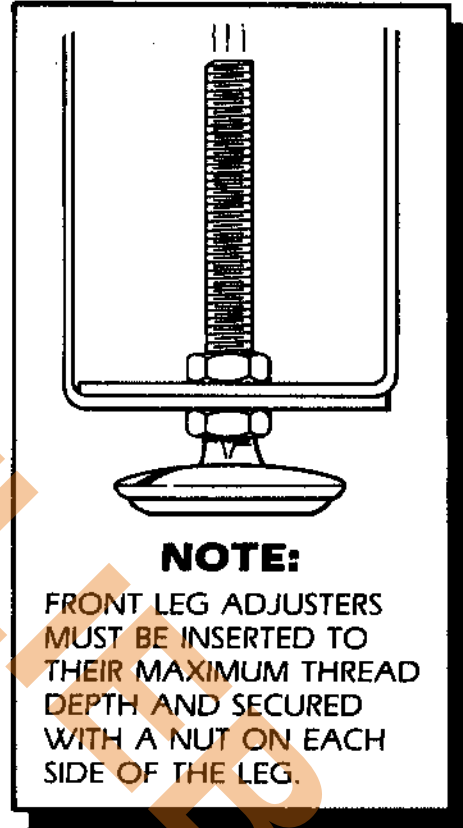
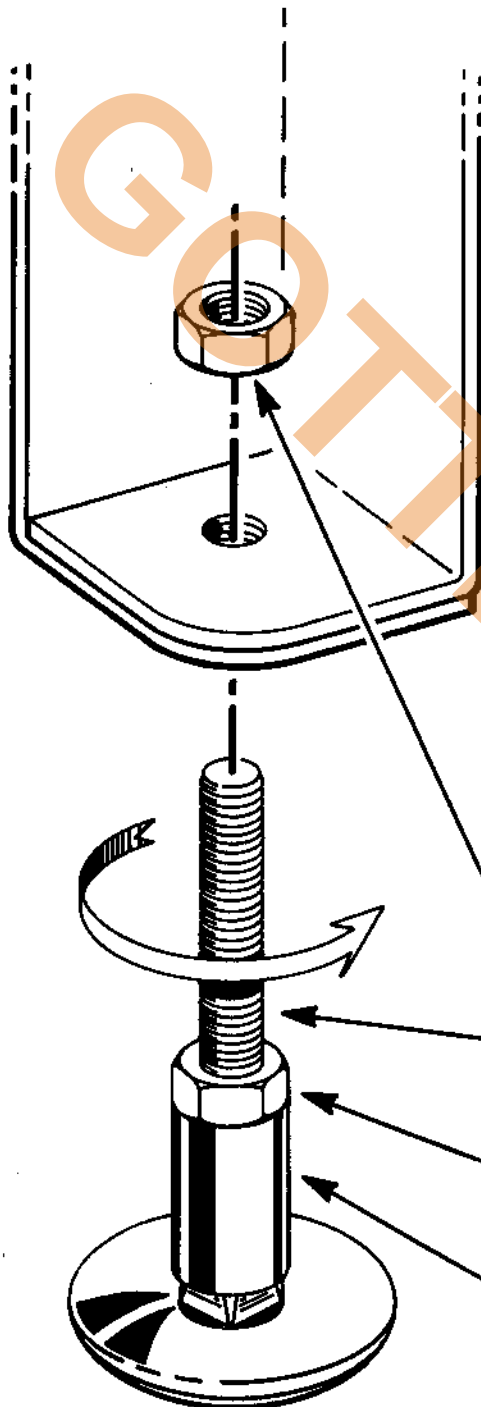
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SET-UP PROCEDURE

TO ADJUST PLAYFIELD PITCH ANGLE (6°)
(REAR LEGS ONLY)



NOTE:

FRONT LEG ADJUSTERS
MUST BE INSERTED TO
THEIR MAXIMUM THREAD
DEPTH AND SECURED
WITH A NUT ON EACH
SIDE OF THE LEG.

4. TIGHTEN LOCKING NUT.
3. ATTACH ASSEMBLY TO LEG.
2. FASTEN NUT TO SLEEVE.
1. INSERT 1" SLEEVE
(PART NO. 25317)

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SYSTEM 3 OVERVIEW

System 3 contains many new features which improve game play and reliability. Some of these features are as follows:

- 1) New lithium battery provides data retention for a minimum of 5 years under normal operation and virtually eliminates battery leakage. Also a low battery warning is given in the displays when the voltage drops to the critical level.
- 2) New interlocking connector system for improved reliability.
- 3) Use of High Speed CMOS technology for low power consumption and cooler operation.
- 4) Improved solenoid driver reliability due to simplified circuitry and the use of Rugged Power MOSFETS.
- 5) Lamp short protection.
- 6) Switch matrix input protection.
- 7) Easy line voltage adjustment on location.
- 8) Improved bookkeeping functions.
- 9) New 128 x 32 Dot Matrix Display.
- 10) Capability for operators to enter their own messages in the attract mode.
- 11) Use of new SMART SWITCH(tm) technology which eliminates the use of contact points on switches. Therefore the need for cleaning dirty switches is eliminated.
- 12) Addition of a Tournament Mode switch which allows a quick and easy way to replace current adjustment settings with special settings. This switch also provides an easy way to set the game for free play.

This equipment has been found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

WARNING

DO NOT TRANSPORT GAME WITH LIGHTBOX IN THE UPRIGHT (PLAYING) POSITION.
USE LATCH ONLY TO TEMPORARILY HOLD LIGHTBOX UPRIGHT WHILE ATTACHING THE LIGHTBOX TO THE CABINET.
SECURE THE LIGHTBOX TO THE CABINET WITH THE TWO BOLTS AND LOCKWASHERS PROVIDED.

I. INSTALLATION

A. SET-UP

1. Bolt the legs to the cabinet.
2. Lift lightbox into an upright position. Be sure none of the cables are crimped in between the lightbox and cabinet.
3. Engage the snap in the rear of the lightbox to the cabinet.
4. To remove the lightbox backglass and gain servicing access to the electronics panel and the insert lamp assembly, proceed as follows:

UNLOCK THE LIGHTBOX BY TURNING THE KEY A QUARTER TURN CLOCKWISE.

LIFT UP THE BACKGLASS RETAINING BOTTOM TRIM ABOUT 3/4" TO CLEAR THE "H" RETAINING CHANNEL ON THE TOP EDGE OF THE DISPLAY/SPEAKER PANEL, PIVOT OUT TOWARDS YOU AND SLIDE THE BACKGLASS DOWN AND OUT, CAREFULLY SET ASIDE.

REMOVE THE "H" RETAINING CHANNEL, SLIDE THE PLEXIGLASS INSERT UP AND OUT, SLIDE UP AND REMOVE THE DISPLAY/SPEAKER PANEL AND LAY FACE DOWN ON THE CABINET.

UNLOOSEN THE TWO WING NUTS ON THE LEFT SIDE AND PUSH THE LOCK SLIDE UPWARDS, THIS ALLOWS THE LIGHTBOX LAMP INSERT TO SWING OUT AND FOR GAINING ACCESS TO THE ELECTRONICS PANEL.

5. Secure the lightbox to the cabinet with the bolts and washers provided.

TO REPLACE THE BACKGLASS, INSERT THE DISPLAY/SPEAKER PANEL, ENSURE THAT THE METAL TABS ON THE PANEL MATE INTO THE WOOD RETAINERS, SLIDE IN THE PLEXIGLASS PANEL AND INSERT THE "H" RETAINING CHANNEL.

SLIDE THE BACKGLASS UP INTO THE LIGHTBOX, PIVOT INWARDS AND SLIDE DOWN INTO THE "H" CHANNEL, TURN THE KEY A QUARTER TURN COUNTER-CLOCKWISE TO LOCK THE LIGHTBOX.

6. Open the cabinet door and loosen the front moulding locking arm.
7. Remove the front moulding from the cabinet.
8. Slide the playfield glass toward you and remove it, carefully set aside.
9. Slide the playfield toward you, pivot upwards and back towards the lightbox,

hold in place and insert the prop stick into the countersunk hole on the underside of the playfield.

CAUTION!

Use prop stick when servicing under the playfield.

10. Unravel and straighten out the power line cord located at the rear of the cabinet.
11. Proceed to "B. CHECK-OUT".

B. CHECK-OUT

1. Check that all cables are clear of moving parts.
2. Check for any loose wires.
3. Check switches for loose solder or other foreign matter.
4. Be certain all fuses are firmly seated.
5. Check transformer for any foreign matter across terminals.
6. Be sure that the Transformer Panel power input connector A12J5, corresponds to the supply voltage.
7. Check the setting of the normally open tilt switch on the underside of the playfield. One blade should be free-floating with a weight on the end.
8. The plumb-bob tilt can be adjusted by loosening the clip and raising the plumb-bob to increase its sensitivity, or lowering it to decrease its sensitivity.
9. Lower the playfield into the cabinet. Using the leg adjusters, level the playfield. At this point, the pitch of the playfield should be approximately 6 degrees.
10. Plug the line-cord into a properly grounded 3-wire receptacle ONLY!
11. Refer to Section III to make all necessary game adjustments.
12. Re-install the playfield glass, front moulding and lock the cabinet door.
13. CAUTION! If this game has been subjected to extreme cold, allow to warm up to room temperature.

I. INSTALLATION

C. COIN METER (OPTIONAL)

A +12vdc mechanical coin meter may be installed by the operator to count total coins accepted by the machine. The coin meter leads should be soldered to the lugs on the terminal strip mounted inside the front door on the right side (see Figure 1). If the coin meter is polarized, the positive lead (red) should be attached to the lug that has the cathode (banded) side of the diode attached to it otherwise the leads may be attached in any order. The COIN METER adjustment must be set to on and the following four adjustments should be set to the number of pulses (counts) required for each coin denomination used.

NOTE: Make sure that the GAME MODE adjustment is not set to either REPLAY + TICKETS or TICKETS ONLY (see Game Adjustments section).

drill bit. Drill the "B" hole out from the inside of the cabinet using a 1" drill bit. In the game envelope you will find template #30213 for a 1/2" plywood spacer to be used between the outside of the game cabinet and the dispenser cabinet so that the dispenser will clear the leg on the game when opened for loading tickets.

The GAME MODE adjustment is used to set whether to dispense a number of tickets along with each replay awarded (REPLAY + TICKETS) or to dispense a number of tickets in place of each replay awarded (TICKETS ONLY). The TICKETS TO AWARD adjustment is used to set the number of tickets to dispense for each replay awarded (see Game Adjustments section).

NOTE: Make sure that the COIN METER adjustment is set to off when using a ticket dispenser.

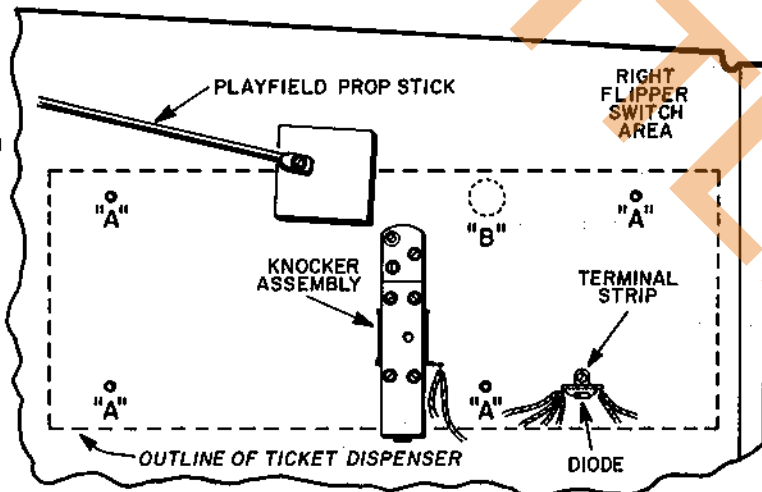


FIGURE 1.

D. TICKET DISPENSER (OPTIONAL)

This machine is equipped to easily interface to the Deltronic Labs TDOM-10-S-S ticket dispenser. To install the dispenser, first locate the five partially drilled holes on the inside of the cabinet on the right side (see Figure 1). The four "A" holes are for mounting the cabinet with #10 X 1-3/4" carriage bolts. The "B" hole is for cable access to the unit. Drill the "A" holes out from the inside of the cabinet using a 13/64"

E. BILL ACCEPTOR (OPTIONAL)

The MARS VFM2-L1 bill acceptor can be easily interfaced to this machine. The unit can easily be mounted to the front door by removing the existing cover plate and bolting the unit to the door. There is also a connector provided on the front door which directly interfaces to the bill acceptor. The game is set at the factory to give the proper amount of credits with the bill acceptor set to output one pulse per dollar. In order to change this configuration, the GAME PRICING adjustment will need to have a CUSTOM value entered. Other bill acceptors may also be interfaced to the game but may require a different mounting or wiring configuration.

F. COMMUNICATIONS ADAPTER (OPTIONAL)

A kit (MA-1940) may be purchased through your distributor which will allow the system to output Bookkeeping data to a serial printer.

II. GAME PLAY AND SCORING



*** PLAYFIELD FEATURES ***

LEFT OUTLANE:
SCORE 3000.

AWARD 3 CARDS WHEN LIT.

RIGHT OUTLANE:
SCORE 3000.

AWARD SPECIAL WHEN FLASHING OUT.

RETURN LANES:
SCORE 30,000.

RAISE CENTER RAMP WHEN LIT, IF NOT IN GOLDEN GLOVE, WORLD SERIES, HOME RUN DERBY OR GRAND SLAM DERBY.

ACTIVATE THE COMBO FEATURE IF NOT IN STEAL HOME, NIGHT GAME, TRADING CARDS OR ANY MULTIBALL AND IF THE LEFT ORBIT SHOT IS NOT ACTIVE.

LEFT RETURN LANE- ACTIVATE THE BIG ORBIT SHOT FEATURE IF NOT IN WORLD SERIES, NIGHT GAME, TRADING CARDS OR ANY MULTIBALL.

KICKING RUBBERS:
SCORE 30.

PERFORM TOGGLE FUNCTION.

POP BUMPERS:
SCORE 100,000.

ADVANCE BULLPEN AWARD.

RESTART GRAND SLAM OR HOME RUN TIMER IF BALL CAME THROUGH TOP ROLLOVER IN NORMAL MODE.

LOWER RIGHT UPKICKER:

IN #35 ALL-STARS ROUND, SCORE 10,000,000 TIMES THE NUMBER OF PLAYERS ADDED. ADD 2 TIME UNITS.

IF A POP BUMPER WAS THE LAST SWITCH HIT, THEN SCORE 50,000, AWARD BULLPEN AWARD IF IN NORMAL MODE. ACTIVATE COMBO FEATURE IF NOT IN STEAL HOME OR ANY MULTIBALL ROUND IF LEFT ORBIT SHOT IS NOT ACTIVE.

IF A POP BUMPER WAS NOT THE LAST SWITCH HIT, THEN SCORE 100,000, AWARD BASEBALL CARD TRADE FEATURE WHEN LIT, AND START ROUND WHEN FLASHING.

HOME RUN (OPTO):
SCORE 3,000,000.

IN NORMAL MODE, AWARD FLASHING CENTER RAMP AWARD OR HOME RUN, STOP FLASHING OUT AND DROP THE CENTER RAMP.

IN NIGHT GAME ROUND, ADVANCE INNING, IF STROBING.

IN GRAND SLAM DERBY, AWARD ONE GRAND SLAM.

IN HOME RUN DERBY ROUND, AWARD ONE HOME RUN.

IN WORLD SERIES, AWARD A HOME RUN, IF NOT STROBING. SCORE SUPER JACKPOT AND END ROUND, IF STROBING.

IN MULTIBALL, COLLECT JACKPOT, DOUBLE JACKPOT OR SUPER JACKPOT AND DROP THE CENTER RAMP.

TOP LEFT UPKICKER:
SCORE 300.

IN #35 ALL-STARS ROUND, SCORE 10,000,000 TIMES THE NUMBER OF PLAYERS ADDED. ADD 2 TIME UNITS.

ACTIVATE THE BIG ORBIT SHOT FEATURE IF NOT IN WORLD SERIES, NIGHT GAME, TRADING CARDS, OR ANY MULTIBALL.

MIDDLE RIGHT ROLLOVER:
SOUND ONLY.

II. GAME PLAY AND SCORING

SPOT TARGETS (2):

SCORE 30,000.

COMPLETING BOTH TARGETS LIGHTS RIGHT UPKICKER FOR CARD TRADE FEATURE.

DROP TARGETS:

SCORES 30,000.

AWARD HOME RUN IF THE DROP TARGET IS HIT WHEN FLASHING WHEN THE SKILL SHOT IS ACTIVE.

COMPLETING THE BANK AWARDS A "SINGLE" AND RAISES THE CENTER RAMP, IF IN NORMAL MODE.

HITTING THE FLASHING DROP TARGET WHEN "COMBO" IS FLASHING AWARDS 20,000,000. HITTING THE FLASHING DROP TARGET WHEN "COMBO" IS NOT FLASHING SCORES 20,000,000, ADVANCES ALL BASE RUNNERS, ADDS TO STEAL TOTAL, AND ADDS 1 CARD.

STEAL A BASE, ADD 1 CARD, AND ADD 5 TIME UNITS IF FLASHING IN STEAL HOME ROUND.

CAPTIVE BALL:

SCORE 300,000.

DURING NORMAL MODE, AWARD THE COMBO FEATURE WHEN FLASHING. IF NOT FLASHING AND THE TIMER IS OFF, THEN START THE TIMER, FLASH A RANDOM DROP TARGET AND FLASH THE DROP TARGET "COMBO" LAMP.

SCOOP (OPTO):

SCORE 300,000.

IN NORMAL MODE, AWARD COMBO WHEN FLASHING. IF "ATTEMPT STEAL" IS FLASHING OUT, THEN TURN IT OFF, LIGHT "WALK", START A TIMER, AND FLASH A RANDOM DROP TARGET LAMP.

AWARD A WALK WHEN LIT. IF "COMBO" IS NOT FLASHING AND THE TIMER IS OFF, THEN TURN OFF "WALK" AND START "ATTEMPT STEAL FLASHING OUT.

ADVANCE TO NEXT STAGE DURING STEAL HOME ROUND WHEN STROBING AND ADD 2 TIME UNITS.

IN 7TH INNING STRETCH, ADD A LETTER TO BIG HURT.

IN NIGHT GAME ROUND, ADVANCE INNING, IF STROBING.

LEFT ORBIT SHOT (OPTO):

SCORE 300,000.

IN NIGHT GAME ROUND, ADVANCE INNING, IF STROBING.

OPEN TOP BALL GATE IF "BIG ORBIT SHOT" IS LIT OR FLASHING OUT AND BALL DID NOT COME THROUGH TOP LEFT OPTO.

AWARD EXTRA BALL WHEN FLASHING OUT.

SCORE AND ADVANCE LEFT ORBIT SHOT FEATURE.

ADVANCE JACKPOT WHEN FLASHING.

AWARD COMBO FEATURE WHEN FLASHING.

IN TRADING CARD ROUND, SCORE 10,000,000 POINTS AND ADD ONE CARD.

IN WORLD SERIES, SCORE 30,000,000, IF STROBING.

IN REGULAR MULTIBALL, RAISE THE CENTER RAMP AND REACTIVATE THE CENTER SHOT, IF STROBING.

BIG (RIGHT) ORBIT SHOT (OPTO):

SCORE 300,000.

IN NIGHT GAME ROUND, ADVANCE INNING, IF STROBING.

AWARD EXTRA BALL WHEN FLASHING OUT.

AWARD 100,000,000 WHEN FLASHING OUT.

ADVANCE JACKPOT WHEN FLASHING OUT.

BEGIN THE CONSECUTIVE ORBIT FEATURE WHEN LIT "BIG ORBIT SHOT" IS LIT.

IN TRADING CARD ROUND, SCORE 10,000,000 POINTS AND ADD ONE CARD.

IN WORLD SERIES, SCORE 30,000,000, IF STROBING.

IN REGULAR MULTIBALL, RAISE THE CENTER RAMP AND REACTIVATE THE CENTER SHOT, IF STROBING.

IN 7TH INNING STRETCH, ADD A LETTER TO BIG HURT.

II. GAME PLAY AND SCORING

LEFT RAMP (OPTO):

SCORE 50,000.

IN NIGHT GAME ROUND, ADVANCE INNING,
IF STROBING.

IN NORMAL MODE, IF "SINGLE" IS LIT,
THEN AWARD ONE "SINGLE". ACTIVATE THE
SHOOT THE GAP FEATURE, AND ADVANCE TO
NEXT INNING.

IN NORMAL MODE, AWARD SHOOT THE GAP
AWARD IF FLASHING.

IN #35 ALL-STARS ROUND, SCORE
10,000,000 TIMES THE NUMBER OF PLAYERS
ADDED. ADD 2 TIME UNITS.

IN WORLD SERIES, SCORE 30,000,000, IF
STROBING.

RIGHT RAMP (OPTO):

SCORE 30,000.

IN NORMAL MODE, AWARD SHOOT THE GAP
AWARD IF FLASHING.

IN NORMAL MODE, AWARD PLAYER'S CHOICE
FEATURE WHEN FLASHING.

IN NIGHT GAME ROUND, ADVANCE INNING,
IF STROBING.

IN #35 ALL-STARS ROUND, SCORE
10,000,000 TIMES THE NUMBER OF PLAYERS
ADDED. ADD 2 TIME UNITS.

IN WORLD SERIES, SCORE 30,000,000, IF
STROBING.

LEFT AND RIGHT SCOREBOARD TARGETS:

SCORE 300.

IN NORMAL MODE, ADD A LETTER TO
GRANDSLAM.

TOP RIGHT ROLLOVER:

SCORE 300,000.

LOAD THE BASES AND RAISE THE
CENTER RAMP WHEN LIT.

TOP RIGHT HOLE:

SCORE 1,000,000.

ADD A LETTER TO BIG HURT WHEN LIT.

GLOVE:

SCORE 100,000 AND AWARD A "SINGLE".

IN GOLDEN GLOVE ROUND, SCORE
20,000,000 AND ADD 1 TO CATCH TOTAL.

GLOVE (ALL THE WAY BACK):

SCORE 1,000,000.

AWARD ONE CATCH.

FLASH "BEGIN ROUND" LAMP IF NOT IN A
ROUND.

OUTHOLE:

COLLECT CATCH BONUS, 1M PER CATCH, AT
END OF BALL.

COLLECT RUNS BONUS, 1M PER RUN, AT END
OF GAME.

COLLECT CARD BONUS, 10M PER CARD, AT
END OF GAME.

*** GENERAL GAME FEATURES ***

HIGH TO DATE AWARDS:

TOTAL GRAND SLAMS:

EXCEEDING HIGH GRAND SLAMS TO DATE
ALLOWS PLAYER TO ENTER INITIALS AS
"SULTAN OF SWAT" AND AWARDS A SPECIAL.

TOTAL HOME RUNS:

EXCEEDING HIGH HOME RUNS TO DATE
ALLOWS PLAYER TO ENTER INITIALS AS
"MVP" AND AWARDS A SPECIAL.

TOTAL CATCHES:

EXCEEDING HIGH CATCHES TO DATE ALLOWS
PLAYER TO ENTER INITIALS AS "GOLD
GLOVE" AND AWARDS A SPECIAL.

TOTAL STEALS:

EXCEEDING HIGH STEALS TO DATE ALLOWS
PLAYER TO ENTER INITIALS AS "STOLEN
BASE KING" AND AWARDS A SPECIAL.

ANY HIGH TOTAL TO DATE IS RESET TO ITS
DEFAULT VALUE AFTER HOW MANY EVER
GAMES ARE SET IN GAME ADJUSTMENT #53.

II. GAME PLAY AND SCORING

SKILL SHOT:

AT THE START OF EACH NEW BALL THE DROP TARGET BANK IS RESET AND TWO TARGETS AT RANDOM ARE DROPPED. IF A PLAYER HITS THE STANDING TARGET WITH HIS FIRST SHOT, BEFORE TIME RUNS OUT, THEN HE IS AWARDED A HOME RUN. IF A PLAYER HITS ANY OTHER SWITCH OR IF TIME RUNS OUT, THEN THE BANK RESETS.

LEFT ORBIT SHOT FEATURE:

SHOOTING THE LEFT TO RIGHT ORBIT SHOT WHEN "500K" IS LIT SCORES 500,000 AND FLASHES OUT THE NEXT LAMP IN THE SERIES. EACH SHOT AWARDS THE LISTED CORRESPONDING SCORE AND FLASHES OUT THE NEXT LAMP. WHEN TIME RUNS OUT, THE NEXT LOWER LAMP IN THE CHAIN FLASHES OUT UNTIL, IN THE END, "500K" IS RELIT.

AWARD:

1ST SHOT -	500,000
2ND SHOT -	5,000,000
3RD SHOT -	50,000,000
4TH SHOT -	500,000,000
5TH SHOT -	1,000,000,000

PLAYER'S CHOICE:

THE PLAYER GETS THE OPPORTUNITY TO CHOOSE AN AWARD FROM THE TABLE BELOW. IF THE PLAYER DOES NOT CHOOSE BEFORE TIME RUNS OUT, THEN HE RECEIVES THE ITEM LISTED. THE OTHER AWARD IN THE CHOICE IS ALWAYS ADD 2 LETTERS TO GRANDSLAM.

1ST -	MULTIBALL.
2ND -	LIGHT DOUBLE.
3RD -	HURRY-UP EXTRA BALL OR HOME RUN.
4TH -	ADVANCE 2 INNINGS.
5TH -	MULTIBALL.
6TH -	LIGHT DOUBLE.

CATCHES FEATURE:

HITTING THE GLOVE ALL THE WAY BACK INCREASES A PLAYER'S CATCHES.

COMPLETING THE 10TH CATCH STARTS EITHER HURRY-UP EXTRA BALL.

COMPLETING THE 20TH CATCH AWARDS 50,000,000.

COMPLETING THE 30TH CATCH FLASHES OUT THE 100M RIGHT ORBIT SHOT.

LIGHT DOUBLE FEATURE:

THIS FEATURE CAN BE STARTED THROUGH THE BULLPEN FEATURE, PLAYER'S CHOICE, OR THROUGH A MYSTERY SEQUENCE. THE CENTER RAMP IS RAISED AND THE DOUBLE LAMP FLASHES OUT FOR A TIMED PERIOD. SHOOTING THE HOME RUN AWARDS A SECOND HOME RUN OR GRAND SLAM, AS THE CASE MAY BE.

COMBO FEATURE:

HITTING EITHER RETURN LANE WHEN NOT IN A ROUND STARTS THE COMBO FEATURE. SHOOTING THE LEFT ORBIT SHOT WHEN FLASHING AWARDS COMBO AND FLASHES THE CAPTIVE BALL "COMBO" AND THE SCOOP "COMBO". SHOOTING THE CAPTIVE BALL OR THE SCOOP WHEN FLASHING AWARDS COMBO AND FLASHES THE DROP TARGET "COMBO" LAMP AND ONE RANDOM DROP TARGET LAMP. THE OTHER DROP TARGETS ARE TRIPPED.

1ST CONSECUTIVE COMBO =	20,000,000.
2ND CONSECUTIVE COMBO =	40,000,000.
3RD CONSECUTIVE COMBO =	80,000,000.

HOME RUN AWARD:

10,000,000 FOR HOME RUN.

40,000,000 FOR GRAND SLAM.

CENTER HOME RUN RAMP:

COMPLETING THE DROP TARGET BANK WHEN NOT IN A ROUND, HITTING THE TOP RIGHT ROLLOVER WHEN LIT OR GOING THROUGH EITHER RETURN LANE ROLLOVER WHEN LIT RAISES THE CENTER RAMP AND FLASHES OUT THE "HOME RUN" OR "GRAND SLAM" LAMP. WHEN TIME EXPIRES, THE CENTER RAMP IS DROPPED.

JACKPOT:

THE JACKPOT STARTS AT 20,000,000. EACH ADVANCE INCREASES THE JACKPOT BY 10,000,000. THIS VALUE IS REMEMBERED FROM BALL TO BALL.

DEACTIVATE POP BUMPERS:

PRESSING BOTH FLIPPERS AT THE SAME TIME STOPS THE POP BUMPERS FROM ACTIVATING.

ABORT DISPLAY:

PRESSING BOTH FLIPPERS AT THE SAME TIME ABORTS THE CURRENT DISPLAY SHOW.

II. GAME PLAY AND SCORING

BASEBALL CARD TRADE:

COMPLETING BOTH SPOT TARGETS ACTIVATES THE RIGHT UPKICKER FOR THE CARD TRADE FEATURE. THE POSSIBLE AWARDS ARE:

AWARDS:

- 1 - 2 = FLASH LEFT FIELD 5M.
- 3 - 4 = ADVANCE INNING.
- 5 - 6 = COLLECT JACKPOT.
- 7 - 9 = FLASH LEFT FIELD 50M.
- 10 - 12 = EXTRA BALL. 1 PER PLAYER, AFTER THAT MULTIBALL.
- 13 - 15 = FLASH RIGHT FIELD 100M.
- 16 = DOUBLE ENTIRE SCORE.
- 17 - 19 = COLLECT SUPER JACKPOT.
- 20 - 29 = FLASH LEFT FIELD 500M.
- 30+ = DOUBLE SUPER JACKPOT.

ANY FLASH FEATURE IS DELAYED UNTIL THE ROUND IS OVER IF PLAYER IMMEDIATELY GOES INTO NIGHT GAME, TRADING CARDS, WORLD SERIES OR REGULAR MULTIBALL THROUGH "BEGIN ROUND".

STEAL FEATURE:

WHEN A PLAYER SHOOTS THE SCOOP WHEN LIT FOR "WALK", START "ATTEMPT STEAL" FLASHING OUT. HITTING THE SCOOP WHEN "ATTEMPT STEAL" IS FLASHING OUT FLASHES A RANDOM DROP TARGET. HITTING THIS DROP TARGET BEFORE TIME EXPIRES ADVANCES ALL RUNNERS AND SCORES 20,000,000. IF TIME EXPIRES, THEN THE LEAD RUNNER IS OUT (REMOVED FROM HIS BASE).

BIG HURT FEATURE:

COMPLETING BIG HURT AWARDS DOUBLE JACKPOT.

BULLPEN:

THE BULLPEN AWARD IS CHANGED EVERY TIME A POP BUMPER IS HIT. WHEN THE PLAYER RECEIVES AN AWARD, THAT AWARD IS REMOVED FROM THE TABLE. THE POSSIBLE AWARDS ARE:

- EXTRA BALL, IF ALLOWED.
- 5 CARDS.
- ADD A LETTER TO GRANDSLAM.
- LIGHT DOUBLE.
- HOMERUN.
- MULTIBALL.
- ADVANCE 2 INNINGS.
- ADVANCE INNING.
- COLLECT JACKPOT.
- 3 CARDS.
- 10 CARDS.
- GRANDSLAM.
- ADVANCE INNING.
- ADD LETTER TO BIG HURT.
- LIGHT DOUBLE.
- ADD 2 LETTERS TO GRANDSLAM.

TOGGLE FUNCTION:

MOVE TO NEXT ROUND.

RANDOMLY LIGHT "BIG ORBIT SHOT" OR "BIG HURT SHOT", IF "BIG ORBIT SHOT" IS NOT FLASHING OUT.

IF PLAYER'S SCORE IS GREATER THAN 100,000,000, THEN TOGGLE "PLAYER'S CHOICE".

SHOOT THE GAP FEATURE:

BEGIN THIS FEATURE WHEN A PLAYER SHOOTS THE LEFT RAMP WHEN LIT FOR "SINGLE". THE PLAYER'S OBJECT IS TO PUMP THE RAMPS. THE SHOTS MUST BE CONSECUTIVE. WHEN A PLAYER MISSES, THIS FEATURE IS ENDED. MAKING THE ACTIVE SHOT ADVANCES THE INNING AND ACTIVATES THE SHOT FOR THE OPPOSITE RAMP.

CONSECUTIVE ORBITS:

SHOOTING A "BIG ORBIT SHOT" WHEN LIT STARTS FLASHING OUT THE "BIG ORBIT SHOT" LAMP FOR A TIMED PERIOD. IF THE PLAYER SHOOTS A RIGHT ORBIT SHOT WHEN FLASHING OUT, THEN ADVANCE THE JACKPOT AND RESET THE TIMER TO ITS ORIGINAL VALUE.

INNINGS:

ADVANCING INNINGS INCREASES THE VALUE OF SUPER JACKPOT. SUPER JACKPOT EQUALS INNINGS TIMES 100,000,000. COMPLETING 6 INNINGS AWARDS 7TH INNING STRETCH.

REGULAR MULTIBALL:

THE CENTER RAMP IS RAISED AND THAT SHOT IS ACTIVATED. "ADVANCE JACKPOT" IS ACTIVATED. SHOOTING A HOME RUN AWARDS JACKPOT, DROPS THE CENTER RAMP, DEACTIVATES "ADVANCE JACKPOT", AND ACTIVATES BOTH ORBIT SHOTS. COMPLETING EITHER ORBIT SHOT DEACTIVATES THE ORBIT SHOTS, REACTIVATES THE HOME RUN SHOT AND STARTS A TIMER. IF THE PLAYER MAKES THE HOME RUN SHOT BEFORE TIME EXPIRES, THEN HE COLLECTS DOUBLE JACKPOT. REPEAT THIS SEQUENCE EXCEPT THAT THE THIRD HOME RUN SHOT AWARDS SUPER JACKPOT.

GRANDSLAM DERBY:

SPELLING GRANDSLAM AWARDS GRAND SLAM DERBY, WHICH IS 4 BALL MULTIBALL. EACH HOME RUN SHOT AWARDS A GRAND SLAM AND RELOADS THE BASES. IF A PLAYER HOLDS THE RIGHT FLIPPER IN FOR 5 SECONDS, THEN THE CENTER RAMP IS DROPPED UNTIL HE RELEASES THE FLIPPER.

II. GAME PLAY AND SCORING

7TH INNING STRETCH:

THIS IS 4 BALL MULTIBALL. EACH SCOOP SHOT AND RIGHT ORBIT SHOT ADDS A LETTER TO BIG HURT. COMPLETING BIG HURT AWARDS DOUBLE JACKPOT AND RESETS BIG HURT. DURING THIS ROUND, "ADVANCE JACKPOT" IS ACTIVATED.

ROUNDS:

TWO ROUNDS MAY NOT OCCUR AT THE SAME TIME. THERE ARE 6 MAIN ROUNDS. ONCE THE MAIN 6 ROUNDS HAVE BEEN PLAYED, THEN THE WORLD SERIES ROUND CAN BE ACTIVATED.

GOLDEN GLOVE ROUND:

A SECOND BALL IS SERVED INTO PLAY. HITS ON THE GLOVE SCORE 20,000,000, ADD TO CATCH TOTAL, AND SERVE ANOTHER BALL INTO PLAY. THE ROUND ENDS WHEN THE GAME IS BACK TO ONE BALL IN PLAY. THE CENTER RAMP IS NEVER RAISED DURING THIS ROUND.

HOME RUN DERBY ROUND:

A SECOND BALL IS SERVED INTO PLAY AND THE CENTER RAMP IS RAISED. SHOOTING THE HOME RUN SHOT AWARDS A HOME RUN AND SERVES ANOTHER BALL INTO PLAY. IF A PLAYER HOLDS THE RIGHT FLIPPER IN FOR 5 SECONDS, THEN THE CENTER RAMP IS DROPPED UNTIL HE RELEASES THE FLIPPER.

#35 ALL-STARS ROUND:

THIS IS A TIMED ROUND WHERE THE PLAYER TRIES TO MAKE NINE RAMP OR UPKICKER SHOTS. EACH SUCCESSFUL SHOT ADDS ONE PLAYER TO THE LINEUP, SCORES 10,000,000 TIMES THE NUMBER OF PLAYERS IN THE LINEUP, AND ADDS 2 TIME UNITS. ADDING NINE PLAYERS TO THE LINEUP ENDS THE ROUND.

NIGHT GAME ROUND:

A SECOND BALL IS SERVED INTO PLAY. TWO SHOTS ARE ACTIVATED. EVERY 5 SECONDS, AN ACTIVE SHOT IS CHANGED. SHOOTING AN ACTIVE STROBING SHOT ADVANCES THE INNING, SCORES 3,000,000, AND SERVES

ANOTHER BALL INTO PLAY. HITTING ONE OF THE STROBED SHOTS WHEN IT IS NOT STROBING SCORES 3,000,000. IF A PLAYER HAS COMPLETED AT LEAST 6 INNINGS, THEN 7TH INNING STRETCH IS STARTED AFTER THIS ROUND ENDS.

STEAL HOME ROUND:

THIS IS A TIMED ROUND WHERE THE PLAYER TRIES TO STEAL BASES. SET A BASE RUNNER ON FIRST BASE. SHOOTING THE STROBING SCOOP ACTIVATES THE CENTER DROP TARGET AND ADDS 5 TIME UNITS. HITTING THE CENTER DROP TARGET ADVANCES THE RUNNER, ADDS TO THE STEALS TOTAL AND ADDS 1 CARD. AN EXTRA BALL OR 40,000,000 IS AWARDED FOR STEALING HOME. STEALING SECOND BASE SCORES 20,000,000 AND STEALING THIRD BASE SCORES 30,000,000.

TRADING CARDS ROUND:

A SECOND BALL IS SERVED INTO PLAY AND BOTH ORBIT SHOTS ARE ACTIVATED. SHOOTING EITHER ORBIT SHOT SERVES ANOTHER BALL INTO PLAY, ADDS ONE CARD, AND SCORES 10,000,000.

WORLD SERIES ROUND:

THIS IS A TIMED ROUND. BOTH ORBIT SHOTS AND BOTH RAMP SHOTS ARE ACTIVATED. COMPLETING AN ACTIVE STROBING SHOT SCORES 30,000,000, DEACTIVATES THE CORRESPONDING SHOT, AND RESETS THE TIME TO 20 TIME UNITS. COMPLETING ALL 4 SHOTS RESETS THE TIMER TO 20 TIME UNITS AND RAISES THE CENTER RAMP. SHOOTING THE HOME RUN SHOT BEFORE TIME EXPIRES AWARDS SUPER JACKPOT AND ENDS THE ROUND. THE ROUND LAMPS ARE REST WHEN THIS ROUND ENDS.

BEGINNING OF GAME:

EACH PLAYER STARTS WITH THE JACKPOT SET TO 20,000,000, THE SUPER JACKPOT SET TO 100,000,000, THE INNINGS SET TO 1, AND THE CATCHES SET TO 1.

THE PLAYER IS SPOTTED "GRAN" IN GRAND SLAM IF THE GAME IS SET TO 3 BALLS OR LESS.

II. GAME PLAY AND SCORING

BEGINNING OF BALL:

IF THE PLAYER ATTEMPTS TO DEFEAT AN AUTOMATIC MULTIBALL BALL SERVE BY PRESSING THE MANUAL PLUNGER IN WHILE THE GAME TRIES TO SERVE A MULTIBALL INTO PLAY, THEN ALL SWITCHES ARE DISABLED UNTIL THAT BALL IS SHOT INTO PLAY.

LAST BALL IN PLAY ONLY:

THE RIGHT OUTLANE SPECIAL IS ACTIVATED FOR A TIMED PERIOD IF THE PLAYER'S

SCORE IS LESS THAN 30,000,000 POINTS. IF A PLAYER ENTERS MULTIBALL WHILE THIS IS ACTIVATED, THEN THE SPECIAL IS DEACTIVATED.

IF A PLAYER'S SCORE IS LESS THAN 50,000,000, THEN A HURRY-UP EXTRA BALL IS ACTIVATED FOR A TIMED PERIOD.

IF A PLAYER'S SCORE IS LESS THAN 100,000,000 AND IT IS A SINGLE PLAYER GAME, THEN THE RIGHT ORBIT SHOT "100 MILLION" IS ACTIVATED FOR A TIMED PERIOD.

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NOTES

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III. TEST MODE

There are several functions accessible to the operator while in the test mode. These functions are Self-Test, Bookkeeping, Game Adjustments, and Utilities. Each of these functions will be explained in detail later in this section. To enter the test mode, the game must be in the attract mode (game over). Then depress the Test button located just inside the front door of the game. The operator will then be given a choice as to which function he wants to access. Use the left flipper button to choose (highlight) the function desired and then either the Test button or the right flipper button to enter the chosen function.

NOTE: The Test button may be held in to fast forward through the steps of a particular function.

To exit the test mode or change functions the Slam switch (front door) must be activated or the power must be turned off.

I. SELF-TEST

This function will allow the operator to test all the hardware related devices in the game. Each test is described below. In most cases the Credit button can be used to restart each test (see Testmode Flowchart).

A. MEMORY TEST

This function tests all memory devices on the Control Board (A1). If all the devices pass the test an "OK" will be displayed. If a failure occurs, a description of the faulty component will be displayed. Then after a short period of time the Game Prom check sum will be displayed.

B. LAMP CHECK

This function will flash all the controlled lamps and flasher lamps continuously. This will allow the operator to easily check for and replace any burned out light bulbs.

C. LAMP MATRIX TEST

This test will allow an operator to single step through and check the operation of each lamp in the game. The left flipper button will

decrement the active lamp number by one while the right flipper button will increment the active lamp number by one. The strobe number and the return number are combined to form the lamp number (strobe,return) which is shown in the display along with a description of the lamp. Only one lamp at a time should flash during this test.

D. RELAY AND SOLENOID TEST

This test will allow an operator to single step through and check the operation of each relay and solenoid driver in the game. The left and right flipper buttons are used to change the active driver number. The selected driver description and number will appear in the display. The Credit button is then used to activate the driver for a short time period. Solenoid #31 ("Q" relay) is always on during this test so as to provide power to devices such as the pop bumpers and kicking rubbers (see Playboard Schematic Diagram).

E. SWITCH MATRIX TEST

The first part of this test will report any switch(s) which have not been operated in the course of the last 15 games (INOPERATIVE SWITCHES). The second part of the test will report any switch(s) which are stuck closed. If no switches are closed when this test is started, the message "ALL SWITCHES OPEN" will be displayed. If any switches are closed, the closed switch(s) name and number will continuously be displayed. The strobe number and the return number are combined to form the switch number (strobe,return). The Credit button can be used to restart this test.

F. SWITCH EDGES TEST

This test will display the name and number of any switch that is actuated. When actuating each switch, a problem exists if either no switch is shown or any switch other than the one actuated is displayed.

G. DISPLAY TEST

This test checks the operation of the 128 x 32 dot matrix display. The right flipper button is used to advance this

III. TEST MODE

test. The first two steps check the different levels of display intensity. Each block that appears on the display should be of lesser intensity than the one to the left of it. During the next four steps a diagonal pattern is stepped from left to right in the display. While in this part of the test every fourth pixel only in each row of dots should be lit. During the next eight steps another diagonal pattern is stepped from left to right in the display. While in this part of the test every eighth pixel only in each row of dots should be lit.

H. SOUND TEST

This test checks the interface lines from the Control Board (A1) to the Sound Board (A6). Every time the right flipper button is pressed, a different tone should be heard. During each tone, the sound line connection which is being tested will be shown in the display. After the tone stops the sound line which is being tested will still be kept at a low level ($<.8v$) until the right flipper button is pressed again or the Credit button is used to restart the test.

J. FRONT DOOR TEST

This test checks the operation of the coin chutes used in the game. Utilizing this function will not affect any bookkeeping values. Each coin chute closure is categorized and shown in the display.

K. AUXILIARY DRIVER TEST

This test will allow the operator to single step through and check the operation of each driver transistor on the Auxiliary Driver Board (A11). The left and right flipper buttons are used to change the active driver number. The selected driver description and number will appear in the lower display. The Credit button is then used to activate the driver for a short time period.

II. BOOKKEEPING

The Test button is used to step through bookkeeping. The display will contain a description of each step,

the step number, and two different bookkeeping values. The value in the leftmost column represents long term bookkeeping. The value in the rightmost column (in brackets) represents short term bookkeeping. These two values are provided so that the operator may compare recent performance with long term performance and then make any necessary game adjustments.

NOTE: The left column of steps 1 (earnings) and 17-20 (coin chute counts) will not be displayed unless the credit button is pressed during that active step number.

The left flipper button will allow the operator to reset all of the left (long term) and right (short term) bookkeeping values. The right flipper button will allow the operator to reset all of the right (short term) bookkeeping values only. If the R.BOOK AUTO-RESET adjustment is on, the right (short term) bookkeeping will automatically be reset after every 2000 plays (see Game Adjustments). Therefore, the operator does not need to reset the short term bookkeeping himself unless he prefers to follow his own procedure. Also, this feature will aid in adjusting the game payout percentage to the caliber of players in different locations. If there happens to be a major error in a long term bookkeeping value the word ERROR will appear to the right of that bookkeeping value. To correct this error the long term bookkeeping must be reset. A description of each bookkeeping step is given in the test mode flowchart.

III. GAME ADJUSTMENTS

This function allows the operator to make any adjustments to his game as necessary.

A. FACTORY SETTINGS

Upon entering the game adjustment section of bookkeeping, the operator is given a choice to load all factory settings or to single step through the game adjustments and adjust each section individually. If he chooses

III. TEST MODE

to enter the factory settings by depressing the Credit button, he will also be given a choice of what language to load. By using the right flipper button he may choose the appropriate language and then depress the Credit button again to enter the settings. After the settings are loaded the display should show the message "FACTORY SETTINGS LOADED" for a short time and then proceed to game adjustment step 1. At any time during the previous steps the operator may either exit the test mode or depress the Test button to proceed immediately to game adjustment step 1.

WARNING

Loading the factory settings will affect all previous game adjustment settings. Therefore be careful when selecting this feature.

B. GAME ADJUSTMENT STEPS

Each time the Test button is pressed a description of the next step appears in the display along with the step number and the current status of that step. Unless otherwise specified, the left and right flipper buttons are used to change the possible selections in each step.

- 1) SCORE REPLAY LEVEL 1
- 2) SCORE REPLAY LEVEL 2
- 3) SCORE REPLAY LEVEL 3

Each Score Replay Level may be set by using the left flipper button to decrement the score and the right flipper button to increment the score. The Credit button can be used to load the factory setting for each individual level if desired. If the Auto-Percentaging adjustment is on, Replay Levels 2 & 3 can only be set to on or off. If Replay Level 2 is on, the score level will be set to two times Replay Level 1. If Replay Level 3 is on, the score level will be set to three times Replay Level 1. This allows the operator several combinations of levels in the Auto-Percentaging mode (i.e. 1, 1 & 2, 1 & 3, or 1 & 2 & 3).

- 4) HIGH GAME TO DATE 1
- 5) HIGH GAME TO DATE 2
- 6) HIGH GAME TO DATE 3

7) HIGH GAME TO DATE 4

8) HIGH GAME TO DATE 5

Each High Game To Date may be set by using the left flipper button to decrement the score and the right flipper button to increment the score. The Credit button can be used to load the factory setting for the displayed level and all those below it.

9) GAME PRICING

This step provides a choice of loading a standard setting for a particular country or a custom setting. When a standard setting is selected, the following steps (10-17) are skipped.

- 10) CHUTE 1 UNITS (L)
- 11) CHUTE 2 UNITS (R)
- 12) CHUTE 3 UNITS (C)
- 13) CHUTE 4 UNITS
- 14) UNITS REQUIRED FOR CREDIT
- 15) UNITS REQUIRED FOR BONUS
- 16) BONUS CREDITS
- 17) MINIMUM UNITS REQUIRED FOR CREDIT

Steps 10-17 are used if a custom setting is selected in step 9 (GAME PRICING). Steps 10-13 select the number of units that each chute is worth when a coin is dropped into that particular chute. The value entered for step 14 determines how many units must be accumulated for a credit to be issued on the game. Steps 15 and 16 determine how many units must be accumulated for any bonus credits to be issued. A value of zero entered for step 15 will disable the bonus feature. Step 17 indicates the number of units required before any credits are issued (see Coin Chute Setting Table for examples).

18) COIN METER

If set to ON, the pulses to be given for each of the four coin chutes can be defined so that the number of pulses for a given chute are in relation to the currency denomination. If set to OFF, steps 19-22 will be skipped.

- 19) CHUTE 1 PULSES
- 20) CHUTE 2 PULSES
- 21) CHUTE 3 PULSES
- 22) CHUTE 4 PULSES

The four steps above are used to set

III. TEST MODE

COIN CHUTE SETTING TABLE

COIN CHUTE SETTING TABLE														
Country		Coin Chutes				Plays/Coin(s)	Chute Adjustment Steps							
		Left 1	Right 2	Center 3	4		10	11	12	13	14	15	16	17
USA		.25	.25	\$1		1/.50, 2/\$1	01	01	04	00	02	00	00	00
USA (Custom)						1/.50, 5/\$2	01	01	04	00	02	08	01	00
						1/.50, 2/.75, 3/\$1	03	03	12	00	04	00	00	00
						1/.50, 3/\$1	01	01	04	00	02	04	01	00
						1/.25, 4/\$1	01	01	04	00	01	00	00	00
Australia	1	.20	\$1	\$2	-	1/3x.20, 2/\$1, 5/\$2	02	10	20	00	05	20	01	00
	2	.20	\$1	\$2	-	1/5x.20, 1/\$1, 3/\$2	01	05	10	00	05	10	01	00
	3	.20	\$1	\$2	-	1/5x.20, 1/\$1, 2/\$2	01	05	10	00	05	00	00	00
Belgium		5Fr	20Fr	50Fr	-	1/20Fr, 2/40Fr, 3/50Fr	01	04	10	00	04	10	01	00
Canada		.25	\$1	-	-	1/.50, 2/\$1	01	04	00	00	02	00	00	00
Denmark		1Kr	10Kr	-	-	1/3x1Kr, 4/10 Kroner	01	10	00	00	03	10	01	00
Finland		5Mka	1Mka	-	-	1/3x1 Markka, 2/5 Markkaa	10	02	00	00	05	00	00	00
France	1	1Fr	5Fr	10Fr	20Fr	1/3x1Fr, 2/5Fr, 5/10Fr	02	10	20	40	05	20	01	00
	2	1Fr	5Fr	10Fr	20Fr	2/5Fr, 4/10Fr, 9/20Fr	02	10	20	40	05	40	01	10
	3	1Fr	5Fr	10Fr	20Fr	1/5Fr, 3/10Fr, 7/20Fr	03	15	30	60	10	60	01	15
Germany	1	5DM	2DM	1DM	Token	1/1DM, 2/2DM, 6/5 D-Mark	05	02	01	10	01	05	01	00
	2	5DM	2DM	1DM	Token	1/2DM,2/3DM,3/4DM,5/5DM	20	08	04	40	05	20	01	00
	3	5DM	2DM	1DM	Token	1/2DM, 3/5DM	05	02	01	10	02	05	01	00
Greece		50D	50D	-	-	1/100 Drachma	01	01	00	00	02	00	00	00
Hungary		20F	20F	-	-	1/20 Forint	01	01	00	00	01	00	00	00
Italy		500L	500L	-	-	1/2x500L,2/3x500L,3/4x500L	03	03	00	00	04	00	00	00
Japan		100Y	100Y	-	-	1/100 Yen, 3/2x100 Yen	01	01	00	00	01	02	01	00
Mexico		10NP	5NP	2NP	1NP	1/1 Nuevo Peso	10	05	02	01	01	00	00	00
New Zealand		\$1	\$2	-	-	1/\$1, 3/\$2	01	02	00	00	01	02	01	00
Norway	1	5Kr	10Kr	20Kr	-	1/5Kr, 2/10Kr, 4/20Kr	01	02	04	00	01	00	00	00
	2	5Kr	10Kr	20Kr	-	1/10Kr, 3/20 Kroner	01	02	04	00	02	04	01	00
Singapore	1	-	.50	Token	-	1/.50 or 1/Token	00	01	01	00	01	00	00	00
	2	.20	-	-	-	1/2x.20	01	00	00	00	02	00	00	00
Spain		500P	100P	-	-	1/100P, 6/500 Pesetas	05	01	00	00	01	05	01	00
Sweden	1	10Kr	5Kr	-	1Kr	1/10Kr, 2/15Kr, 3/20Kr	32	16	00	02	20	00	00	00
	2	10Kr	5Kr	-	1Kr	1/5x1Kr, 1/5Kr, 2/10Kr	10	05	00	01	05	00	00	00
Switzerland		1Fr	5Fr	2Fr	-	1/1Fr, 3/2Fr, 7/5 Francs	01	07	03	00	01	00	00	00
United Kingdom	1	1£	50P	20P	10P	1/3x10P, 2/50P, 4/1 Pound								
	2	1£	50P	20P	10P	1/50P, 3/1 Pound								
Universal		-	-	-	-	1/1 Coin	01	01	00	00	01	00	00	00

III. TEST MODE

the number of pulses to be issued for each of the four coin chutes.

23) COIN DOOR TYPE

This step provides a choice of loading a standard setting for a particular country or a custom setting. When a standard setting is selected, the following steps (24-28) are skipped.

24) COLLECTION TEXT

25) CHUTE 1 VALUE

26) CHUTE 2 VALUE

27) CHUTE 3 VALUE

28) CHUTE 4 VALUE

Step 24 is used to enter the name of the currency in use. The remaining four steps are used to set the monetary value of each coin chute.

29) GAME BUY-IN BONUS

At the end of a game, if enabled, a 10-second timer is initialized allowing each player that participated in the previous game a chance to purchase 1 credit for either 1 or 2 coins.

30) EXTENDED PLAY

At the end of a player's last ball in play, if enabled, a 10-second timer is initialized allowing the player to continue playing his current game by inserting either 1 or 2 coins for one extra ball.

31) EXTENDED PLAY MAXIMUM

This step sets the maximum number of extra balls a player may purchase in any one game when the EXTENDED PLAY feature is enabled. In a multiple player game, each player can only purchase one ball so this step will have no effect.

32) EXTENDED PLAY CHUTE(S)

This step sets which coin chute(s) will be enabled toward purchasing a game if step 29 is enabled and/or an extra ball if step 30 is enabled. A coin dropped in any other chute will be used toward purchasing a new game.

33) GAME PERCENT PAYOUT

This step is used to set the game payout percentage used when the Auto-Percentaging adjustment is on. The value entered for this step is compared to the value calculated by

dividing total replays by total plays (see Bookkeeping section). Total replays include all replays won from beating the score replay level, achieving a new high game to date, winning a playfield special, and all match replays.

When the GAME MODE adjustment is set to Add a Ball this setting refers to extra ball percentage rather than replay percentage. The value entered in this case will be compared to the value calculated by dividing total extra balls won by total plays (see Bookkeeping section).

34) MATCH PERCENT PAYOUT

This step is used to set the match payout percentage. If this step is set to zero, the match will be disabled.

NOTE: The MATCH PERCENT PAYOUT value is included in the value entered for GAME PERCENT PAYOUT (step #33). Therefore in order to retain the same payout percentage for the other payout features in the game such as score level replays, the GAME PERCENT PAYOUT will be automatically adjusted by the same amount as this step when changed.

35) HIGH GAME REPLAYS

This step is used to set the number of replays to award when the highest game to date has been beaten.

36) MAXIMUM CREDITS

This step sets the maximum number of credits allowed on the game.

37) TILT WARNINGS

This step sets the number of tilts allowed before the current player's ball in play is terminated.

38) BALLS PER GAME

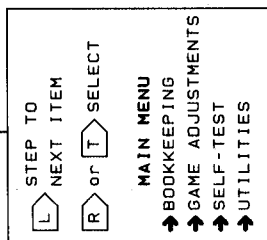
This step sets the number of balls per game to 1-5.

39) GAME MODE

This step allows the game to be played in Replay, Replay + Tickets, Tickets Only, Add a Ball, or Novelty mode. In Replay mode all Specials and replays are allowed. Replay + Tickets mode is the same as Replay mode with the addition of one or more tickets to be issued (TICKETS TO AWARD) along

NOTE:
THE TEST MODE CAN ONLY BE ACCESSED DURING THE ATTRACT MODE (GAME OVER).
THE TEST MODE MAY BE EXITED BY EITHER ACTUATING THE SLAM SWITCH ON THE FRONT DOOR OR TURNING THE POWER OFF.

TEST MODE

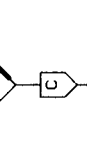
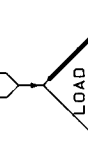
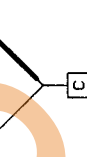
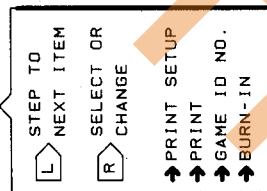
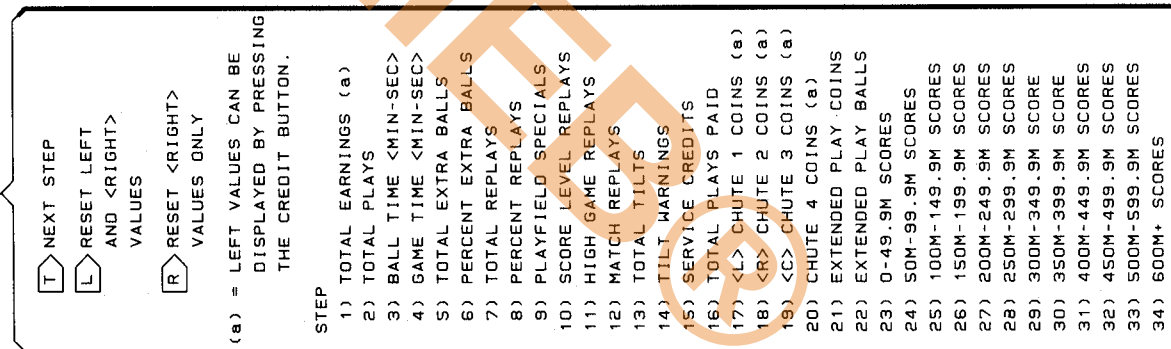
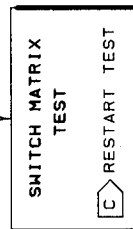
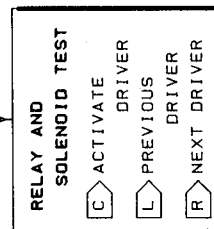
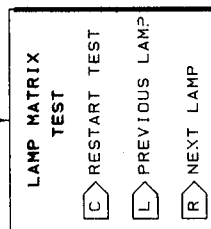
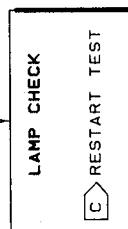
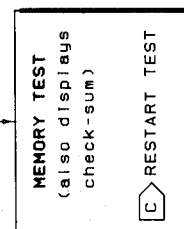


GAME ADJUSTMENTS

UTILITIES

BOOKKEEPING

SELF-TEST



T NEXT STEP

L CHANGE ADJUSTMENT

R CHANGE ADJUSTMENT

C SET TO FACTORY DEFAULT
(Applies only to steps below that are followed by an asterisk *)

STEP

- 1) FIRST REPLAY LEVEL *
- 2) SECOND REPLAY LEVEL *
- 3) THIRD REPLAY LEVEL *
- 4) HIGHEST GAME TO DATE *
- 5) HIGH GAME TO DATE 2 *
- 6) HIGH GAME TO DATE 3 *
- 7) HIGH GAME TO DATE 4 *
- 8) HIGH GAME TO DATE 5 *
- 9) GAME PRICING

Steps 10-17 are skipped if GAME PRICING is not set to CUSTOM.

- 10) <L> CHUTE 1 UNITS
- 11) <R> CHUTE 2 UNITS
- 12) <C> CHUTE 3 UNITS
- 13) CHUTE 4 UNITS
- 14) UNITS/BONUS CREDIT
- 15) UNITS/BONUS CREDIT
- 16) BONUS CREDITS
- 17) MINIMUM UNITS
- 18) COIN METER

Steps 19-22 are skipped if COIN METER is off.

- 19) CHUTE 1 PULSES
- 20) CHUTE 2 PULSES
- 21) CHUTE 3 PULSES
- 22) CHUTE 4 PULSES
- 23) COIN DOOR TYPE

LEGEND

T PRESS TEST BUTTON

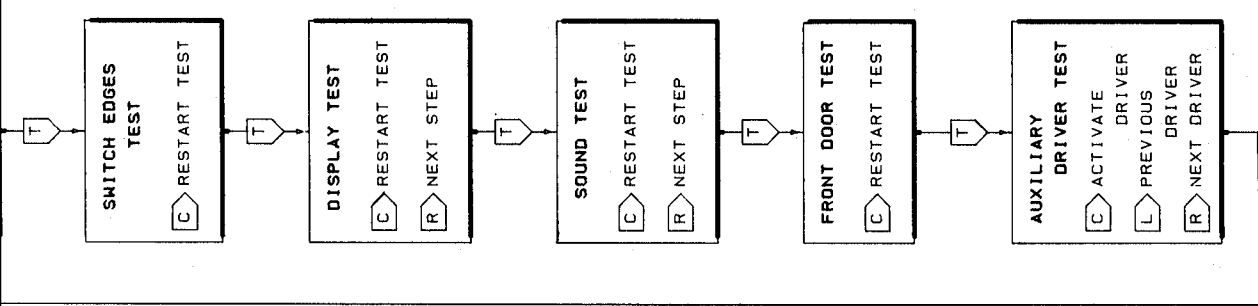
C PRESS CREDIT BUTTON

T PRESS LEFT FLIPPER BUTTON

- If COIN DOOR TYPE is not set to CUSTOM.
- 24) COLLECTION TEXT
 - 25) CHUTE 1 VALUE
 - 26) CHUTE 2 VALUE
 - 27) CHUTE 3 VALUE
 - 28) CHUTE 4 VALUE
 - 29) GAME BUY-IN BONUS
 - 30) EXTENDED PLAY
 - 31) EXTENDED PLAY MAXIMUM
 - 32) EXTENDED PLAY CHUTE(S)
 - 33) GAME PERCENT PAYOUT
 - 34) MATCH PERCENT PAYOUT
 - 35) HIGH GAME REPLAYS
 - 36) MAXIMUM CREDITS
 - 37) TILT WARNINGS
 - 38) BALLS PER GAME
 - 39) GAME MODE
 - 40) TICKETS TO AWARD
 - 41) LANGUAGE
 - 42) AUTO PERCENTAGING
 - 43) REPLAY LIMIT
 - 44) HIGH GAMES 2-S
 - 45) ATTRACT SOUND
 - 46) ATTRACT MESSAGE 1
- Use the credit button to enter a message.
- 47) ATTRACT MESSAGE 2
 - 48) RIGHT BOOK AUTO-RESET
 - 49) PLAYFIELD SPECIAL
 - 50) REPLAY LEVEL BOOST
 - 51) GAME RESTART
 - 52) GAME INACTIVITY TIMER
 - 53) HIGH GAMES RESET
 - 54) PRINT BOOK RESET
 - 55) GAME DIFFICULTY
 - 56) ROUND TIMING
 - 57) OUTLANE SPECIAL TIME
 - 58) 100,000,000 TIME
 - 59) BIG ORBIT SHOT TIME
 - 60) HURRY-UP EB TIME
 - 61) HOME RUN TIME
 - 62) GRAND SLAM TIME
 - 63) LEFT ORBIT SHOT TIME
 - 64) ATTEMPT STEAL TIME
 - 65) DOUBLE TIME
 - 66) BULLPEN EB %
 - 67) AUTO-SKILL
 - 68) HIGH CATCHES
 - 69) HIGH STEALS
 - 70) HIGH HOME RUNS
 - 71) HIGH GRAND SLAMS
 - 72) HIGH CATCHES SPECIAL
 - 73) HIGH STEALS SPECIAL
 - 74) HIGH HOME RUNS SPEC
 - 75) HIGH GRAND SLAMS SPEC
 - 76) ADD-A-MULTIBALL
 - 77) REDUCED SCORING
 - 78) BALL TIME SAFETY
 - 79) MINIMUM GAME TIME

R PRESS RIGHT FLIPPER BUTTON

- 36) HIGHEST GAME TO DATE
- 37) 1-15 SEC. BALL TIME
- 38) 16-30 SEC. BALL TIME
- 39) 31-45 SEC. BALL TIME
- 40) 46-60 SEC. BALL TIME
- 41) 61 SEC.+ BALL TIME
- 42) % L OUTLANE DRAINS
- 43) % R OUTLANE DRAINS
- 44) GOLDEN GLOVE ROUNDS
- 45) HOME RUN DERBY ROUNDS
- 46) STEAL HOME ROUNDS
- 47) *3S ALL-STARS ROUNDS
- 48) ADD PLAYER TO LINEUP
- 49) TRADING CARD ROUNDS
- 50) ORBIT SHOTS
- 51) NIGHT GAME ROUNDS
- 52) WORLD SERIES ROUNDS
- 53) MULTIBALL
- 54) GRAND SLAM DERBY
- 55) 7TH INNING STRETCH
- 56) BIG HURT COMPLETED
- 57) HIGH GRAND SLAMS SPEC
- 58) HIGH HOME RUNS SPEC
- 59) HIGH CATCHES SPECIALS
- 60) HIGH STEALS SPECIALS
- 61) OUTLANE SPECIALS
- 62) HURRY-UP EXTRA BALLS
- 63) CARD TRADE EXTRA BALL
- 64) STEAL HOME EXTRA BALL
- 65) BULLPEN EXTRA BALLS
- 66) MIN TIME EXTRA BALLS
- 67) SKILL SHOT
- 68) GRAND SLAMS
- 69) HOME RUNS
- 70) CATCHES
- 71) STEALS
- 72) GLOVE SINGLES
- 73) ADVANCE JACKPOTS
- 74) JACKPOTS WON
- 75) DOUBLE JACKPOTS WON
- 76) SUPER JACKPOTS WON
- 77) TOTAL INNINGS
- 78) LEFT ORBIT SHOT AWARD
- 79) BIG ORBIT SHOT AWARD
- 80) CARD TRADES OFFERED
- 81) PLAYER CHOICE OFFERED
- 82) BULLPEN AWARDS
- 83) SHOOT THE GAP AWARDS
- 84) BALL SEARCH COUNT
- 85) MISSING BALL COUNT



III. TEST MODE

with each replay. In Tickets Only mode one or more tickets will be issued in place of each replay won. In Add a Ball mode all Score Level Replays and Playfield Specials award an extra ball in place of a replay. Also the Match and High Game To Date awards are disabled. However, after the Add a Ball mode is selected, the PLAYFIELD SPECIAL, MATCH PERCENT PAYOUT, and HIGH GAME REPLAYS adjustments may be individually set to whatever setting may be desired. In Novelty mode all Specials award 200,000,000 points, Extra Balls award 100,000,000 points and the Score Replay Levels, Match, and High Game to Date awards are disabled.

NOTE: If either the Replay + Tickets or Tickets Only setting is selected do not set the COIN METER setting to on.

40) TICKETS TO AWARD

This step allows the operator to set the number of tickets to award when a replay has been won. This setting will only apply when the GAME MODE is set to either Replay + Tickets, or Tickets Only.

41) LANGUAGE

This step allows the Test Mode steps to be displayed in English, German, or French.

42) AUTO-PERCENTAGING

If this step is set to on, the Score Replay Levels will be adjusted periodically so that the Game Percent Payout setting will match the actual Replay Percentage displayed in Bookkeeping.

NOTE: If the GAME MODE is set to Add a Ball, the Extra Ball Percentage in bookkeeping is used in place of the Replay Percentage.

43) REPLAY LIMIT

This step may be set to no limit or one per player per game.

44) HIGH GAMES 2-5

This step will determine if High Games to Date (2-5) will be saved or erased when power is turned off.

45) ATTRACT SOUND

This step determines whether or not sounds are enabled during the attract mode (game over).

46) ATTRACT MESSAGE 1

This step is used to enter, enable, or disable an operator message. The message is permanently stored in memory and will be periodically displayed during the attract mode (game over). To enter a message press the Credit button. The current message will be displayed and the cursor position will be indicated by the flashing character. If the current position is blank, a flashing directional arrow will appear. This type of arrow will indicate which direction the cursor will move if the Credit button is pressed. The characters are chosen using the left and right flipper buttons and then entered into memory by pressing the Credit button.

47) ATTRACT MESSAGE 2

This step is used to enter, enable, or disable a second operator message. See step 43 above for details. When both messages are enabled they will be displayed consecutively.

48) RIGHT BOOKKEEPING AUTO-RESET

If this step is set to on, all the short term bookkeeping steps (in brackets) will reset after 2000 plays. Otherwise they will not reset until 10,000 games have been played on the machine.

49) PLAYFIELD SPECIAL

When a playfield special is won, either a replay or an extra ball is awarded to the player based on the setting of this step.

50) REPLAY LEVEL BOOST

This step may be set anywhere from 0 to 990,000,000 in increments of 10,000,000. If set to zero, the boost is disabled. Otherwise the Replay Level will be increased by the boost value after completing a game where a player has won a replay and his skill level has been determined to be above average. The Replay Level will return back to its base level once all of the replays won have been played.

III. TEST MODE

51) GAME RESTART

This step is used to enable or disable the credit button from starting a new game while currently in a game. If set to ON, a new game will begin when the credit button is pressed if there are any remaining credits. If set to OFF, a new game cannot be started until the current game has ended.

52) GAME INACTIVITY TIMER

This timer can be used to cause a game to go to game over automatically if there is no activity on the playfield for a specified time period. This period can be set from one to nine minutes. Setting this step to zero disables the timer.

53) HIGH GAMES RESET

All the high games to date will reset back to their factory settings automatically when the set number of plays is reached. This step can be set from 100 to 9900 plays. If set to 0 (disabled), the high games can only be reset by hand.

54) PRINT BOOK RESET

If this step is set to on, all the short term bookkeeping steps (in brackets) will reset automatically after any printout of bookkeeping data has finished.

OPERATOR ADJUSTMENT SETTINGS

(*** = ENGLISH & GERMAN FACTORY DEFAULT SETTING)

(** = FRENCH FACTORY DEFAULT SETTING)

55) GAME DIFFICULTY

THE ADJUSTMENTS LISTED IN THE TABLE BELOW ARE AUTOMATICALLY SET AS INDICATED IN THE TABLE UNLESS FINE-TUNE IS SELECTED USING THE RIGHT FLIPPER BUTTON. IF FINE-TUNE IS SELECTED, EACH STEP IN THE TABLE CAN BE ADJUSTED INDIVIDUALLY. OTHERWISE, THESE STEPS ARE SKIPPED. WHEN FINE-TUNE IS SELECTED, ALL SETTINGS REVERT BACK TO THE FACTORY DEFAULT SETTINGS AS SHOWN IN THE TABLE BELOW.

STEP	GAME DIFFICULTY	VERY EASY	EASY	MEDIUM	HARD	VERY HARD
55	---	---	---	---	---	---
56	ROUND TIMING	VERY EASY	EASY	MEDIUM	HARD	VERY HARD
57	OUTLANE SPECIAL TIME	EASY	EASY	MEDIUM	MEDIUM	HARD
58	100,000,000 TIME	EASY	EASY	MEDIUM	MEDIUM	HARD
59	BIG ORBIT SHOT TIME	EASY	EASY	MEDIUM	MEDIUM	HARD
60	HURRY-UP EB TIME	EASY	EASY	MEDIUM	MEDIUM	HARD
61	HOME RUN TIME	EASY	EASY	MEDIUM	MEDIUM	HARD
62	GRAND SLAM TIME	EASY	EASY	MEDIUM	MEDIUM	HARD
63	LEFT ORBIT SHOT TIME	EASY	EASY	MEDIUM	MEDIUM	HARD
64	ATTEMPT STEAL TIME	EASY	EASY	MEDIUM	MEDIUM	HARD
65	DOUBLE TIME	EASY	EASY	MEDIUM	MEDIUM	HARD
66	BULLPEN EB %	VERY EASY	EASY	MEDIUM	HARD	VERY HARD

56) ROUND TIMING

Controls how fast a round times out.

VERY EASY = Slowest

EASY = Slow

*** MEDIUM = Average

** HARD = Faster

VERY HARD = Fastest

57) OUTLANE SPECIAL TIME

Determines how much time the player gets for the right outlane special feature.

EASY = 30 time units.

*** MEDIUM = 20 time units.

** HARD = 10 time units.

58) 100,000,000 time

Determines how much time the player gets for the 100,000,000 feature.

EASY = 40 time units.

*** MEDIUM = 30 time units.

HARD = 20 time units.

59) BIG ORBIT SHOT TIME

Determines how much time the player gets for the big orbit shot feature.

EASY = 7 time units.

*** MEDIUM = 5 time units.

HARD = 4 time units.

60) HURRY-UP EB TIME

Determines how much time the player gets for the hurry-up extra ball feature.

EASY = 20 time units.

*** MEDIUM = 15 time units.

** HARD = 10 time units.

61) HOME RUN TIME

Determines how much time the player gets for the raised ramp when shooting for home run.

EASY = 15 time units.

*** MEDIUM = 10 time units.

HARD = 7 time units.

62) GRAND SLAM TIME

Determines how much time the player gets for the raised ramp when shooting for grand slam.

EASY = 10 time units.

*** MEDIUM = 7 time units.

HARD = 4 time units.

63) LEFT ORBIT SHOT TIME

Determines how much time the player gets for the left orbit shot feature.

EASY = 6 time units.

*** MEDIUM = 4 time units.

HARD = 3 time units.

III. TEST MODE

64) ATTEMPT STEAL TIME

Determines how much time the player gets for the attempt steal feature.

EASY = 15 time units.

*** MEDIUM = 10 time units.

HARD = 5 time units.

65) DOUBLE TIME

Determines how much time the player gets for the double home run/grand slam feature.

EASY = 15 time units.

*** MEDIUM = 10 time units.

HARD = 5 time units.

66) BULLPEN EB %

Determines the percentage of extra balls below which the bullpen extra ball option is enabled.

VERY EASY = 50%.

EASY = 40%.

*** MEDIUM = 30%.

** HARD = 20%.

VERY HARD = 10%.

67) AUTO-SKILL

Various game features become more difficult as the game recognizes a player's increased skill level.

OFF = Disabled

*** ON = Enabled

68) HIGH CATCHES

Sets the current high catches to date value (1-99). The factory default value can be reloaded by pressing the credit button while on this step.

69) HIGH STEALS

Sets the current high steals to date value (1-99). The factory default value can be reloaded by pressing the credit button while on this step.

70) HIGH HOME RUNS

Sets the current high home runs to date value (1-99). The factory default value can be reloaded by pressing the credit button while on this step.

71) HIGH GRAND SLAMS

Sets the current high grand slams to date value (1-99). The factory default value can be reloaded by pressing the credit button while on this step.

72) HIGH CATCHES SPECIAL

Award a special when High Catches to Date has been beaten?

OFF = No

*** ON = Yes

73) HIGH STEALS SPECIAL

Award a special when High Steals to Date has been beaten?

OFF = No

*** ON = Yes

74) HIGH HOME RUNS SPECIAL

Award a special when High Home Runs to Date has been beaten?

OFF = No

*** ON = Yes

75) HIGH GRAND SLAMS SPECIAL

Award a special when High Grand Slams to Date has been beaten?

OFF = No

*** ON = Yes

76) ADD-A-MULTIBALL

Determines how many additional balls can be put into play during multiball.

EASY = 2 balls.

*** MEDIUM = 1 ball.

HARD = 0 balls.

77) REDUCED SCORING

Controls whether the game scores using regular or reduced score values.

*** OFF = Regular scoring.

ON = Reduced scoring.

In reduced scoring,

Golden Glove round glove hits score 10M instead of 20M.

Jackpot increments are 5M instead of 10M.

Double Jackpot increments are 10M instead of 20M.

Super Jackpot increments are 50M instead of 100M.

Double Super Jackpot increments are 100M instead of 200M.

Baseball card bonus increments are 5M instead of 10M.

1 - 3 cards trade is 5M instead of 10M.

13 - 15 cards trade is 50M instead of 100M.

Combo award is 10M, 20M, 40M instead of 20M, 40M, 80M.

Drop target combo award is 40M instead of 80M.

Grand slam awards 20M instead of 40M.

Home run awards 5M instead of 10M.

78) BALL TIME SAFETY

Should a ball drain very quickly, it will be returned to the shooter based upon this setting. This timer is active once per ball.

VERY EASY = 10 SECONDS.

EASY = 8 SECONDS.

*** MEDIUM = 6 SECONDS.

** HARD = 4 SECONDS.

VERY HARD = NO SAFETY TIME.

79) MINIMUM GAME TIME

This step allows for continuing play up to an adjusted minimum time (0 - 4 minutes).

** 0 = no minimum time.

*** 2:00 = 2 min., 0 secs.

III. TEST MODE

IV. UTILITIES

Use the left flipper button to choose (highlight) a function and then the right flipper button to select or change the value of the function. Each utility is described below.

A. PRINT

Bookkeeping - all values
Short Bookkeeping - first 8 values

CAUTION

After printing is finished, all the short term bookkeeping steps (in brackets) will automatically reset if the PRINT BOOK RESET game adjustment is set to ON.

B. PRINTER SET-UP

Type - NSM DATA or SERIAL
Baud Rate - 1200, 2400, 4800, 9600
Data - 7 bit or 8 bit
Parity - none, even, or odd

C. ID NUMBERS

Two six digit numbers can be entered in permanent memory during this step. One is a GAME ID and the other is an ARCADE ID. These two ID's appear on all printouts. Also the GAME ID number will appear in the display on power-up. The left and right flipper buttons alter the digit value and the credit button enters the displayed value into memory and then proceeds to the next digit position.

D. BURN-IN

This function can be used to continuously exercise all the lamps and solenoids in the game.

V. TOURNAMENT MODE

The Tournament Mode switch provides a simple way to alter some of the normal game settings in order to provide for tournament play. The switch is located on a circuit board just inside the front door of the game to the lower left. The game must be in a game over condition in order to recognize the switch changing states. When the switch is moved to the "ON" position with the front door open, four Tournament Mode adjustments will appear on the display. These adjustments can be altered by using the left flipper button to select the function and the right flipper button

to alter the current setting. Once these settings have been chosen they will remain in permanent memory so that all that has to be done each subsequent time that tournament play is desired is to move the switch to the "ON" position. When the Tournament Mode settings are in effect they override the normal Game Adjustment settings. When the switch is moved to the "OFF" position, all the normal Game Adjustment settings are back in effect.

NOTE: Even if the game will not be used for tournament play, this switch can be used to provide an easy way to set the game for FREE PLAY without affecting any other game settings by setting the remaining three Tournament Mode adjustments to "NORMAL".

Each Tournament Mode adjustment is described below.

*** = Factory Default Setting

1) FREE PLAY

*** OFF = Credits are required to start a game.
ON = A game may be started without any credits posted.

2) GAME FEATURES

*** NORMAL = Normal play.
TOURNAMENT =
Various game features are altered as described below in order to provide the same odds for all players.
a) High CATCHES to date always set to 99.
b) High STEALS to date always set to 99.
c) High HOME RUNS to date always set to 99.
d) High GRAND SLAMS to date always set to 99.
due to player's skill level.
e) Round timing is not affected by player's skill level.
f) Outlane Special is disabled.
g) Ball time safety disabled.
h) Minimum game time disabled.

3) SPECIAL/REPLAY

*** NORMAL = Normal play.
POINTS =
Playfield Special awards
200,000,000 points. Match, High
Game to Date, and Score Replay
Level payouts are disabled.

4) EXTRA BALL

*** NORMAL = Normal play.
POINTS =
Extra Ball awards 100,000,000
points.

III. TEST MODE

SERVICE SWITCH

The switch is actuated when the front door is closed. With the front door closed, all bookkeeping steps are incremented normally. When the front door is opened all bookkeeping steps are frozen at their current values. Any credits that are added with the front door open are recorded in the SERVICE CREDITS bookkeeping steps.

AUTO-PRINT FEATURE

If there is a Communications Adapter installed in the game, the printer will immediately begin printing the first eight bookkeeping values as soon as it is plugged in during game over. If a different printout option is required the Test Mode must be entered first before plugging the printer in so that the immediate printout process does not begin. After printing is finished, all the short term bookkeeping steps (in brackets) will automatically reset if the PRINT BOOK RESET game adjustment is set to ON.

INOPERATIVE SWITCH REPORT

An inoperative switch report can be displayed by holding the credit button in during game over if there are no credits remaining and the game is not set for free play. Any switch that has not been operated in any of the last 15 games played will be reported.

SOUND ADJUSTMENTS

The speaker(s) output is controlled by the volume control located on a circuit board just inside the front door of the game to the lower left. Turning the volume control counter-clockwise will decrease the volume. Turning it clockwise will increase the volume.

POST ADJUSTMENTS

The post at the mouth of the left outlane and the post at the mouth of the right outlane can be positioned for liberal/conservative play. The smaller openings produce a more liberal game.

IV. THEORY OF OPERATION

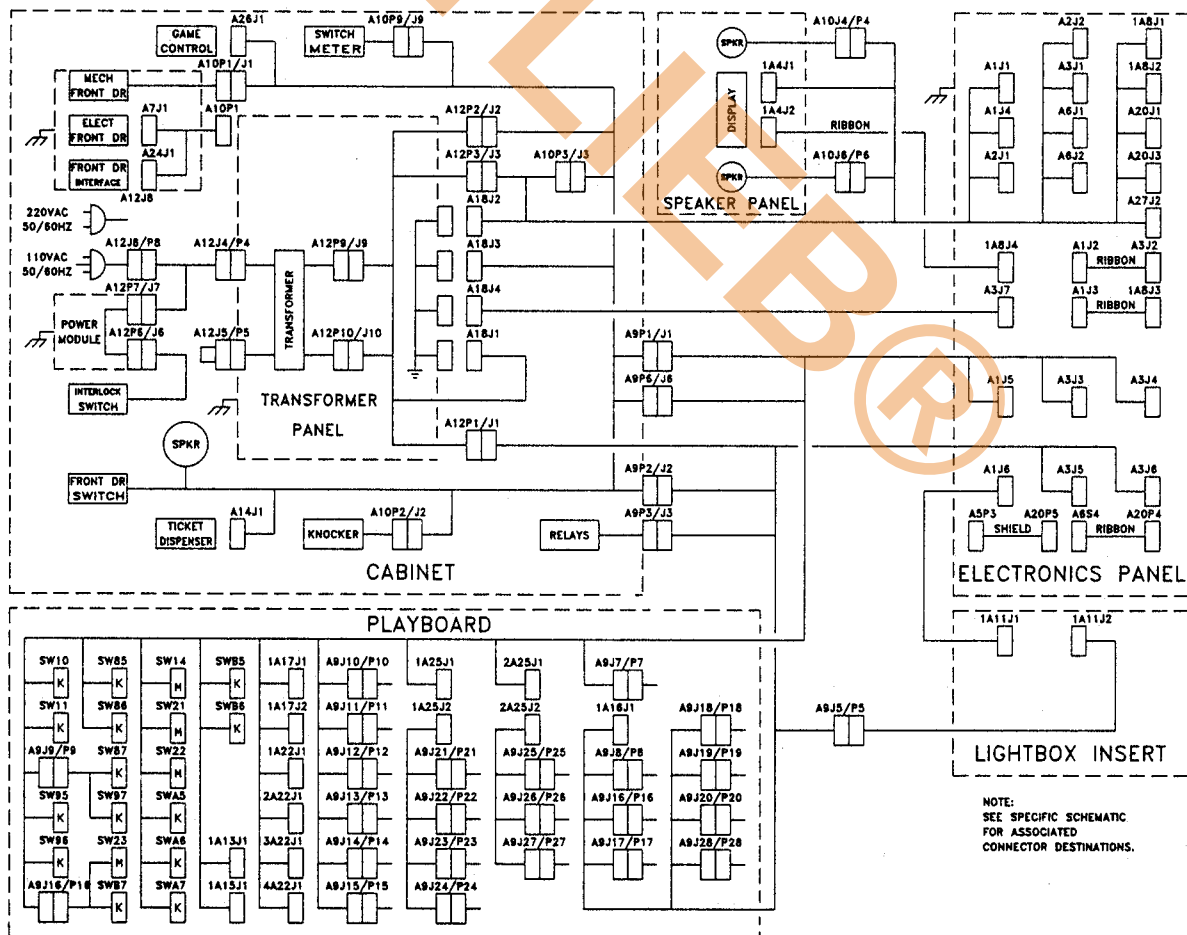


FIGURE 1. INTERCONNECTION DIAGRAM

IV. THEORY OF OPERATION

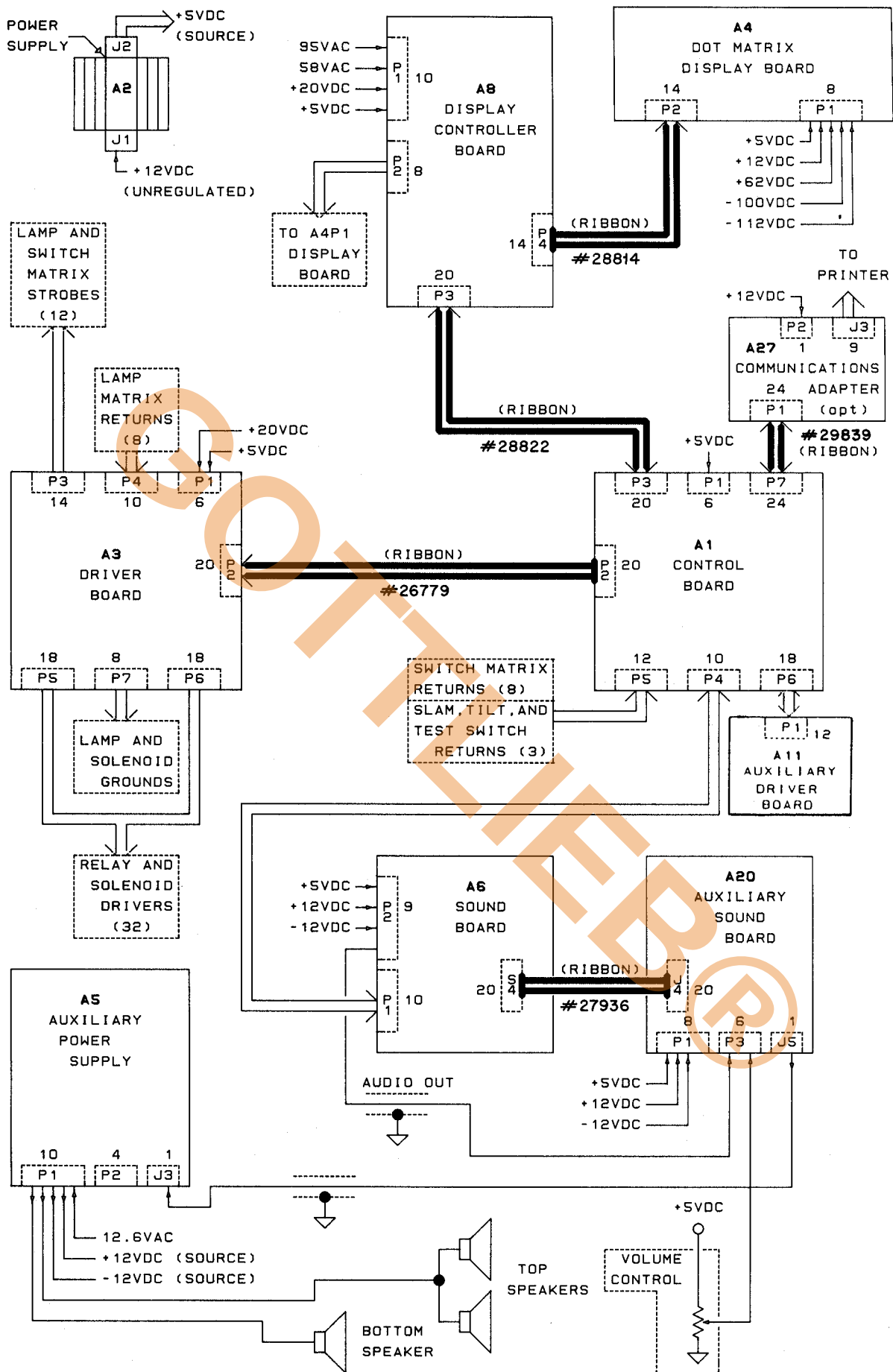


FIGURE 2. SYSTEM 3 BLOCK DIAGRAM

IV. THEORY OF OPERATION

A. CONTROL BOARD (A1)

The Control Board is supplied with 5vdc (A1P1) from the Power Supply (A2P2). The data contained in ram (U3) is kept valid when power is turned off by the lithium battery (BAT1) and controller (U6).

NOTE: When replacing either the battery, ram, or the controller there may be a message that appears in the display on power up the first time that indicates a low battery condition. If this occurs, turn the power off and back on again. The board should power up normally this time. If not, there is another problem on the board.

The Control Board can accommodate either a 27512 or a 27256 Eeprom. JP1 must be installed for a 27512 or JP2 for a 27256 Game Prom. A 4 Mhz oscillator is configured using U17, R1, R2, C22, C23, and XTAL1. The oscillator output is then divided by 2 to a 2Mhz clock by U18 which is used as the input clock to the 65C02 (U1) microprocessor. The clock output of U1 (pin 39) is used as a sync signal for reading from or writing to the peripheral devices.

Two versatile interface adapters (U4, U5) are used to develop the necessary control signals for the system. The display connector (A1P3) is comprised of several signals. U4-15 and U4-17 are used as inputs to receive data from the Display Controller Board. Data is output to the Display Controller Board by U7 (BD0-BD7) and then latched by pulsing the DS0 line at U9-4. The output at DS1 (U9-5) is used to reset the Display Controller Board if it does not respond to data output by the Control Board.

The Driver Board connector (A1P2) contains all the signals necessary to operate the lamp and switch matrix strobes, the lamp matrix returns, and the solenoids. The lamp clear (LCLR), lamp strobe (LSTB), and lamp strobe data (LDATA) are generated by U4-12, U4-11, and U4-10 respectively. The appropriate lamp return data

during each active lamp strobe is output by U7 and latched into U5 on the Driver Board by the lamp return data strobe (LDS). The solenoid data is output by U7 (BD0-BD7) and latched into the appropriate Driver Board device (U1-U4) by the solenoid strobes (SS0-SS3).

The switch matrix returns are input at A1P5, buffered by U19 and U20 and then input to U4. Discrete inputs are provided at A1P5 for the slam, tilt, and test switches.

The connection to the Sound Board (A1P4) is made up of eight sound data lines (SD0-SD7), a return line (SRET), and a reset line (MR).

A reset circuit is configured using U13, U14, R3, and C24. When power is applied to the system, the microprocessor reset pin (U1-40) is held low for approximately 10 milliseconds. The system can also be reset by pressing the switch (SW1) on the board. Whenever a reset occurs the master reset signal (MR) (U18-9) is held low until the display strobe (DSTB) becomes active. At this point the master reset goes high which enables the peripheral IC's on the Display Board and Driver Board to accept data.

A watchdog circuit is employed to monitor both the display digit strobe and the lamp strobe. This circuit is made up of U11, U12, U13, U16, R5, R6, R29, R32, R33, C20, C21, C28, and C29. If either the display strobe (DSTB) or the lamp strobe (LSTB) is missing for 330 milliseconds the system will be reset. The system will also be reset if the supply voltage drops below 4vdc. This voltage monitor is configured using U21, VR1, D1, D2, R34, and R35.

B. POWER SUPPLY (A2)

The transformer panel delivers 12vdc to the input of the power supply. The regulated output voltage should be set to 5vdc by using potentiometer R3. This voltage is then supplied to the Control Board (A1), Driver Board (A3), Display Board (A4), Sound Board

IV. THEORY OF OPERATION

(A6), Display Controller Board (A8), and any other auxiliary board which may require it.

C. DRIVER BOARD (A3)

Two voltages are supplied to this board at A3P1. The 5vdc is supplied from the Power Supply (A2) and the 20vdc is supplied from the transformer panel. The 20vdc is used to source the controlled lamps and the switch matrix. The Driver Board receives its data at A3P2 from the Control Board (A1P2). Solenoid data is latched into U1-U4. Lamp return data is latched into U5. Lamp and switch strobe data is shifted through U6 and U7. The comparators (U10,U11) are used to protect the MOSFETS (Q33-Q49). If a sensed input voltage exceeds the reference voltage (V_{ref}), the corresponding MOSFET is turned off immediately following the lamp clear pulse (LCLR) supplied by U12 thus limiting the duty cycle. If the master reset signal (MR) is held low all lamps and solenoids will be disabled.

D. DISPLAY CONTROLLER (A8)

This board is comprised of the power supply section and the digital section. The power supply is used to generate the necessary voltages that are required to power the Display Board. All voltages are input at A8P1 and then output to the Display Board at A8P2.

The digital section controls the information which appears in the display and also the refresh of the display information. The clock circuit runs at 3.579 MHz and is divided by two through U5 and then fed to the microprocessor (U1-37) as the master clock. The LED on the board will flash if the microprocessor (U1) is running properly. A controller chip (U2) is used to refresh the Display Board independent from the code which is being executed by the microprocessor (U1). U1 uses the data bus during the phase 2 portion of the clock while U2 uses it during the phase 1 portion. The address lines from both U1 and U2 are multiplexed through U9-U11 to determine which device has control of

the ram (U4). The necessary data is then output to the Display Board at A8P4. Data is both transmitted and received from the Control Board at A8P3. If the Control Board cannot successfully communicate with the Display Controller Board it will attempt to reset the Controller Board by sending a negative going signal on A8P3-14 (DS1).

E. DISPLAY BOARD (A4)

The Display Board consists of a 128 column X 32 row gas plasma display. The drive electronics located on the backside of the board convert low voltage serial data in to high voltage parallel data out for driving the display. The column drivers contain output latches so that column data for the following row can be entered while the present row is being displayed. All voltages required by the display are input at A4P1. All control signals needed to multiplex the display are input at A4P2. The Display Controller Board sends 128 bits of serial column data on the SDATA line for every row of display information. The data is shifted through the driver IC's by the dot clock signal (DCLK). The column data for a particular row is then latched by the column latch (CLATCH) signal. The row clock (RCLK) signal is used to clock the row driver data (RDATA) through the row driver IC. There is only one active row at a time. Between rows the display enable (DE) signal is used to prevent the display from flickering.

F. SOUND BOARD (A6)

The Sound Board consists of two 6502 microprocessor systems, a dual DAC, an input port to receive commands from the system Control Board, and a low level audio output at A6P2-9 which is sent to the summing amplifier located on the Auxiliary Sound Board (A20) for amplification.

The Sound Board requires three supply voltages +5vdc, +12vdc, and -12vdc. In addition, a power-up reset signal is required from the Control Board. If a manual reset is desired, pressing SW2 will reset both processors.

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A 4MHz oscillator is configured with R11, R12, C14, C15, C22, XTAL1, and T1. This clock is then divided down by S1 into either a 2MHz or 1MHz clock signal for the processors N1 and T3. A 250 KHz clock signal from S1-11 is used by the programmable timer section consisting of N5, H5, T5, and K5.

Eight lines from the Control Board are input at A6P1 on the Sound Board and sent to the two input code latches A3 and B2. When any of these inputs goes low (except for A6P1-9 when JP7 is not installed) A2-8 goes high which causes the input code data to be latched into A3 and B2. Also at the same time the flip-flops contained in A4 are clocked which cause the IRQ input of each microprocessor to go low. The outputs of A4 will remain in the low state until each flip-flop is cleared by a signal from its associated microprocessor after each IRQ is processed.

The Sound Board is designed to accommodate different types of Eeproms. Jumpers JP1, JP2, JP3, and JP4 should be set to their proper positions based on the density of the Eeproms being used.

G. AUXILIARY SOUND BOARD (A20)

The Auxiliary Sound Board contains a sound generator YM2151 (U9) and a sound/speech generator MSM6295 (U1). Both of these IC's operate under the control of the T3 microprocessor on the master Sound Board (A6). The sound generator YM2151 responds to its commands by sending serial data to the YM3014 DAC (U10). The DAC then converts this data into an analog signal which is filtered through a series of op-amps and then sent to the main summing amplifier (U11).

A 74HCT74 IC (U6) is used to divide the 4 MHz clock signal present at A20P4-9 into both a 1 MHz and 2 MHz signal which is selectable via JP3 (2 MHz) or JP4 (1 MHz). This signal is then used as the master clock for the speech generator (U1). When the speech generator (U1) receives a command, it then retrieves its data from the Eeproms (U4, U5). The analog output at pin 36 (DAO) is then sent

through an active filter network and then to the main summing amplifier (U11).

The output of the main summing amplifier (U11-7) is input to a voltage controlled amplifier (VCA) (U13). The volume is controlled by a potentiometer located just inside the front door of the game. The potentiometer acts as a resistor divider which supplies a 0 to 5 volt signal to the VCA at U13-2. The output of the VCA is then sent to Auxiliary Power Supply (A5) for amplification.

H. SENSOR BOARD (A15)

This board is used to detect if any flipper is energized and then inputs the data to the Control Board to be processed. This board therefore eliminates the need for a second switch to be used on the flipper assembly itself. U1 is an optocoupler device which converts the input signal from the flipper circuit when energized to a signal which can be recognized by the Control Board as a valid switch closure.

I. OPTICAL INTERFACE (A25)

The optical interface assembly generates and receives the infrared light pulses needed to optically detect the ball breaking an infrared light beam. It also provides a visual indication that the interface assembly is functioning properly.

This method of detection transmits infrared light pulses from an opto LED to an opto phototransistor receiver. The LED light pulses are generated from a switch strobe that is buffered and current amplified by two sections of the LM339 voltage comparator (output pins 1 & 2) and transistor Q2.

When no ball is present, the light pulses reach the opto receiver which passes the pulses 180 degrees out of phase with the switch strobe on to two additional sections of the comparator (pins 9 & 10). Because the strobe pulses and receive pulses are out of phase, they cancel at resistors R1 & R3 and keep comparator

IV. THEORY OF OPERATION

output pin 13 high therefore preventing Q1 from passing strobes on to the switch return line.

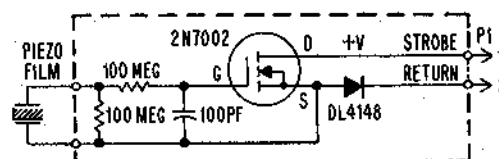
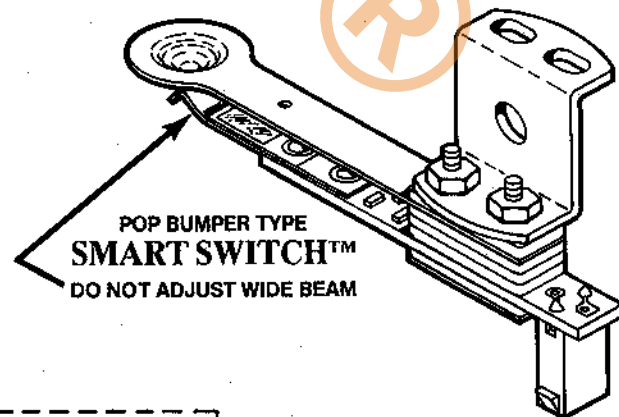
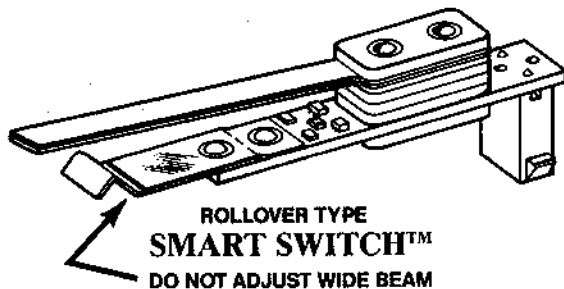
As a ball passes between the opto transmitter and receiver, the light beam is broken. Now, with no out of phase pulses coming from the receiver, the strobe appears at comparator inputs 9 & 10. Comparator output pin 13 begins pulsing low and passes the strobes through Q1 to the return line to signal a closed switch. Also positive strobe pulses at output pin 14 of the comparator turn Q3 on and light LED D2. D2 lit indicates a broken light beam and a closed optical switch.

The above principles also apply when using the quad optical interface board with a few exceptions. Four opto switches are processed by only one interface board. The switch strobes are not buffered, but are connected through 120 ohm 5 watt resistors to the opto LEDs. All of the opto switch comparators feed a common return transistor Q5, but still have individual red LEDs to indicate which of the four opto switches are closed.

J. SMART SWITCH™ (Piezo Film Sensor)

These devices take the place of the the normal contact point type switches used for sensing the ball on various different devices in the game. These

devices should not require any adjustment. DO NOT ATTEMPT TO ADJUST THE WIDE CANTILEVER BEAM used in a switch assembly. This could cause permanent damage to the device. The lifetime of these switches has been determined to be over 10 million cycles. The main advantage of these switches is the fact that they cannot be contaminated by such elements as moisture, dust, or smoke. Each switch assembly consists of a wide cantilever beam which has a piezo film sensor element laminated to its surface. When this beam is deflected, it induces a strain on the laminated piezo film sensor element. As the beam is returning to its rest position it generates an output voltage which triggers the on board circuit. This circuit then generates a momentary output which resembles that of contact points being closed. The switch design used in rollover and spot target applications generates an output signal as the beam which contains the piezo film returns to its rest position after it is actuated. The switch design used for pop bumpers generates an output signal as the beam is deflected in order to provide an immediate response by the pop bumper solenoid. This immediate response type of switch can be distinguished from the other because either the film itself or the printed circuit board will be colored blue. BE CAREFUL not to interchange these two different types of switches.



SCHEMATIC REPRESENTATION

NOTES

GO TT LEB®

V. GENERAL INFORMATION

A. PRINTED CIRCUIT BOARDS ARE DESIGNATED AS FOLLOWS:

A1 - Control Board
A2 - Power Supply
A3 - Driver Board
A4 - Dot Matrix Display
A5 - Auxiliary Power Supply
A6 - Sound Board
A8 - Display Controller
A11 - Auxiliary Driver Board
A13 - Resistor Board
A15 - Sensor Board
A16 - Filter Board
A17 - Diode Board
A20 - Auxiliary Sound Board
A22 - LED Board
A25 - Optical Interface Board
A26 - Game Controls Board
A27 - Communications Adapter (Optional)
A28 - Interface Board (Miscellaneous)

Printed circuit board connectors will be labeled AX-JX. For example, A3-J4 is the connector J4 to the driver board (A3).

B. WIRE COLORS ARE SHOWN AS NUMBERS:

0 Black
1 Brown
2 Red
3 Orange
4 Yellow
5 Green
6 Blue
7 Violet
8 Gray
9 White

For example, 688 is a BLUE-GRAY-GRAY striped wire.

C. FUSE AND COIL INFORMATION

TRANSFORMER PANEL

F1	Line Input.....	110V AC.....	8 Amp	SLO-BLO
		220V AC.....	4 Amp	SLO-BLO
F2	Primary Power.....	110V AC.....	5 Amp	SLO-BLO
		220V AC.....	2-1/2 Amp	SLO-BLO
F3	Display.....		3/8 Amp	SLO-BLO
F4	Display.....		3/8 Amp	SLO-BLO
F5	Power Supply.....		2-1/2 Amp	SLO-BLO
F6	Controlled Lamps and Switches.....		10 Amp	SLO-BLO
F7	Solenoids.....		8 Amp	SLO-BLO
F8	Lightbox Illumination.....		15 Amp	
F9	Playfield Illumination.....		7-1/2 Amp	
F10	Auxiliary Power Supply.....		3 Amp	SLO-BLO
F11	Auxiliary Power Supply.....		3 Amp	SLO-BLO

NOTE:

FUSE DESIGNATIONS F12 THRU F14 NOT USED.

V. GENERAL INFORMATION

PLAYBOARD FUSES, COILS/COLORS/SLEEVES

FUSE	RATING	PART NO.	USAGE	COIL/COLOR	SLEEVE
F15	1-1/2 AMP SLO-BLO	EL-24	LEFT POP BUMPER (Q1)	16570 (GREEN)	5064
F16	1-1/2 AMP SLO-BLO	EL-24	RIGHT POP BUMPER (Q2)	16570 (GREEN)	5064
F17	1-1/2 AMP SLO-BLO	EL-24	LEFT KICKING RUBBER (Q3)	5195 (WHITE)	5064
F18	1-1/2 AMP SLO-BLO	EL-24	RIGHT KICKING RUBBER (Q4)	5195 (WHITE)	5064
F19	4 AMP SLO-BLO	EL-33	BOTTOM LEFT FLIPPER	29876 (ORANGE)	5065
F20	2-1/2 AMP SLO-BLO	EL-21	TOP LEFT FLIPPER	25959 (RED)	5065
F21	4 AMP SLO-BLO	EL-33	BOTTOM RIGHT FLIPPER	29876 (ORANGE)	5065
F22	1-1/2 AMP SLO-BLO	EL-24	3 POSITION BANK RESET (Q8)	17876 (TAN)	21411
			#1 TRIP (Q9)	26452 (PINK)	—
			#2 TRIP (Q10)	26452 (PINK)	—
			#3 TRIP (Q11)	26452 (PINK)	—
F23	1-1/2 AMP SLO-BLO	EL-24	CENTER RAMP LIFT (Q12)	27642 (YELLOW)	5065
F24	1/2 AMP SLO-BLO	EL-20	SHOOTER LANE RAMP LIFT (Q14)	26451 (YELLOW)	21411
F25	1/2 AMP SLO-BLO	EL-20	TOP RIGHT PLUNGER GATE (Q16)	26451 (YELLOW)	5064
F26	1/2 AMP SLO-BLO	EL-20	TOP BALL GATE (Q17)	26451 (YELLOW)	21411
F27	1/2 AMP SLO-BLO	EL-20	BALL RELEASE (Q28)	26451 (YELLOW)	5065
			OUTHOLE (Q29)	26451 (YELLOW)	5065
			TOP RIGHT HOLE KICKER (Q13)	26450 (PINK)	5064
F28	2-1/2 AMP SLO-BLO	EL-21	SHOOTER LANE KICKER (Q5)	19300 (ORANGE)	5064
F29	1 AMP SLO-BLO	EL-6	BOTTOM RIGHT UPKICKER (Q6)	17876 (TAN)	21411
F30	1-1/2 AMP SLO-BLO	EL-24	TOP LEFT UPKICKER (OPTO) (Q7)	16570 (GREEN)	6087

V. GENERAL INFORMATION

D. COIL CHART

SOLENOID COILS					
PART NUMBER	WHERE USED	RESISTANCE (OHMS)	NUMBER OF TURNS	WIRE GAUGE	WRAPPER COLOR
A-19300	GENERAL PURPOSE	7.8	1075	#25	ORANGE
A-5195	GENERAL PURPOSE	12.3	1305	#26	WHITE
A-16570	GENERAL PURPOSE	15.5	1450	#27	GREEN
A-17876	GENERAL PURPOSE	24	1750	#28	TAN
A-26450	GENERAL PURPOSE	42	2400	#29	PINK
A-26451	GENERAL PURPOSE	65.8	3000	#30	YELLOW
A-30297	GENERAL PURPOSE	66.5	2750	#30	BLUE
A-26926	3-BANK RESET	32.8	2650	#27	BLUE
A-29876	FLIPPER (NEW UNIT)	2.36/202	560/3325	#23/#33	ORANGE
A-25959	FLIPPER (NEW UNIT)	3.85/202	720/3325	#24/#33	RED
A-26646	FLIPPER (NEW UNIT)	4.57/201	725/3470	#25/#33	BLUE
A-28740	FLIPPER (NEW UNIT)	6.02/207	790/3600	#26/#33	TAN
A-27642	FLIPPER (NEW UNIT)	9.1/203	950/3700	#27/#33	YELLOW
A-27643	FLIPPER (OLD UNIT)	11.4/202	960/3670	#28/#33	GREEN
A-30468	FLIPPER (OLD UNIT)	11.59/269	960/4700	#28/#33	WHITE
A-31272	GENERAL PURPOSE	44.8/268	2200/3575	#30/#34	BLUE
A-27926	GENERAL PURPOSE	64.7	3475	#29	BLUE
RELAY COILS					
PART NUMBER	WHERE USED	RESISTANCE (OHMS)	NUMBER OF TURNS	WIRE GAUGE	WRAPPER COLOR
A-26452	DROP TAR. TRIP	137	2450	#35	PINK
A-16890	GENERAL PURPOSE	231	4000	#35	ORANGE

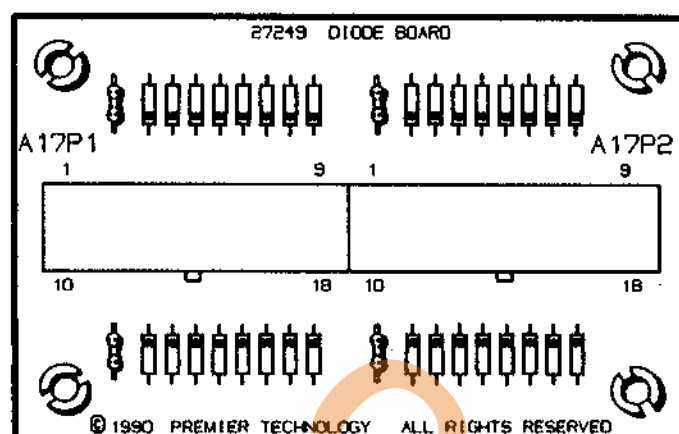
VI. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

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VI. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

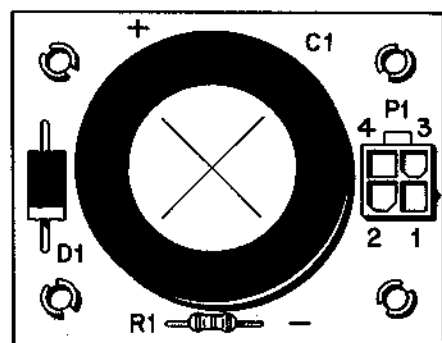
DIODE BOARD (A17) COMPONENT LOCATION



DIODE BOARD (A17) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	DIODE MATRIX ASSEMBLY (1A17)	MA-2136
D1-D24	DIODE, 1N4148	XO-261
D25-D32	DIODE, 1N4008	XO-254
R1-R3	RESISTOR, 220 OHM, 1/4W, 5%	XO-21
R4	RESISTOR, 0 OHM	XO-469
P1, P2	HEADER, 18 POSITION	XO-916
	CIRCUIT BOARD SUPPORT (4)	23984

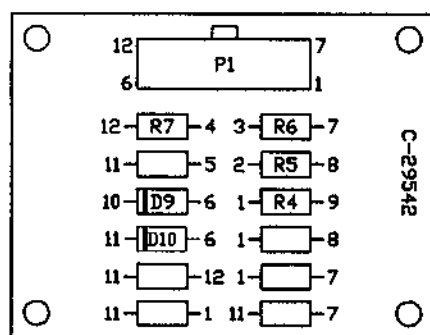
FILTER BOARD (A16) COMPONENT LOCATION



FILTER BOARD (A16) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	FILTER BOARD ASSEMBLY	MA-1745
C1	CAPACITOR, 2200UF, 100V	XO-923
D1	DIODE, 1N5401	XO-263
R1	RESISTOR, 24K OHM, 5%, 1/4W	XO-10
P1	HEADER, 4 POSITION	XO-909
	CIRCUIT BOARD SUPPORT (4)	23984

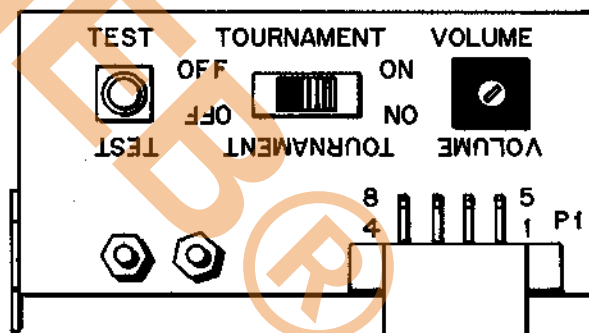
RESISTOR BOARD (A13) COMPONENT LOCATION



RESISTOR BOARD (A13) PARTS LIST

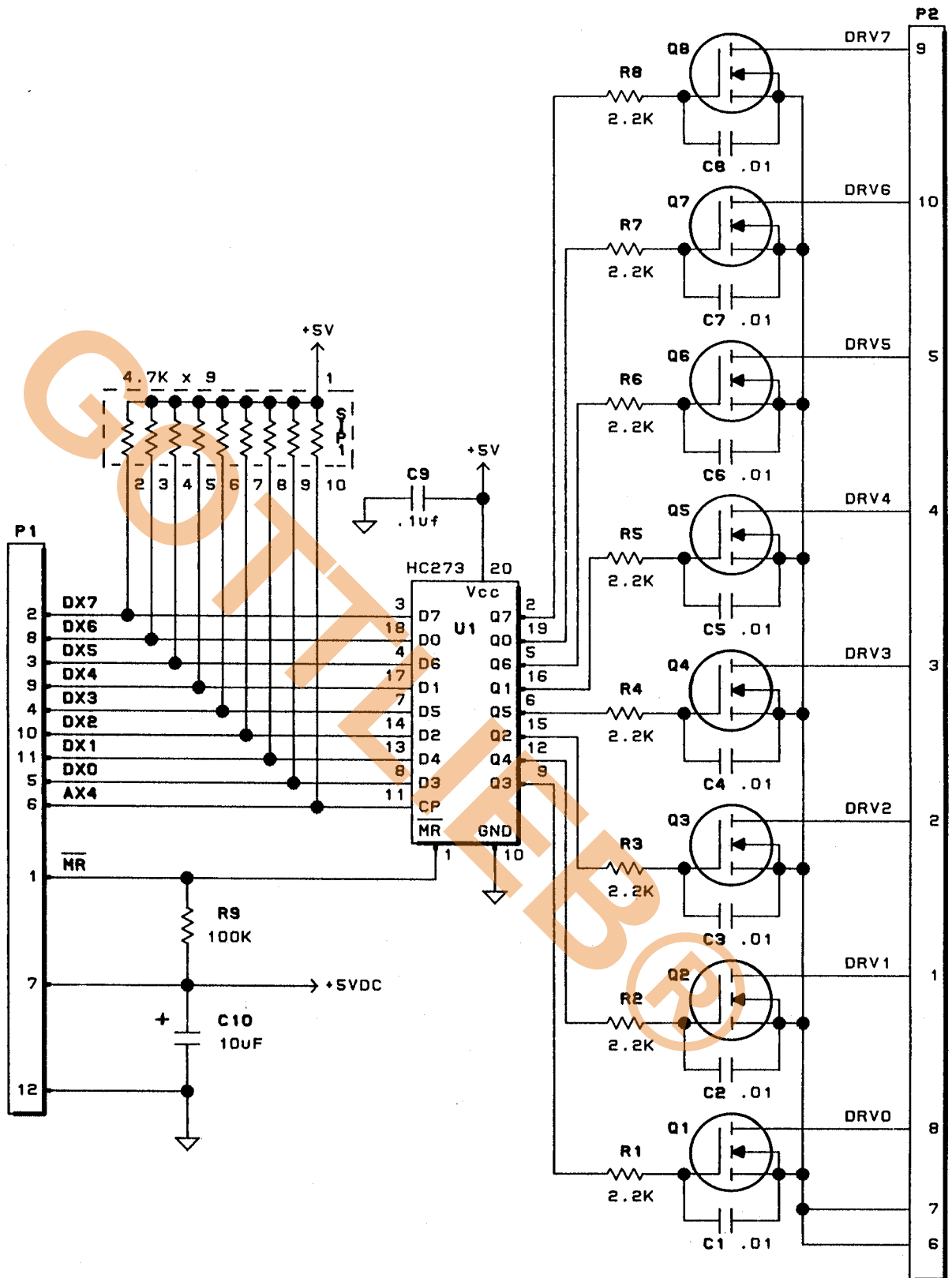
REFERENCE	DESCRIPTION	PART NUMBER
	RESISTOR BOARD (A13)	30987
D9, D10	DIODE, 1N4004	XO-254
R4-R7	RESISTOR, 220 OHM, 5%, 1/4W	XO-21
P1	HEADER, 12 POSITION	XO-913
	SPACER, (4)	23984

GAME CONTROLS BOARD (A26) COMPONENT LOCATION



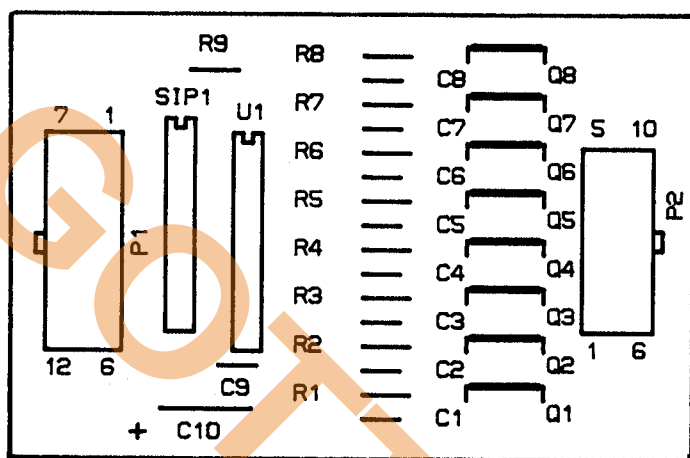
GAME CONTROLS BOARD (A26) PARTS LIST

DESCRIPTION	PART NUMBER
Game Controls Board (A26)	MA-1851
Potentiometer, 10K OHM, 20%, 15W	XO-1194
Pushbutton Switch	XO-897
Slide Switch	XO-1193
Header, 8 Position	XO-920
Mounting Bracket	28619
Key Cap, Yellow	XO-1198



Premier Technology			
TITLE			
AUXILIARY DRIVER BOARD (A11)			
SCHEMATIC DIAGRAM			
DRAWN	APPROVED	DATE	
J.B.	RHM	12-2-91	MA-1722

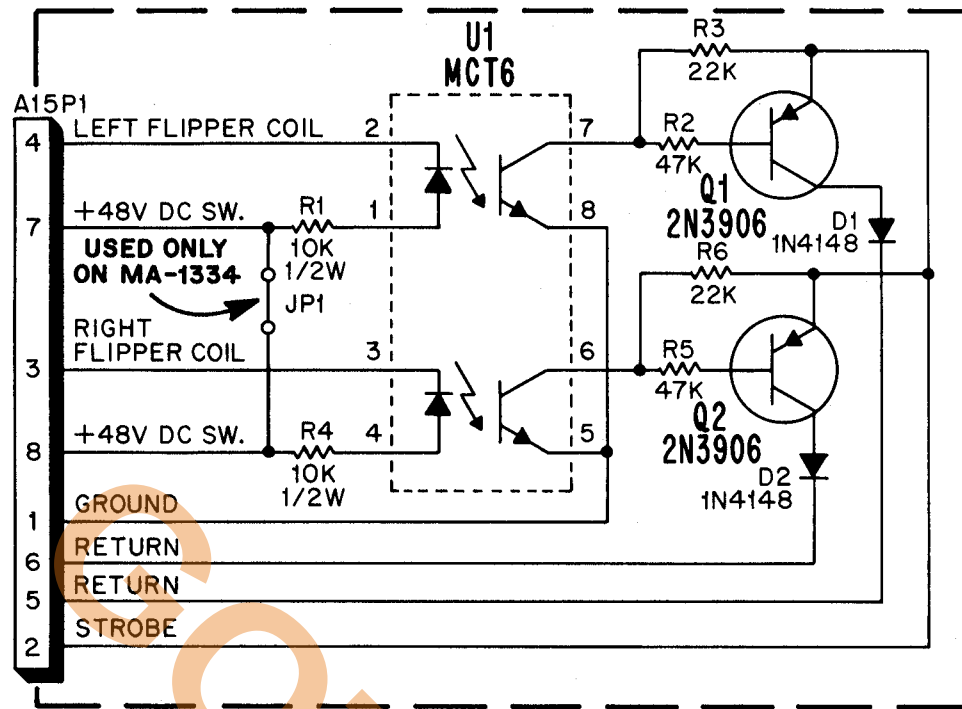
AUXILIARY DRIVER BOARD (A11) COMPONENT LOCATION



AUXILIARY DRIVER BOARD (A11) PARTS LIST

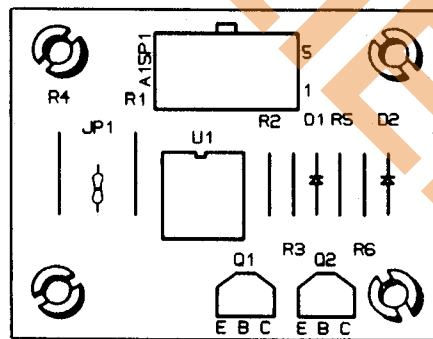
REFERENCE	DESCRIPTION	PART NUMBER
	Auxiliary, Driver Board, (A11)	MA-1722
C1-C9	Capacitor, .01UF, 10%, 50V	XO-696
C10	Capacitor, 10UF, +80%-20%, 25V	XO-225
Q1-Q8	Transistor, MOSFET, 12N10L	XO-947
R1-R8	Resistor, 2.2K, OHM, 5%, 1/4W	XO-27
R9	Resistor, 100K OHM, 5%, 1/4W	XO-45
SIP1	Resistor Pack, 4.7 OHM X 9	XO-906
U1	IC, Octal "D" Flip-Flop, 74HC273	XO-949
P1	Header, 12 Position	XO-913
P2	Header, 10 Position	XO-912

VI. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



Premier Technology			
TITLE			
SENSOR BOARD (A15)			
SCHEMATIC DIAGRAM			
DRAWN	APPROVED	DATE	E-27041
R.P.S.	RHM	10-12-89	

SENSOR BOARD (A15) COMPONENT LOCATION

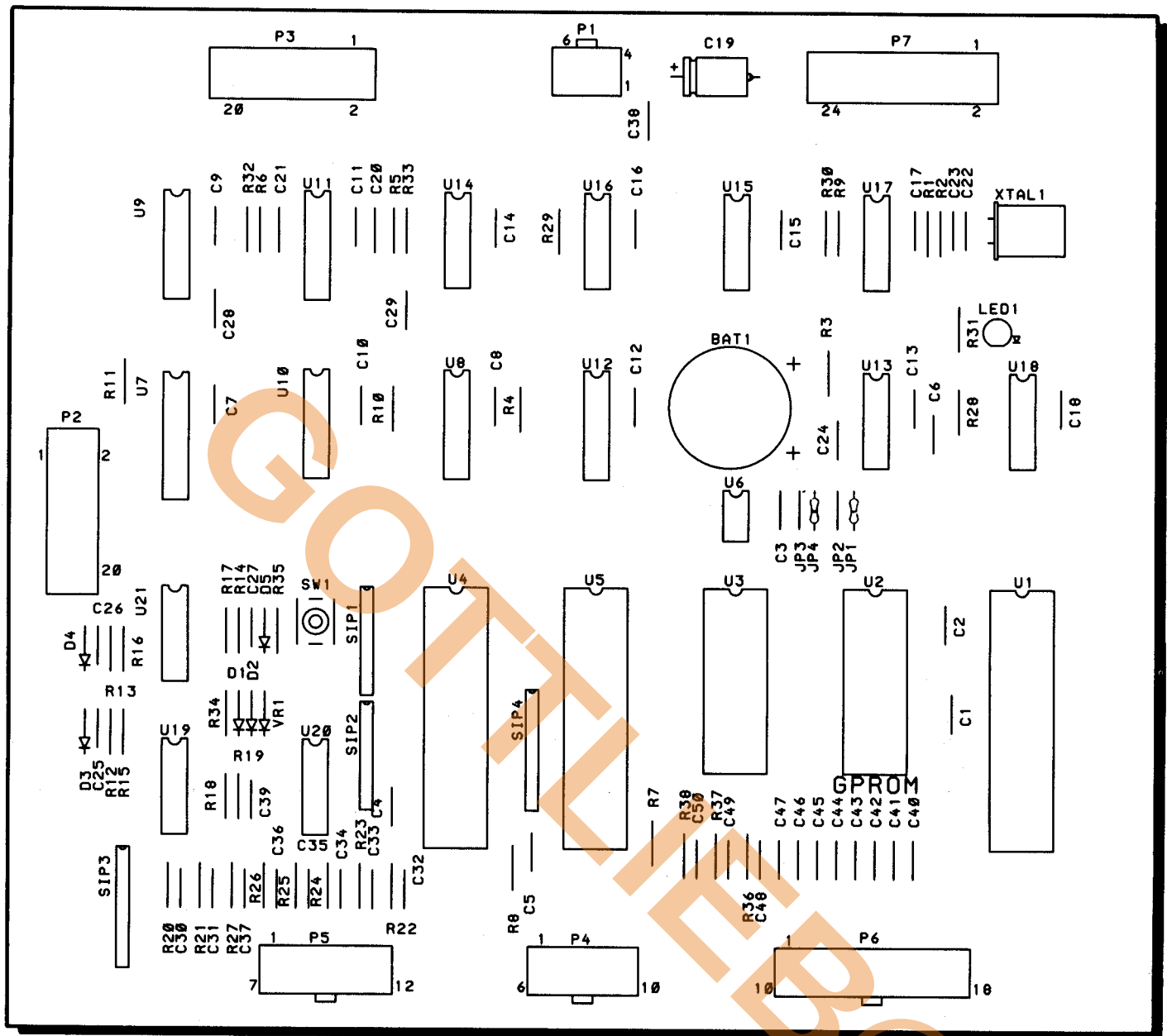


SENSOR BOARD (A15) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER	
	Sensor Board Assembly (A15)	MA-1334	MA-2108
D1,D2	Diode, 1N4148	XO-261	XO-261
JP1	Jumper, Resistor, 0 OHM	XO-469	(NOT USED)
Q1,Q2	Transistor, 2N3906 (PNP)	XO-588	XO-588
R1,R4	Resistor, 10K Ohm, 5%, 1/2W	XO-62	XO-62
R2,R5	Resistor, 47K Ohm, 5%, 1/4W	XO-30	XO-30
R3,R6	Resistor, 22K Ohm, 5%, 1/4W	XO-42	XO-42
U1	IC, Optocoupler, MCT6	XO-1000	XO-1000
A15P1	Header, 8 Position	XO-911	XO-911
	Spacer (4)	23984	23984

VI. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

CONTROL BOARD (A1) COMPONENT LOCATION

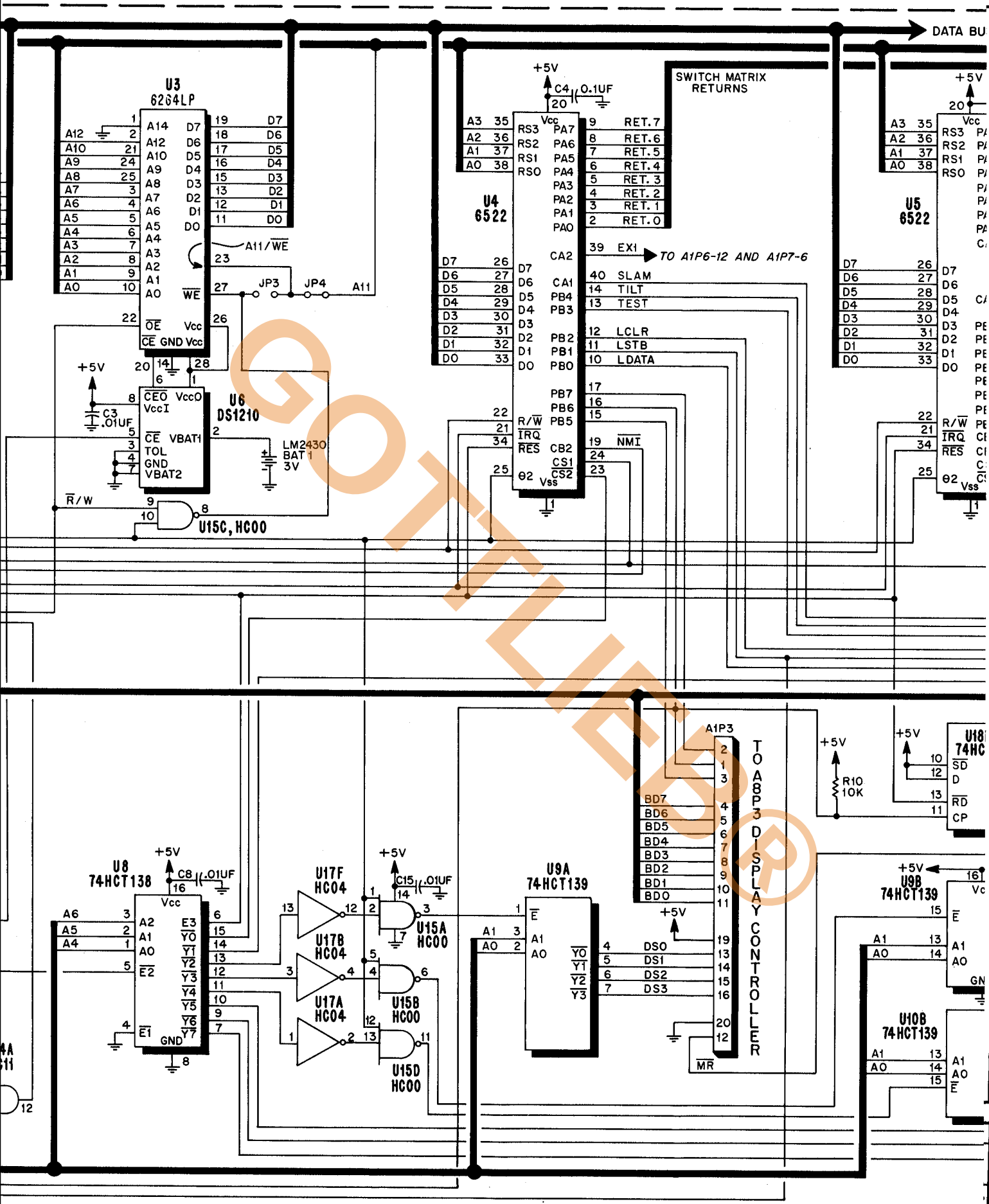


CONTROL BOARD (A1) PARTS LIST

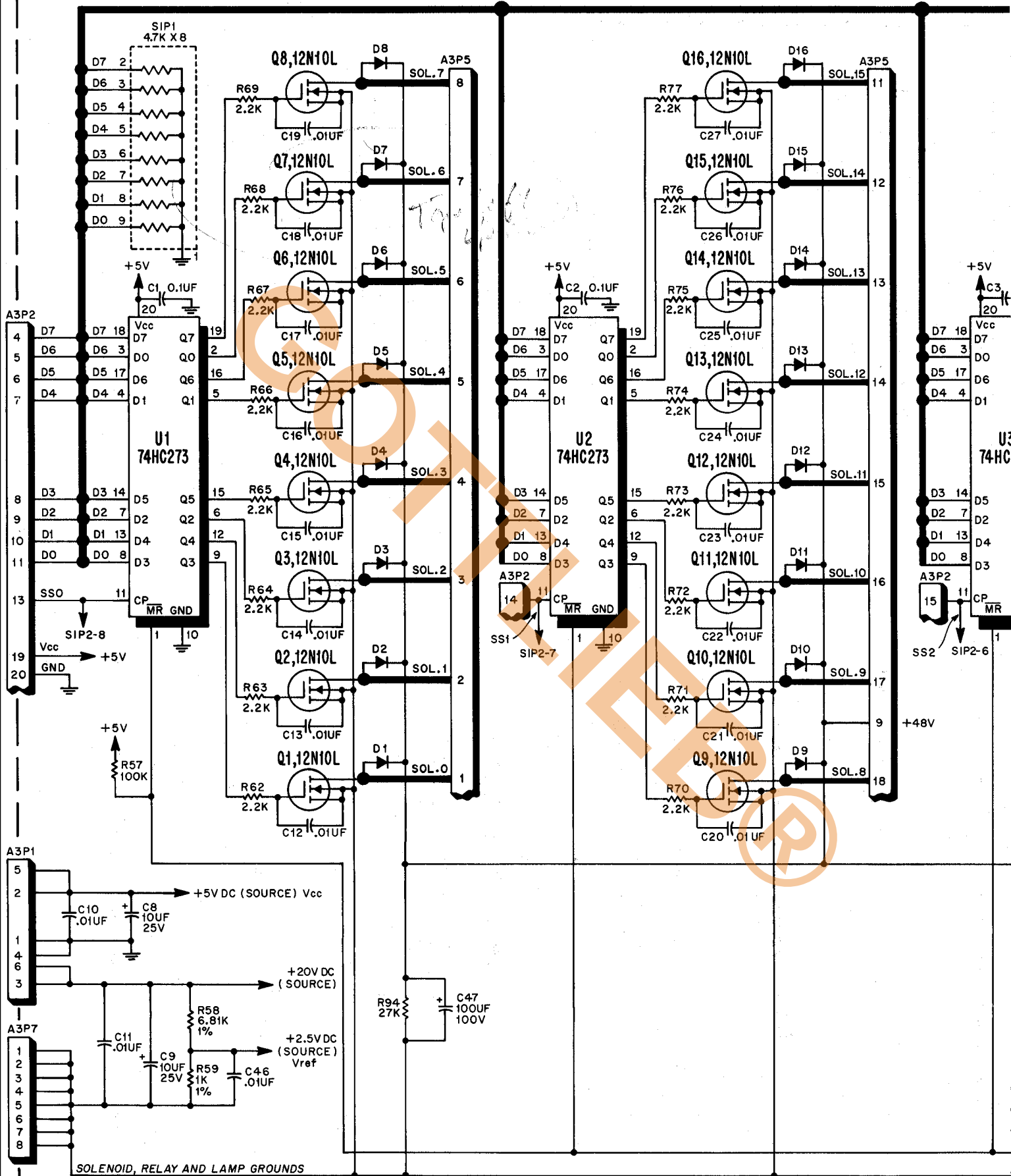
REFERENCE	DESCRIPTION	PART NUMBER	REFERENCE	DESCRIPTION	PART NUMBER
BAT 1	Control Board Assembly (A1)	MA-1934	SIP3,SIP4	Resistor Pack, 4.7K OHM X 8	X0-161
C3, C7-C18, C30-C50	Lithium Battery, LM2430, 3V	X0-925	SW1	Switch, N.O.	X0-897
C1,C2,C4	Capacitor, .01UF, +80% -20%, 50V	X0-229	U1	IC, 65C02P2, CPU, 2MHZ	X0-927
C5,C25,C27	Capacitor, 0.1UF, +80% -20%, 50V	X0-230	U3	IC, 6264LP, 8K X 8, Static Ram	X0-781
C6,C22,C23	Capacitor, 33PF, 10%, 100V	X0-896	U4,U5	IC,6522AP, Versatile Interface Adaptor (VIA)	X0-929
C19	Capacitor, 100UF, +80% -20%, 10V	X0-211	U6	IC, DS1210, Non-Volatile Controller	X0-930
C20,C21	Capacitor, 1UF, 20%, 50V	X0-746	U7	IC, 74HCT373, Octal Latch	X0-931
C24	Capacitor, .022UF, 10%, 50V	X0-873	U8	IC, 74HCT138, Decoder	X0-932
C28,C29	Capacitor, 1000PF, 10%, 100V	X0-296	U9,U10	IC, 74HCT139, Dual Decoder	X0-933
D1-D5	Diode, 1N4148	X0-261	U11	IC, 74HC123, Dual Multivibrator	X0-934
LED 1	LED, MV5752 (Red)	X0-270	U12	IC, 74HC161, Binary Counter	X0-935
R1	Resistor, 22 MEGOHM, 5%, 1/4W	X0-74	U13	IC, 74HC14, Schmitt Hex Inverters	X0-936
R2,R10,R11	Resistor, 10K OHM, 5%, 1/4W	X0-18	U14	IC, 74HC11, Triple "And" Gates	X0-937
R18,R28,R30	Resistor, 560K OHM, 5%, 1/4W	X0-169	U15,U16	IC, 74HC00, Quad "Nand" Gates	X0-782
R3	Resistor, 680K OHM, 5%, 1/4W	X0-669	U17	IC, 74HC04, Hex Inverters	X0-888
R5,R6	Resistor, 3K OHM, 5%, 1/4W	X0-23	U18	IC, 74HC74, Dual "D" Flip-Flop	X0-939
R4,R7-R9	Resistor, 2.2K OHM, 5%, 1/4W	X0-27	U19,U20,U21	IC, LM339, Quad Comparators	X0-583
R12-R14	Resistor, 3.3K OHM, 5%, 1/4W	X0-38	VR1	Zener Diode, 1N5225B, 3V, 5%	X0-269
R15-R17	Resistor, 4.7K OHM, 5%, 1/4W	X0-7	XTAL1	Crystal, 4MHZ	X0-366
R19-R27, R36-R38	Resistor, 330 OHM, 5%, 1/4W	X0-34	AlP1	Header, 6 Position	X0-910
R31	Resistor, 100K OHM, 5%, 1/4W	X0-45	AlP2,AlP3	Header, 20 Position (Ribbon)	X0-940
R32-R33	Resistor, 1K OHM, 5%, 1/4W	X0-5	AlP4	Header, 10 Position	X0-912
R34	Resistor, 100 OHM, 5%, 1/4W	X0-28	AlP5	Header, 12 Position	X0-913
R35	Resistor Pack, 10K OHM X 7, 5%, 1/4W	X0-926	AlP6	Header, 18 Position	X0-916
SIP1,SIP2			AlP7	Header, 24 Position	X0-1201
				Jumper, Resistor, 0 OHM (2)	X0-469
				Socket, 28 Pin Dip	X0-536



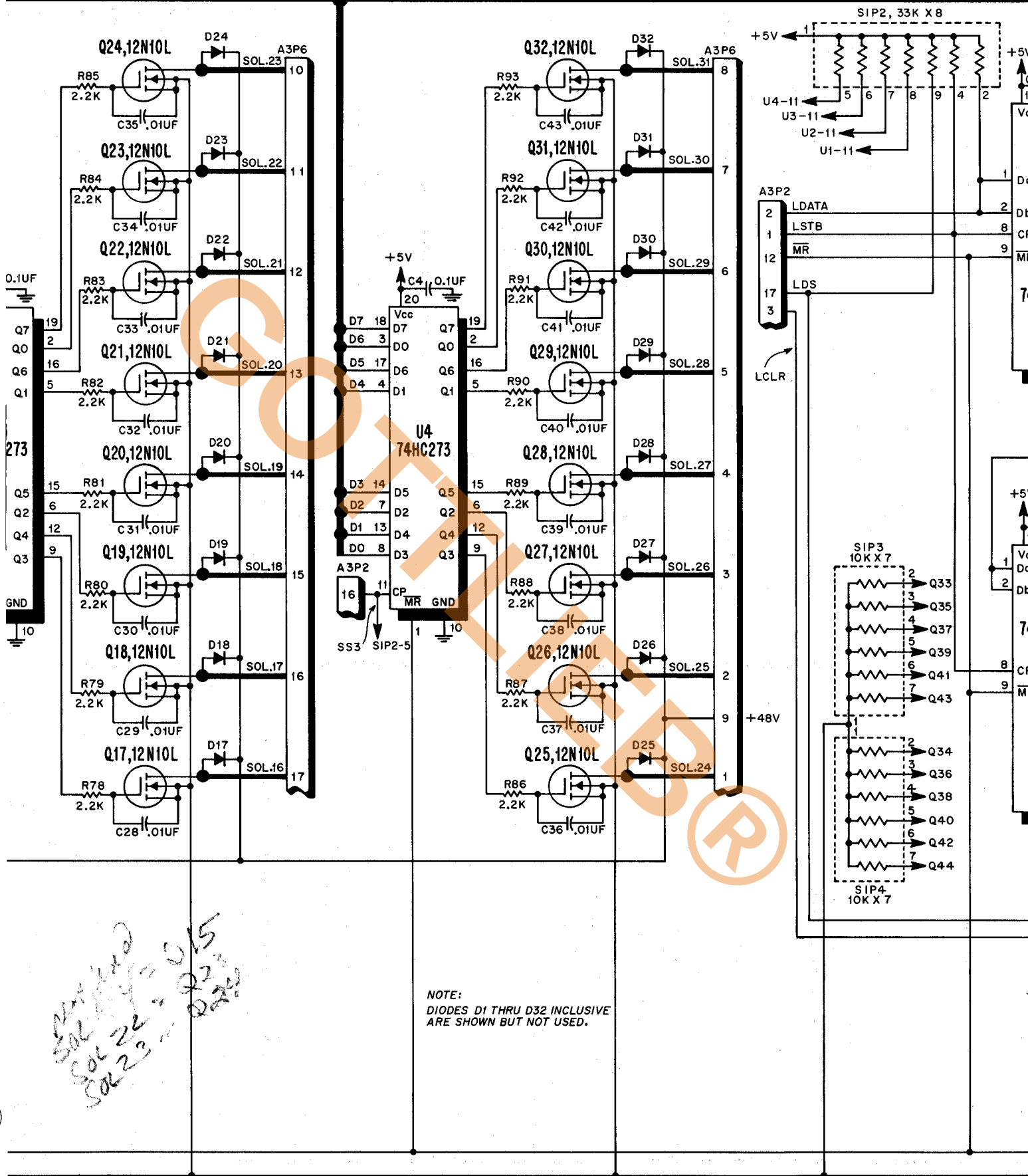
VI. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

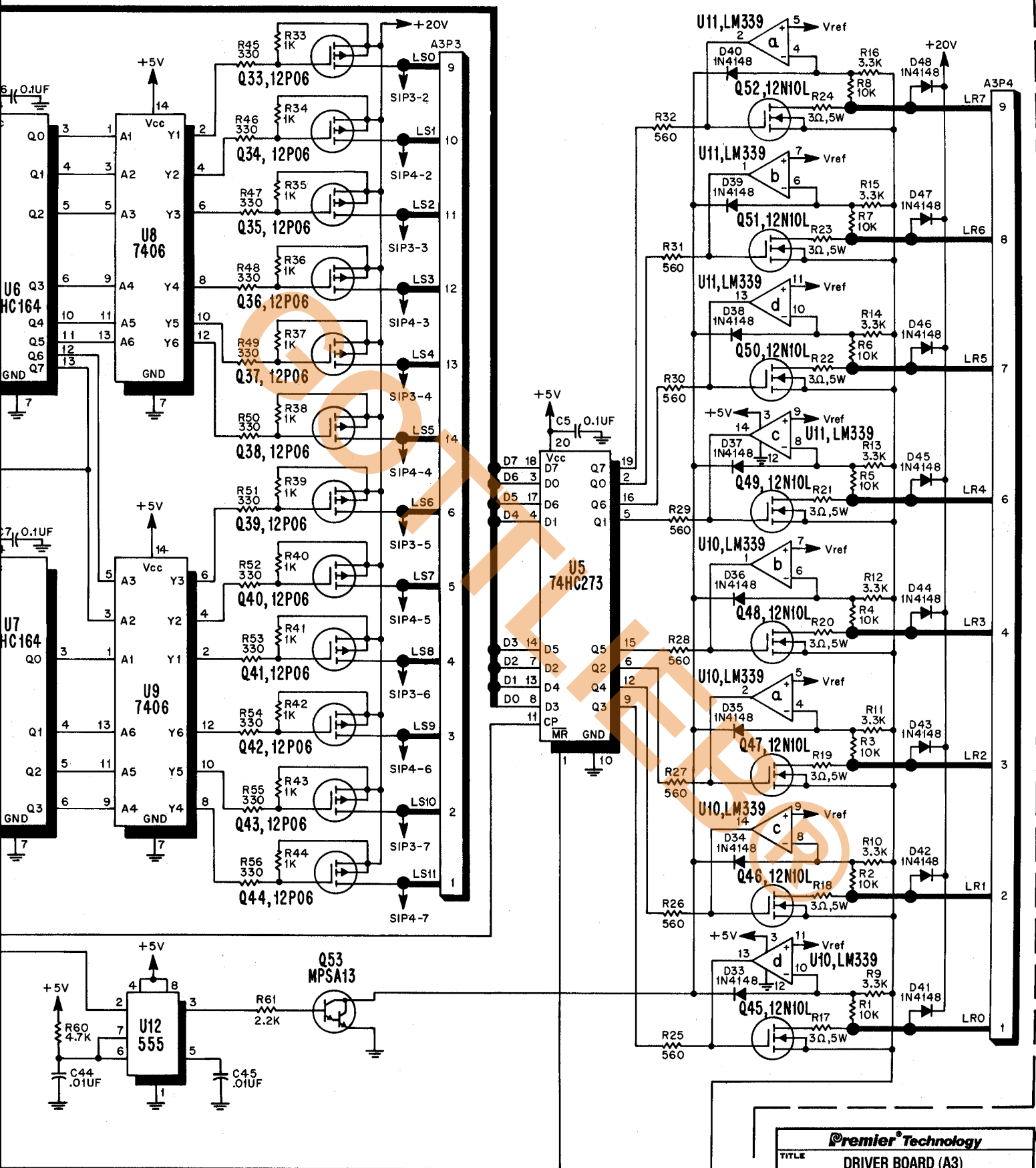






VI. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

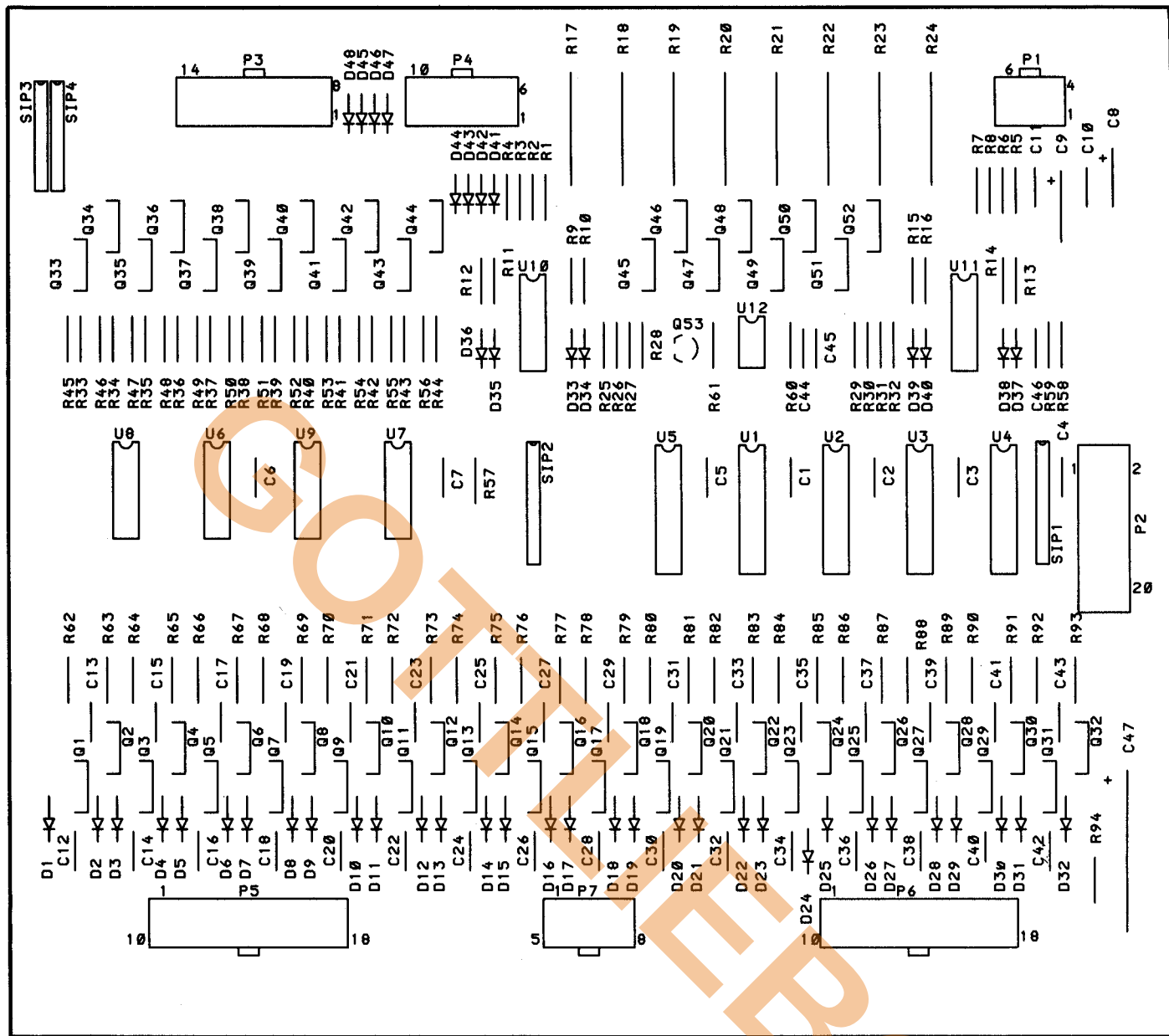




Premier Technology				
TITLE				
DRIVER BOARD (A3)				
SCHEMATIC DIAGRAM				
DRAWN	APPROVED	DATE	E-27034	
R.P.20	RHM	10-12-89		

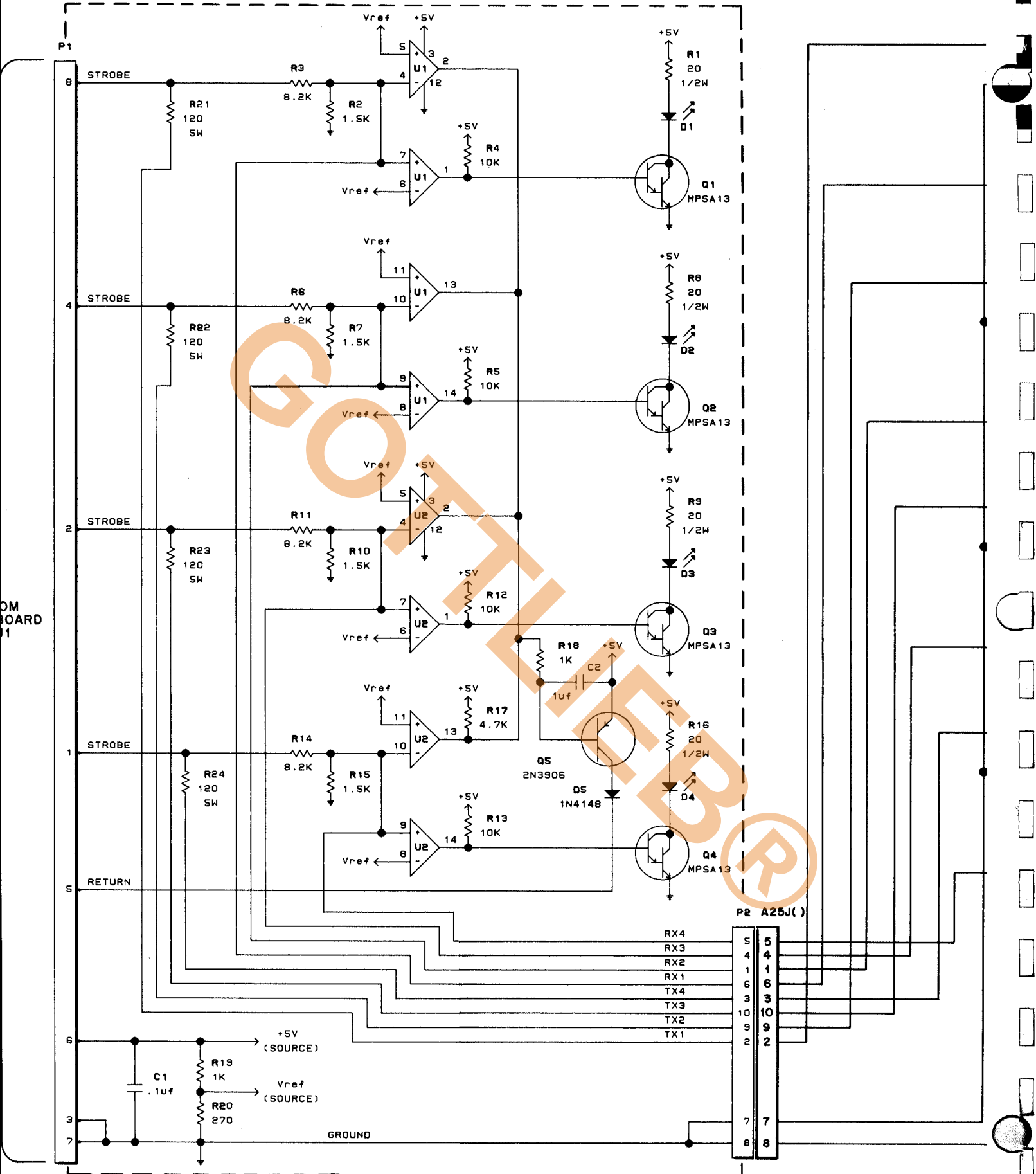
VI. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

DRIVER BOARD (A3) COMPONENT LOCATION



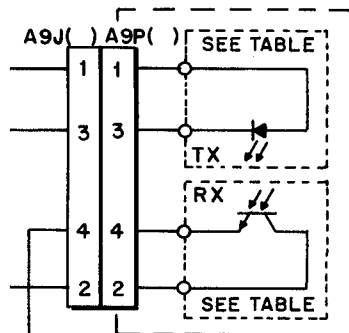
DRIVER BOARD (A3) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER	REFERENCE	DESCRIPTION	PART NUMBER
	Driver Board Assembly (A3)	MA-1358	R58	Resistor, 6.81K Ohm, 1%, 1/4W	XO-943
C1-C7	Capacitor, 0.1 UF, +80% -20%, 50V	XO-230	R59	Resistor, 1K Ohm, 1%, 1/4W	XO-944
C8	Capacitor, 10UF, 20%, 25V	XO-127	R60	Resistor, 4.7K Ohm, 5%, 1/4W	XO-7
C9	Capacitor, 10UF, +80% -20%, 25V	XO-225	R61-R93	Resistor, 2.2K Ohm, 5%, 1/4W	XO-27
C10,C11	Capacitor, .01UF, +80% -20%, 50V	XO-229	R94	Resistor, 27K Ohm, 5%, 1/4W	XO-11
C45,C46			SIP1	Resistor Pack, 4.7K Ohm X 8.5%, 1/4W	XO-161
C12-C44	Capacitor, .01UF, 10%, 50V	XO-696	SIP2	Resistor Pack, 33K Ohm X 8.5%, 1/4W	XO-945
C47	Capacitor, 100UF, 20%, 100V	XO-958	SIP3	Resistor Pack, 10K Ohm X 7.5%, 1/4W	XO-926
D33-D48	Diode, 1N4148	XO-261	SIP4		
Q1-Q32,	Transistor, RFP12N10L, OR IRL530,	XO-947	U1-U5	IC, Octal "D" Flip-Flops, 74HC273	XO-949
Q45-Q52,Q54	N-Channel MOSFET		U6-U7	IC, Shift Register, 74HC164	XO-950
Q33-Q44	Transistor, RFP12P06, IRF9531 OR	XO-948	U8-U9	IC, Buffer, 7406	XO-85
	MT2955 P-Channel MOSFET		U10-U11	IC, Quad Comparator, LM339	XO-583
Q53	Transistor, MPSA13, Darlington	XO-304	U12	IC, Timer, NE555	XO-631
R1-R8	Resistor, 10K Ohm, 5%, 1/4W	XO-18	A3P1	Header, 6 Position	XO-910
R9-R16	Resistor, 3.3K Ohm, 5%, 1/4W	XO-38	A3P2	Header, 20 Position (Ribbon)	XO-940
R17-R24	Resistor, 3 Ohm, 5%, 5W	XO-942	A3P3	Header, 14 Position	XO-914
R25-R32	Resistor, 560 Ohm, 5%, 1/4W	XO-36	A3P4	Header, 10 Position	XO-912
R33-R44	Resistor, 1K Ohm, 5%, 1/4W	XO-5	A3P5,	Header, 18 Position	XO-916
R45-R56	Resistor, 330 Ohm, 5%, 1/4W	XO-34	A3P6		
R57	Resistor, 100K Ohm, 5%, 1/4W	XO-45	A3P7	Header, 8 Position	XO-911

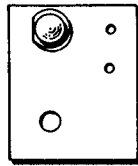


QUAD OPTICAL INTERFACE BOARD SCHEMATIC DIAGRAM

IC DIAGRAMS, PARTS LISTS



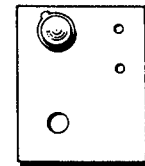
OPTO LED TRANSMITTER BOARD COMPONENT LOCATION



OPTO LED TRANSMITTER BOARD PARTS LIST

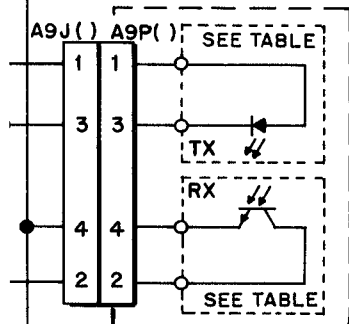
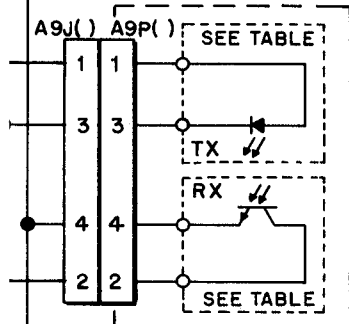
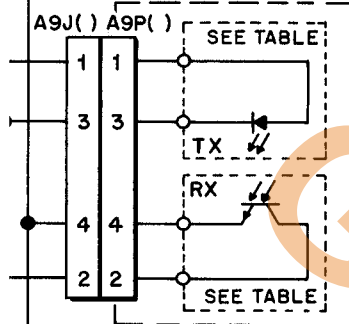
REFERENCE	DESCRIPTION	PART NUMBER
TX	Opto LED Transmitter Assembly Plastic Transmitter LED	SEE TABLE XO-994

OPTO PHOTOTRANSISTOR RECEIVER BOARD COMPONENT LOCATION



OPTO PHOTOTRANSISTOR RECEIVER BOARD PARTS LIST

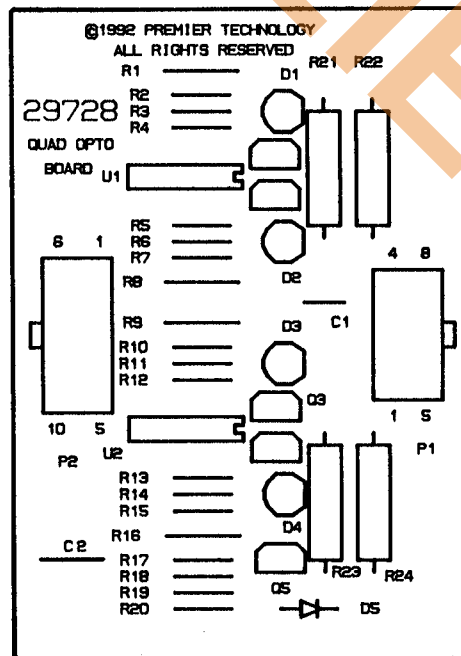
REFERENCE	DESCRIPTION	PART NUMBER
RX	Opto Phototransistor Receiver Assembly Plastic Phototransistor	SEE TABLE XO-993



BRACKET AND OPTO BOARD ASSEMBLY REFERENCES						
ASSEMBLY	CONNECTOR NO.	BRACKET NO.	LOCATION	SWITCH NO.	TRANSMITTER	RECEIVER
31282	A9P21	31285	LEFT TOP	SW 80	31240	31241
31497	A9P22	31284	LEFT RAMP	SW 90	31240	31241
31500	A9P23	31499	HOME RUN	SW A0	31240	31241
31522	A9P24	30461	UPKICKER	SW B0	31240	31241
31519	A9P25	31283	RIGHT TOP	SW 81	31240	31241
31497	A9P26	31284	RIGHT RAMP	SW 91	31240	31241
30346	A9P27	29662	SCOOP	SW A1	MA-1330	MA-1331

NOTE: BRACKET AND OPTO BOARD ASSEMBLY DOES NOT INCLUDE WIRING HARNESS.

QUAD OPTICAL INTERFACE BOARD COMPONENT LOCATION

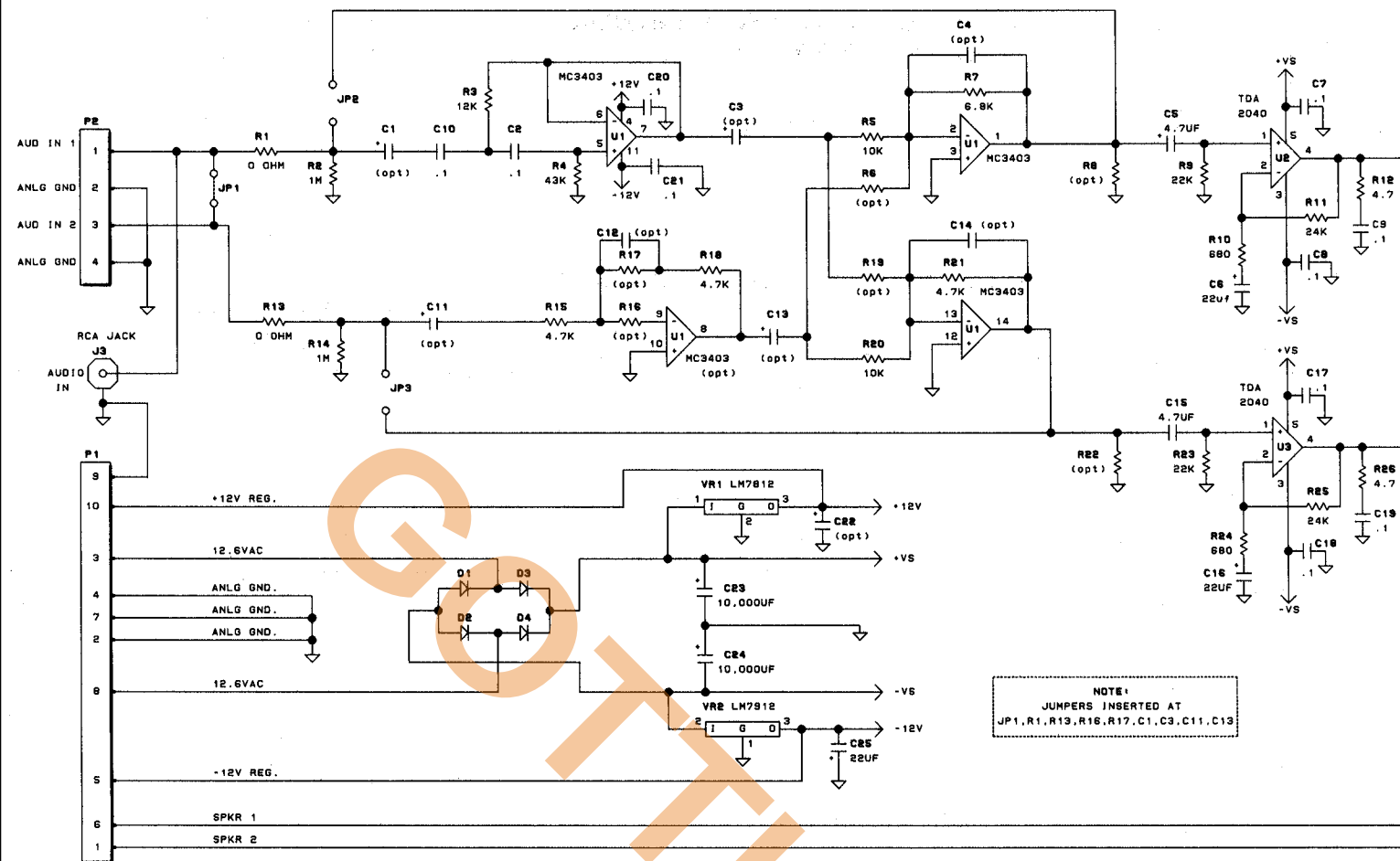


QUAD OPTICAL INTERFACE BOARD PARTS LIST

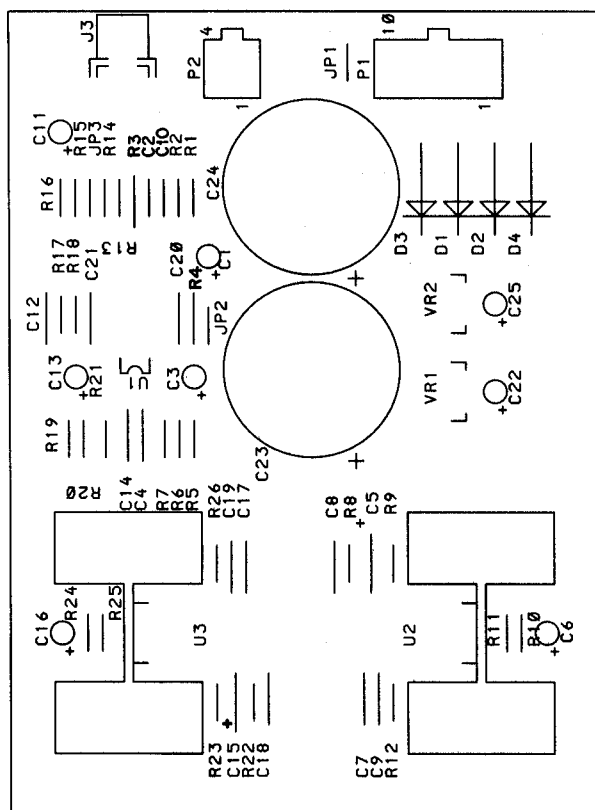
REFERENCE	DESCRIPTION	PART NUMBER
C1	QUAD OPTICAL INTERFACE BOARD (A25)	MA-1925
C2	CAPACITOR, 0.1UF, +80%-20%, 50V	XO-230
D1-D4	CAPACITOR, 1UF, NON-POLAR, 50V	XO-746
Q1-Q4	DIODE, MV5752 (LED,RED)	XO-270
Q5	TRANSISTOR, NPN, MPS-A13	XO-304
R1,R8,R9,R16	TRANSISTOR, PNP, 2N3906	XO-588
R2,R7,R10,R15	RESISTOR, 20 OHM, 5%, 1/2W	XO-65
R3,R6,R11,R14	RESISTOR, 1.5K OHM, 5%, 1/4W	XO-20
R4,R5,R12,R13	RESISTOR, 8.2K OHM, 5%, 1/4W	XO-589
R17	RESISTOR, 10K OHM, 5%, 1/4W	XO-18
R18,R19	RESISTOR, 4.7K OHM, 5%, 1/4W	XO-7
R20	RESISTOR, 1K OHM, 5%, 1/4W	XO-5
R21,R24	RESISTOR, 270 OHM, 5%, 1/4W	XO-68
U1,U2	RESISTOR, 120 OHM, 10%, 5W	XO-1042
P1	IC, QUAD COMPARTOR, LM339	XO-583
P2	HEADER, 8 POSITION	XO-911
	HEADER, 10 POSITION	XO-912
	SUPPORT, SRS-8-6N, (4)	23984

OPTO LED TRANSMITTER BOARD (TX) SCHEMATIC DIAGRAM AND OPTO PHOTOTRANSISTOR RECEIVER BOARD (RX) SCHEMATIC DIAGRAM

VI. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



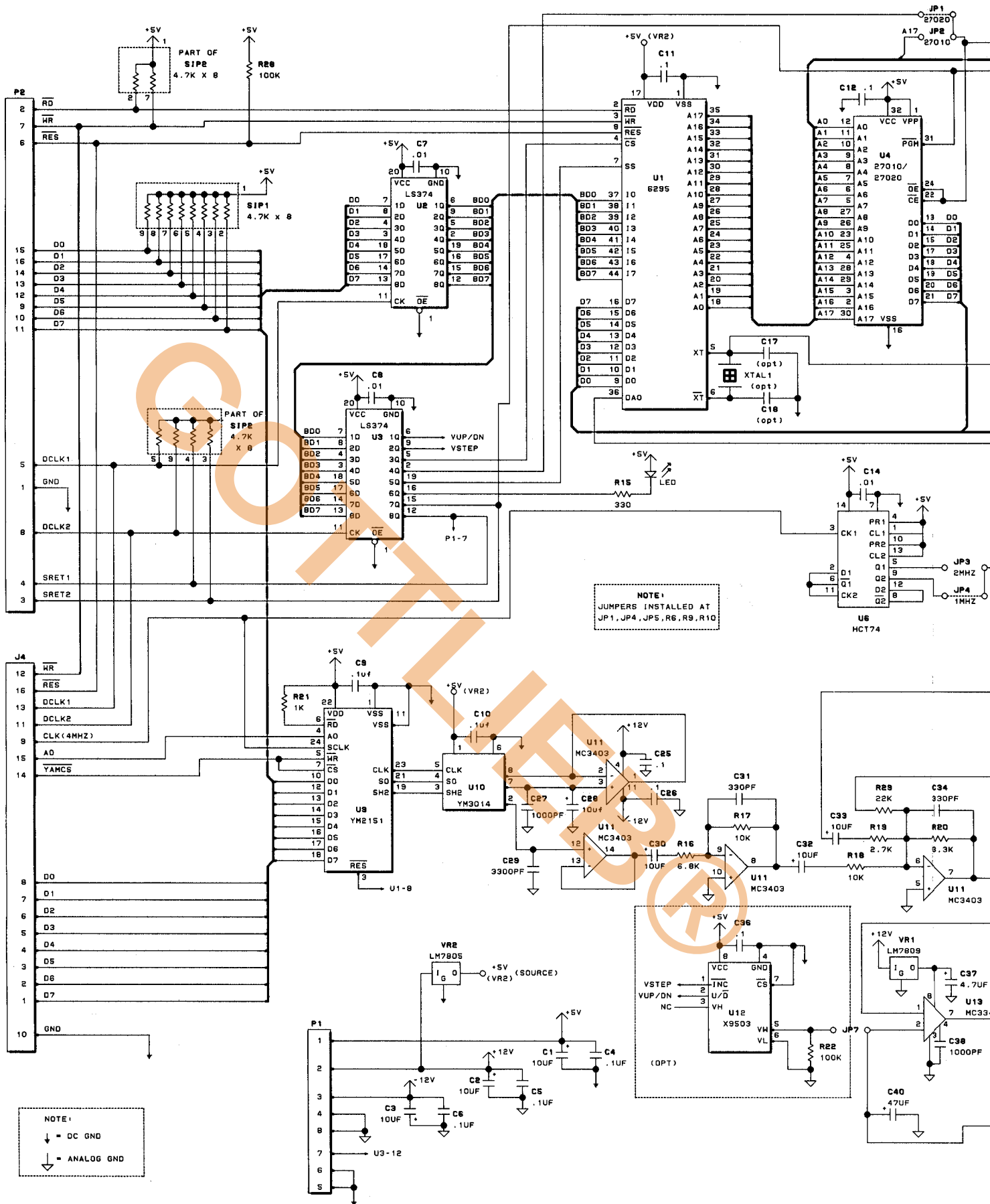
AUXILIARY POWER SUPPLY (A5) COMPONENT LOCATION



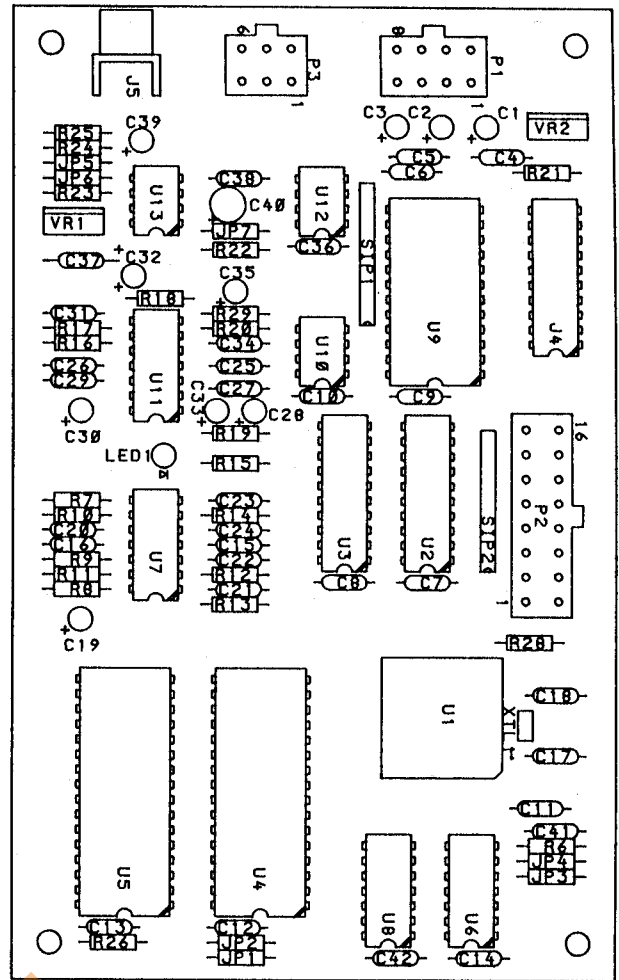
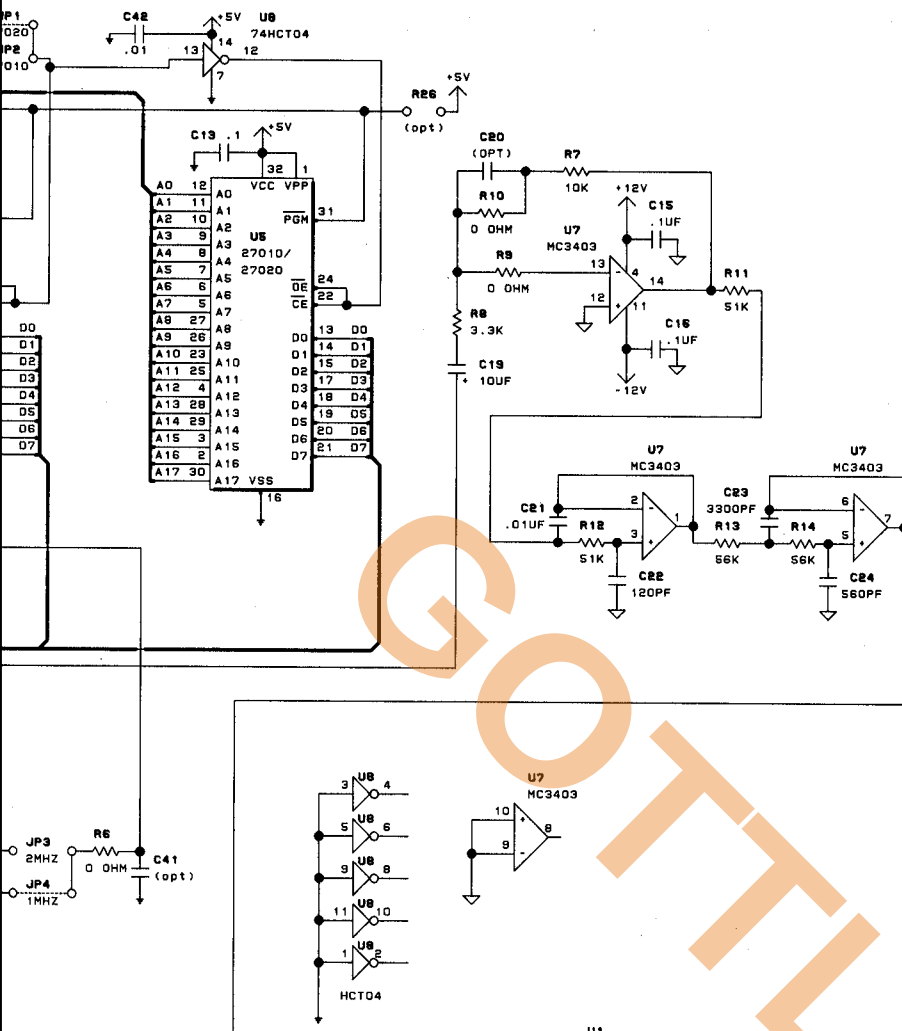
AUXILIARY POWER SUPPLY (A5) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
A5	AUXILIARY POWER SUPPLY	MA-1772
C1, C3, C11, C13	CAPACITOR, 4.7UF, 10%, 10V	XO-469A
C2, C10	CAPACITOR, 0.1UF, 10%, 100V	XO-784
C5, C15	CAPACITOR, 4.7UF, 10%, 10V	XO-226
C6, C16, C25	CAPACITOR, 22UF, +80%-20%, 16V	XO-293
C7, C8, C9, C17, C18, C19, C20, C21	CAPACITOR, 0.1UF, +80%-20%, 50V	XO-230
C23, C24	CAPACITOR, 10,000UF, +80%-20%, 25V	XO-830
D1-D4	DIODE, 1N5401	XO-263
R1, R13, JP1, R16, R17	RESISTOR, 0 OHM, JUMPER	XO-469
R2, R14	RESISTOR, 1 MEGOHM, 5%, 1/4W	XO-604
R3	RESISTOR, 12K OHM, 5%, 1/4W	XO-9
R4	RESISTOR, 43K OHM, 5%, 1/4W	XO-15
R5, R20	RESISTOR, 10K OHM, 5%, 1/4W	XO-18
R7	RESISTOR, 6.8K OHM, 5%, 1/4W	XO-8
R8	RESISTOR, 2.2K OHM, 5%, 1/4W	XO-27
R9, R23	RESISTOR, 22K OHM, 5%, 1/4W	XO-42
R10, R24	RESISTOR, 680 OHM, 5%, 1/4W	XO-139
R11, R25	RESISTOR, 24K OHM, 5%, 1/4W	XO-10
R12, R26	RESISTOR, 4.7 OHM, 5%, 1/4W	XO-800
R15, R18, R21	RESISTOR, 4.7K OHM, 5%, 1/4W	XO-7
U1	IC, QUAD AMP, MC3403P	XO-953
U2, U3	IC, AUDIO AMPLIFIER, TDA2040	XO-1038
VR1	REGULATOR, +12V, LM7812CT	XO-1039
VR2	REGULATOR, -12V, LM7912CT	XO-130
J3	CONNECTOR, RCA	XO-1035
P1	HEADER, 10 POSITION	XO-912
	HEAT SINK	XO-1040

VI. WIRING AND SCHEMATIC DIA

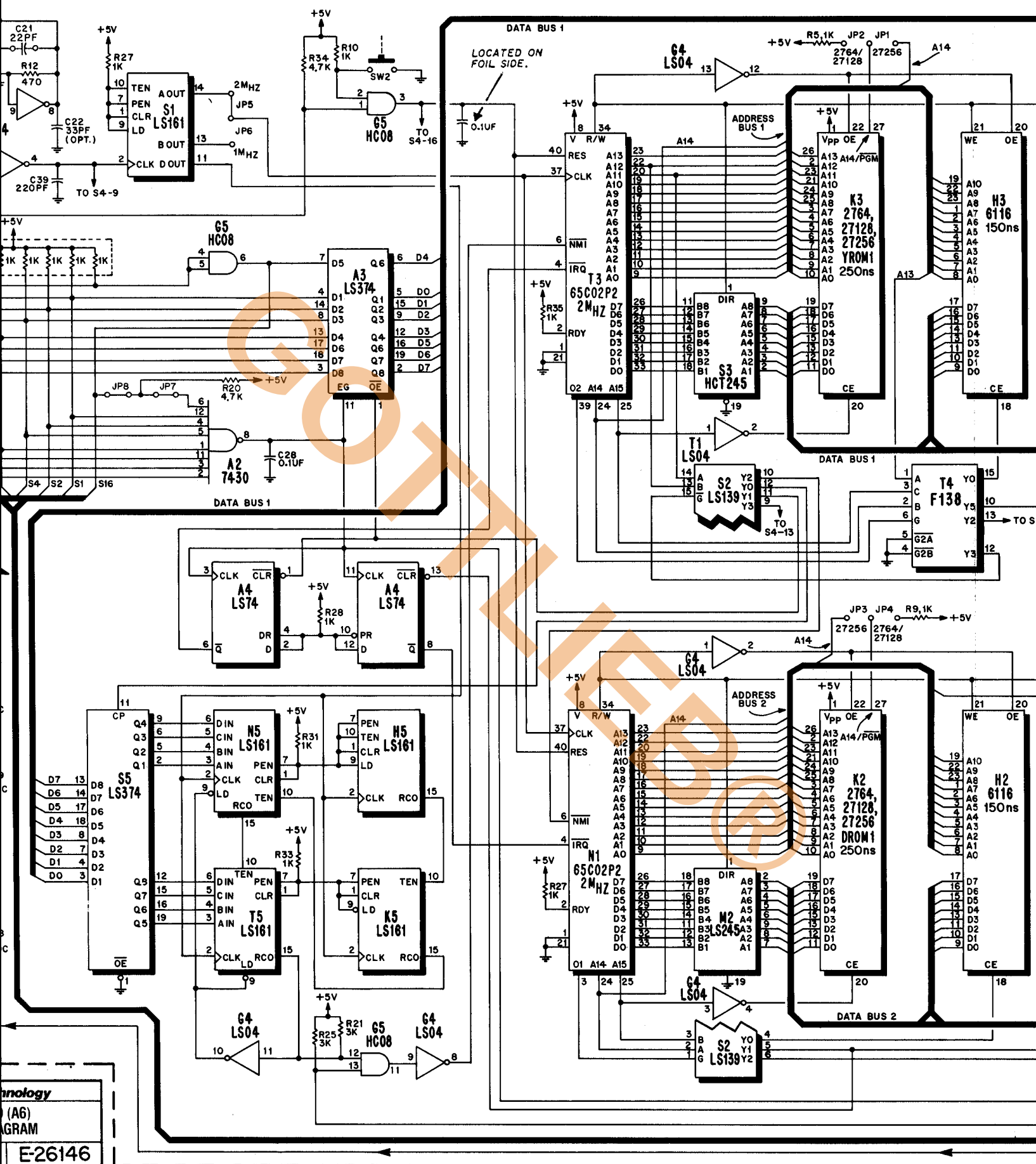


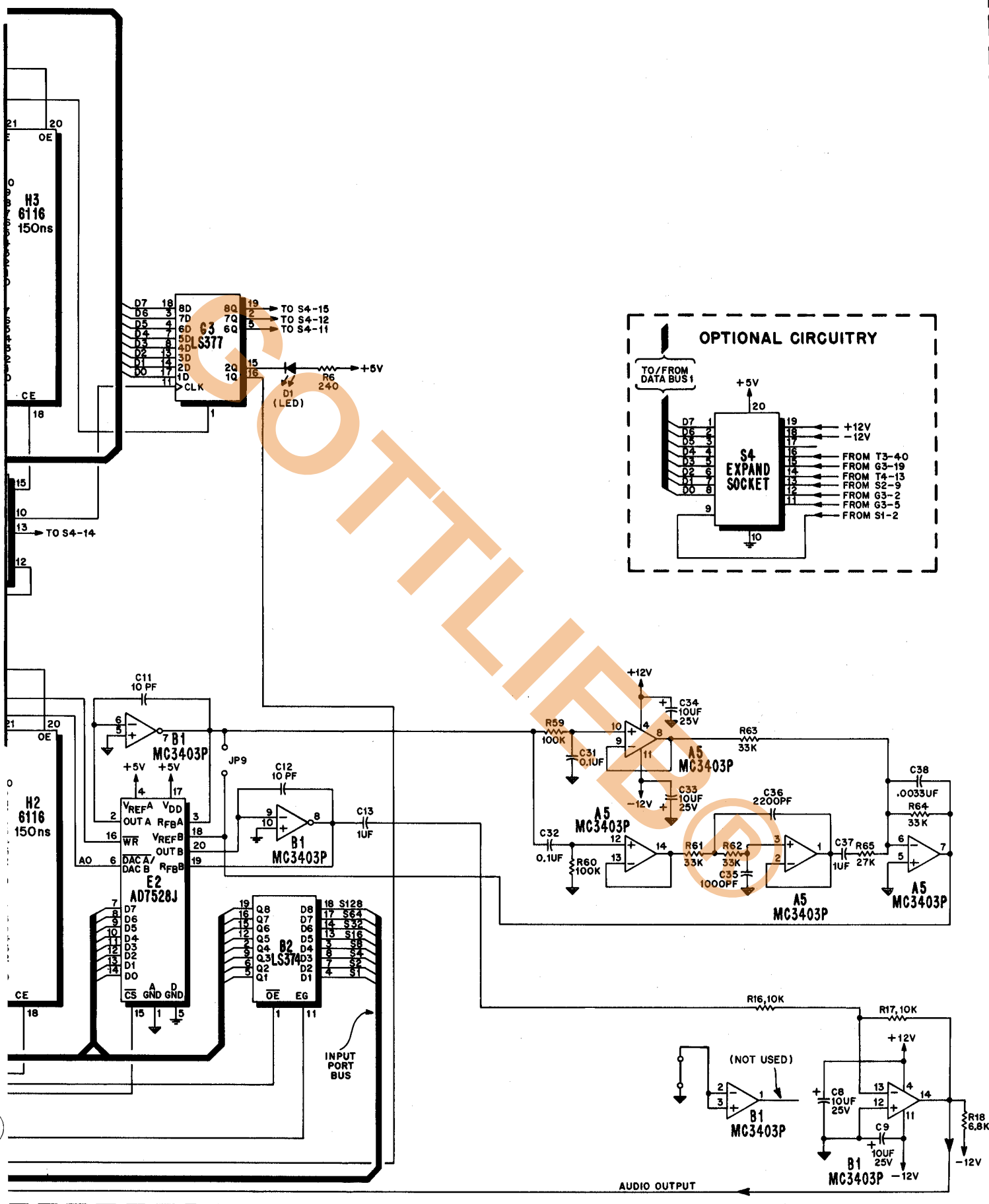
Premier Technology			
TITLE			
AUXILIARY SOUND BOARD (A20)			
SCHEMATIC DIAGRAM			
DRAWN	APPROVED	DATE	
J.B.	RHM	4-8-92	MA-1770

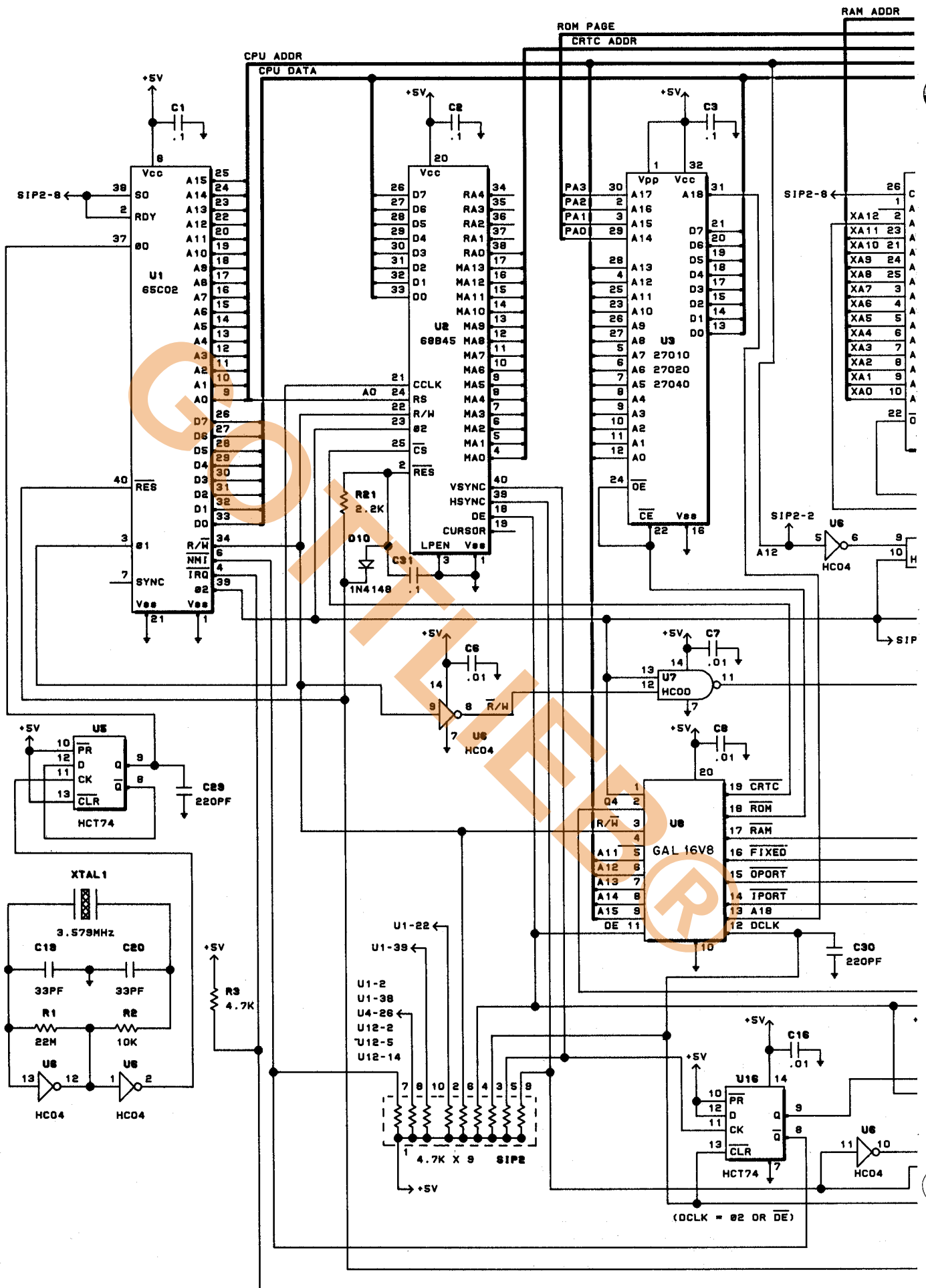
AUXILIARY SOUND BOARD (A20)
COMPONENT LOCATIONAUXILIARY SOUND BOARD (A20)
PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
A20	AUXILIARY SOUND BOARD	MA-1770
C1, C2, C3, C19, C28, C30, C32, C33, C35, C39	CAPACITOR, 10UF, +80%-20%, 16V	XO-1030
C4-C6, C9-C13, C15, C16, C25, C26, C36	CAPACITOR, 0.1UF, +80%-20%, 50V	XO-230
C7, C8, C14, C42	CAPACITOR, .01UF, +80%-20%, 50V	XO-229
C21	CAPACITOR, .01UF, 10%, 50V	XO-696
C22	CAPACITOR, 120PF, 10%, 50V	XO-1032
C23, C29	CAPACITOR, 3300PF, 10%, 100V	XO-600
C24	CAPACITOR, 560PF, 10%, 50V	XO-681
C31, C34	CAPACITOR, 330PF, 10%, 50V	XO-1033
C37	CAPACITOR, 4.7UF, 10%, 10V	XO-226
C38	CAPACITOR, 1000PF, 10%, 100V	XO-296
C40	CAPACITOR, 47UF, 10V	XO-227
C41	DIODE, MV5752, RED	XO-270
D1, D2, D3, D4, D5, D6, D7	RESISTOR, 10K OHM, 5%, 1/4W	XO-18
R7, R17, R18	RESISTOR, 3.3K OHM, 5%, 1/4W	XO-38
R8, R20	RESISTOR, 0 OHM, JUMPER	XO-469
R6, R9, R10, JP1, JP4, JP5	RESISTOR, 51K OHM, 5%, 1/4W	XO-44
R11, R12	RESISTOR, 56K OHM, 5%, 1/4W	XO-771
R13, R14	RESISTOR, 330 OHM, 5%, 1/4W	XO-34
R15	RESISTOR, 6.8K OHM, 5%, 1/4W	XO-8
R16	RESISTOR, 2.7K OHM, 5%, 1/4W	XO-6
R19	RESISTOR, 1K OHM, 5%, 1/4W	XO-5
R21, R25	RESISTOR, 1MEG OHM, 5%, 1/4W	XO-604
R23	RESISTOR, 100K OHM, 5%, 1/4W	XO-45
R28	RESISTOR, 22K OHM, 5%, 1/4W	XO-42
R29	IC, MSM6295, SPEECH CHIP	*XO-1023
U1	IC, 74LS374, OCTAL "D" FLIP-FLOP	XO-96
U2, U3	IC, 27C010 (SPECIFIED PER GAME)	
U4, U5	IC, 74HCT74, "D" FLIP-FLOP	XO-889
U6	IC, MC3403P, QUAD AMP	XO-953
U7, U11	IC, 74HCT04, HEX INVERTER	XO-1026
U8	IC, YM2151, SOUND CHIP	XO-882
U9	IC, YM3014, SERIAL DAC	XO-883
U10	IC, MC3340P, VCA, AMPLIFIER	XO-1028
U13	SOCKET, 20 PIN	XO-491
J4	JACK, RCA	XO-1035
J5	HEADER, 8 POSITION	XO-911
P1	HEADER, 6 POSITION	XO-910
P3	SOCKET, 32 PIN	XO-1036
U4, U5	SOCKET, 24 PIN	XO-529
U9	PCB ASSEMBLY, P/O *XO-1023	27922
VR1	IC, LM7809CT, REGULATOR	XO-1037
VR2	IC, 5V REGULATOR	XO-663

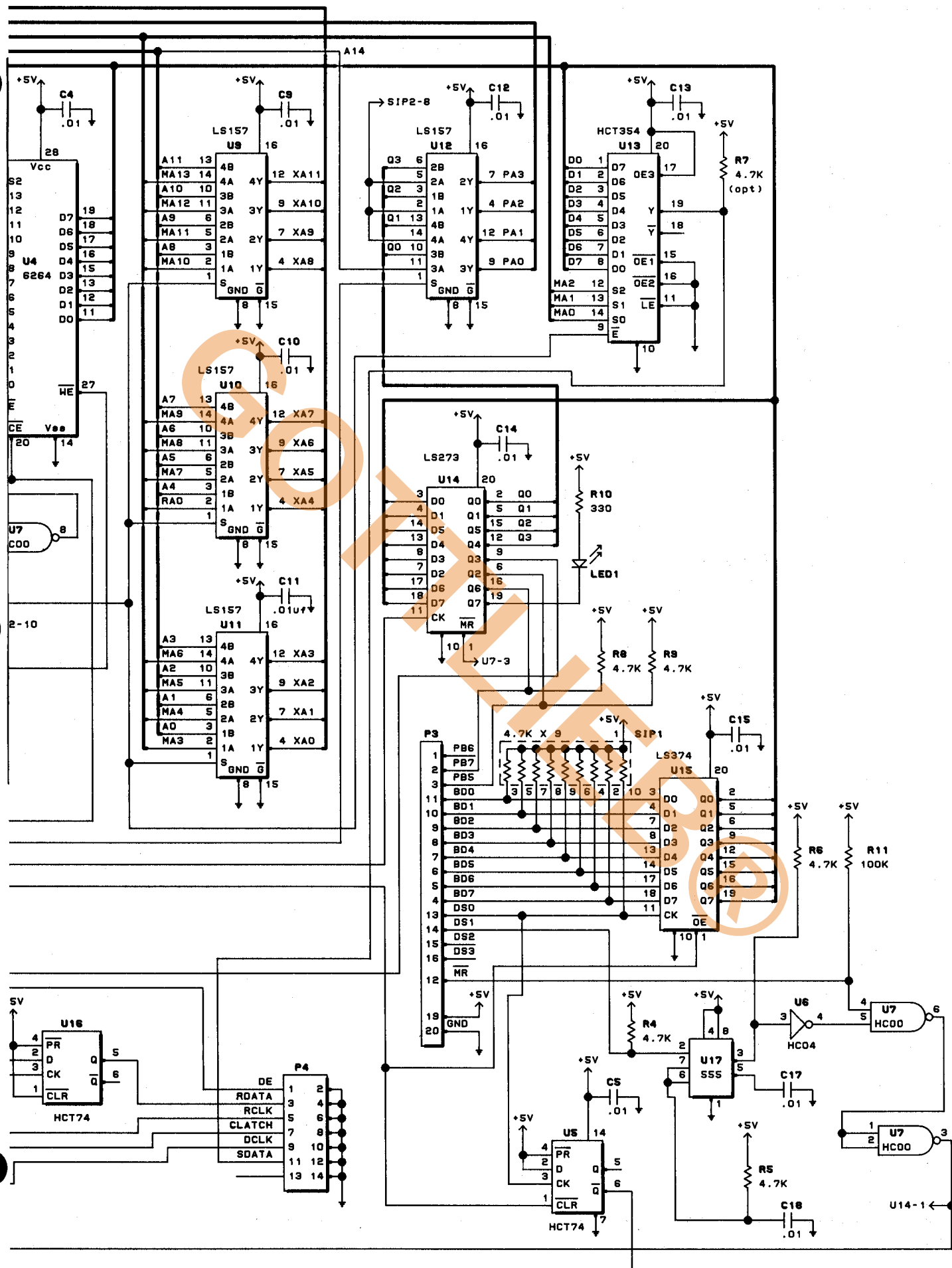
VI. WIRING AND SCHEMATIC DIA

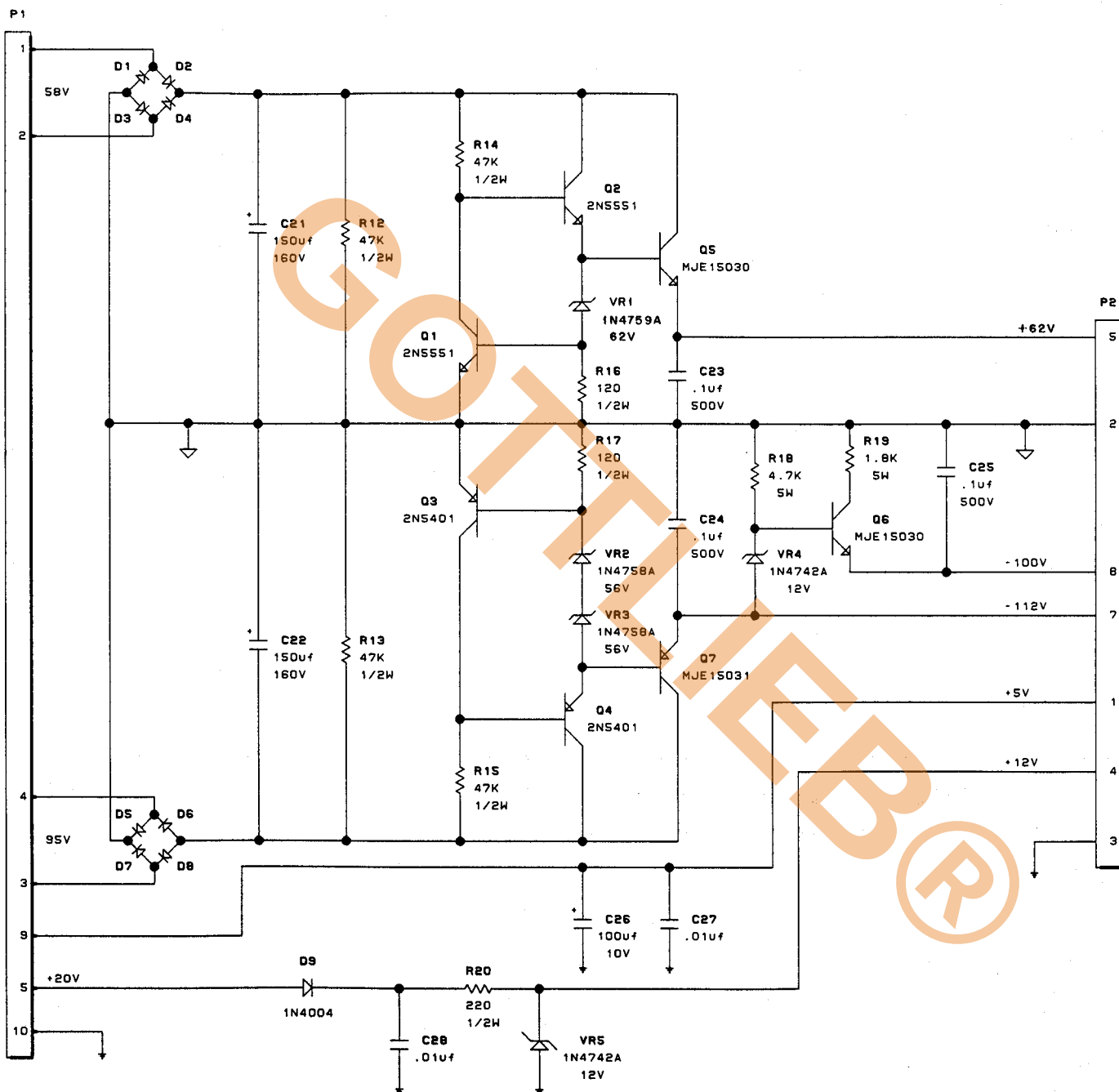






VI. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



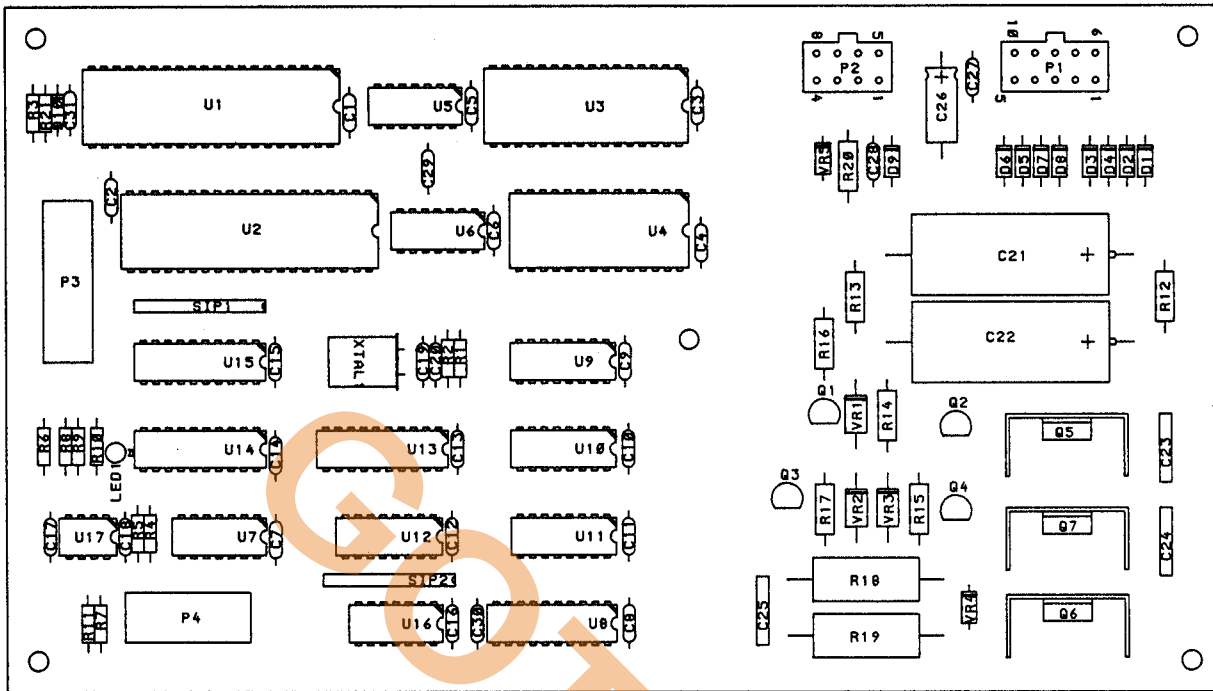


Premier Technology			
TITLE			
DISPLAY CONTROLLER (A8)			
SCHEMATIC DIAGRAM			
DRAWN	APPROVED	DATE	
C.B.	RHM	4-8-92	MA-1739

VI. WIRING AND SCHEMATIC DIAGRAMS, PARTS

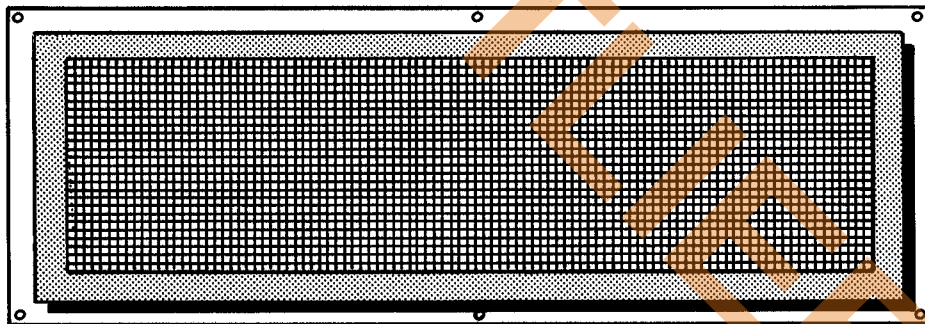
DISPLAY CONTROLLER (A8) COMPONENT LOCATION

DISPL

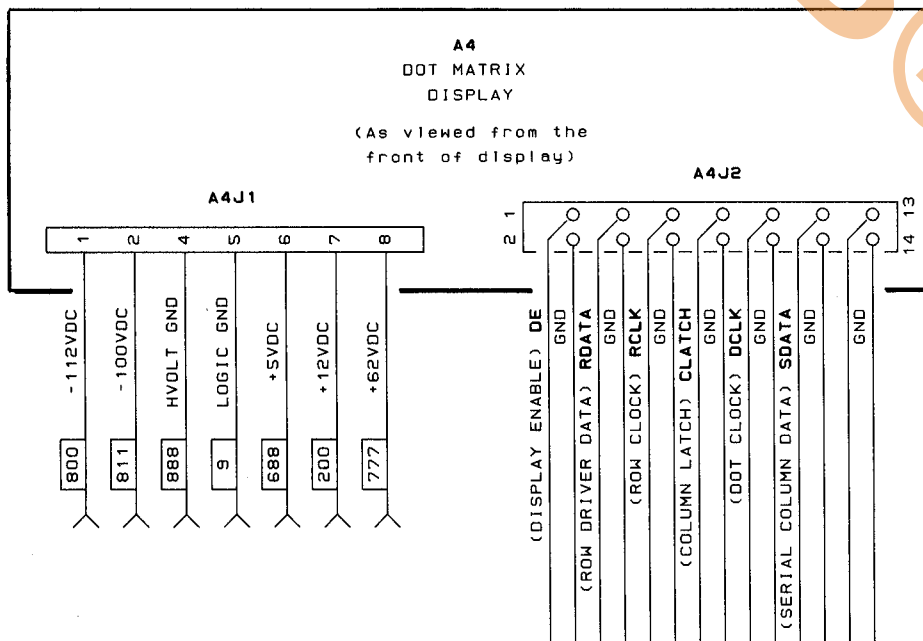


REFERENCE	DESCRIPTION
A8	DISPLAY CONTROLLER
C1-C3	CAPACITOR
C4-C18	CAPACITOR
C27, C28	CAPACITOR
C19, C20	CAPACITOR
C21, C22	CAPACITOR
C23, C25	CAPACITOR
C26	CAPACITOR
C29, C30	CAPACITOR
C31	CAPACITOR
D1-D9	DIODE, 1N
D10	DIODE, 1N
LED 1	DIODE, LED
Q1, Q2	TRANSISTOR
Q3, Q4	TRANSISTOR
Q5, Q6	TRANSISTOR
Q7	TRANSISTOR
R1	RESISTOR
R2	RESISTOR
R3-R6, R8, R9	RESISTOR
R10	RESISTOR
R11	RESISTOR
R12-R15	RESISTOR
R16-R17	RESISTOR
R18	RESISTOR
R19	RESISTOR
R20	RESISTOR
R21	RESISTOR
SIP1, SIP2	RESISTOR
U1	IC, 65C02
U2	IC, 68B45
U4	IC, 6264L
U5, U16	IC, 74HCT
U6	IC, 74HC0
U7	IC, 74HC0
U8	IC, GAL16
U9-U12	IC, 74LS1
U13	IC, 74HCT
U14	IC, 74LS2
U15	IC, 74LS3
U17	IC, NE555
VR1	DIODE, ZENER
VR2, VR3	DIODE, ZENER
VR4, VR5	DIODE, ZENER
XTAL1	CRYSTAL
P1	HEADER, 1
P2	HEADER, 8
P3	HEADER, 2
P4	HEADER, 1
	HEATSINK, 3
	SOCKET, 2

DOT MATRIX DISPLAY (A4)



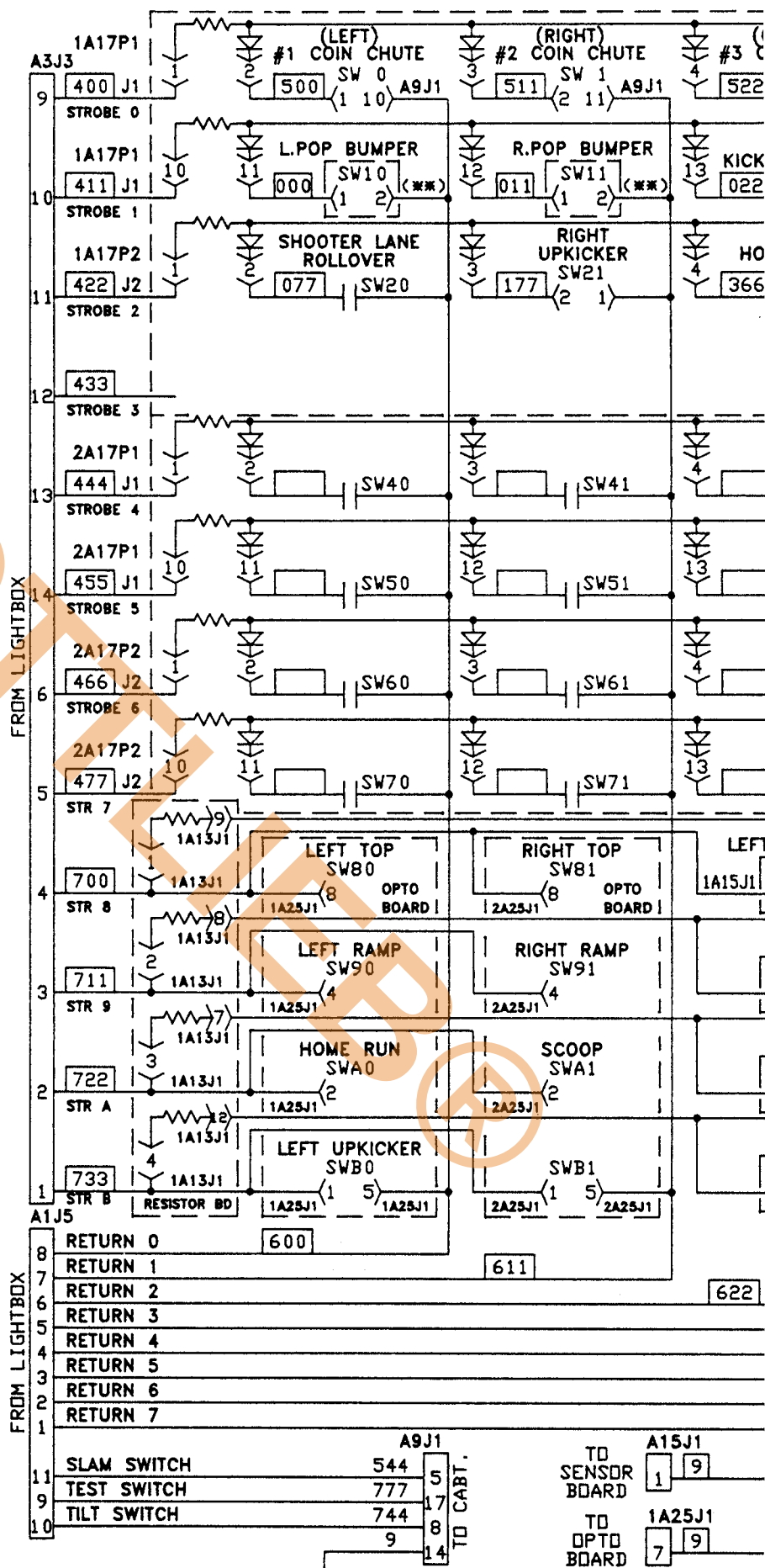
DESCRIPTION	PART NUMBER
DOT MATRIX DISPLAY	29151



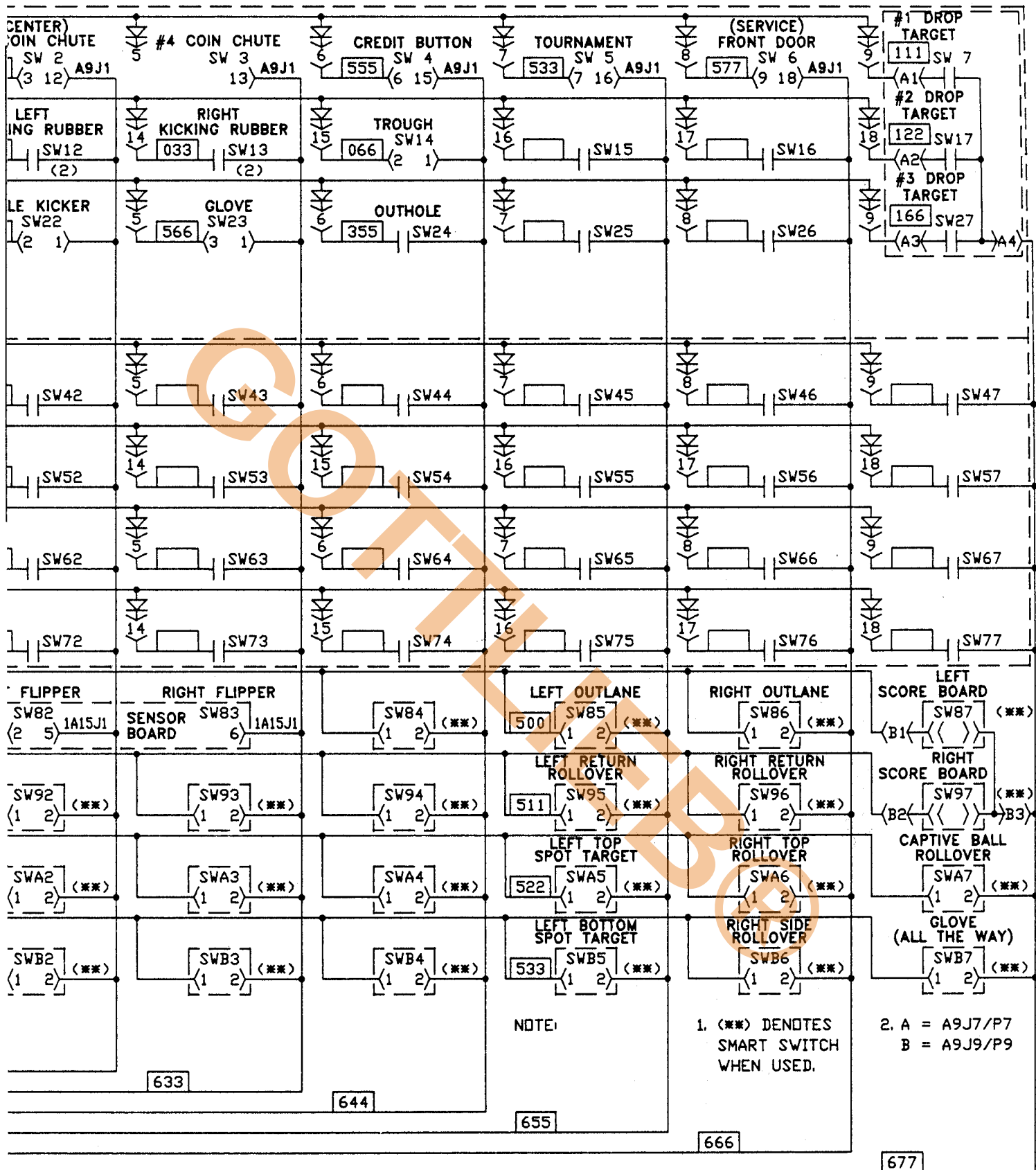
AY CONTROLLER (A8)

PARTS LIST

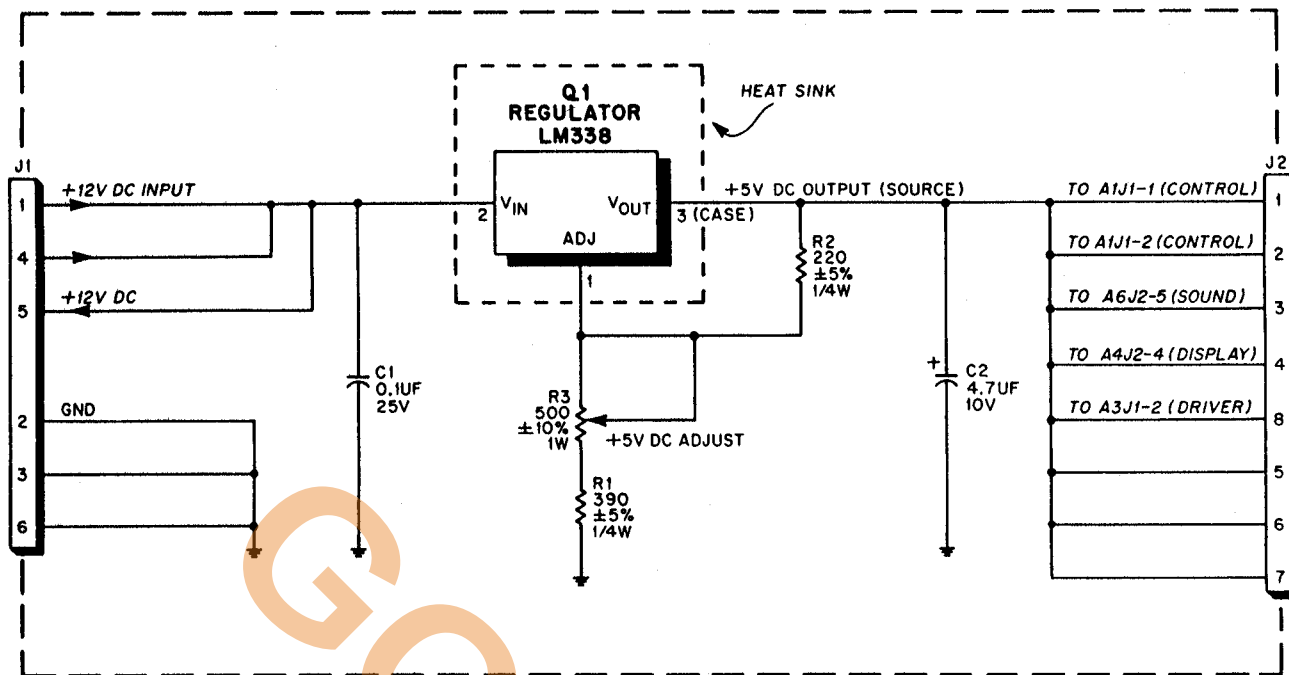
	PART NUMBER
CONTROLLER	MA-1739
0.1UF, +80%-20%	XO-230
.01UF, +80%-20%	XO-229
33PF, 10%, 100V	XO-896
150UF, 160V	XO-1133
0.1UF, 500V	XO-886
100UF, 10V	XO-211
220PF, 10%, 100V	XO-694
0.1UF, 100V	XO-784
004	XO-254
148	XO-261
RED, MV5752	XO-270
NPN, 2N5551	XO-1141
PNP, 2N5401	XO-1142
NPN, MJE15030	XO-1143
PNP, MJE15031	XO-1144
22 MEGOHM, 5%, 1/4W	XO-74
10K OHM, 5%, 1/4W	XO-18
4.7K OHM, 5%, 1/4W	XO-7
330 OHM, 5%, 1/4W	XO-34
100K OHM, 5%, 1/4W	XO-45
47K OHM, 5%, 1/4W	XO-1135
120 OHM, 5%, 1/4W	XO-1136
4.7K OHM, 5%, 5W	XO-1137
1.8K OHM, 5%, 1/4W	XO-1138
220 OHM, 5%, 1/4W	XO-185
2.2K OHM, 5%, 1/4W	XO-27
ACK, 4.7 OHM	XO-906
2, CPU, 2MHZ	XO-927
CONTROLLER	XO-1139
RAM STAT 8K X 8	XO-781
4, DUAL "D" FLIP-FLOP	XO-889
INVERTER	XO-888
QUAD "NAND" GATES	XO-782
8-25L	U8-G
7, QUAD 1 OF 2 MULTIPLEXER	XO-390
54, 1 OF 8 MULTIPLEXER	XO-1140
3, OCTAL DATA LATCH	XO-94
4, OCTAL "D" FLIP-FLOP	XO-96
TIMER	XO-631
ER, 1N4759A, 62V, 5%	XO-267
ER, 1N4758A, 56V, 5%	XO-1164
ER, 1N4742A, 12V, 5%	XO-257
5.79MHZ	XO-1166
POSITION	XO-912
POSITION	XO-911
POSITION, RIBBON	XO-940
POSITION, RIBBON	XO-1134
6038	XO-472
PIN	XO-1036
PIN	XO-491



IND SCHEMATIC DIAGRAMS, PARTS LISTS

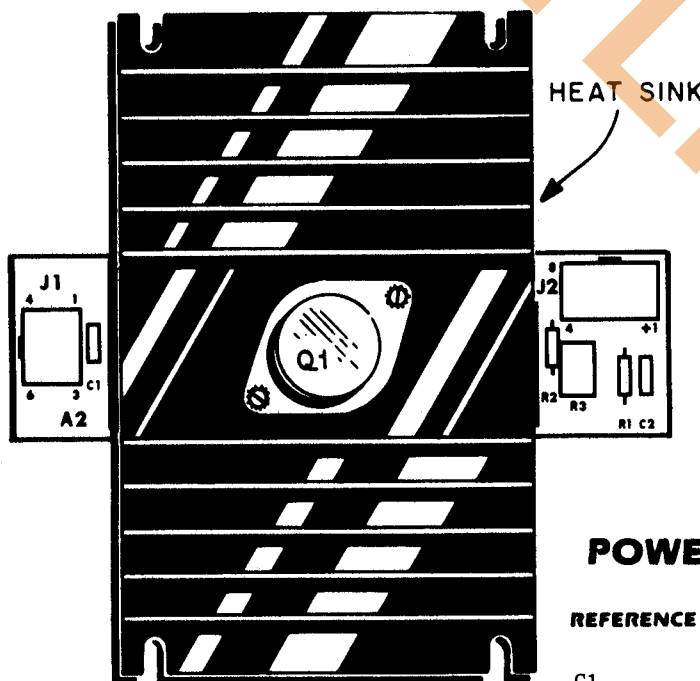


VI. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



Premier Technology			
TITLE			
POWER SUPPLY (A2)			
SCHEMATIC DIAGRAM			
DRAWN P.P.S.	APPROVED RHM	DATE 12 FEB 85	E-24441

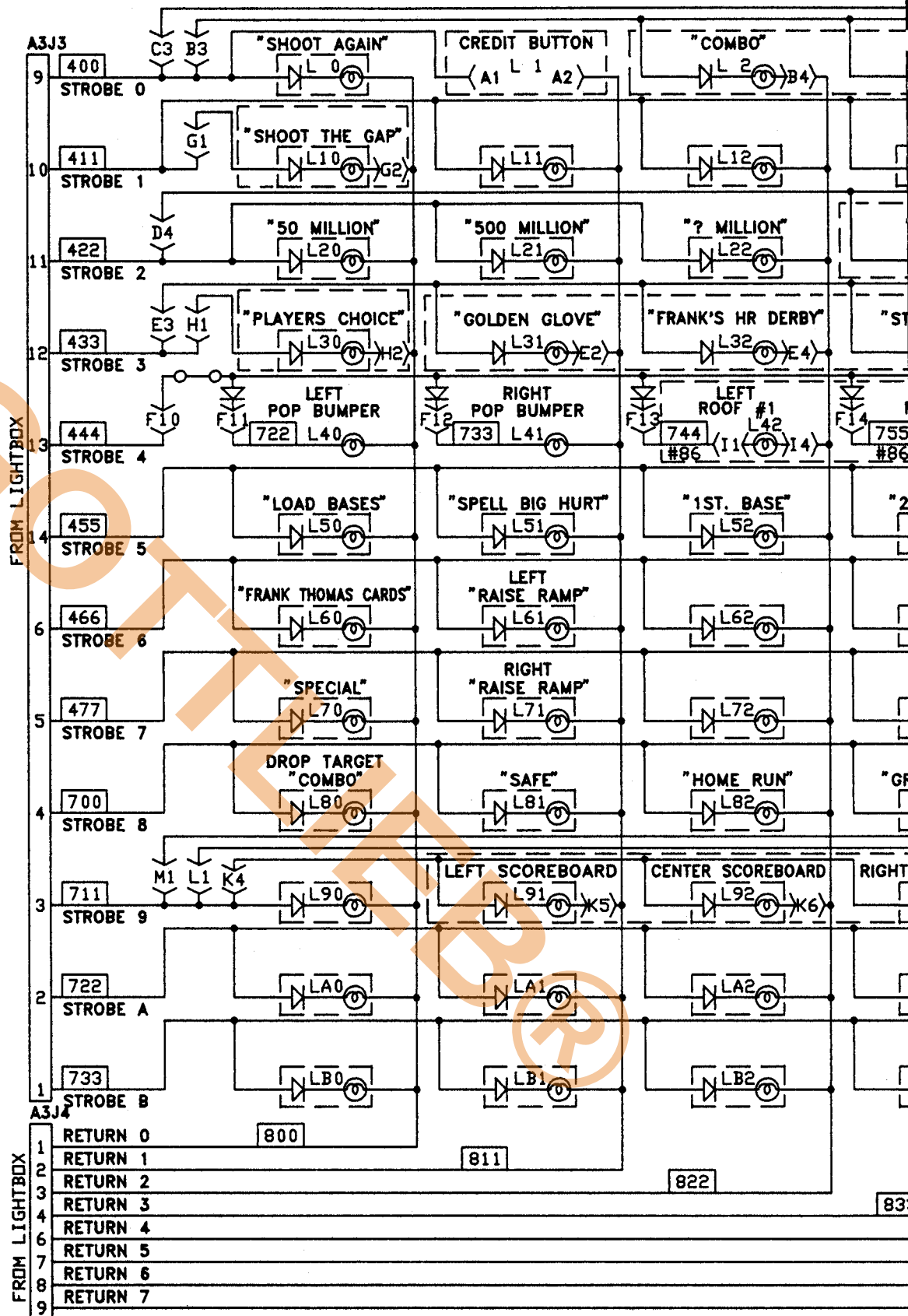
POWER SUPPLY (A2) COMPONENT LOCATION



POWER SUPPLY (A2) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	Power Supply (A2)	MA-1359
C1	Capacitor, 0.1uF, +80% -20%, 50V	XO-230
C2	Capacitor, 4.7uF, 10% 10V	XO-226
J1	Header, 6 Position	XO-910
J2	Header, 8 Position	XO-911
Q1	Regulator, LM338, (5 Amp)	XO-839
R1	Resistor, 390 Ohm, 5%, 1/4W	XO-845
R2	Resistor, 220 Ohm, 5%, 1/4W	XO-21
R3	Resistor, (Pot) 500 Ohm, 10%, 1W	XO-112
	Heat Sink	XO-534
	Insulator (Regulator)	XO-522
	Insulator (Regulator)	XO-523

VI. WIRING AND SCHEMATIC



NOTE: 1. ALL LAMP
DIODES ARE
TYPE 1N4004.

2. ALL LAMPS
ARE TYPE #44
EXCEPT
WHERE NOTED.

2. A = A9J6
G = A9J10/P10
H = A9J11/P11
I = A9J12/P12

J =
K =
L =
M =

DIAGRAMS, PARTS LISTS

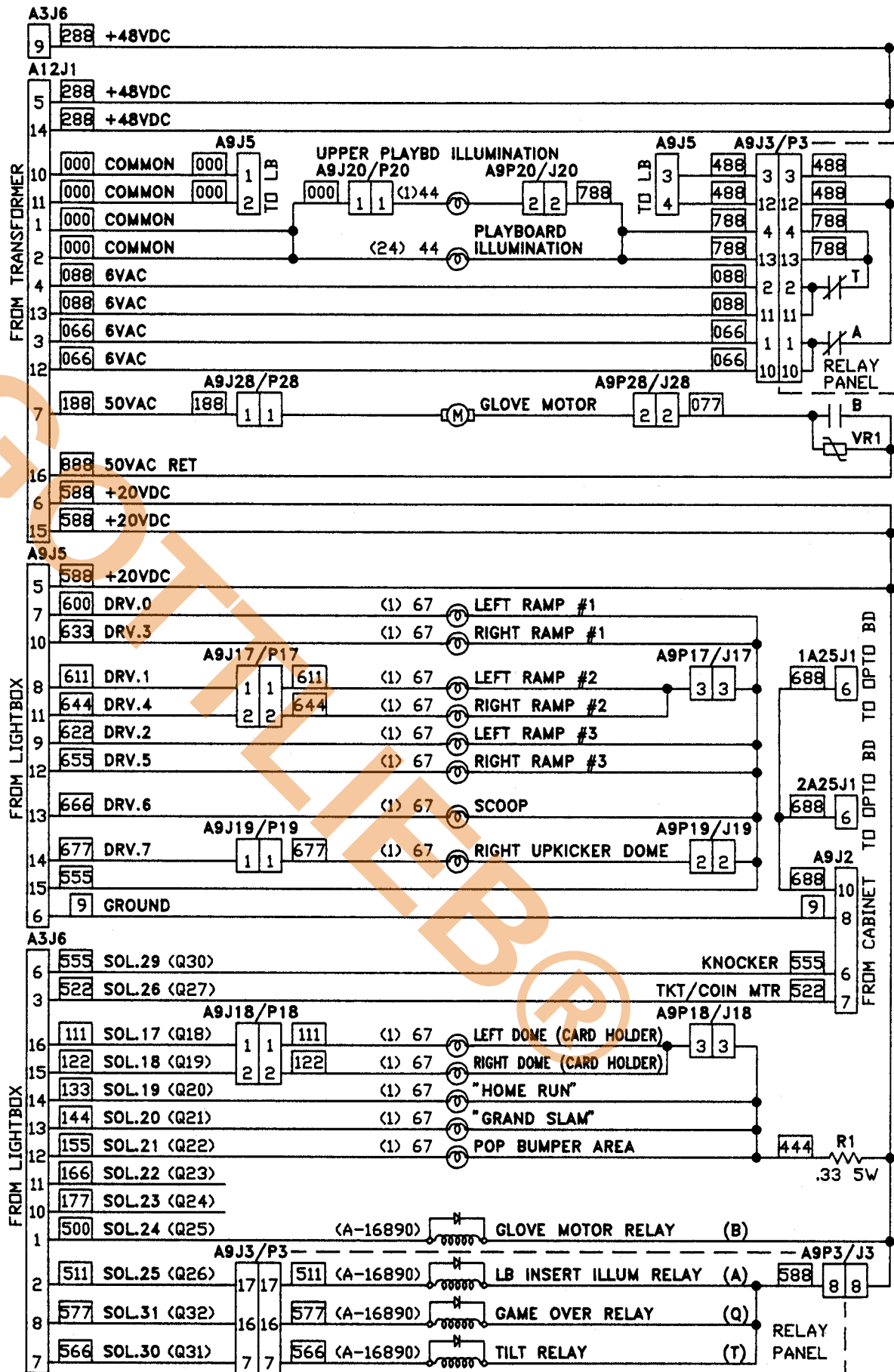


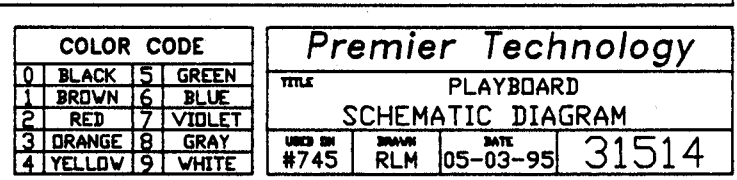
A9J13/P13 B = 1A22J1
A9J9/P9 C = 2A22J1
A9J14/P14 D = 3A22J1
A9J15/P15 E = 4A22J1
F = 1A17J2

COLOR CODE			
0	BLACK	5	GREEN
1	BROWN	6	BLUE
2	RED	7	VIOLET
3	ORANGE	8	GRAY
4	YELLOW	9	WHITE

Premier Technology			
TITLE			
LAMP MATRIX SCHEMATIC DIAGRAM			
USED ON	DRAWN	DATE	
#745	RLM	05-02-95	31513

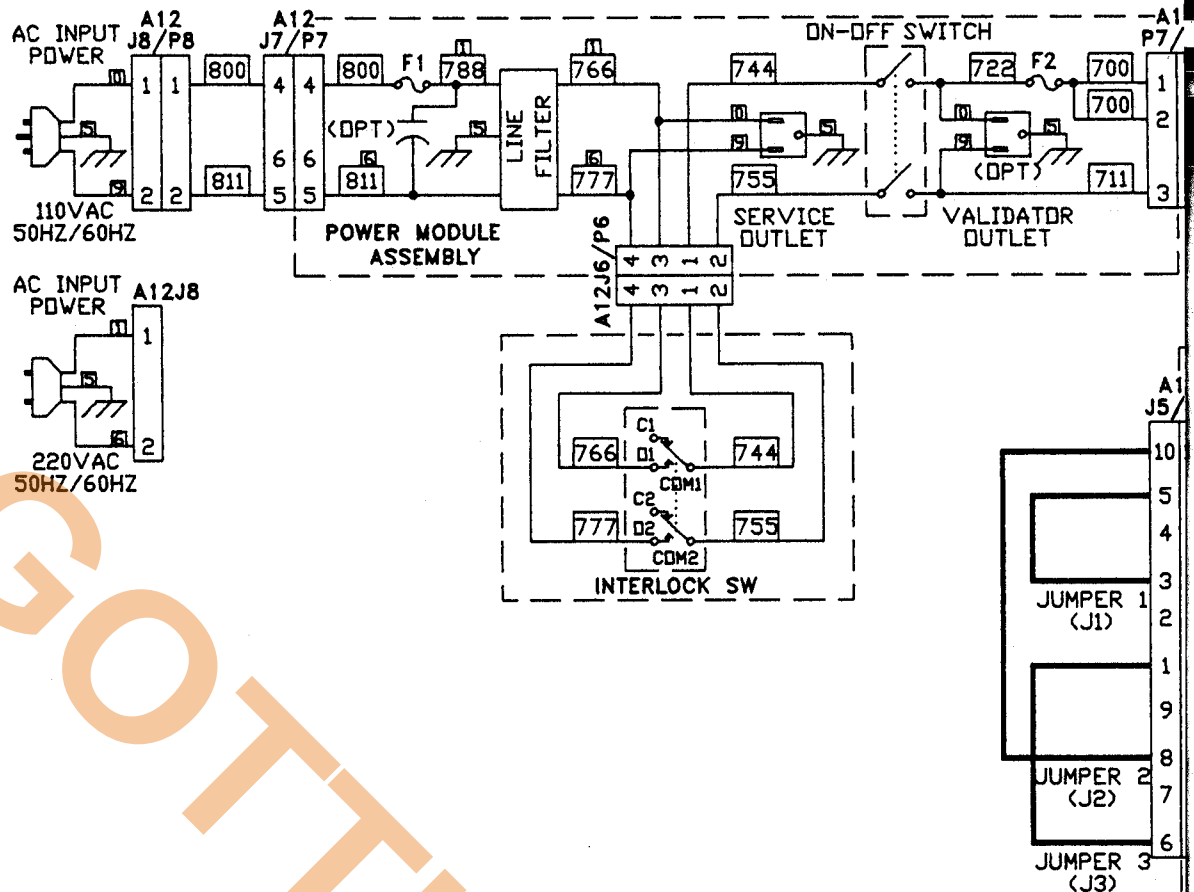
VI. WIRING AND SCHEMATIC





1. ALL DIODES ARE TYPE 1N4004.

VI. WIRING AND SCHEMATIC



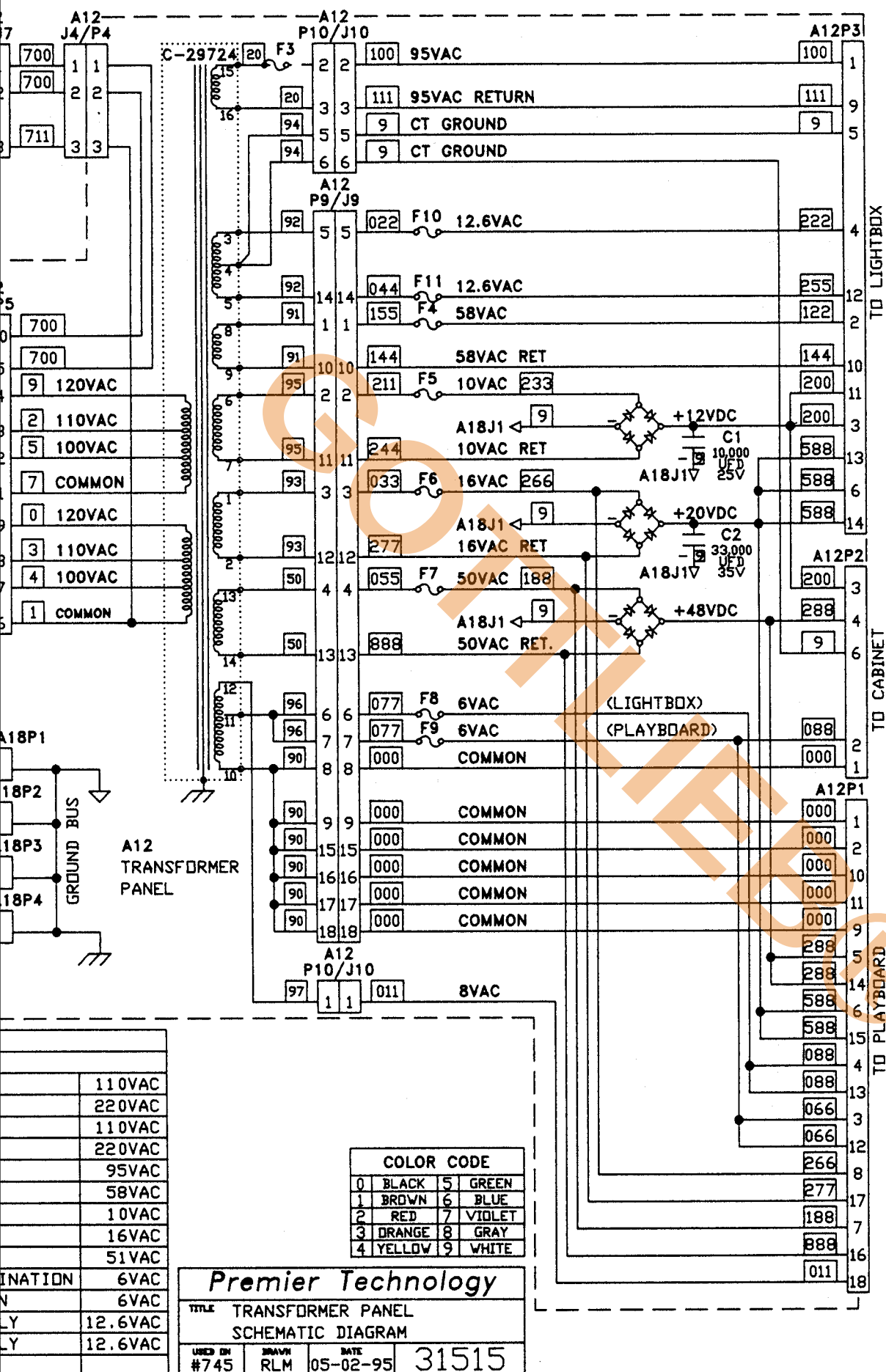
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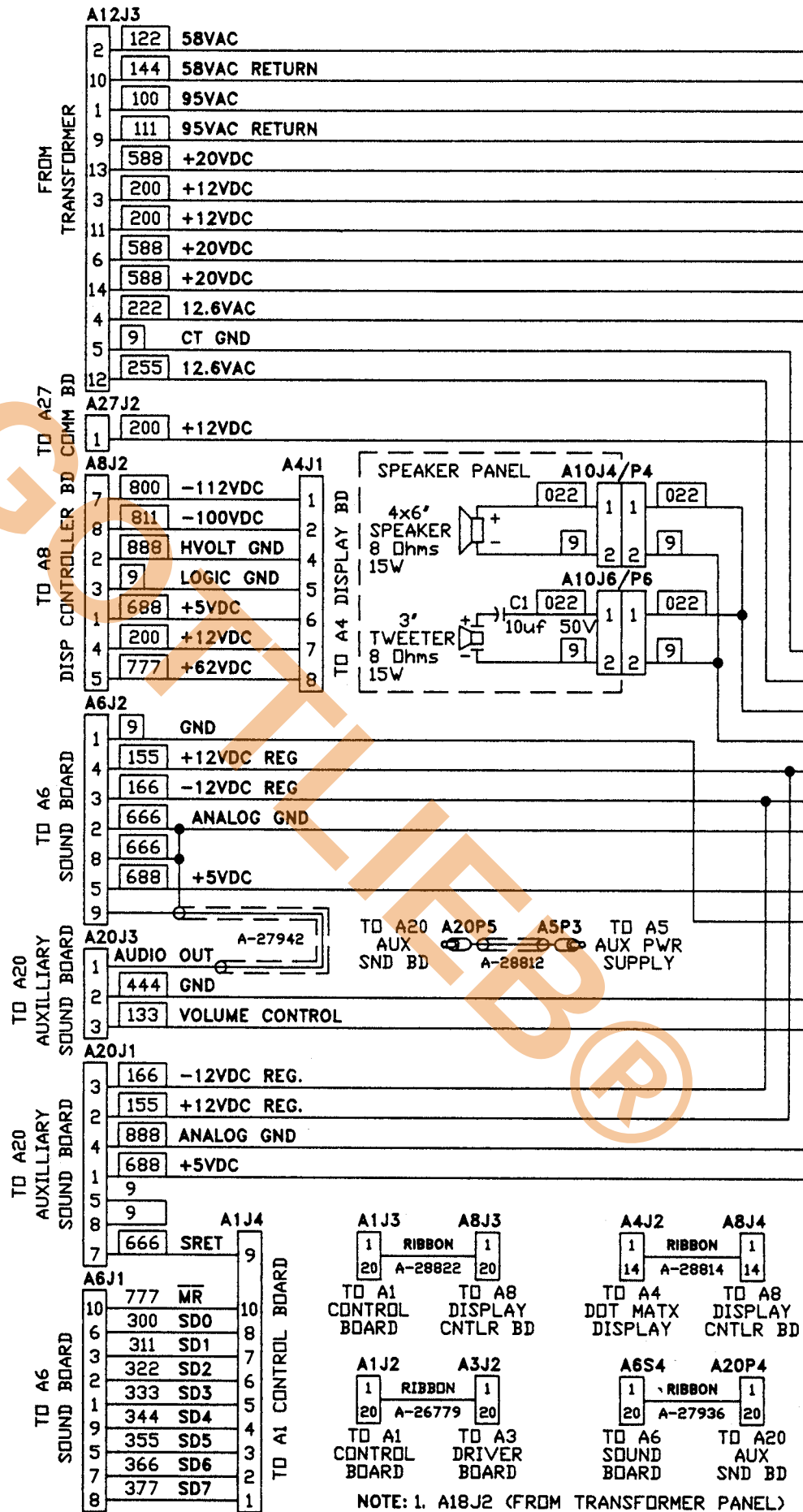
1. XXX INDICATES WIRE COLOR.
2. A12J5 SHOWN IN 110VAC OPERATION.
3. CIRCUIT GROUND EARTH GROUND

A12J5 WIRING VIEW PIN NUMBERS									
10	9	8	7	6	5	4	3	2	1
100VAC INPUT JUMPERS					200VAC INPUT JUMPERS				
J2	9	8	J2	J3	J1	9	8	J2	J3
J1	4	3	J1	J3	J1	4	3	J1	J2
110VAC INPUT JUMPERS					220VAC INPUT JUMPERS				
J2	9	J2	7	J3	J1	9	J2	7	J3
J1	4	J1	2	J3	J1	4	J1	2	J2
120VAC INPUT JUMPERS					240VAC INPUT JUMPERS				
J2	J2	8	7	J3	J1	J2	8	7	J3
J1	J1	3	2	J3	J1	J1	3	2	J2

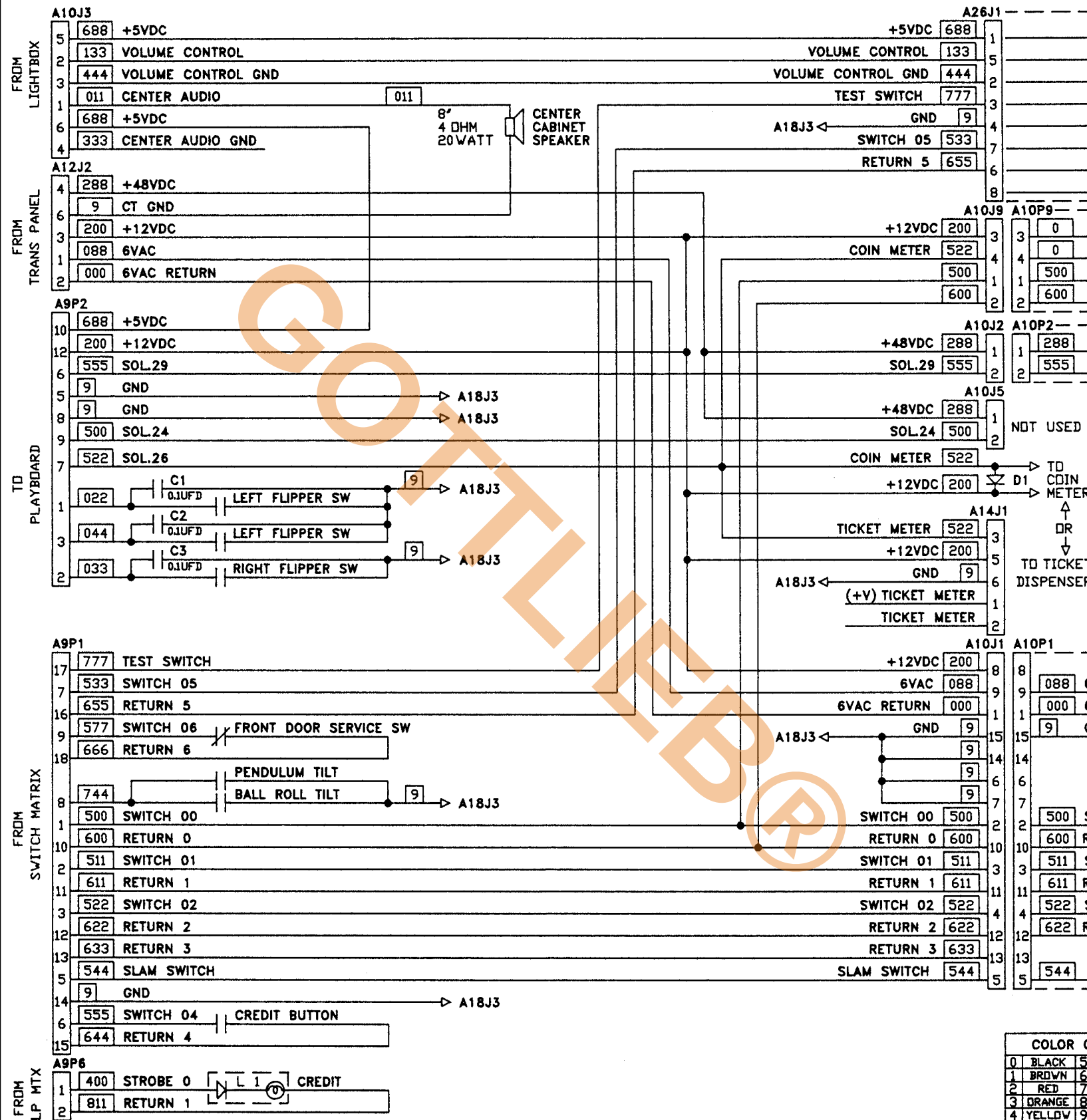
FUSE DESIGNATIONS TABLE			
FUSE	RATING	PART NO.	USAGE
F1	8.0A SLO-BLO	EL26	LINE INPUT
	4.0A SLO-BLO	EL33	LINE INPUT
F2	5.0A SLO-BLO	EL 8	PRIMARY POWER
	2.5A SLO-BLO	EL21	PRIMARY POWER
F3	3/8A SLO-BLO	EL31	DISPLAY
F4	3/8A SLO-BLO	EL31	DISPLAY
F5	2.5A SLO-BLO	EL21	POWER SUPPLY
F6	10 A SLO-BLO	EL36	CONTROLLED LAMPS
F7	8.0A SLO-BLO	EL26	SOLENOIDS
F8	15 A	EL25	LIGHTBOX INSERT ILLUM
F9	7.5A	EL22	PLAYBOARD ILLUMINATIO
F10	3.0A SLO-BLO	EL 9	AUXILLIARY POWER SUPP
F11	3.0A SLO-BLO	EL 9	AUXILLIARY POWER SUPP
F12			

C DIAGRAMS, PARTS LISTS

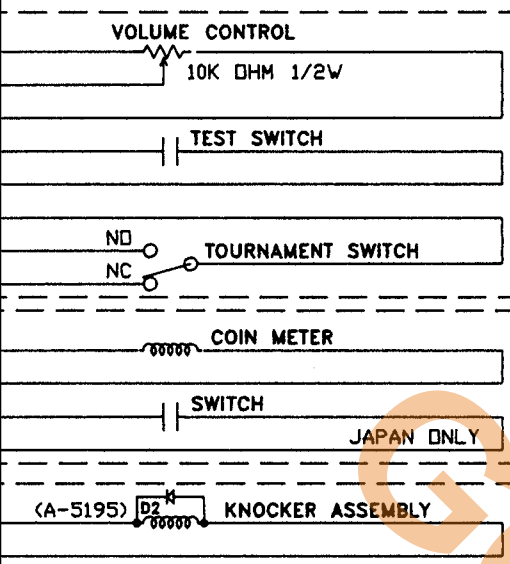




VI. WIRING AND SCHEMATIC

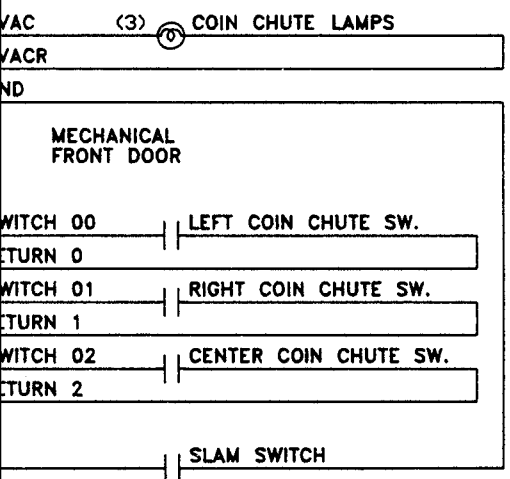


DIAGRAMS, PARTS LISTS

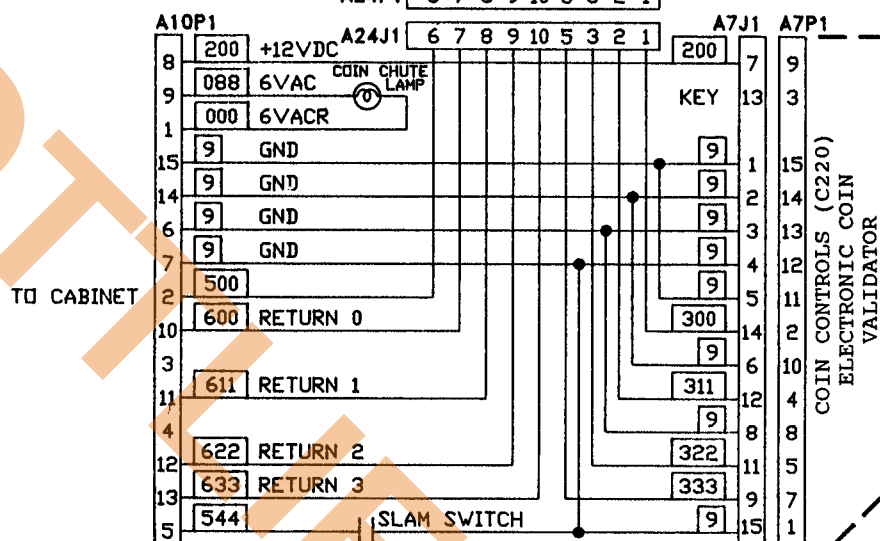
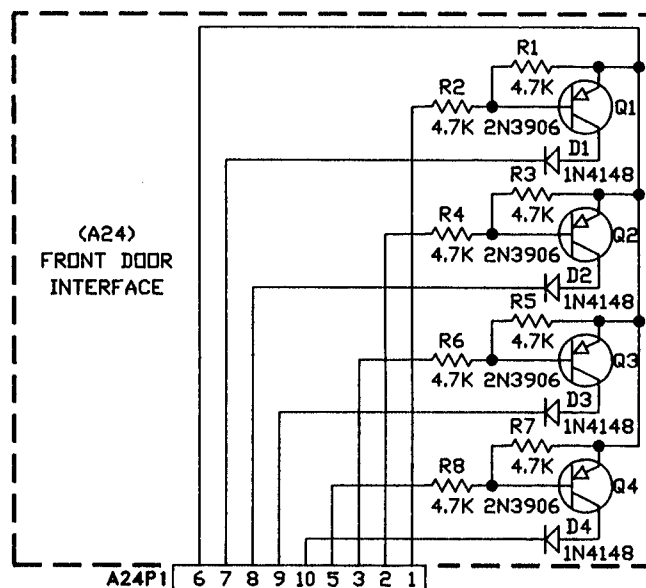


NOTE:

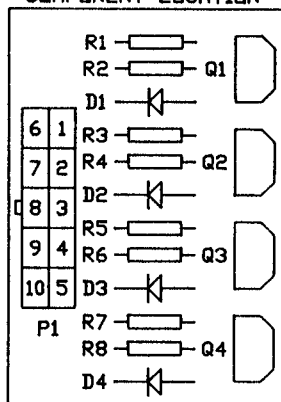
1. AMOUNT OF PARTS VARIES PER GAME.
2. ALL DIODES ARE TYPE 1N4004.
3. A18J3 (FROM TRANSFORMER PANEL).



CODE	Premier Technology
GREEN	TITLE CABINET/FRONT DOOR
BLUE	SCHEMATIC DIAGRAM
VIOLET	USED ON #745
GRAY	DRAWN RLM
WHITE	DATE 05-02-95
	31516



(A24) FRONT DOOR INTERFACE COMPONENT LOCATION



(A24) FRONT DOOR INTERFACE PARTS LIST

REFERENCE DESCRIPTION	PART NO.
FRONT DOOR INTERFACE ASSEMBLY	MA1645
D1-D4 DIODE, 1N4148	XQ-261
Q1-Q4 TRANSISTOR, PNP, 2N3906	XQ-588
R1-R8 RESISTOR, 4.7K OHM, 1/4W, 5%	XQ-7
A24P1 HEADER, 10 POSITION	XQ-912
SPACER (4)	23984

COLOR CODE	
0 BLACK	5 GREEN
1 BROWN	6 BLUE
2 RED	7 VIOLET
3 ORANGE	8 GRAY
4 YELLOW	9 WHITE

Premier Technology	
TITLE	SCHEMATIC DIAGRAM
ELECTRONIC FRONT DOOR-4 OUTPUT	
USED ON	DRAWN RLM
DATE	09-20-91
28541	

VII. PARTS INFORMATION

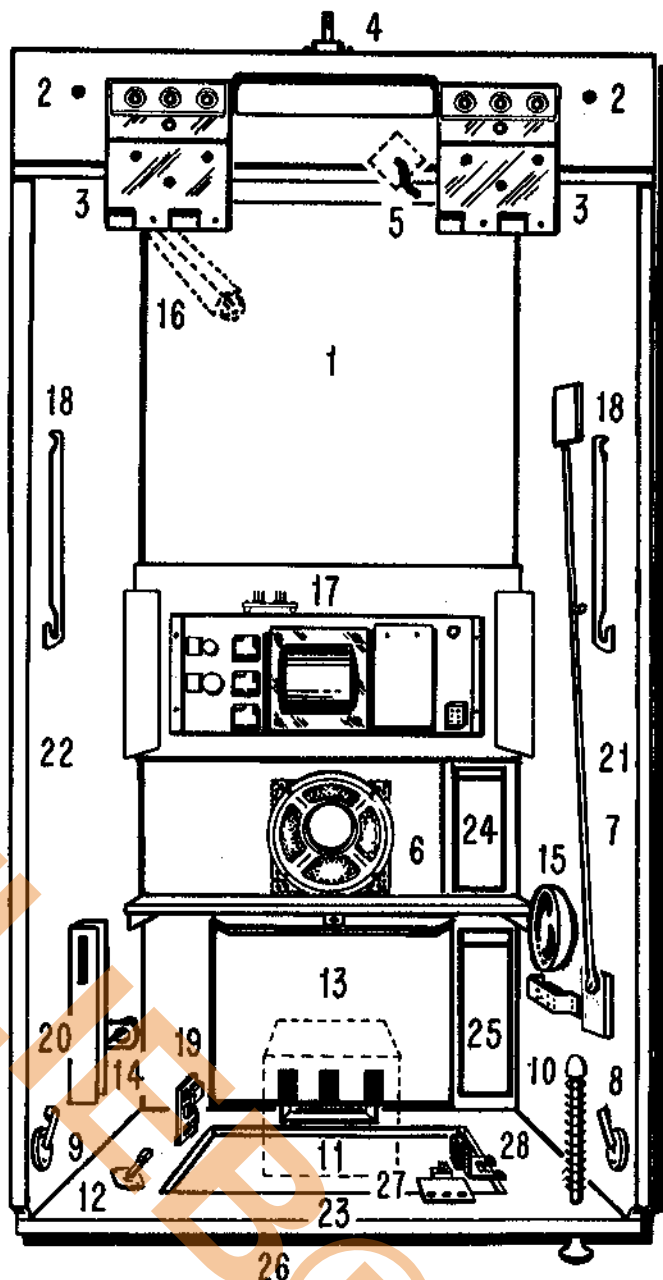
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VII. PARTS INFORMATION

CABINET PARTS

ITEM	DESCRIPTION	PART NO.
1	Cabinet Screened	31577-745
2	Lightbox Mounting Thumb Screw (2) (Not Shown for Reference Only, Part of Lightbox Assembly)	FA-162
3	Butt Hinge (2) (Attached to Lightbox)	26449
4	"U" Bolt (P/O Lightbox) Latch Assembly (P/O Cabinet)	24659 21969
5	Line Cord (Domestic) Line Cord Cover Plate	23365 23364
6	Speaker, 4 Ohm, 8" Speaker Grille	28934 28935
7	Prop Stick, Playfield	23940
8	Right Flipper Switch Assembly (Switch with Bracket) (Switch Only)	28974 28963
9	Left Flipper Switch Assembly (Switch with Bracket) (Switch Only)	28973 28962
10	Ball Shooter Assembly	31009
11	Front Door Assembly (Universal) Cable Assembly Slam Switch (N/O) 6V DC Lamp, Wedge Base, #555 Lampholder	29106 MA-2043 26130 LA-2 FD-24
12	Replay Switch Assembly	18092
13	Cashbox Cover	28032 *SEE NOTE
14	Plumb Bob Tilt Switch Assembly Strike Plate Carbon, Tilt Bob Rod, Tilt Bracket Clip	358 30879 357 22043 14653
15	Knocker Assembly 5" Bell Assembly (When Used)	MA-12 27591
16	Cabinet Leg (4), 27" Leg Bolt (8) 3" Leg Adjuster (4) 3/8-16", Jam Nut (8)	4337 3775 MH-21 FA-665
17	Transformer Panel Assembly Bridge Rectifier (3) Capacitor, (10,000UF), 25V Capacitor, (33,000UF), 35V Fuse Holder and Cap Fuse Block (8 Pole) F3, 3/8 Amp, SLO-BLO F4, 3/8 Amp, SLO-BLO F5, 2-1/2 Amp, SLO-BLO F6, 10 Amp, SLO-BLO F7, 8 Amp, SLO-BLO F8, 15 Amp F9, 7-1/2 Amp F10, 3 Amp, SLO-BLO F11, 3 Amp, SLO-BLO Transformer	MA-2128 EL-42 XO-830 XO-957 EL-78 EL-10 EL-31 EL-31 EL-21 EL-36 EL-26 EL-25 EL-22 EL-9 EL-9 29724
18	Cabinet Pivot Bracket (Left) Cabinet Pivot Bracket (Right)	25658 25657
19	Game Controls Board (A26)	MA-1851
20	Ball Roll Tilt Housing and Switch Assembly Switch	24394 24393
21	Right Moulding (Not Shown)	28700
22	Left Moulding (Not Shown)	28701
23	Front Moulding (Not Shown)	16951
24	Relay Strip Assembly "Q" Relay "T" Relay "A" Relay	MA-1872 MA-1172 MA-25 MA-1021
25	Power Module Assembly (110V AC) Double Throw Switch Fuse Holder And Cap (2) Line Filter Power Module Assembly (FRANCE) Power Module Assembly (GERMANY) Power Module Assembly (JAPAN) Power Module Assembly (220V AC) F1, 8 Amp SLO-BLO, 110V AC 4 Amp SLO-BLO, 220V AC F2, 5 Amp SLO-BLO, 110V AC 2.5 Amp SLO-BLO, 220V AC	MA-1928 23799 EL-78 EL-50 30255A 30255B 30255C 30255D EL-26 EL-33 EL-8 EL-21

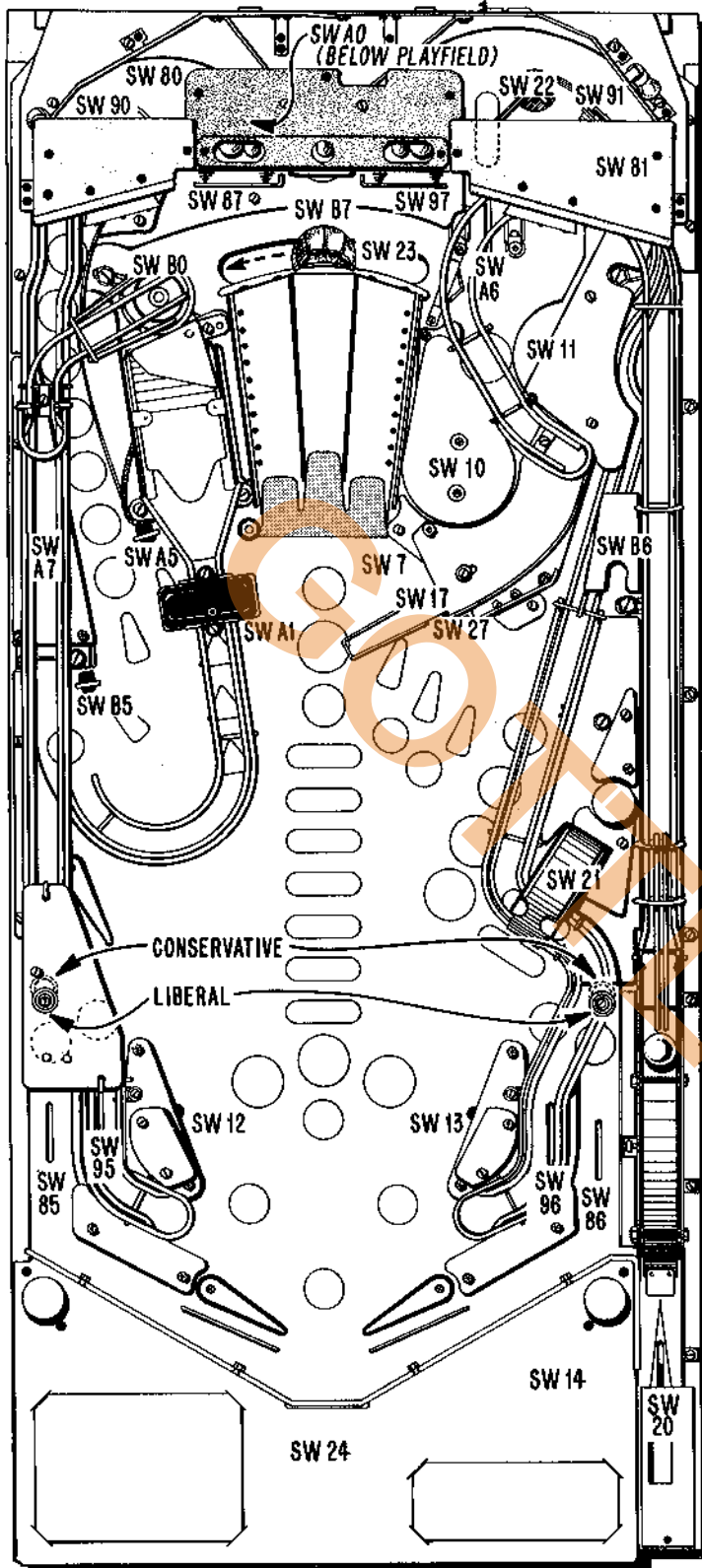


ITEM	DESCRIPTION	PART NO.
26	Lock Bar (Not Shown) Lock Bracket (Not Shown) Lock Bar Bracket (Not Shown)	29759 29760 29761
27	Front Door Service Switch Assembly Switch Bracket Switch	29451 29305
28	Interlock Switch Assembly Switch Bracket Switch Cover Switch Insulator	29148 29145 EL-66 24145

*NOTE:
COVER USED WITH ELECTRONIC DOOR
OR 3 CHUTE DOOR, PART NO. 28062

COVER USED WITH 2 CHUTE DOOR WITH
\$1.00 ACCEPTOR SLOT, PART NO. 30002

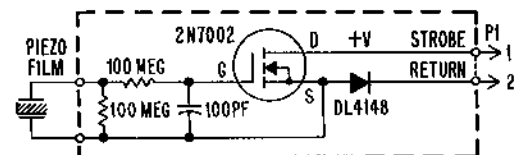
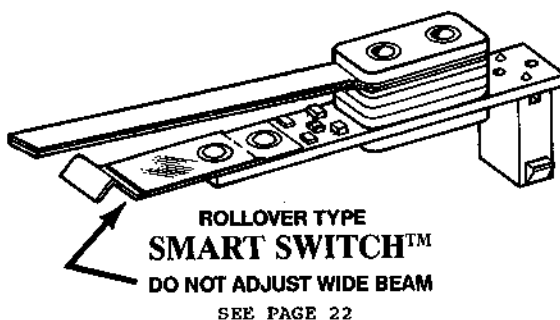
VII. PARTS INFORMATION



PLAYBOARD SWITCH ASSIGNMENTS

SWITCH MATRIX NUMBER	SWITCH ASSIGNMENT	PART NO.
SW 0	LEFT COIN SWITCH (#1)	P/O FRONT DOOR
SW 1	RIGHT COIN SWITCH (#2)	P/O FRONT DOOR
SW 2	CENTER COIN SWITCH (#3)	P/O FRONT DOOR
SW 3	COIN CHUTE (#4)	P/O ELECTRONIC DOOR
SW 4	START (CREDIT) BUTTON	18092
SW 5	TOURNAMENT	XO-1193
SW 6	FRONT DOOR (SERVICE)	29305
SW 7	DROP TARGET #1 (LEFT)	25896
*SW 10	LEFT POP BUMPER	29818
*SW 11	RIGHT POP BUMPER	29819
SW 12	LEFT KICKING RUBBER	27702
SW 13	RIGHT KICKING RUBBER	27702
SW 14	TROUGH	25938
SW 15	(NOT USED)	
SW 16	(NOT USED)	
SW 17	DROP TARGET #2 (CENTER)	25897
SW 20	SHOOTER LANE ROLLOVER	25938
SW 21	RIGHT UPKICKER	27667A
SW 22	HOLE KICKER	30777
SW 23	GLOVE	27667
SW 24	OUTHOLE	26927
SW 25	(NOT USED)	
SW 26	(NOT USED)	
SW 27	DROP TARGET #3 (RIGHT)	25895
SW 40	(NOT USED)	
THRU		
SW 77		
SW 80	LEFT TOP (OPTICAL INTERFACE, SEE PAGE 39)	P/O MA-1925
SW 81	RIGHT TOP (OPTICAL INTERFACE, SEE PAGE 39)	P/O MA-1925
SW 82	LEFT FLIPPER (SENSOR BOARD, SEE PAGE 30)	P/O MA-1334
SW 83	RIGHT FLIPPER (SENSOR BOARD, SEE PAGE 30)	P/O MA-1334
SW 84	(NOT USED)	
*SW 85	LEFT OUTLANE ROLLOVER	28625
*SW 86	RIGHT OUTLANE ROLLOVER	28625
*SW 87	LEFT SCOREBOARD	31550
SW 90	LEFT RAMP (OPTICAL INTERFACE, SEE PAGE 39)	P/O MA-1925
SW 91	RIGHT RAMP (OPTICAL INTERFACE, SEE PAGE 39)	P/O MA-1925
SW 92	(NOT USED)	
THRU		
SW 94		
*SW 95	LEFT RETURN ROLLOVER	28625
*SW 96	RIGHT RETURN ROLLOVER	28625
*SW 97	RIGHT SCOREBOARD	31550
SW A0	HOME RUN (OPTICAL INTERFACE, SEE PAGE 39)	P/O MA-1925
SW A1	SCOOP (OPTICAL INTERFACE, SEE PAGE 39)	P/O MA-1925
SW A2	(NOT USED)	
THRU		
SW A4		
*SW A5	LEFT TOP SPOT TARGET (WHITE)	29430Z
*SW A6	RIGHT TOP ROLLOVER	28625
*SW A7	CAPTIVE BALL ROLLOVER	28625
SW B0	LEFT UPKICKER (OPTICAL INTERFACE, SEE PAGE 39)	P/O MA-1925
SW B1	(NOT USED)	
THRU		
SW B4		
*SW B5	LEFT BOTTOM SPOT TARGET (WHITE)	29430Z
*SW B6	RIGHT SIDE ROLLOVER	28625
*SW B7	GLOVE (ALL THE WAY)	31554

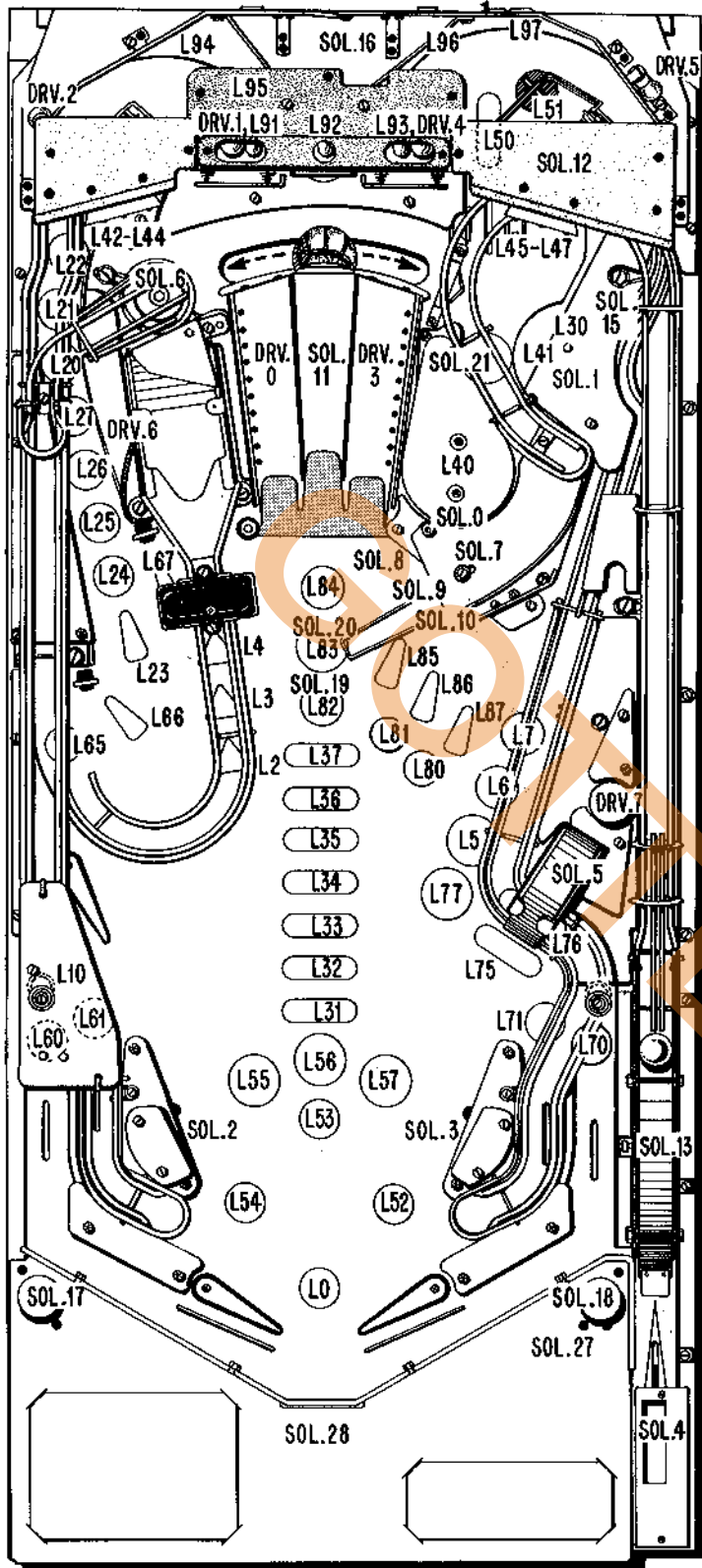
SMART SWITCH



SCHEMATIC REPRESENTATION

VII. PARTS INFORMATION

PLAYBOARD LAMP ASSIGNMENTS



SOLENOID, DRIVER FUNCTIONS/LOCATIONS

SOL. 0	LEFT POP BUMPER	SOL. 20	"GRAND SLAM", #67
SOL. 1	RIGHT POP BUMPER	SOL. 21	POP BUMPER AREA, #67
SOL. 2	LEFT KICKING RUBBER	SOL. 22	(NOT USED)
SOL. 3	RIGHT KICKING RUBBER	SOL. 23	(NOT USED)
SOL. 4	SHOOTER LANE KICKER	SOL. 24	(NOT USED)
SOL. 5	BOTTOM RIGHT UPKICKER	SOL. 25	LIGHTBOX ILLUM. RELAY (A)
SOL. 6	TOP LEFT UPKICKER (OPTO)	SOL. 26	TICKET/COIN METER ENABLE
SOL. 7	3 POSITION BANK RESET	SOL. 27	BALL RELEASE
SOL. 8	#1 TRIP	SOL. 28	OUTHOLE
SOL. 9	#2 TRIP	SOL. 29	KNOCKER
SOL. 10	#3 TRIP	SOL. 30	TILT RELAY (T)
SOL. 11	CENTER RAMP LIFT	SOL. 31	GAME OVER RELAY (O)
SOL. 12	TOP RIGHT HOLE KICKER	DRV. 0	LEFT RAMP #1, #67; *INSERT #1, #67
SOL. 13	SHOOTER LANE RAMP LIFT	DRV. 1	LEFT RAMP #2, #67; *INSERT #2, #67
SOL. 14	(NOT USED)	DRV. 2	LEFT RAMP #3, #67; *INSERT #3, #67
SOL. 15	TOP RIGHT PLUNGER GATE	DRV. 3	RIGHT RAMP #1, #67; *INSERT #4, #67
SOL. 16	TOP BALL GATE	DRV. 4	RIGHT RAMP #2, #67; *INSERT #5, #67
SOL. 17	LEFT DOME (CARDHOLDER), #67	DRV. 5	RIGHT RAMP #3, #67; *INSERT #6, #67
SOL. 18	RIGHT DOME (CARDHOLDER), #67	DRV. 6	SCOOP, #57
SOL. 19	"HOME RUN", #67	DRV. 7	RIGHT UPKICKER DOME, #57

LAMP NUMBER	LAMP ASSIGNMENT
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
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82	82
83	83
84	84
85	85
86	86
87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

L0 "SHOOT AGAIN"
L1 Credit Button
L2 "COMBO"
L3 "WALK"
L4 "ATTEMPT STEAL"
L5 "100 MILLION"
L6 "BIG ORBIT SHOT"
L7 "BIG HURT SHOT"
L10 "SHOOT THE GAP"
L11
THRU (Not Used)
L17
L20 "50 MILLION"
L21 "500 MILLION"
L22 "? MILLION"
L23 "COMBO"
L24 "EXTRA BALL"
L25 "ADV. JACKPOT"
L26 "500 THOUSAND"
L27 "5 MILLION"
L30 "PLAYERS CHOICE"
L31 "GOLDEN GLOVE"
L32 "FRANK'S HR DERBY"
L33 "STEAL HOME"
L34 "#35 ALL-STARS"
L35 "FRANK THOMAS CARDS"
L36 "NIGHT GAME"
L37 "WORLD SERIES"
L40 Left Pop Bumper
L41 Right Pop Bumper
L42 Left Roof #1
L43 Left Roof #2
L44 Left Roof #3
L45 Right Roof #1
L46 Right Roof #2
L47 Right Roof #3
L50 "LOAD BASES"
L51 "SPELL BIG HURT"
L52 "1ST. BASE"
L53 "2ND. BASE"
L54 "3RD. BASE"
L55 "SHOOT LEFT GAP"
L56 "SHOOT GLOVE"
L57 "SHOOT RIGHT GAP"
L60 "FRANK THOMAS CARDS"
L61 "LEFT RAISE RAMP"
L62
THRU (Not Used)
L64
L65 Captive Ball "COMBO"
L66 "CARD"
L67 "TRADE"
L70 Left Outlane "SPECIAL"
L71 "RIGHT RAISE RAMP"
L72
THRU (Not Used)
L74
L75 "CARD TRADE"
L76 "BEGIN ROUND"
L77 "EXTRA BALL"
L80 Drop Target "COMBO"
L81 "SAFE"
L82 "HOME RUN"
L83 "GRAND SLAM"
L84 "DOUBLE"
L85 #1 Drop Target
L86 #2 Drop Target
L87 #3 Drop Target
L90 (Not Used)
L91 Left Scoreboard
L92 Center Scoreboard
L93 Right Scoreboard
L94 Left Ramp #1
L95 Left Ramp #2
L96 Right Ramp #1
L97 Right Ramp #2
LA0
THRU (Not Used)
LB7

LAMP SOCKETS
WITH
DIODE BOARD

<u>TYPE</u>	<u>PART NO.</u>
1-1/8" BRACKET	26621
1/2" BRACKET	26622
LAYDOWN	26623

NOTE:
*LAMPS MOUNTED ON LIGHTBOX INSERT,
SEE PAGE 80 FOR LOCATION.

VII. PARTS INFORMATION

PLAYBOARD PARTS INFORMATION

PARTS LIST

ITEM	DESCRIPTION	PART NO.
1	PLASTIC SHIELD SET ASSEMBLY	31572-T
1A	PLASTIC SHIELD SET ASSEMBLY	31572-X
2	PLASTIC SHIELD SET ASSEMBLY	31572-U
3	PLASTIC SHIELD SET ASSEMBLY	31572-S
3A	BULB SHIELD, RED (2)	24875U
3B	BULB SHIELD, BLUE (2)	24875W
3C	BULB SHIELD, GREEN (2)	24875S
4	ROOF TOP ASSEMBLY	31582-A
5	ROOF TOP ASSEMBLY	31581-A
6	BALL HOLE KICKER	MA-1493
7	(SEE EXPLODED VIEW ILLUSTRATION)	
7	BASE PLATE ASSEMBLY (SEE PAGE 75)	
7A	VACUUM FORM RAMP (BELOW PLAYBOARD)	31391
8	SCOREBOARD ASSEMBLY (SEE PAGE 74)	
9	(SEE ASSEMBLY ILLUSTRATION)	
9	ACTUATOR ASSEMBLY	31527
10	(SEE ASSEMBLY ILLUSTRATION)	
10	BALL STOP ASSEMBLY	30187
11	(SEE EXPLODED VIEW ILLUSTRATION)	
11	UPKICKER AND OPTO ASSEMBLY	31522
12	(SEE EXPLODED VIEW ILLUSTRATION)	
12	ROLLOVER GUIDE, RED (2)	15646U
13	PIVOT ARM ASSEMBLY (SEE PAGE 76)	
13A	(SEE ASSEMBLY ILLUSTRATION)	
13A	CENTER RAMP ASSEMBLY	(SEE PAGE 76)
13B	(SEE ASSEMBLY ILLUSTRATION)	
13B	RAMP LIFTER ASSEMBLY	(SEE PAGE 76)
14	PLASTIC SHIELD SET	31572
15	BALL GUIDE RAIL	31280
16	RAMP FLAP	31518
17	SCOOP	31580
18	WIREFORM RAMP	31471
19	WIREFORM RAMP	31470
20	BALL SNUBBER	27128
21	URETHANE BUMPER	28680
22	METAL SHIELD	17300
23	WIREFORM GATE	21696
24	WIREFORM RAMP	31468
25	PLASTIC SHIELD SET ASSEMBLY	31572-Q
26	PLASTIC SHIELD SET ASSEMBLY	31572-O
27	PLASTIC SHIELD SET	31572
28	POP BUMPER BRACKET AND COIL ASSEMBLY (2)	MA-1375
29	(SEE EXPLODED VIEW ILLUSTRATION)	
29	POP BUMPER COIL AND DIODE (2)	16570
30	POP BUMPER BODY, SOCKET, WHITE (2)	MA-1467
30A	BUMPER CAP, CLEAR RED	26635U
31	PLATE AND SPRING RAMP ASSEMBLY (SEE PAGE 82)	
32	(SEE ASSEMBLY ILLUSTRATION)	
32	(NOT USED)	
33	TARGET BANK ASSEMBLY, 3 POSITION	MA-2135
34	(SEE EXPLODED VIEW ILLUSTRATION)	
34	DROP TARGET ARM, NYLON, YELLOW (3)	11905T
35	DROP TARGET DECAL (3)	31541
36	WIREFORM RAMP	31469
37	VACUUM FORM RAMP (BELOW PLAYBOARD)	31273
38	BRACKET AND OPTO BOARD ASSEMBLY	30346
39	WIREFORM RAMP	31472
40	CAPTIVE BALL SHIELD	26448
41	PLASTIC SHIELD SET ASSEMBLY	31572-K
42	PLASTIC SHIELD SET ASSEMBLY	31572-P
43	PLASTIC DOME, YELLOW	25147T
44	BALL SCOOP AND RIGHT SHIELD ASSEMBLY	31276
45	UPKICKER ASSEMBLY	31488
46	(SEE EXPLODED VIEW ILLUSTRATION)	
46	SHOOTER LANE LIFT RAMP ASSEMBLY (SEE PAGE 78)	
47	(SEE ASSEMBLY ILLUSTRATION)	
47	STEEL BALL, 1-1/16" DIAMETER (2)	21864
48	MIDDLE LEFT FLIPPER ASSEMBLY	MA-1790
49	(SEE EXPLODED VIEW ILLUSTRATION)	
49	COIL AND DIODE ASSEMBLY	25959
50	FLIPPER SWITCH ASSEMBLY	26439
51	PLASTIC SHIELD SET ASSEMBLY	31572-M
52	PLASTIC SHIELD SET ASSEMBLY	31572-N
53	KICKER ASSEMBLY	MA-1083
54	KICKER ASSEMBLY	MA-1373
55	MYLAR OVERLAY	31363
56	BALL GUIDE RAIL	27916
57	BALL GUIDE RAIL	27915
58	LOWER LEFT FLIPPER ASSEMBLY	MA-1790E
59	(SEE EXPLODED VIEW ILLUSTRATION)	
59	COIL AND DIODE ASSEMBLY	29876
60	FLIPPER SWITCH ASSEMBLY	26439
61	RIGHT FLIPPER ASSEMBLY	MA-1791E
62	(SEE EXPLODED VIEW ILLUSTRATION)	
62	COIL AND DIODE ASSEMBLY	29876
63	FLIPPER SWITCH ASSEMBLY	26438
64	SNUBBER RAIL (2)	13798
65	PLASTIC SHIELD SET ASSEMBLY	31572-R
66	PLASTIC SHIELD SET	31572
67	PLASTIC DOME, BLUE	26293W
68	PLASTIC DOME, RED	26293U
	CARDHOLDER AND FENCE ASSEMBLY	31329
	CARDHOLDER SCREENED	30353
	SHOOTER GAUGE AND PLASTIC ASSEMBLY	30945-745
	BALL SHOOTER ASSEMBLY (SEE PAGE 77)	
	(SEE ASSEMBLY ILLUSTRATION)	
67	PLASTIC SHIELD AND BRACKET	31547A
68	VACUUM FORM RAMP ASSEMBLY	31545

RUBBER RINGS

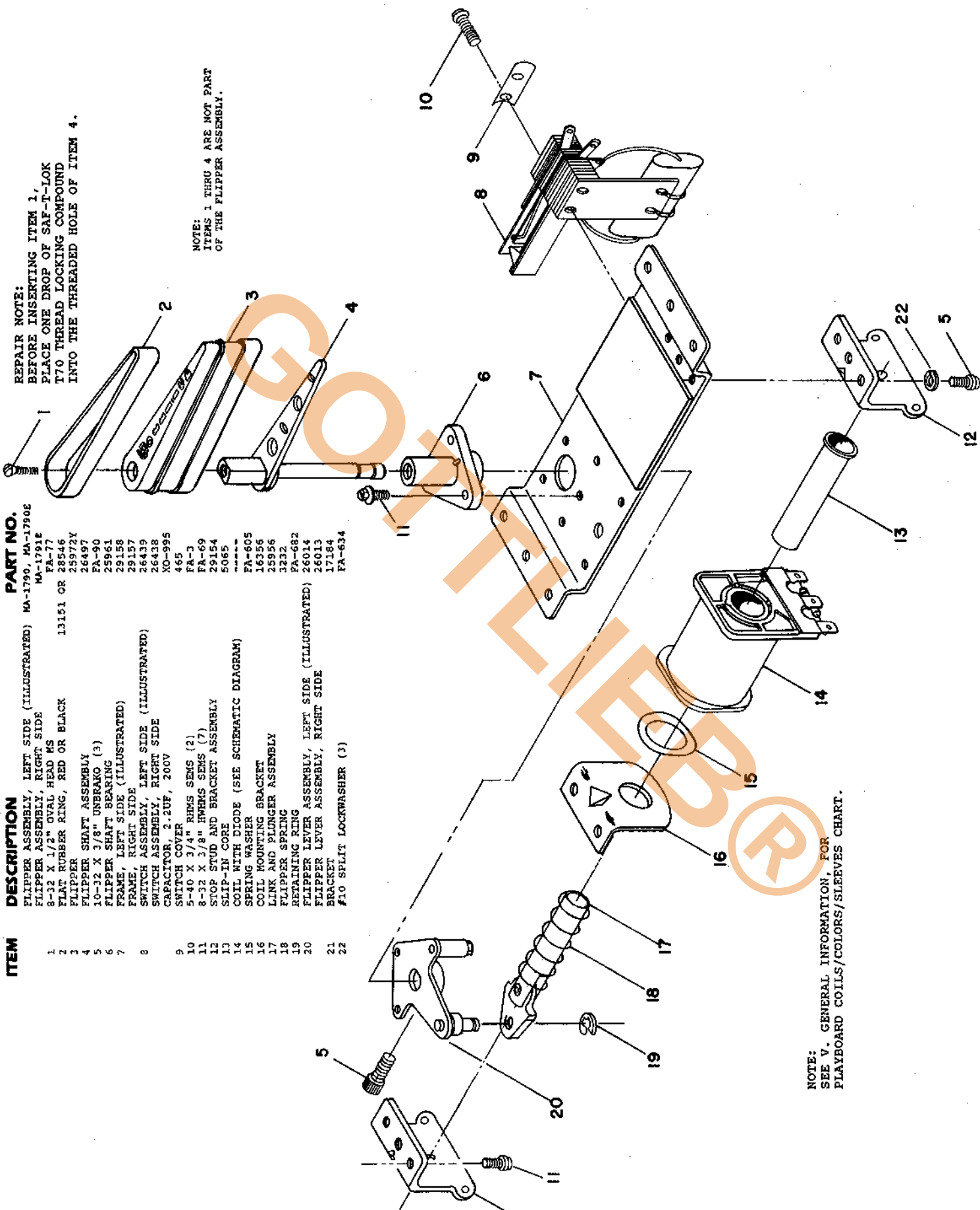
ITEM	DESCRIPTION	PART NO.
3A	1-1/2" (BLACK)	10220
3B	3/4" (BLACK)	10218
3C	MINI-POST, LARGE (BLACK)	15705
3D	MINI-POST, SMALL (BLACK)	14793
3E	2" (BLACK)	10221
3F	2-1/2" (BLACK)	10222
3G	BUMPER, TAPERED (BLACK)	30003Y
3H	FLIPPER, (BLACK)	28546
3J	3/8" (BLACK)	10217
3K	BUMPER RUBBER (BLACK)	31505Y

MISCELLANEOUS PARTS

DESCRIPTION	PART NO.
RUBBER GROMMET	5240
HAIRPIN CLIP	6947
MINI POST SCREW	14792
HEX POST WITH GRIP	26531
PLASTIC RIVET	MP-10
PLASTIC POST, 1" (YELLOW)	11561T
PLASTIC POST, 1-3/16" (YELLOW)	11562T
PLASTIC POST, 1" (CLEAR)	20635P

VII. PARTS INFORMATION

FLIPPER PARTS



REPAIR NOTE:
BEFORE INSERTING ITEM 1,
PLACE ONE DROP OF SAF-T-LOK
T70 THREAD LOCKING COMPOUND
INTO THE THREADED HOLE OF ITEM 4.

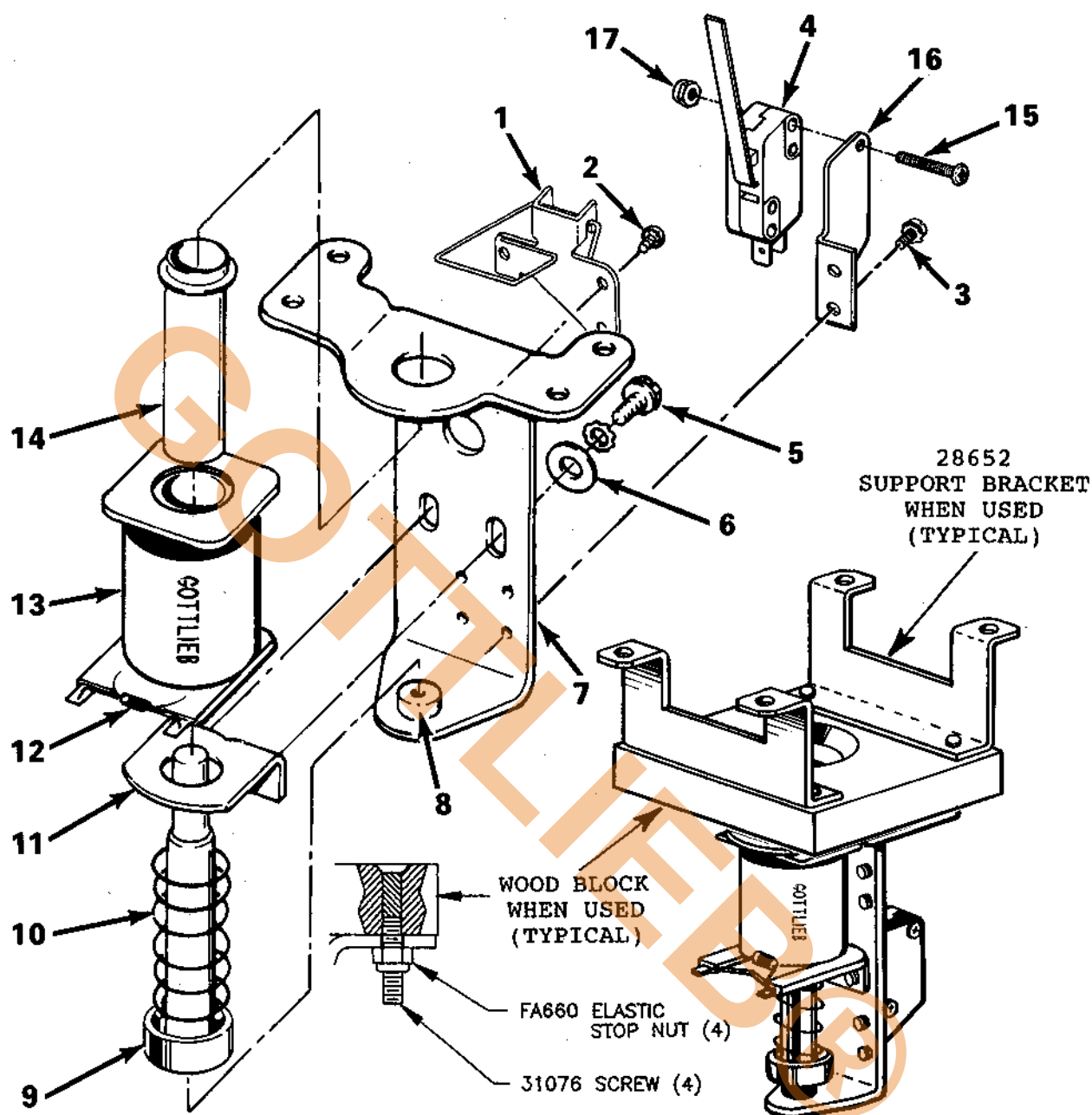
NOTE:
ITEMS 1 THRU 4 ARE NOT PART
OF THE FLIPPER ASSEMBLY.

NOTE:
SEE V. GENERAL INFORMATION, FOR
PLAYBOARD COILS/COLORS/SLEEVES CHART.

ITEM	DESCRIPTION	PART NO.
1	FLIPPER ASSEMBLY, LEFT SIDE (ILLUSTRATED)	MA-1790, MA-1790E
2	FLIPPER ASSEMBLY, RIGHT SIDE	MA-1791E
3	8-12 X 1/2" OVAL HEAD WS	FA-77
4	FLAT RUBBER RING, RED OR BLACK	13151 OR 25972Y
5	FLIPPER SHAFT ASSEMBLY	26437
6	10-32 X 3/8" UNBRAKO (3)	FA-90
7	FLIPPER SHAFT BEARING	25961
8	FRAME, LEFT SIDE (ILLUSTRATED)	29158
9	FRAME, RIGHT SIDE	29157
10	SWITCH ASSEMBLY, LEFT SIDE (ILLUSTRATED)	26439
11	SWITCH ASSEMBLY, RIGHT SIDE	26438
12	CAPACITOR, 2.2UF, 200V	26438
13	SWITCH COVER	XO-995
14	5-40 X 3/4" RHMS SENS (2)	465
15	8-32 X 3/8" RHMS SENS (7)	FA-3
16	STOP STUD AND BRACKET ASSEMBLY	FA-69
17	SLIP-IN CORE	29154
18	COIL WITH DIODE (SEE SCHEMATIC DIAGRAM)	5065
19	SPRING WASHER	FA-605
20	COIL MOUNTING BRACKET	16356
21	LINK AND PLUNGER ASSEMBLY	25956
22	FLIPPER SPRING	3232
	RETAINING RING	FA-682
	FLIPPER LEVER ASSEMBLY, LEFT SIDE (ILLUSTRATED)	26014
	FLIPPER LEVER ASSEMBLY, RIGHT SIDE	26013
	BRACKET	17184
	#10 SPLIT LOCKWASHER (3)	FA-634

VII. PARTS INFORMATION

UPKICKER PARTS

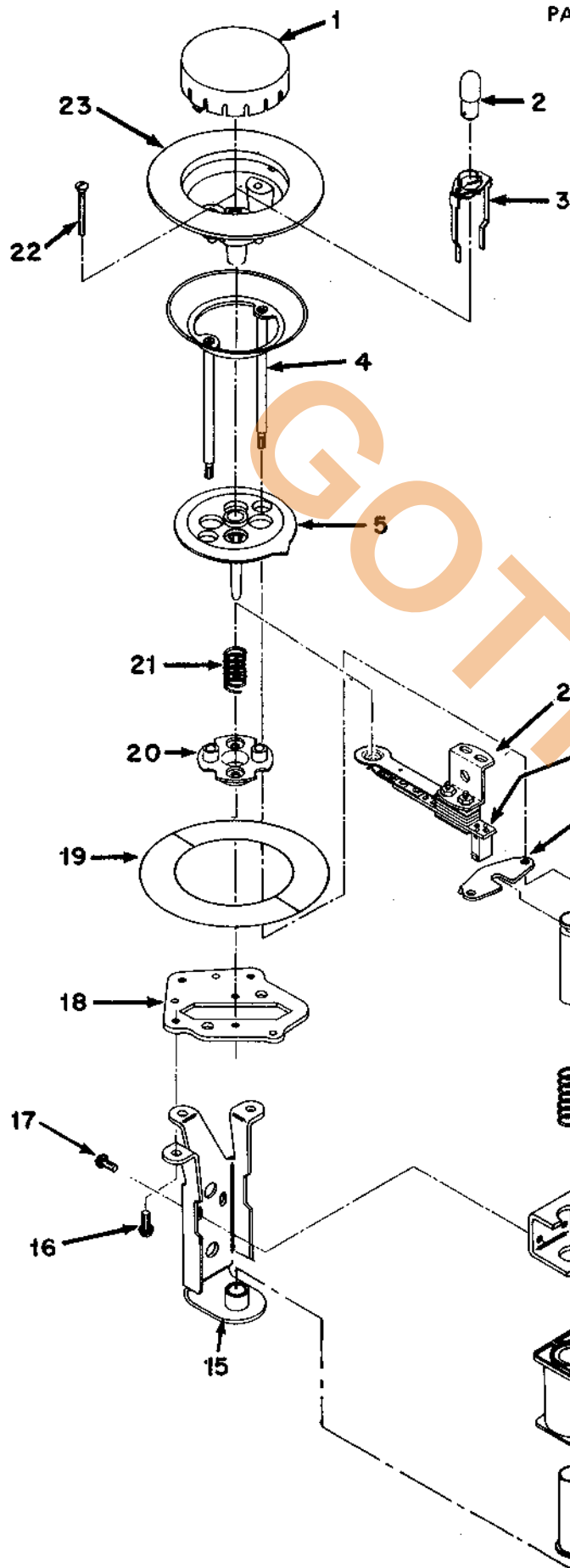


ITEM	DESCRIPTION	PART NO.
	UPKICKER ASSEMBLIES WITH ASSOCIATED COILS	MA-1743, 16570 COIL MA-1747, 26450 COIL MA-1789, 17876 COIL
1	WIREFORM AND BRACKET	28953
2	RHMS-SEMS 6-32 X 3/16" (3)	FA-30
3	RHMS 5-40 X 1/4" SEMS (2)	FA-10
4	MICROSWITCH WITH ACTUATOR	27667A
5	HWHMS-SEMS 8-32 X 5/16" (2)	FA-67
6	#8 WASHER (2)	FA-617
7	FRAME	21416
8	RUBBER GROMMET	5240
9	PLUNGER AND TIP ASSEMBLY	21412
10	SPRING	26739
11	COIL MOUNTING BRACKET	15409
12	DIODE, 1N4004	XO-254
13	COIL	(SEE SCHEMATIC)
14	SLIP-IN-CORE	21411
15	PAN HEAD 4-40 X 5/8" (2)	FA-107
16	MICROSWITCH MOUNTING BRACKET	27870
17	ELASTIC STOP NUT, 4-40 (2)	FA-648

VII. PARTS INFORMATION

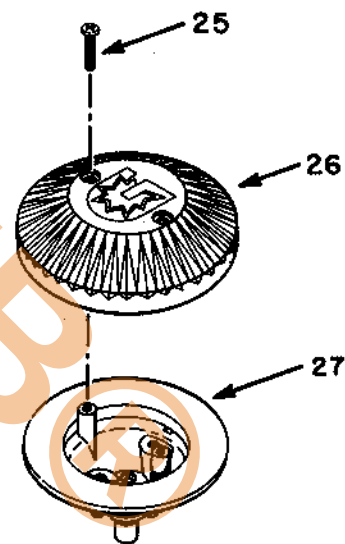
POP BUMPER PARTS

PAT. NO. 213,981



ITEM	DESCRIPTION	PART NO.
1	Pop Bumper Assembly	Specify Game
2	Pop Bumper Cap (Specify Color)	10434
3	Lamp, #44	LA-0
4	Socket	P8-0
5	Tie Rods and Ring	16634
6	Pop Bumper Skirt (Specify Color)	10433
7	Switch Assembly	Specify Game
8	Slotted Yoke	12149
9	Plunger	2663
10	Insulating Yoke	2662
11	Elastic Stop Nut, 6-32	FA-660
12	Kicker Return Spring	21643
13	Stop Bracket	8571
14	Coil	Specify Game
15	Coil Sleeve	5064
16	Coil Mounting Bracket and Stop	17906
17	8-32 x 1/4 HHMS SEMS	FA-64
18	6-32 x 1/4 HHMS SEMS	FA-53
19	Pop Bumper Pad	16632
20	Pop Bumper Trim Platter	25732
21	Pop Bumper Base	10432
22	Pop Bumper Spring	10430
23	6-32 x 1-1/8 Oval HMS	FA-43
24	Pop Bumper Body (Specify Color)	10435
25	Bracket and Switch Assembly	29819 (ILLUSTRATED)
26		29818 (OPPOSITE BRACKET)
27	4-40 x 1/2 Pan Head Phillips	FA-108
	Pop Bumper Cap, Clear, (Specify Color)	26635
	Pop Bumper Body (Specify Color)	26860

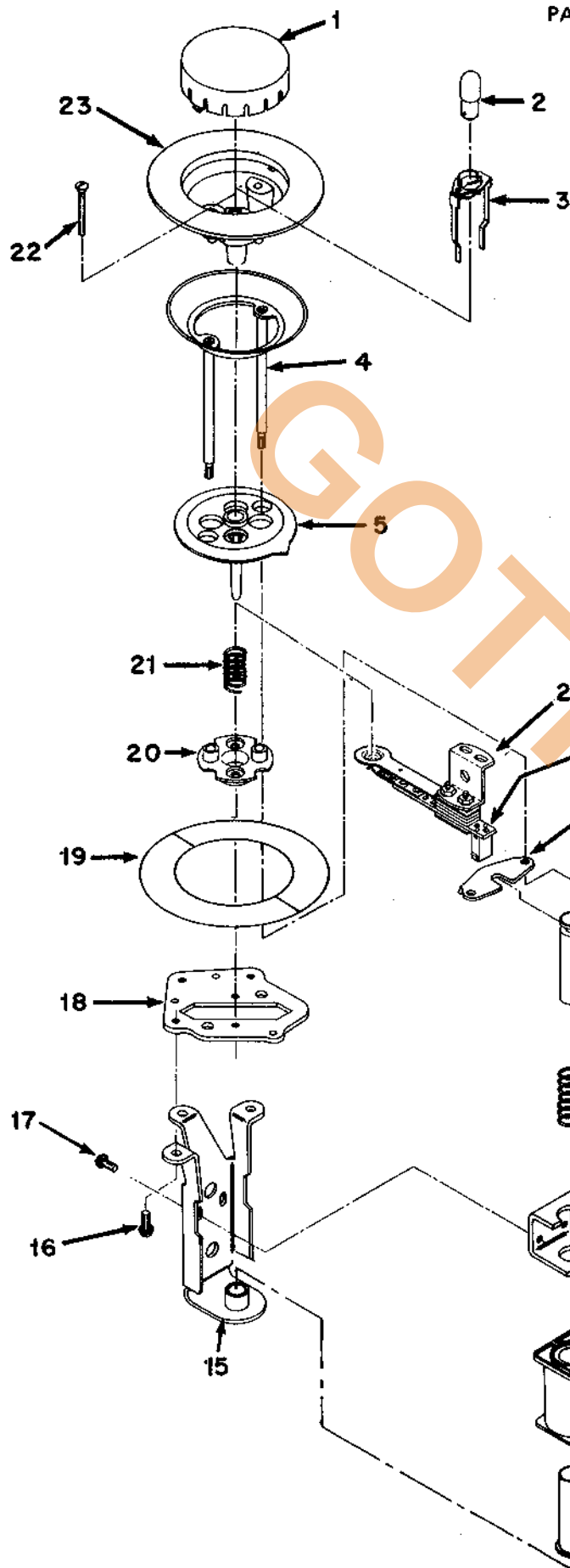
NOTE:
ITEMS 23 AND 27 ARE INTERCHANGEABLE.



VII. PARTS INFORMATION

POP BUMPER PARTS

PAT. NO. 213,981



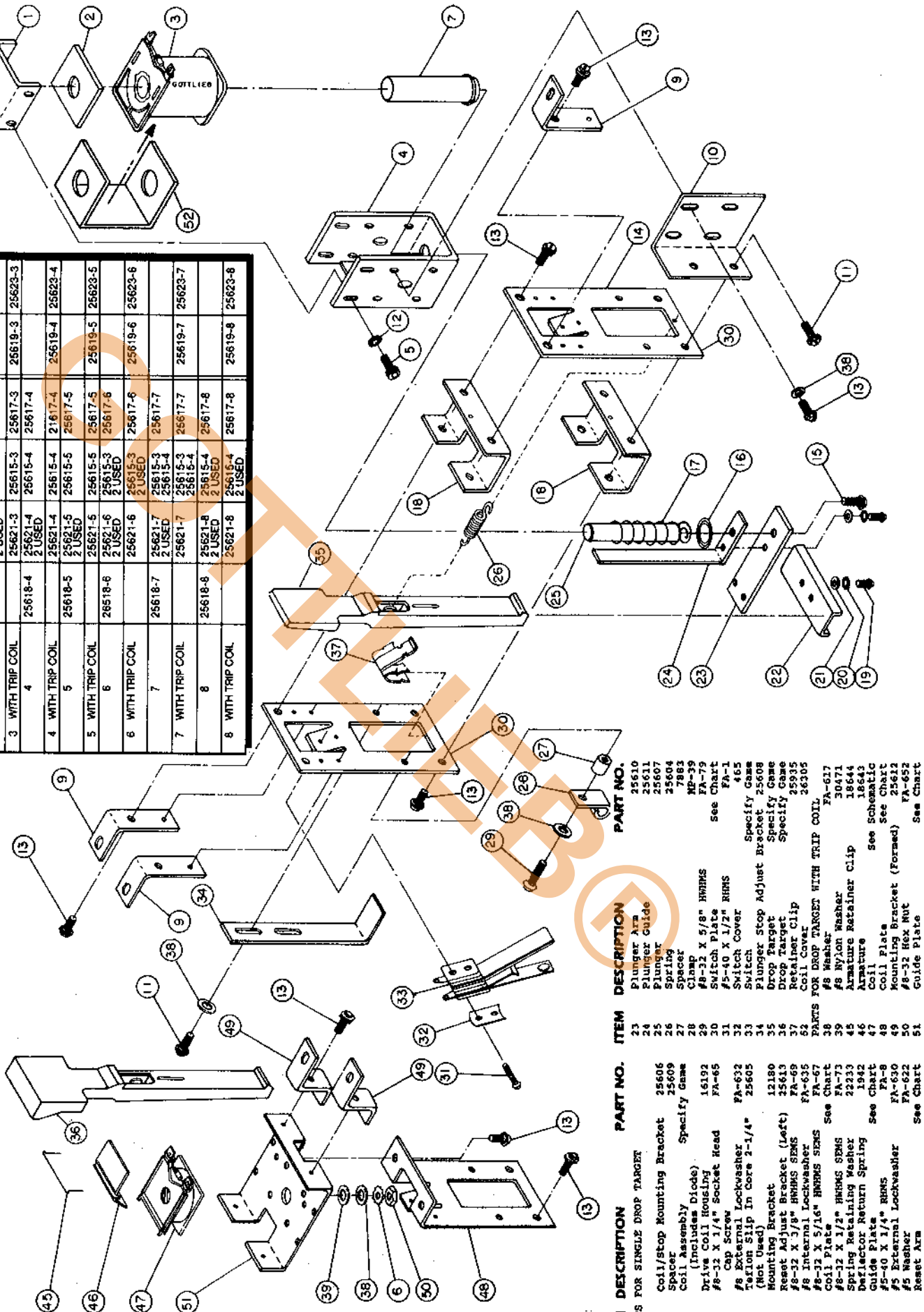
ITEM	DESCRIPTION	PART NO.
1	Pop Bumper Assembly	Specify Game
2	Pop Bumper Cap (Specify Color)	10434
3	Lamp, #44	LA-0
4	Socket	P8-0
5	Tie Rods and Ring	16634
6	Pop Bumper Skirt (Specify Color)	10433
7	Switch Assembly	Specify Game
8	Slotted Yoke	12149
9	Plunger	2663
10	Insulating Yoke	2662
11	Elastic Stop Nut, 6-32	FA-660
12	Kicker Return Spring	21643
13	Stop Bracket	8571
14	Coil	Specify Game
15	Coil Sleeve	5064
16	Coil Mounting Bracket and Stop	17906
17	8-32 x 1/4 HHMS SEMS	FA-64
18	6-32 x 1/4 HHMS SEMS	FA-53
19	Pop Bumper Pad	16632
20	Pop Bumper Trim Platter	25732
21	Pop Bumper Base	10432
22	Pop Bumper Spring	10430
23	6-32 x 1-1/8 Oval HMS	FA-43
24	Pop Bumper Body (Specify Color)	10435
25	Bracket and Switch Assembly	29819 (ILLUSTRATED)
26		29818 (OPPOSITE BRACKET)
27	4-40 x 1/2 Pan Head Phillips	FA-108
	Pop Bumper Cap, Clear, (Specify Color)	26635
	Pop Bumper Body (Specify Color)	26860

NOTE:
ITEMS 23 AND 27 ARE INTERCHANGEABLE.

VII. PARTS INFORMATION DROP TARGET PARTS

Patent Number: 4,804,186

DROP TARGETS	WITHOUT TRIP COIL				WITH TRIP COIL	
	ITEM 14 COIL PLATE	ITEM 18 GUIDE PLATE	ITEM 22 RESET ARM	ITEM 30 SWITCH PLATE	ITEM 48 COIL PLATE	ITEM 51 GUIDE PLATE
1. WITH TRIP COIL	25618-1	25621-1	25615-2	25617-1	25619-1	25623-1
2. WITH TRIP COIL	25618-2	25621-1	25615-2	25617-2		
3. WITH TRIP COIL	25618-3	25621-3	25615-2	25617-3	25619-2	25623-2
4. WITH TRIP COIL	25618-4	25621-4	25615-3	25617-4	25619-3	25623-3
5. WITH TRIP COIL	25618-5	25621-5	25615-4	25617-5	25619-4	25623-4
6. WITH TRIP COIL	25618-6	25621-6	25615-5	25617-6	25619-5	25623-5
7. WITH TRIP COIL	25618-7	25621-7	25615-6	25617-7	25619-6	25623-6
8. WITH TRIP COIL	25618-8	25621-8	25615-7	25617-8	25619-7	25623-7
			2 USED	25617-8	25619-8	25623-8



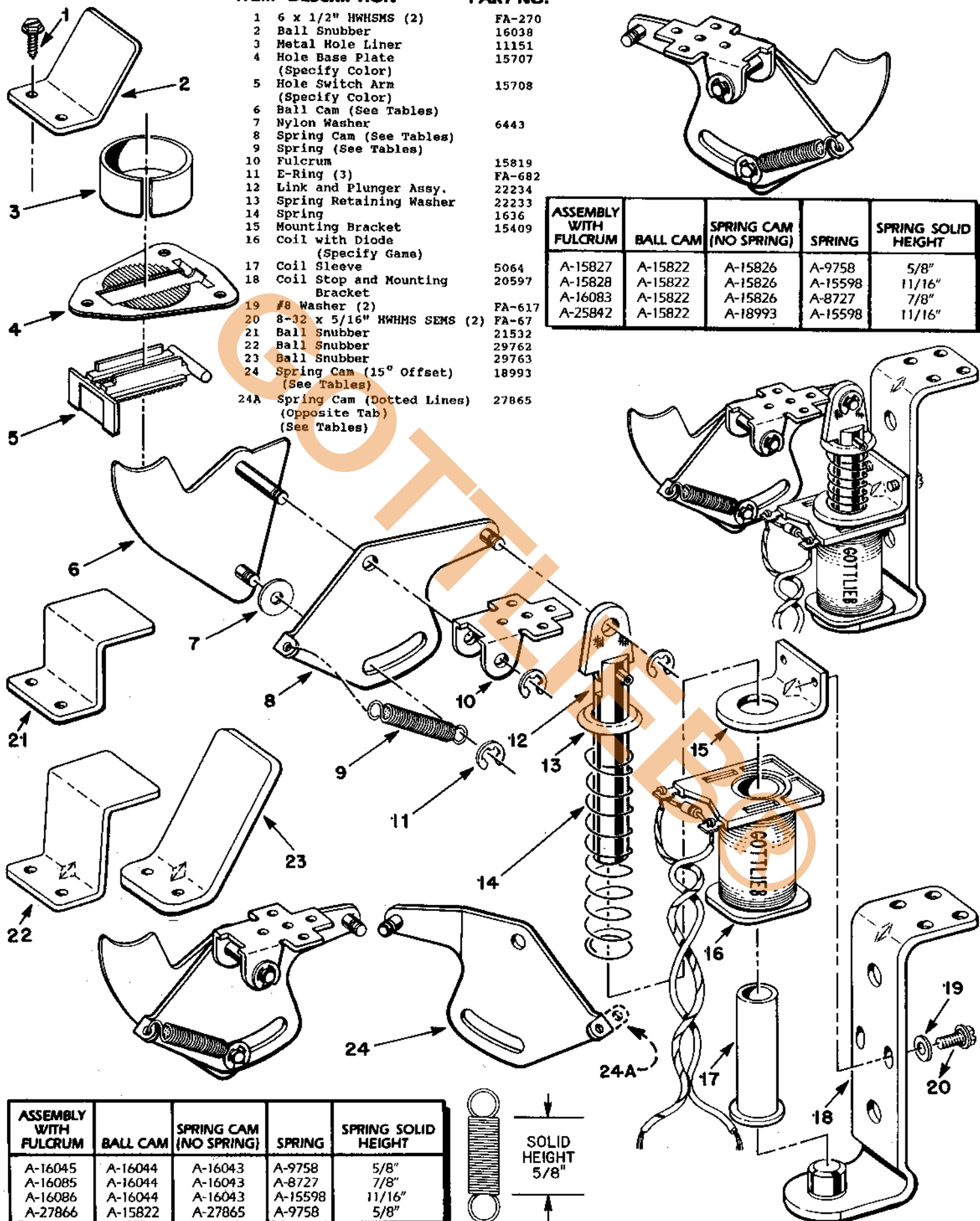
VII. PARTS INFORMATION

BALL HOLE KICKER PARTS

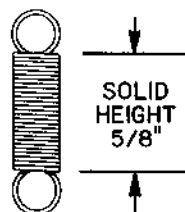
ITEM DESCRIPTION PART NO.

1	6 x 1/2" HHWSMS (2)	FA-270
2	Ball Snubber	16038
3	Metal Hole Liner	11151
4	Hole Base Plate	15707
5	Hole Switch Arm	15708
6	Ball Cam (See Tables)	
7	Nylon Washer	6443
8	Spring Cam (See Tables)	
9	Spring (See Tables)	
10	Fulcrum	15819
11	E-Ring (3)	FA-682
12	Link and Plunger Assy.	22234
13	Spring Retaining Washer	22233
14	Spring	1636
15	Mounting Bracket	15409
16	Coil with Diode	
	(Specify Game)	
17	Coil Sleeve	5064
18	Coil Stop and Mounting Bracket	20597
19	#8 Washer (2)	FA-617
20	8-32 x 5/16" HHWS SEMS (2)	FA-67
21	Ball Snubber	21532
22	Ball Snubber	29762
23	Ball Snubber	29763
24	Spring Cam (15° Offset)	18993
	(See Tables)	
24A	Spring Cam (Dotted Lines)	27865
	(Opposite Tab)	
	(See Tables)	

ASSEMBLY WITH FULCRUM	BALL CAM	SPRING CAM (NO SPRING)	SPRING	SPRING SOLID HEIGHT
A-15827	A-15822	A-15826	A-9758	5/8"
A-15828	A-15822	A-15826	A-15598	11/16"
A-16083	A-15822	A-15826	A-8727	7/8"
A-25842	A-15822	A-18993	A-15598	11/16"

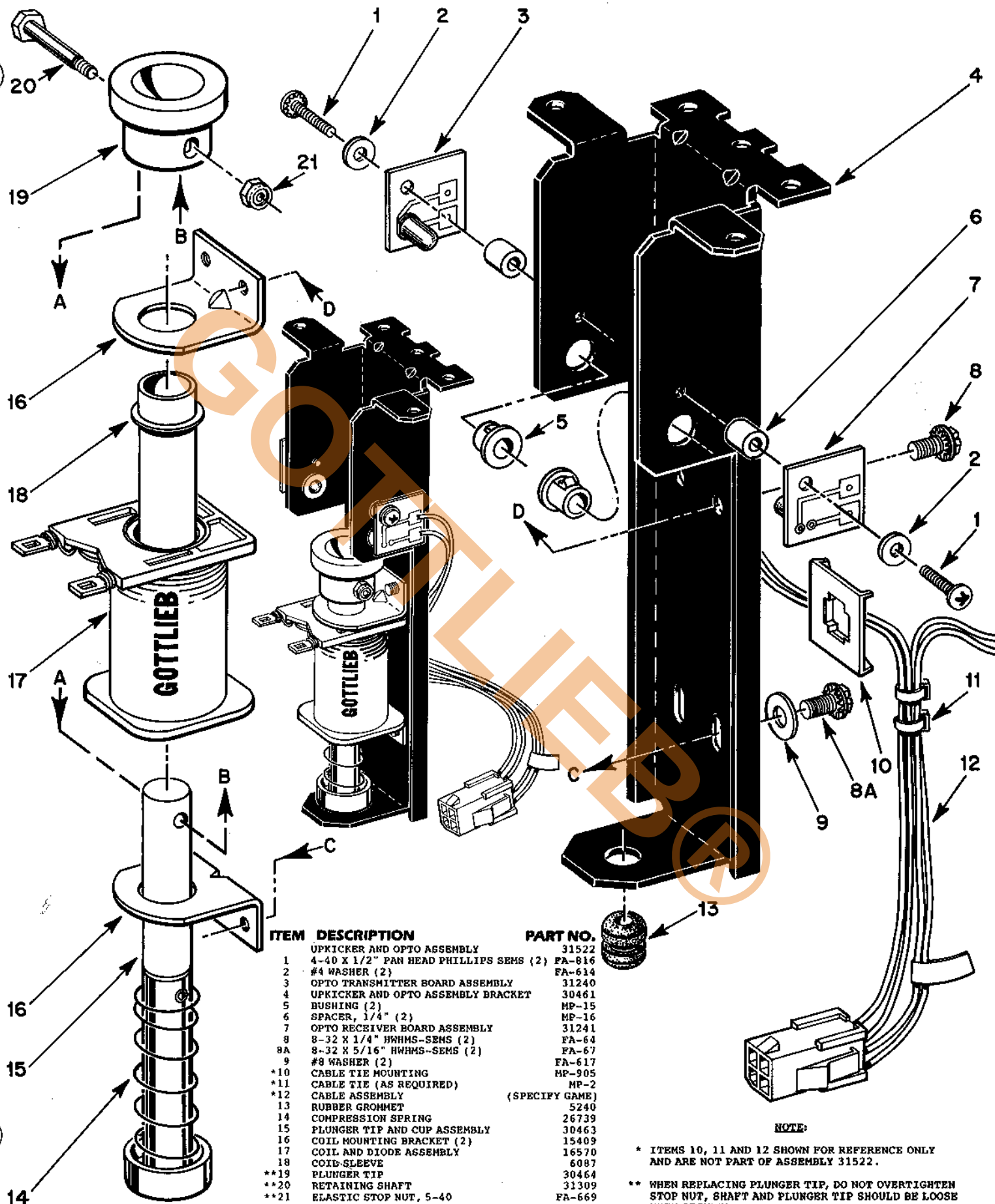


ASSEMBLY WITH FULCRUM	BALL CAM	SPRING CAM (NO SPRING)	SPRING	SPRING SOLID HEIGHT
A-16045	A-16044	A-16043	A-9758	5/8"
A-16085	A-16044	A-16043	A-8727	7/8"
A-16086	A-16044	A-16043	A-15598	11/16"
A-27866	A-15822	A-27865	A-9758	5/8"



VII. PARTS INFORMATION

UPKICKER AND OPTO ASSEMBLY 31522



ITEM DESCRIPTION

- 1 UPKICKER AND OPTO ASSEMBLY
- 2 4-40 X 1/2" PAN HEAD PHILLIPS SEMS (2)
- 3 OPTO TRANSMITTER BOARD ASSEMBLY
- 4 UPKICKER AND OPTO ASSEMBLY BRACKET
- 5 BUSHING (2)
- 6 SPACER, 1/4" (2)
- 7 OPTO RECEIVER BOARD ASSEMBLY
- 8 8-32 X 1/4" HWHMS-SEMS (2)
- 8A 8-32 X 5/16" HWHMS-SEMS (2)
- 9 #8 WASHER (2)
- *10 CABLE TIE MOUNTING
- *11 CABLE TIE (AS REQUIRED)
- *12 CABLE ASSEMBLY
- 13 RUBBER GROMMET
- 14 COMPRESSION SPRING
- 15 PLUNGER TIP AND CUP ASSEMBLY
- 16 COIL MOUNTING BRACKET (2)
- 17 COIL AND DIODE ASSEMBLY
- 18 COIL-SLEEVE
- **19 PLUNGER TIP
- **20 RETAINING SHAFT
- **21 ELASTIC STOP NUT, 5-40

PART NO.

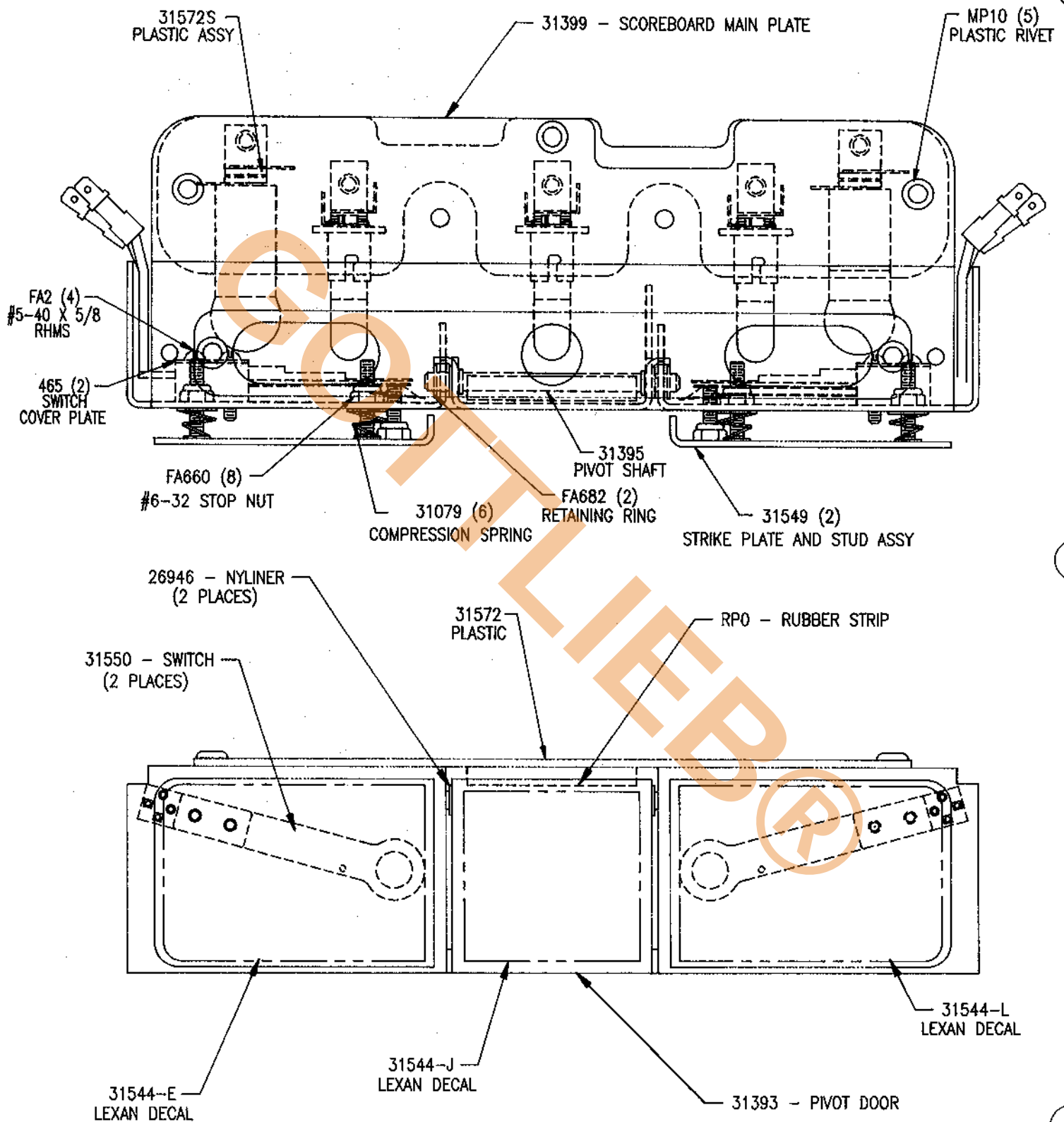
- 31522
- FA-816
- FA-614
- 31240
- 30461
- MP-15
- MP-16
- 31241
- FA-64
- FA-67
- FA-617
- MP-905
- MP-2
- (SPECIFY GAME)
- 5240
- 26739
- 30463
- 15409
- 16570
- 6087
- 30464
- 31309
- FA-669

NOTE:

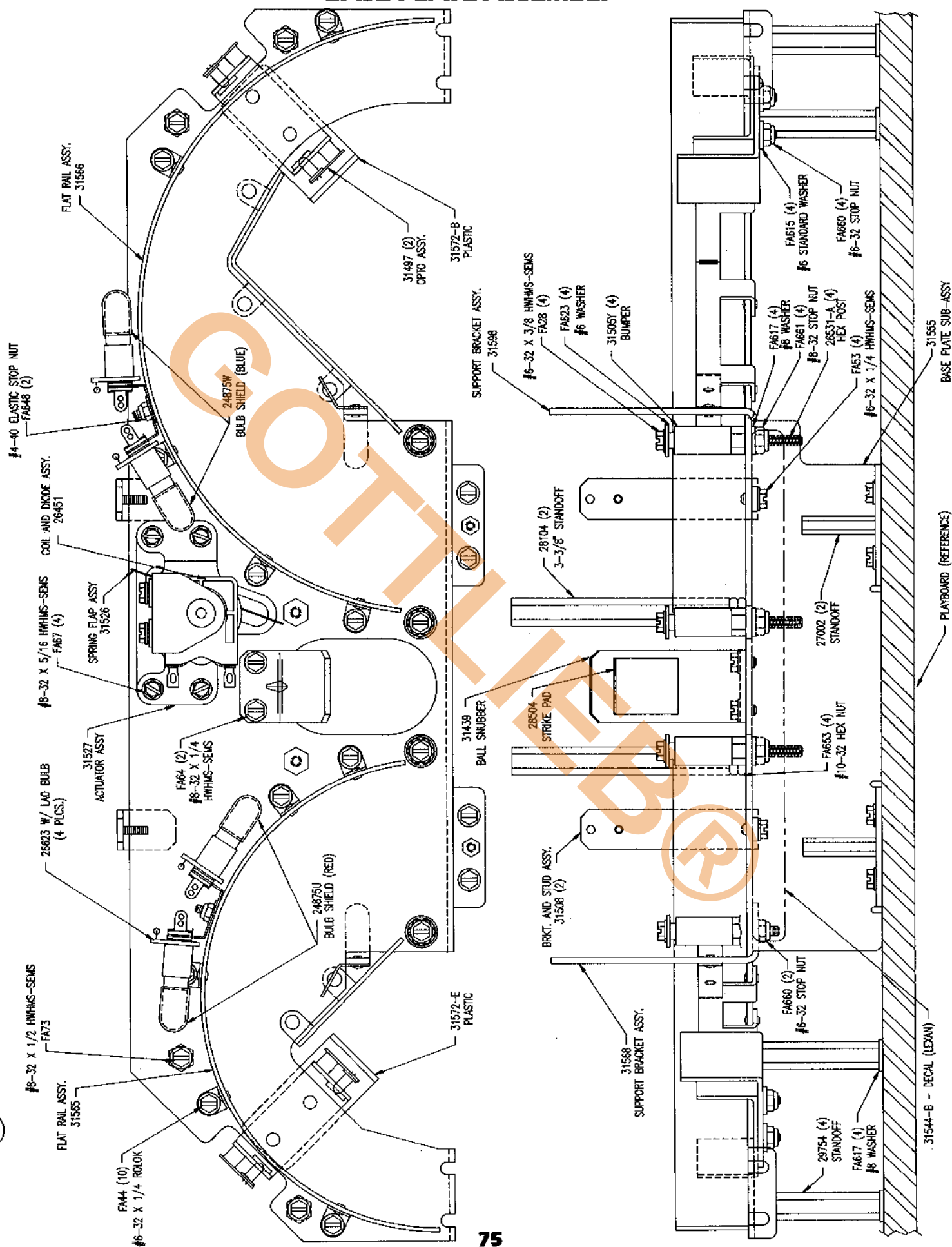
- * ITEMS 10, 11 AND 12 SHOWN FOR REFERENCE ONLY AND ARE NOT PART OF ASSEMBLY 31522.
- ** WHEN REPLACING PLUNGER TIP, DO NOT OVERTIGHTEN STOP NUT, SHAFT AND PLUNGER TIP SHOULD BE LOOSE WHEN SECURED.

VII. PARTS INFORMATION

SCOREBOARD ASSEMBLY

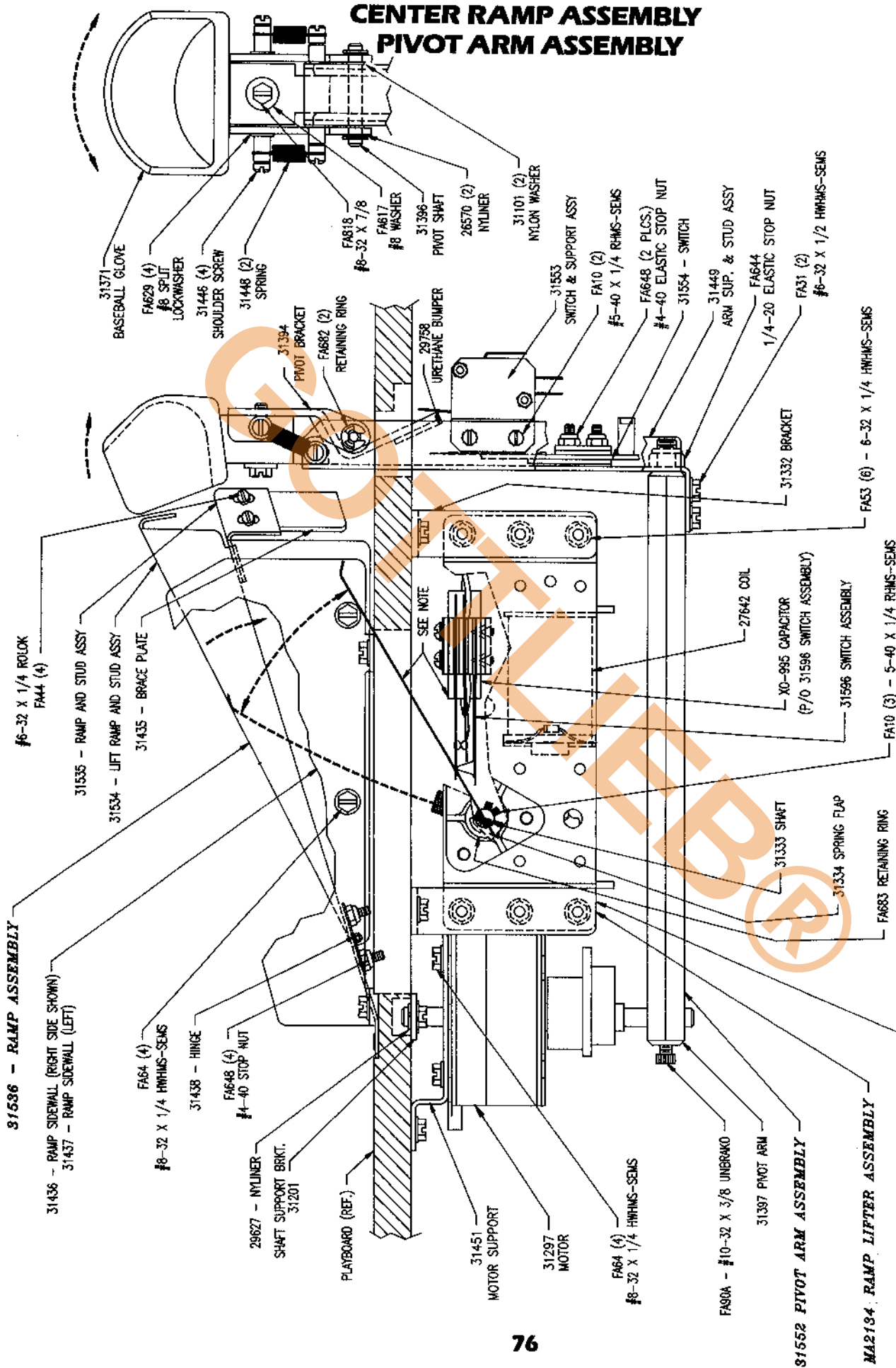


VII. PARTS INFORMATION BASE PLATE ASSEMBLY



VII. PARTS INFORMATION

RAMP LIFTER ASSEMBLY CENTER RAMP ASSEMBLY PIVOT ARM ASSEMBLY



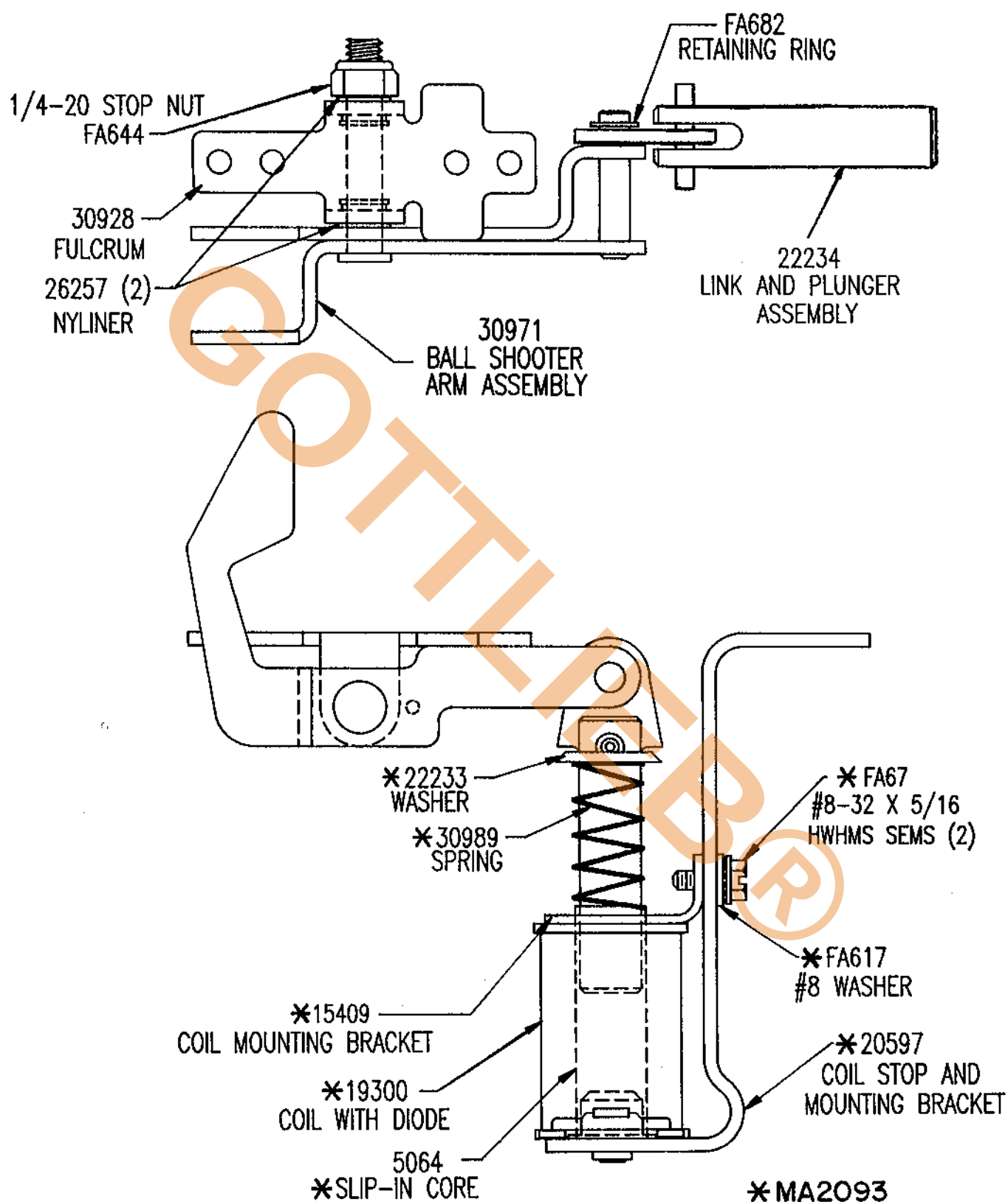
SEE FLUPPER ASSEMBLY EXPLODED VIEW, LEFT SIDE MECHANISM

(ALL OTHER PARTS ARE IDENTICAL EXCEPT FOR THOSE ILLUSTRATED HERE)

NOTE: TO SET SHAFT POSITION -- SPRING FLAP SHOULD REST UPON XO-995 CAPACITOR OF 31596 SWITCH ASSEMBLY WHEN UNIT IS REMOVED FROM PLAYFIELD AND PLINGER IS IN REST POSITION.

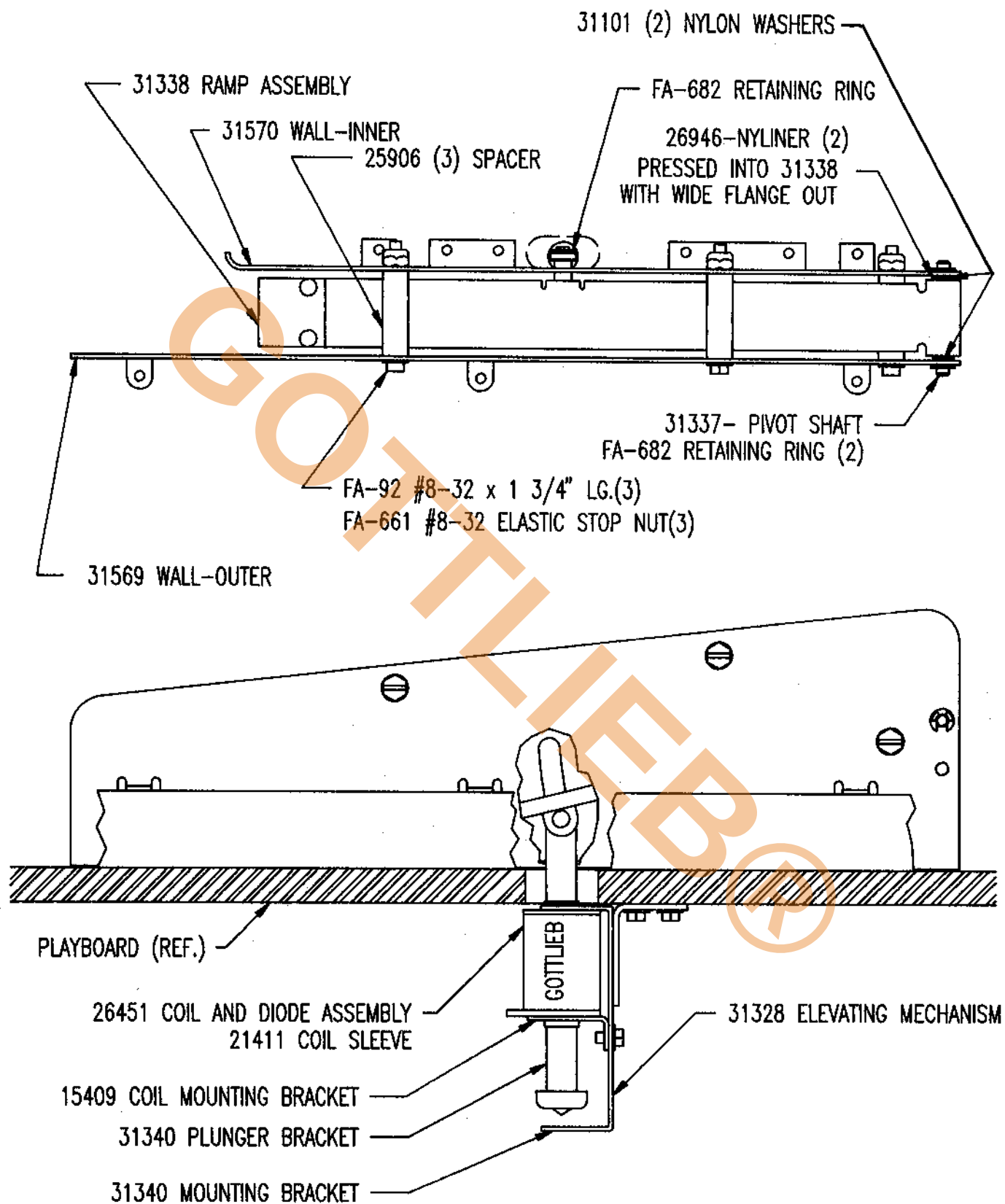
VII. PARTS INFORMATION

BALL SHOOTER ASSEMBLY



VII. PARTS INFORMATION

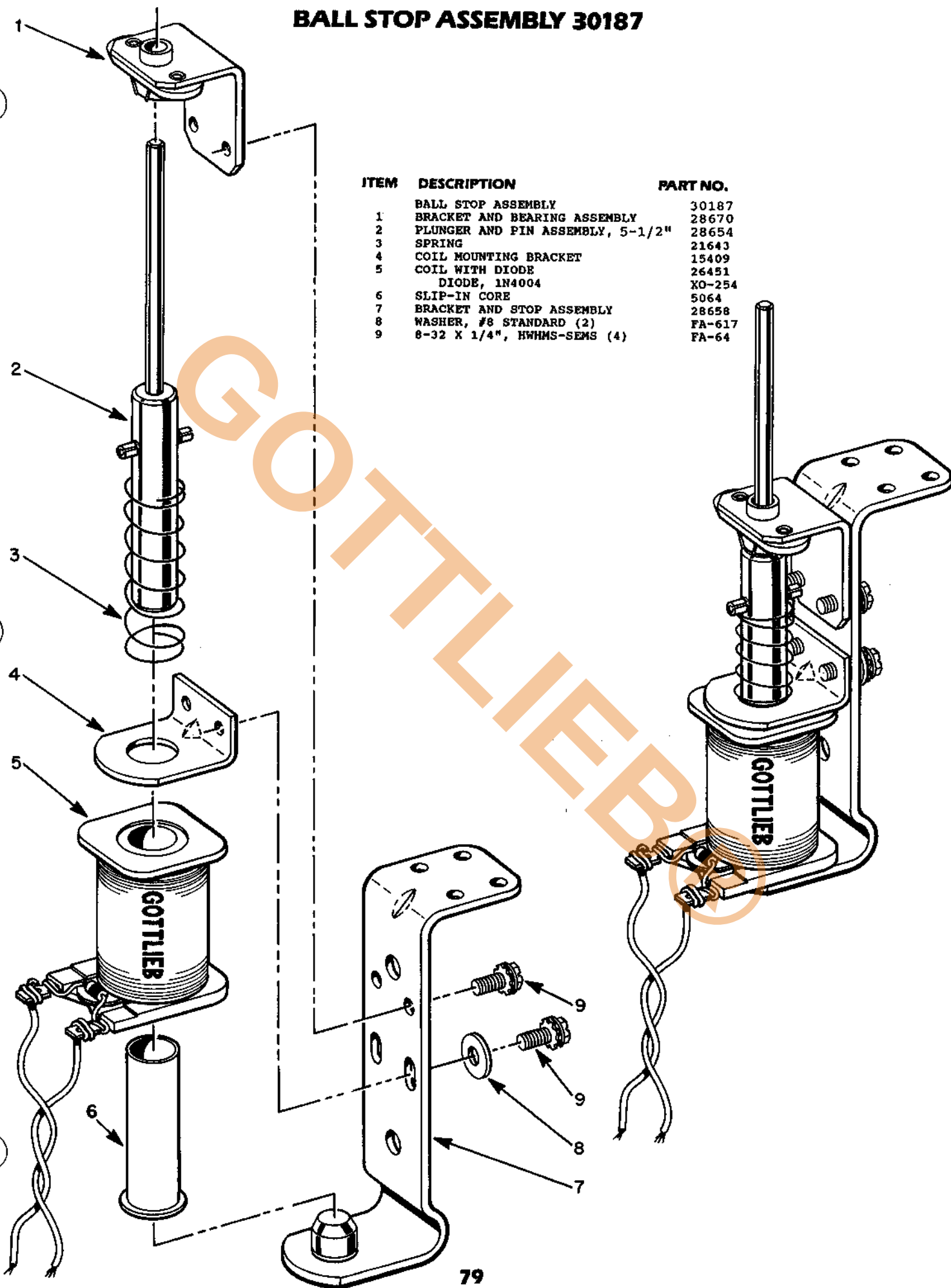
SHOOTER LANE LIFT RAMP ASSEMBLY



VII. PARTS INFORMATION

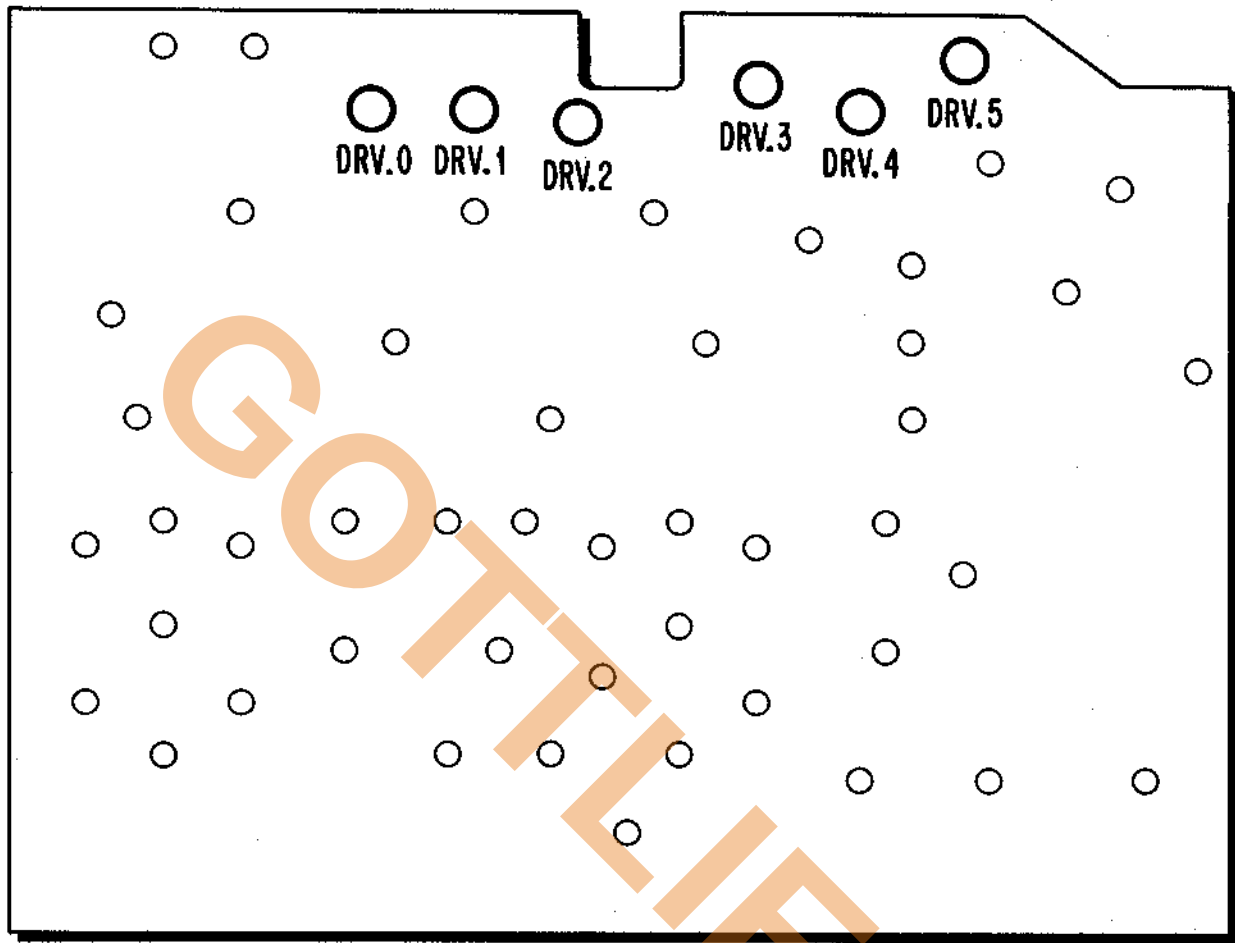
BALL STOP ASSEMBLY 30187

ITEM	DESCRIPTION	PART NO.
1	BALL STOP ASSEMBLY	30187
2	BRACKET AND BEARING ASSEMBLY	28670
3	PLUNGER AND PIN ASSEMBLY, 5-1/2"	28654
4	SPRING	21643
5	COIL MOUNTING BRACKET	15409
6	COIL WITH DIODE	26451
7	DIODE, 1N4004	XO-254
8	SLIP-IN CORE	5064
9	BRACKET AND STOP ASSEMBLY	28658
10	WASHER, #8 STANDARD (2)	FA-617
11	8-32 X 1/4", HWHMS-SEMS (4)	FA-64



VII. PARTS INFORMATION

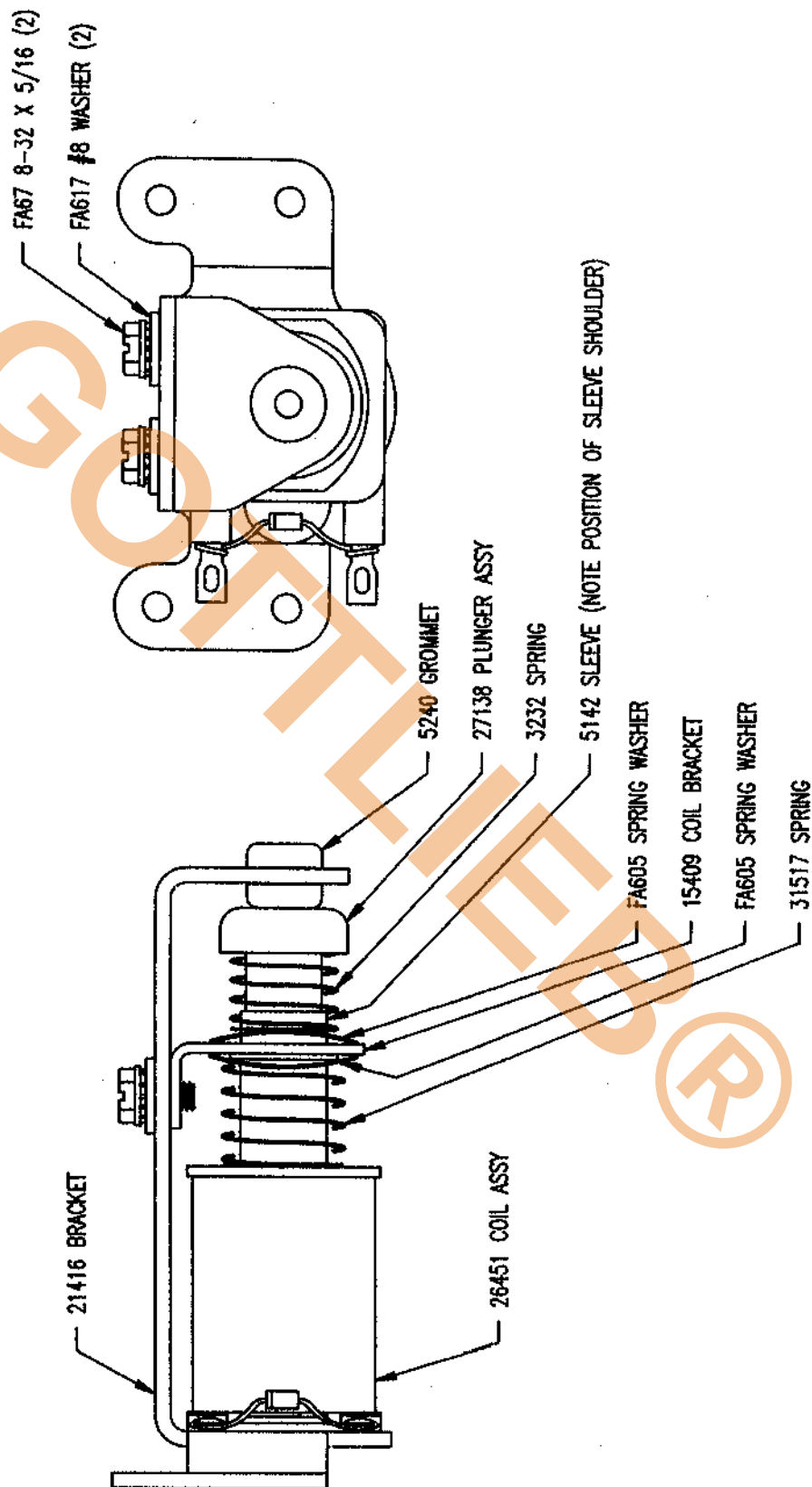
LIGHTBOX INSERT LAMP IDENTIFICATION



NOTE:
DRIVER LAMPS ARE TYPE #67, PART NO. LA-5;
ALL OTHER LAMPS ARE TYPE #44, PART NO. LA-0.

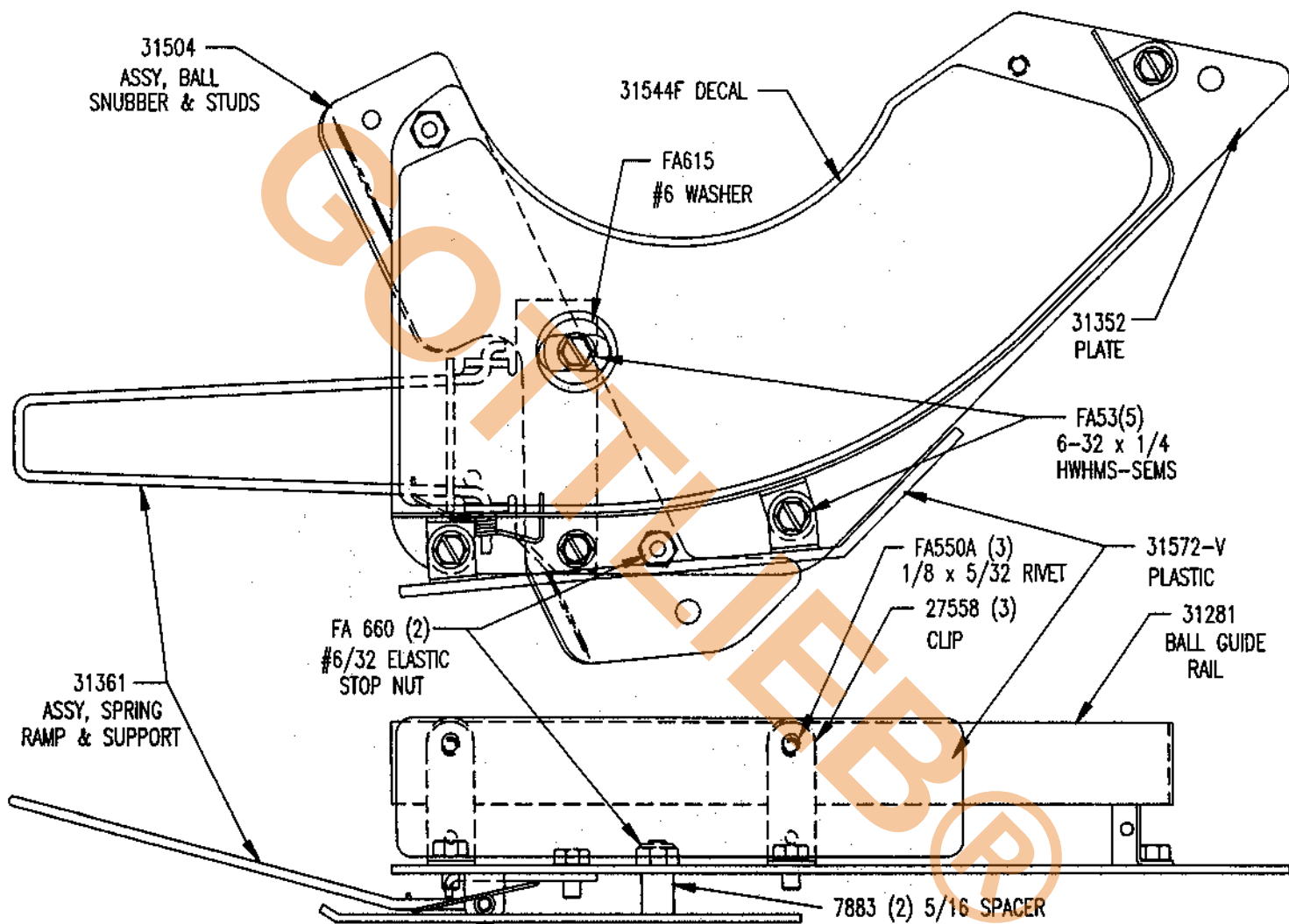
VII. PARTS INFORMATION

ACTUATOR ASSEMBLY 31527



VII. PARTS INFORMATION

PLATE AND SPRING RAMP ASSEMBLY



VII. PARTS INFORMATION

UNIQUE PARTS

The following denotes new parts and assemblies unique to BIG HURT, GAME #745. Part numbers prefixed with an asterisk (*) will be illustrated or can be located on pages 28 thru 82. Numbers in parenthesis () indicates multiple quantities.

PLAYBOARD

PART NO.

VACUUM FORM RAMP*31273
BALL SCOOP AND RIGHT SHIELD ASSEMBLY*31276
BALL GUIDE RAIL*31280
CARDHOLDER AND FENCE ASSEMBLY*31329
SHOOTER LANE LIFT RAMP ASSEMBLY ..(SEE PAGE 78)
MYLAR OVERLAY*31363
VACUUM FORM RAMP*31391
WIREFORM RAMP*31468
WIREFORM RAMP*31469
WIREFORM RAMP*31470
WIREFORM RAMP*31471
WIREFORM RAMP*31472
UPKICKER ASSEMBLY*31488
BUMPER RUBBER BLACK (6)*31505Y
RAMP FLAP*31518
UPKICKER AND OPTO ASSEMBLY*31522
PLATE AND SPRING RAMP ASSEMBLY ...(SEE PAGE 82)
ACTUATOR ASSEMBLY*31527
RAMP LIFTER ASSEMBLY(SEE PAGE 76)
CENTER RAMP ASSEMBLY(SEE PAGE 76)
DROP TARGET DECAL (3)*31541
SCOREBOARD ASSEMBLY(SEE PAGE 74)
PIVOT ARM ASSEMBLY(SEE PAGE 76)
BASE PLATE ASSEMBLY(SEE PAGE 75)
SCOOP*31580
ROOF TOP ASSEMBLY*31581-A
ROOF TOP ASSEMBLY*31582-A
PLASTIC SHIELD SET*31572
PLASTIC SHIELD SET ASSEMBLIES*31572-()

CABINET

CABINET SCREENED*31577-745
TRANSFORMER PANEL*MA-2128

LIGHTBOX

LIGHTBOX SCREENED 30708-745
SPEAKER PANEL, PLEXI SCREENED 28827-745
STYRENE (BACKGLASS ART) 28833-745
LIGHTBOX INSERT ASSEMBLY MA-2129

NOTES

GOTTLEB®

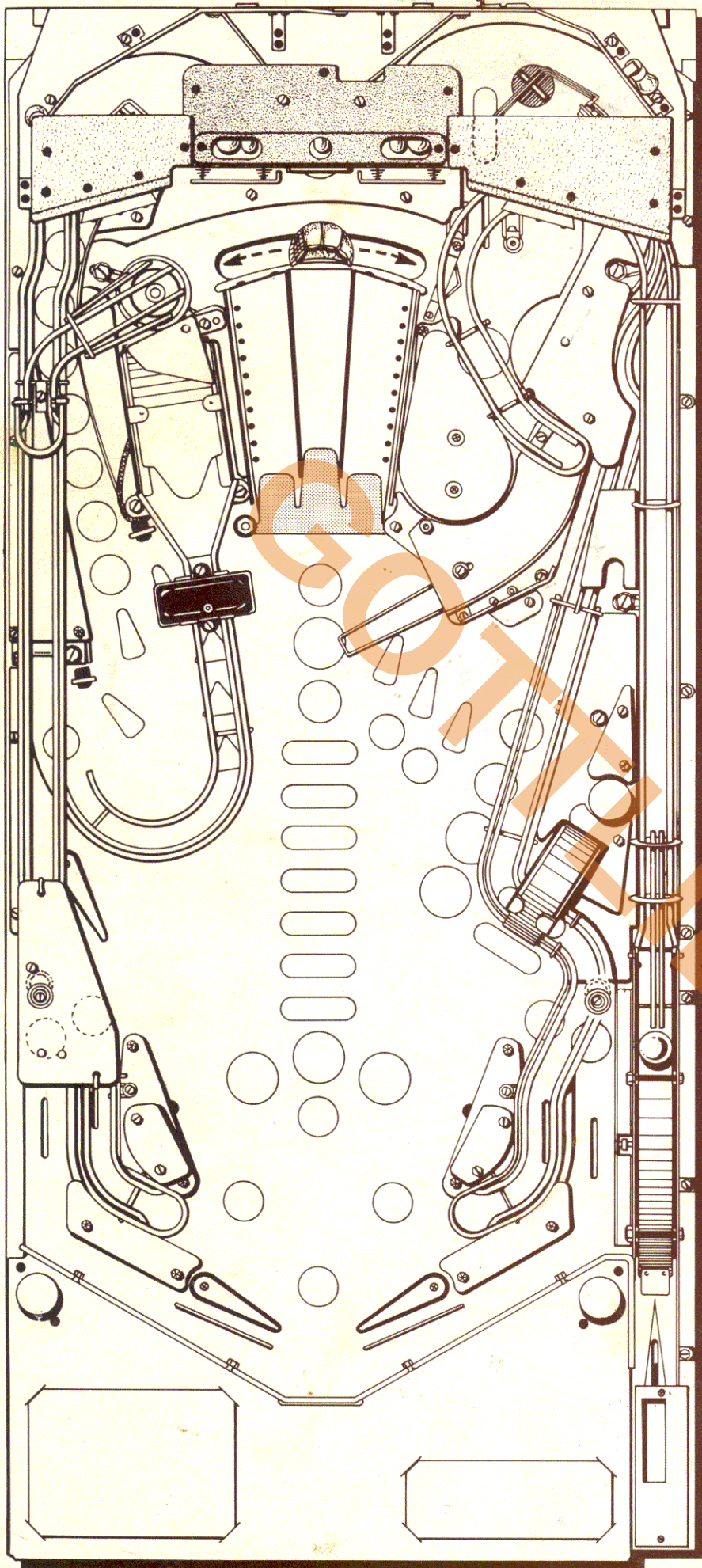
BASIC TROUBLESHOOTING GUIDE

CONDITION	POSSIBLE CAUSE
Game does not power up	* Line fuse (F1) blown * Primary fuse (F2) blown
Game does not power up but general illumination lamps light	* Power supply fuse (F5) blown
SWITCH SHORT message appears in display on power up	* Check for a voltage >0v shorted to switch return number shown in display * Bad Control Board (A1) * Bad Driver Board (A3)
Lightbox illumination lamps do not light	* Fuse (F8) blown
Playfield illumination lamps do not light	* Fuse (F9) blown
All controlled lamps, flash lamps, relays, and switches not working	* Fuse (F6) blown * Bad Driver Board (A3)
All controlled lamps work but some switches do not work	* Bad diode associated with the switch (contact point type switch only)
Some controlled lamps and some switches do not work	* Short circuit on associated strobe line on playfield * Bad Driver Board (A3)
Display not working (blank) but LED on Dot Matrix Controller Board (A8) is flashing	* Display fuse (F3) or (F4) blown * Bad Dot Matrix Display Board (A4) * Bad Display Controller Board (A8)
Display not working and LED on Control Board is flickering rapidly	* Bad Dot Matrix Controller Board (A8) * Bad Control Board (A1)
Display not working and LED on Dot Matrix Controller Board (A8) is glowing bright to dim	* Bad Dot Matrix Controller Board (A8)
A solenoid operated device does not work. (Pop Bumper, Kicker, etc.)	* Associated fuse on playfield is blown * Bad Driver Board (A3)
All flippers and solenoids do not work	* Solenoid fuse (F7) blown
A flipper coil overheats and burns or fuse keeps blowing	* End of stroke switch on flipper unit not opening when the flipper button is held in. * Shorted capacitor on flipper unit
Flipper chatters when flipper button is held in	* Open hold winding (small diameter wire) on flipper coil
No sound or speech	* Bad Auxiliary Power Supply fuse (F10 or F11) * Bad Auxiliary Power Supply Board (A5) * Bad Auxiliary Sound Board (A20) * Bad Sound Board (A6)
Some sounds or speech missing	* Bad Auxiliary Sound Board (A20) * Bad Sound Board (A6)
An optical switch does not work or works intermittently	* Misalignment of LED transmitter to receiver * Bad LED transmitter and/or receiver * Bad Optical Interface Board (A25)

IMPORTANT NOTICE

THIS SHIPMENT HAS BEEN CAREFULLY INSPECTED AND
PROPERLY PACKED BEFORE LEAVING THE FACTORY.

WE CANNOT ASSUME RESPONSIBILITY FOR BREAKAGE
THAT MAY OCCUR IN TRANSPORTATION. IF THIS SHIPMENT IS
DAMAGED IN ANY WAY, IMMEDIATELY NOTIFY THE CARRIER AND
FILE DAMAGE REPORT SO THAT A SATISFACTORY ADJUSTMENT
CAN BE MADE BY THEM.



Premier[®] **Technology**

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1-708-350-0400

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