

MAKE
YOUR
PINBALL
PEPPY

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"IFI XPIN"

MAKE YOUR GAME PEPPY!

FIRST, SOME THINGS TO KEEP IN MIND! POWER CAN BE ADDED TO YOUR MACHINE IN ANY AMOUNT! YOU CAN MAKE THE BALL SHOOT THRU THE GLASS, IF YOU WANTED TO, BUT DON'T! PINBALL RE-BUILDING IS AN ART, AND A TRUE ARTIST PAINTS WITH A SUBTLE BRUSH! NOT ALL SHOTS DESERVE TO MAKE IT TO THE TOP OF THE PLAYFIELD, NOT EVERY BUMPER HIT NEEDS TO BE TOTALLY STRONG! YOU MAY NOTICE THAT MOST OF THESE CHANGES APPLY TO OLDER E.M. GAMES! THAT'S BECAUSE MOST DIGITAL GAMES ARE FROM THE FACTORY VERY PEPPY! BY RETURNING THE PARTS ON YOUR DIGITAL GAME TO ORIGINAL SHARP AND FINE ACTION, YOU DON'T NEED MORE POWER! MORE POWER WILL STRESS YOUR TRANSISTORS INTO EARLY FAILURE! EM'S, ON THE OTHER HAND, WERE SLOW FROM THE FACTORY! THE PLAYERS IN THE 60'S AND 70'S WERE USED TO THIS ACTION, BUT TODAY'S PLAYER THAT JUMPS ON AN EM GAME WILL FIND IT TOO SLOW! SO THE TRICK IS TO BOOST ACTION ON YOUR EM GAME WITHOUT LOSING THE SKILL FACTOR TO TOO MUCH BRUTE FORCE, OR TO LOSE THE "FLAVOR" OF THE ORIGINAL GAME! THINK OF THESE HINTS AS A STARTING POINT, YOU CAN MOVE UP OR DOWN FROM HERE! ALL THESE CHANGES ARE A RESULT OF WHAT I HAVE SETTLED ON AFTER MUCH EXPERIMENTING, ~~AND SINCE I'M UP ON THE PODIUM AND YOU'RE DOWN IN THE AUDIENCE~~
~~FUCK YOU! I AM THE PINBALL GOD!~~

GENERAL RULES

- ON DIGITAL GAMES, KEEP YOUR LINE CORD STRAIGHT! TWISTS AND KNOTS IN YOUR POWER CORD CAN ROB POWER!
- MORE POWER WILL CAUSE MORE STRESS TO STUFF ON THE PLAYFIELD! DROP TARGETS SHOULD BE REPLACED WITH NEW TARGETS! FILL THE BACK OF THE TARGET WITH HOT GLUE, RUBBER CEMENT, OR "GOOP" THIS RUBBERY STUFF WILL ADD STRENGTH AND ELASTISITY! ALSO, BUY NEW FLIPPER BATS! I ALSO ADD NEW POSTS, BIGGER FASTENERS, AND NEW BUMPER BODYS! MOST IMPORTANT - A NEW OR RESURFACED BALL!
- COMPRESSION SPRINGS ARE HIGHLY SUBJECT TO FAILURE AND WILL LOSE SOME SNAP BACK! MY RULE IS TO REPLACE ANY COMPRESSION SPRING THAT IS RUSTED, BROKEN, OR IS COMPRESSED TO MORE THAN 75% BY DESIGN! IF ORIGINAL SPRING MEETS THESE 3 TESTS, I STRETCH IT BACK OUT TO ORIGINAL LENGTH + USE IT AGAIN!
- EXTENSION SPRINGS HAVE OFTEN BEEN MAULED BY BAD MECHANICS OR MADE TOO SHORT! EXTENSION SPRINGS MUST BE EVEN-COILED THE ENTIRE LENGTH, THE END LOOPS MUST BE CLEAN, NOT TORN, AND AT REST COILS SHOULD BE VERY CLOSE TO TOUCHING OR TOUCHING!
- FLIPPER BEARINGS ARE SUBJECT TO WEAR! THIS IS REALLY A PROBLEM ON NEWER (FIREPOWER + ON) WILLIAMS FLIPPERS, SIDE TO SIDE SLOP MERITS REPLACEMENT! ANY CRACKING OR VISABLE STRESS, REPLACE! IF THE TOP OF THE BEARING DOES NOT EXTEND 2-3 MM ABOVE PLAYFIELD, BAT WILL GOUGE GROOVES IN YOUR WOOD!
- ~~WORN~~ COIL STOPS WILL NOT ROB POWER, BUT WORN STOPS CAN CAUSE HUMMING OR FAILURE OF LINK! REPLACE IF WORN!

- END OF STROKE SWITCHES MUST BE FLAT & CLEAN! FILE SILVER ALLOY POINTS WITH FILE, GRIND BIG ASS CADMIUM POINTS! IF TOO MUCH METAL IS GONE, REPLACE SWITCH! ADJUST TO OVERTRAVEL-TO-REST AND OPEN AT LAST POSSIBLE INSTANT!
- CABINET SWITCHES ARE ALSO A LOSS OF POWER POINT! CLEAN OR REPLACE!
- METAL FLIPPER SLEEVES ARE BAD! REPLACE ALWAYS WITH PLASTIC SLEEVE!
- WORN LINKS ARE A MAJOR POWER LOSS! MAKE OR BUY NEW ONES
- NICKLE PLATED PLUNGERS SHED LESS METAL THAN BLACK PAINTED PLUNGERS
- PROPER FLIPPER RUBBER IS IMPORTANT! FOR 78 MM (LONG) FLIPPER, BUY RED, WHITE, OR YELLOW "LIVE" RINGS (60 DURO) NOT BLACK (40-50 DURO)! GOTTLIEB LONG FLIPPERS ARE GROOVED FOR 3/8 RINGS, DO NOT USE 1/2" RINGS!
- "THING FLIPS" NEEDS 1" FLAT RING, NOT 1 1/2" 55MM (SHORT) FLIPPERS CAME FROM FACTORY WITH 3/4" IN GROOVE, 1" BELOW GROOVE! FOR EXTRA LENGTH AND BOUNCE, USE 1" IN GROOVE & 1 1/2" BELOW GROOVE! GOTTLIEB FLAT TOP FLIPPERS (1967 ON) NEED A SPECIAL GROOVED "BEADED" RUBBER OR JUST A 1" IN THE GROOVE!
- REPLACE #6 X 3/8 S.M.S. HOLDING FLIPPER BRACKETS TO PIAYFIED WITH #8 X 3/8 S.M.S.! YOU MAY NEED TO ENLARGE HOLE IN BRACKET TO 1 1/32
- SIDE KILKERS SHOULD HAVE A DROP OF GUN OIL ON FULLUM POINT!
- REPLACE WORN OR SLOPPY LINKS! CLEAN CONTACT POINTS!
- REPLACE #6 X 3/8 S.M.S. WITH #8 X 3/8 S.M.S.!

- BUMPER ROD & RINGS MUST HAVE NO LOOSE PRESS FIT WHERE ROD MEETS RING, POLISH RING & ROD TO MIRROR FINISH FOR EXTRA CREAMY ACTION! IF THREADED END WHERE ROD MEETS METAL YOLK IS NOT SQUARE, REPLACE! GOTTLEB BUMPERS FROM SPIRT OF 76 TILL END REQUIRE A ROD & RING THAT IS LONGER - DO NOT SUB SHORTER ROD & RING HOLE IN WOOD ROD & RING GOES THRU MUST BE SMALLER THAN HOLE IN METAL PAD GOTTLEB USED FROM 1990 ON DEPENDING ON WHICH VENDOR DRILLED PLAYFIELD! IN LARGE HOLE IN METAL PAD TO $9/32$ DEBURR HOLE! YOU WILL NOTICE THAT ROD IS WORN WHERE IT RUBS METAL NOT WOOD! GLUE PLUNGER TO METAL & FIBER YOLKS! NO MORE SCOP! LET IT DRY OVER NIGHT ON UPSIDE DOWN ROD & RING SO ALIGNMENT WILL BE TRUE! IF BINDING OCCURS WHEN RE ASSEMBLED, LOOSEN 2 SCREWS HOLDING BRACKET TO FRAME & ALLOW PLUNGER TO ALIGN IT'S SELF, THEN RETIGHTEN CLEAN OR REPLACE LARGE POINTS THAT CARRY CURRENT TO COIL! UP TO $\frac{1}{2}$ OHM CAN BUILD UP HERE, WASTING ENERGY AS HEAT!
- CUP SWITCH MUST BE CLEAN IN THE CUP, LITHIUM GREASE IN CUP IF METAL, VERY LIGHT COAT! TIGHTEN MACHINE SCREWS HOLDING BUMPER SWITCH STACK TOGETHER! PRESS CUP ONTO END OF SKIRT STEM TO ALIGN, TIGHTEN S.M.S. HOLDING SWITCH BRACKET TO UNDERSIDE OF PLAYFIELD, SCREW CLOSEST TO CUP 1ST! CHECK FOR PROPER CENTERING & GAP BACKING CONTACT ONLY!
- REPLACE #6X $3/8$ " S.M.S. WITH #8X $3/8$ " S.M.S. ON BUMPER BRACKET!
- REPLACE #6X $1/2$ " S.M.S. HOLDING BUMPER BODY TO PLAYFIELD WITH #6-32X $3/4$ " FLAT TOP M.S. FOR TWICE THE THREAD SURFACE!

I USE GLUE DOWN BUMPER TRIM PLATTERS IN ALL GAMES! YOUR TASTE MAY DICTATE SET DOWN PLATTERS GOTTLIEB USED OR NO PLATTER!

ALTHO IT WON'T ROB POWER, YOU MIGHT AS WELL REPLACE BUMPER SKIRT WHILE YOU HAVE IT APART! IT'S LESS THAN 1\$! IT'S NOT A QUESTION OF IF, IT'S ONLY A QUESTION OF WHEN A 30 YEAR OLD PLASTIC WILL FAIL!

HIGH TAP YOUR EM TRANSFORMERS! NOMINAL VOLTAGES WILL RISE ABOUT 5 VOLTS ON GOTTLIEB FROM 30 TO 35 VOLTS! ON WILLIAMS EM'S NOMINAL FULLWAVE VOLTAGES WILL RISE FROM 36 VOLTS TO 42 VOLTS (HALFWAVE FROM 30-35 VOLTS) AND BALLY'S NOMINAL FULLWAVE FROM 52 TO 60 VOLTS (40-48 HALFWAVE) THIS WILL GIVE MORE ELECTRICAL PRESSURE (VOLTAGE) TO EVERYTHING ON THE GAME! ALL GIZMOS WILL HAVE MORE UMPH! THIS WILL HAVE NO EFFECT ON LAMP VOLTAGE! **WARNING!** UNLESS YOU STUDY THE SET UP ON DIGITAL GAMES AND KNOW WHAT YOU'RE CHANGING, HIGH TAPPING A DIGITAL GAME WILL CAUSE MUCH HAVOC! DON'T GO THERE! MANY DIGITAL GAMES ACTUALLY NEED TO BE LOW TAPPED TO REDUCE SOME VOLTAGES!

ACTION & POWER ALSO COMES FROM A SLICK SURFACE AND A FRESH BAIL! ON THE NEXT PAGE IS MY OPINION OF WHAT TO USE ON YOUR SURFACE! SOME PEOPLE ARE ADVOLATING OTHER METHODS OR CHEMICALS WHICH MAY INCLUDE ABRASIVES! ~~THEY ARE WRONG & MUST BE KILLED!~~ I AM THE PINBALL GOD! HEED MY WARNING!

KNOW YOUR SURFACES!

BALLS ARE HARD ON EVEN THE MIGHTIEST OF SURFACES! BY KNOWING WHAT EACH SURFACE IS, YOU CAN CHOOSE THE RIGHT CLEANER TO MAKE IT LOOK GOOD

ORIGINAL TUFF-COAT ON ALL GOTTIER GAMES UP TO WHIRLWIND! ON ALL WILLIAMS GAMES UP TO WHIRLWIND! ON ABOUT HALF OF WILLIAMS GAMES WHIRLWIND - FUNHOUSE! CLEAN + WAX WITH CAR WAX! FOR ADDED PROTECTION USE JOHNSONS PASTE WAX!

DIAMOND PLATE ALSO KNOWN AS L.S. TOP COAT "STEALTH" ON DATA EAST

ON MOST WILLIAMS GAMES WHIRLWIND - FUNHOUSE ALL FROM FUNHOUSE ON! GREAT STUFF! NO HALF MOON CRACKS! NO LONG VERTICAL CRACKS! CLEAN ONLY WITH NOVUS #2! WAX WITH CAR WAX

MYLAR OPTICALLY CLEAR FILM WITH STICKY BACK APPLIED AT FACTORY! VERY DURABLE BUT HEAT FROM LENSES CAUSES GLUE TO CRYSTALLISE! ALSO, ANY V.O.C.'S ON EDGE WILL CAUSE IT TO PEEL! CLEAN ONLY WITH NOVUS #2 WAX NOT NEEDED! REMOVE WITH MINERAL SPIRITS + TOOTH BRUSH SLOWLY!

RAMPS! VACUFORMED PLASTIC! DO NOT CLEAN WITH ANYTHING WITH V.O.C.'S! NOVUS #2 OR #1 WORKS WELL!

P.F. PLASTICS! AGAIN - IF IT'S PLASTIC, CLEAN IT WITH A PLASTIC CLEANER! NOVUS!

CABINETS BEFORE MID 80'S ALL CABINETS WERE ENAMEL PAINT - EASY TO CLEAN + WAX! BUT SINCE MID 80'S BE CAREFUL! TEST CLEAN IN A SMALL SPOT IN BACK! ON NEWEST GAMES WITH "STICKERS", NOT PAINT USE WINDEX!

LEGS CLEAN RUST OFF WITH TURTLE WAX CHROME POLISH! BEAD BLAST PAINTED LEGS + REPAINT! POLISH PLATED LEGS!

CHEMICALS!

DEADLY BLUE TRADE NAME "GEMINI PLAYFIELD CLEANER" IS A LIGHT BLUE COLOR, THIN & SMELLS A LOT LIKE KEROSENE! DO NOT USE ON PLAYFIELDS, RAMPS, MYLARS, CABINETS, OR PLASTICS! IT DOES A GREAT JOB AS A RUBBER CLEANER!

WILDCAT #125 MILKY WHITE, THIN, SAYS "RECOMMENDED BY BALLY" ON LABEL! THIS RECOMMENDATION WAS MADE IN 70'S, BEFORE MYLARS + DIAMOND PLATE FINISHES! IS OK ON ORIGINAL TUFF-COTE AS A CLEANER, BUT DOES NOT PROVIDE ANY WAX PROTECTION! DO NOT USE ON RAMPS, DIAMOND PLATE, MYLARS OR PLAYFIELD PLASTICS

LO-VOL CAR WAX LOOK FOR CARNUBA ON LABEL! SNIFF SEVERAL BRANDS, THE ONE THAT SMELLS LEAST OF PETROL IS A WINNER! "MOTHERS" MAKES A GOOD CARNUBA WAX! I RECOMMEND CAR WAX TO HOME SALES, BECAUSE EVERYBODY HAS IT AND IT'S SAFE ON PAINT! DO NOT USE ON RAMPS!

NOVUS #2 ALSO MADE BY GEMINI! COMPLETELY INERT! CONTAINS NO U.O.C.'S! WILL NOT YELLOW RAMPS! WILL NOT EAT MYLAR GLUE! RETURNS P.F. PLASTICS TO NEW CONDITION! HIGHLY RECOMMENDED FOR NEWER GAMES!

JOHNSONS PASTE WAX IN YELLOW CAN IN AOR CARE SECTION OF HARDWARE STORE! ORGANIC BEE'S WAX WITH SLIGHT AMOUNT OF PETROL! GREAT ON ORIGINAL TUFF COAT! WARNING! REQUIRES MUCH HAND BUFFING AND TAKES AN HOUR TO DRY! ALSO GREAT ON CABINETS WITH MAX-INE BUFF! DO NOT USE ON RAMPS, MYLARS, P.F. PLASTICS

GOTTLIEB COILS

95% OF ALL COILS ARE THESE 5

PART#	COLOR	WIRE GAUGE	# OF TURNS	OHMS	OLD PART#	COMMON USES
A 4893	RED	#22	535	2.1Ω		BUMPERS STEP UNITS SS. BUMPERS
A 1496	YELLOW	#23	635	3Ω		SIDE KICKERS KNOCKERS
A 5194	BLUE	#24	780	4.5Ω		COIL GATES SS. KNOCKERS
A 5195	WHITE	#26	1305	12.3Ω		
A-16570	GREEN	#27	1450	15.5Ω	NONE	BALL RELEASE SS.

EM FLIPPER COILS

PART#	COLOR	POWER WINDING	HOLD WINDING	OLD PART #	COMMON USES
A 5141	GREEN	#22-450	#28-300		ALL FLIPPERS 1950-78
A 5141	"HOT" GREEN YELLOW SPOT	#30-300	#28-325	NONE	MORE POWER FOR YOUR FLIPPERS
A-17875	YELLOW	#24-560 2.8Ω	SS FLIPPERS #31-1100 40Ω	NONE	ALL SOLID STATE 1978-6-89 "BIG HOUSE" A.K.A. "FAT BOY"
A-24161	BLUE	#23-530 2.2Ω	#31-1050 40Ω		ALL SS FLIPPERS 75-89 SLIGHTLY MORE POWERFUL!
A-20095	RED	#22-450 1.55Ω	#30-900 35.5Ω		LONG RAMP SHOTS ALL SS FLIPPERS 78-86 <u>VERY</u> POWERFUL!

◦ SLIM BOY FLIPPERS ◦ BONE BUSTERS 10-89 THRU END

A-29876	ORANGE	#23-760 2.36Ω	#33-3325 200Ω		MOST POWER FULL WILL BREAK DROP TARGETS!
A-25959	RED	#22-445 3.85Ω	#30-1225 202Ω		STANDARD POWER FOR MOST USES
A-26646	BLUE	#25-725 4.57Ω	#33-3470 201Ω		LIMP DICK ACROSS THE PLAYFIELD FLIPPERS

COIL MODIFICATIONS GOTTLIEB EM 1950-78

BUMPERS - REMOVE 3 PASSES OF WIRE FROM A 4893 RED
LOWERING RESISTANCE FROM 2.1 TO 1.8 Ω

SIDE KICKERS - REMOVE A-5194 BLUE 4.5 Ω
REPLACE WITH A-1496 WITH 3 PASSES OF WIRE
REMOVED DRIPPING RESISTANCE FROM 3 Ω TO 2.5 Ω

FLIPPERS - I DON'T USE A 5141 "HOT"! (YELLOW SPOT) WITH PROPER
LINKS, SPRINGS, PLUNGER & SLEEVE, REGULAR A-5141
IS JUST RIGHT!

GOTTLIEB S-S-

BUMPERS - REMOVE 2 PASSES OF WIRE FROM A-4893
LOWERING RESISTANCE FROM 2.1 Ω TO 2 Ω
ON SYSTEM 1 GAMES, GRIND HEADS CLEAN
ON SYSTEM 80 GAMES PERFORM ALL BUMPER BOARD UPDATES!
ON SYSTEM 3 GAMES REPLACE A-5195 WHITE 12 Ω WITH
WITH A 5194 BLUE 4.5 Ω

SIDE KICKERS - REPLACE A 5194 BLUE (EXCEPT SYSTEM 3) WITH A 1496
YELLOW!

FLIPPERS SYSTEM 1 AND SYSTEM 80 REPLACE A-17875 (YELLOW) WITH
A 20095 (RED) SAVE YELLOW COILS FOR EM GAMES!

SYSTEM 3 "SLIM BOY" FLIPPERS! FOR MAXIMUM POWER A-29876
2.36 Ω (ORANGE) FOR GOOD POWER USE RED A 25959 3.85 Ω !
DO NOT USE BLUE 4.57 Ω , TAN 6.02 Ω , OR YELLOW 9.1 Ω

WILLIAMS COIL MODIFICATIONS EM GAMES

48 VOLT PINBALLS BEFORE TRADEWINDS (6-62)

BUMPERS - REPLACE A-26-1200^(12W) WITH GOTTLIEB

A 5194 BLUE (4-5W)

SIDEKICKERS - REPLACE A-26-1200 WITH GOTTLIEB A 5194 (BLUE)

FLIPPERS - REPLACE FL 25-31 WITH WITH GOTTLIEB

A 17875 (YELLOW) FAT BOY FLIPPER COIL **REMOVE DIODE!**

24 VOLT PINBALLS AFTER COQUETTE (5-62) THRU HOT TAP EM (78)

BUMPERS - REPLACE ANY A-23-750 WITH AN A-22-550

OR IF GAME ALREADY HAS A 22-550, REMOVE 75 TURNS OF WIRE! ON A.C. GAMES FROM TRADEWINDS (6-62) THRU

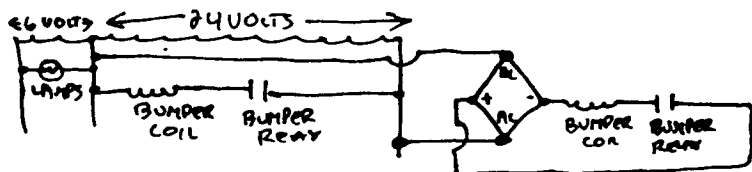
OLYMPIC HOCKEY (1-72) CONVERT FROM A.C. TO D.C.

USING 35 AMP BRIDGE (MINIMUM 50 VOLT P.I.V.) FROM

RADIO SHACK! THIS REQUIRES LAYING NEW WIRES TO

EACH RELAYS BUMPER COIL SWITCH AND A NEW

COMMON FROM EACH BUMPER COIL!



REPLACE ALL #6 X 3/8 S.M.S. FASTNERS HOLDING BUMPER BRACKET TO PLAYFIELD WITH #8 X 3/8 S.M.S.! DRILL HOLES IN BRACKET FROM 1/8" TO 11/32"

SIDEKICKERS - REPLACE A-23-750 WITH A 22-550 WITH 75 TURNS REMOVED!

FLIPPERS - REPLACE FL-21-28 FLIPPER COIL WITH FL 20-28 COIL! METAL SLEEVES MUST BE REPLACED WITH PASTIC!

SOLID STATE PINBALLS - NO COIL CHANGES EXCEPT REWINDING ALL A-23-900 OR A-23-600 TO A-23-750

Bally COIL MODIFICATIONS

EM PINBALLS FROM 1963 TO 1976

BUMPERS - REPLACE A 26 1200 (12W) WITH GOTTIEB A 5194 (BLUE) 4.5W! REPLACE ORANGE 3 LUG FLIPPER COIL TYPE BUMPER COILS WITH 2 LUG GOTTIEB A 5194 ELIMINATING JUMP WIRE FROM E.O.S. SWITCH TO COIL

SIDEKICKERS - REPLACE A-26 1200 WITH GOTTIEB A 5194 BLUE

FLIPPERS - REPLACE A 25-28 COIL WITH GOTTIEB A 17875 (YELLOW) FAT BOY FLIPPER COIL { REMOVE DIODE! }

S.S. PINBALLS FROM FREEDOM (8-76) THRU BLACKWATER 100 (3-88)

BUMPERS - TAKE 100-150 TURNS OFF A 26-1200

SIDEKICKERS - TAKE 100-150 TURNS OFF A-26-1200

FLIPPERS - REPLACE FL 25-500 34-4500 WITH GOTTIEB A 17875 (YELLOW) FAT BOY FLIPPER COIL

- ATARI -

ALL COILS ARE EXACT COPIES OF BALLY COILS EXCEPT FLIPPER COILS, WHICH IS THE SAME WINDINGS WITH DIODES REVERSED!

WILLIAMS FLIPPER COILS 50 VOLT FLIPPERS

THE LATEST NEWEST VERSIONS, WHICH ARE SERIES WOUND!
FOR OLDER PARALLEL WOUND GAMES (FIREBIRD II THRU F-14)
THESE ARE EXACT REPLACEMENTS

GOING FROM THE LIGHTEST, OR WEAKEST, THIS IS A HANDY REFERENCE LIST.

FL-11753 YELLOW:	USED WITH SHORT FLIPPERS AND CLOSE SHOTS.
FL-11722 GREEN:	USED FOR CLOSE SHOTS NEAR DROP TARGETS.
FL-11630 RED:	THE STANDARD AND MOST FREQUENTLY USED.
FL-15411 ORANGE:	USED ON LONG PLAYFIELD SHOTS.
FL-11629 BLUE:	USED ON LONG SHOTS AND HIGH RAMPS.