May 18, 1978

CONFIDENTIAL

TO: YALE HARRISON
GLEN HIGHTOWER

FROM: ~~DAVE~~ CHANDLER dpc

SUBJECT: INTERMISSION CODE

A good solution to the Intermission Code for the Video Games is the use of keys 1 and 9 or 3 and 7 simultaneously. These are the diagonals of the 9-key portion of the key pad, so they should be easy to remember. Either diagonal pair will give the same code, so either pair can be used by the operator.

The result of depressing the two keys of one of these pairs will be to have the system go immediately into the Intermission mode. In this mode, the T.V. screen goes to a solid color (whatever the background color was for the game being played) and the game action is suspended at that point. After a short interval to allow clearing of the keyboard, the game can be reactivated by pushing any key or control on either controller. Game play then continues where it was interrupted by use of the Intermission code. (The system will automatically enter this same mode after 5 minutes of no activity from either controller).

The octal code generated by the controller when 1 and 9 or 3 and 7 are depressed is 132. This is a unique 8-bit code which is not likely to occur in any of the normal uses of the controller.

DPC:lb

cc: Denis Bosley
Richard Chang
Dick Haffey
Ed Krakauer
Mal Kuhn
Bob Lovejoy
Jeff Rochlis
Rick Timmins
Kent Wall

MATTEL CARTRIDGE CONNECTOR

SIGNAL	ORIGIN	NO. OF LEADS	INPUT/OUTPUT
DB0-DB 15	CP1610	16	I/O
* BUS CNTRL. OUT	CP1610	3	0
BUS CNTRL. IN	CART.	3	I
* SR1	8900	1	0
INTR.M.	CART.	1	I
* SR2	8900	1	0
BUSRQ	CART.	1	I
* BUSAK	CP1600	1	0
SST	CART.	1	0
$\overline{\text{MSYNC}}$	8900	1	0
MCLK	8915	1	0
CBLNK	8900	1	0
INTR	CART.	1	I
RESET[1]	CART.	1	I
+5	P.S.	1	0
GND	P.S.	6	0

* These signal pairs are looped through the ROM cartridge.

[1] This signal is grounded by the cartridge.

Executive Interface to User Programs

Programs executing under the Executive must have sufficient program resident in the absolute 8K of address space following the fixed cartridge start address. In particular, there is a universal data block located in the first 40 decles of the cartridge address space.

On Startup:

1.) If home computer ROM exists, call (JSR R5,) to the first address of that ROM.

On Return:

2.) If cable T.V. ROM exists, call to the first address of that ROM.

On Interrupt:

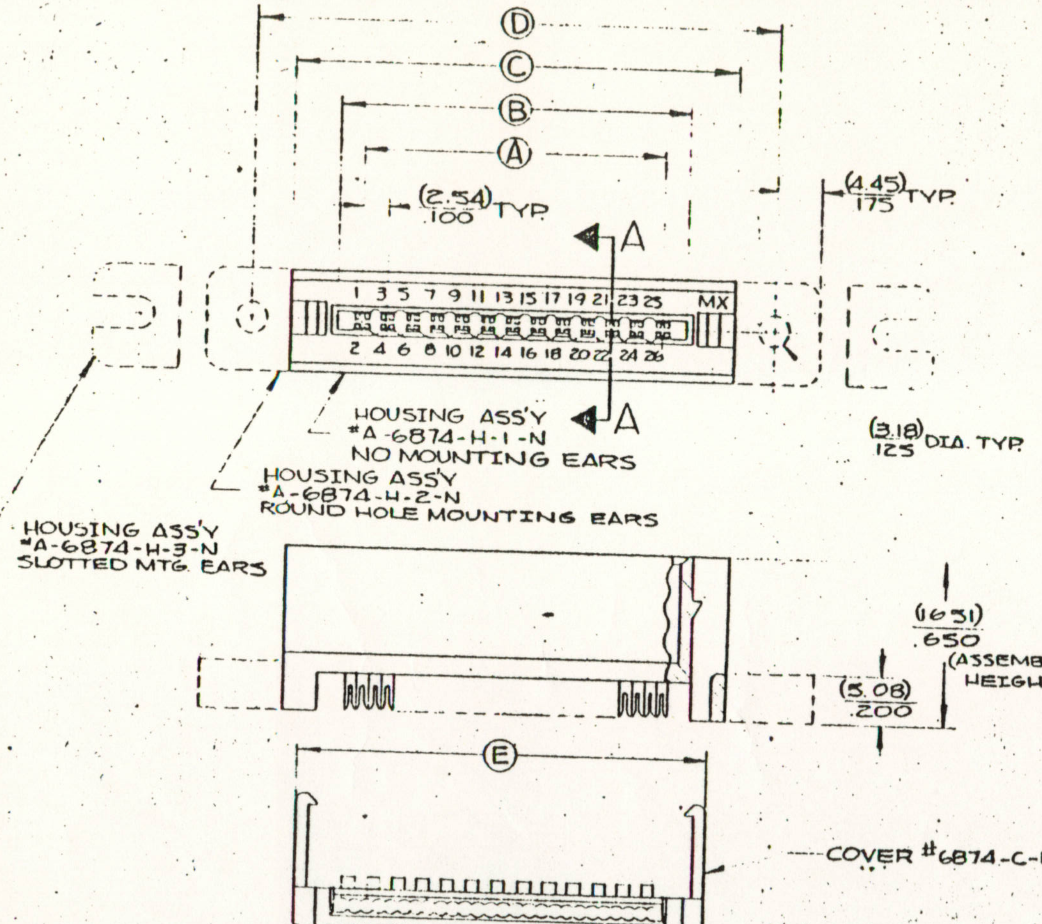
1.) Push PSW and registers.

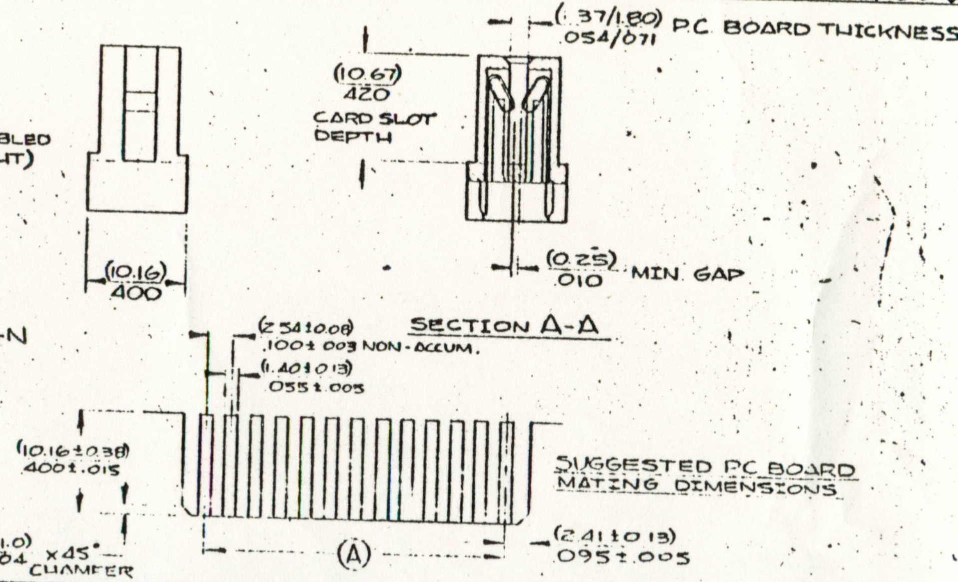
2.) Jump to the address specified by the first 2 bytes in the 8-bit RAM.

If the home computer/cable T.V. doesn't want control at interrupt level, it should leave these bytes unchanged.

If the home computer/cable T.V. assume control at interrupt level but want normal Exec functions carried on, the program may call the Exec routine EINTSER to perform these functions.

PART NO.	ENG NO	MTG. EAR PROVISIONS	NO OF C'KTS	A	B	C	D	E
15-25-8101	A-6874-1-10	NONE	10	(10.16) .400	(15.24) .600	(25.40) 1.000	(33.02) 1.300	(21.49) .846
-8102	-2-10	ROUND						
-8103	-3-10	SLOTTED						
-8141	-1-14	NONE	14	(15.24) .600	(20.32) .800	(30.42) 1.200	(38.10) 1.50	(26.57) 1.046
-8142	-2-14	ROUND						
-8143	-3-14	SLOTTED						
-8161	-1-16	NONE	16	(17.78) .700	(22.86) .900	(33.02) 1.300	(40.64) 1.60	(29.11) 1.146
-8162	-2-16	ROUND						
-8163	-3-16	SLOTTED						
-8201	-1-20	NONE	20	(22.86) .900	(27.94) 1.100	(38.1) 1.500	(45.72) 1.80	(34.19) 1.346
-8202	-2-20	ROUND						
-8203	-3-20	SLOTTED						
-8261	-1-26	NONE	26	(30.42) 1.200	(35.56) 1.40	(45.7) 1.80	(53.3) 2.10	(41.81) 1.646
-8262	-2-26	ROUND						
-8263	-3-26	SLOTTED						
-8341	-1-34	NONE	34	(40.6) 1.60	(45.7) 1.80	(55.9) 2.20	(63.50) 2.50	(51.97) 2.046
-8342	-2-34	ROUND						
-8343	-3-34	SLOTTED						
-8401	-1-40	NONE	40	(48.3) 1.90	(53.3) 2.10	(63.50) 2.50	(71.12) 2.80	(59.59) 2.346
-8402	-2-40	ROUND						
-8403	-3-40	SLOTTED						
-8501	-1-50	NONE	50	(61.0) 2.40	(66.04) 2.60	(76.2) 3.00	(83.82) 3.30	(72.29) 2.846
-8502	-2-50	ROUND						
-8503	-3-50	SLOTTED						
-8601	-1-60	NONE	60	(73.7) 2.90	(78.74) 3.10	(88.9) 3.50	(96.52) 3.80	(81.99) 3.346
-8602	-2-60	ROUND						
-8603	-3-60	SLOTTED						
-8641	-1-64	NONE	64	(78.7) 3.10	(83.82) 3.30	(94.0) 3.70	(101.6) 4.0	(90.07) 3.546
-8642	-2-64	ROUND						
15-25-8643	A-6874-3-64	SLOTTED						





NOTES:
1. BETWEEN AND OVER CONTACT KEYING AVAILABLE
2. CONNECTOR AVAILABLE WITHOUT MTG EARS, WITH ROUND HOLE MTG. EARS AND WITH SLOTTED MTG EARS. (SEE ABOVE)
3. FOR USE WITH #26 & #28 AWG STRANDED WIRE; #30, #28 & #26 AWG. SOLID WIRE; OR RIBBON CABLE ON (1.27)/.050 CENTERS WITH (1.14)/.045 MAX. INSULATION DIAMETER.

MATERIALS:
HOUSING & COVER: THERMOPLASTIC POLYESTER, UL RATED 94V-O, COLOR: BLACK.
TERMINAL: (.020)/.008 THK. PHOS. BRONZE, PLATING: .000030 MIN. GOLD OVER .000050 MIN. THICK NICKEL.

LTR.	REVISIONS
C	REMOVED ... EDP ... REL ERO #7492 1/30/78
B	REV. ... ERO # 7460-X ...

DIMENSION SHOWN (METRIC) INCH
UNLESS OTHERWISE SPECIFIED TOLERANCE: INCH / METRIC
2 PLACE ±.007 ±.018; 3 PLACE ±.014 ±.036; ANGULAR ±1°
DRAFT WHERE APPLICABLE MUST REMAIN WITHIN DIMENSIONS UNLESS OTHERWISE SPECIFIED
DO NOT SCALE DRAWING

DRWG BY: JNM | CHK'D BY: S.C. | SCALE: 2:1

TITLE: INSULATION DISPLACEMENT EDGE CARD CONNECTOR

MOLEX INCORPORATED U.S.A.

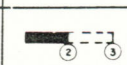
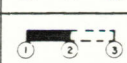
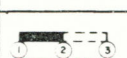
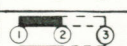
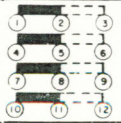
DATE: 1/20/78

PART NO: 15-25-8***

ENG NO: SDA-6874-N-N | B

PS #51-67

BASIC SLIDE SWITCHES

	TYPE NUMBER AND CONTACT RATING		DESCRIPTION	SCHEMATIC	RATINGS* ALL U.L. LISTED — SINGLE POLE — C.S.A. APPROVED AC AMPS @ 125 V.		HOUSING DIMENSIONS: FIG. NO.	WIDTH DIM. "A"	MOUNTING CENTERS DIM. "B"	OVERALL LENGTH DIM. "C"	BODY LENGTH DIM. "D"	BUTTON WINDOW DIM. "E"
SINGLE POLE	SW-311-M	SP — ST Normally Open Momentary			3.0 not CSA Listed		17	.546	1.125	1.380	.875	.285
	SW-411* SW-511• SW-7511• SW-411-L*	SW-611 SW-1011• SW-611-L	SP — ST		4.0 5.0 7.5 4.0	6.0 10.1 6.0	1 7 7 1	.546	1.125 1.625	1.380 1.875	.875	.468
	SW-411-SR* SW-411-SR-L*	SW-611-SR SW-611-SR-L	SP — ST Spring Ret. Norm Open		4.0 4.0	6.0 6.0	14 14	.546	1.125 1.625	1.380 1.875	.875	.468
	SW-412 SW-512• SW-7512• STV-112 ST-612	SW-612 SW-1012 STV-212 ST-612	SP — DT		4.0 5.0 7.5 TV-1 6.0	6.0 10.1 TV-2 3-250 vac	1 7 7 1 10	.546 .546 .546 .556 .546	1.125	1.380	.875 .875 .875 .900*** .875	.468
	SW-412-SR SW-412-SR-L	SW-612-SR SW-612-SR-L	SP — DT Spring Ret.		4.0 4.0	6.0 6.0	14 14	.546	1.125 1.625	1.380 1.880	.875	.468
	SW-412-SO-P	SW-612-SO-P	SP — DT Side operated		4.0	6.0	5	.546	1.180	1.260	.875	.540
	SW-412-PI-P *	SW-612-PI-P	SP — DT Plug in mounting		4.0	6.0	6	.546	1.180	1.260	.875	.510
	SW-412-TT-P*	SW-612-TT-P	SP — DT Twist Tab		4.0	6.0	8	.546	1.315	1.365	.875	.468
	SW-413* SW-413-L*	SW-613 SW-613-L	SP — TT		4.0 4.0	6.0 6.0	1	.546	1.406 1.625	1.656 1.880	1.125	.723
DOUBLE POLE	SW-422* SW-422-L*	SW-622 SW-622-L	DP — DT		4.0 4.0	6.0 6.0	2	.546	1.125 1.625	1.380 1.880	.875	.468
	SW-422-SR* SW-422-SR-L*	SW-622-SR SW-622-SR-L	DP — DT Spring Return		4.0 4.0	6.0 6.0	3	.734	1.125 1.625	1.380 1.880		
	SW-422-SO-P	SW-622-SO-P	DP — DT Side operated		4.0	6.0	5	.546	1.180	1.260	.875	.540
	SW-422-PI-P*	SW-622-PI-P	DP — DT Plug in mounting		4.0	6.0	6	.546	1.180	1.260	.875	.510
	SW-422-TT	SW-622-TT	DP — DT Twist Tab		4.0	6.0	8	.546	1.315	1.365	.875	.468
	SW-422-PP*	SW-622-PP	DP — DT Push-Pull		4.0	6.0	9	.546	—	.890	.890	—
	SW-423-TT* SW-423* SW-423-L* SW-423-PP-P* SW-323-SO	— SW-623,SW-823 SW-623-L SW-623-PP	DP — TT		4.0 4.0 4.0 4.0 3.0	6.0 6.0 8.0 6.0 6.0	15 2 2 9 16	.546 .546 .546 .546 .546	1.340 1.406 1.625 — 1.406	1.365 1.660 1.880 1.125 1.656	1.125 1.125 1.125 1.125 1.125	.723 .723 .723 — .785
	** SW-423-SRO-M ** SW-423-SRO ** SW-423-SRO-L	SW-623-SRO-M SW-623-SRO SW-623-SRO-L	DP — TT Spring Return from one end		4.0 4.0 4.0	6.0 6.0 6.0	3	.734	1.375 1.406 1.625	1.630 1.660 1.880	1.125	.723
	** SW-423-SRC-M ** SW-423-SRC ** SW-423-SRC-L	SW-623-SRC-M SW-623-SRC SW-623-SRC-L	DP — TT Spring Return from both ends		4.0 4.0 4.0	6.0 6.0 6.0	4	.937	1.375 1.406 1.625	1.630 1.660 1.880	1.125	.723
TRIPLE POLE	SW-432 SW-432-L	SW-632 SW-632-L	TP — DT		4.0 4.0	6.0 6.0	12	.734	1.125 1.625	1.380 1.880	.875	.468
	SW-432-SR SW-432-SR-L	SW-632-SR SW-632-SR-L	TP — DT Spring Return		4.0 4.0	6.0 6.0	13	.937	1.125 1.625	1.380 1.880	.875	.468
	SW-433-M SW-433 SW-433-L	SW-633-M SW-633 SW-633-L	TP — TT		4.0 4.0 4.0	6.0 6.0 6.0	12	.734	1.375 1.406 1.625	1.630 1.660 1.880	1.125	.723
FOUR POLE	SW-442 SW-442-L	SW-642 SW-642-L	4P — DT		4.0 4.0	6.0 6.0	13	.937	1.125 1.625	1.380 1.880	.875	.468
	SW-443-M SW-443 SW-443-L	SW-643-M SW-643 SW-643-L	4P — TT		4.0 4.0 4.0	6.0 6.0 6.0	13	.937	1.375 1.406 1.625	1.630 1.660 1.880	1.125	.723

*All 4 AMP switches are U.L. listed at 125 VAC, 1.5 AMP at 250 VAC and 0.5 AMPS at 125 VDC. All 6 AMP switches are U.L. listed at 125 VAC and 0.5 AMPS at 125 VDC. Standard DP switches with solder guard are CSA listed. For specific ratings, please contact factory.
**19/32" nylon handle only.

• 3/16" Terminal Spacing *** .940 Over Tabs on Terminal Board

FIGURE 8.

DOUBLE POLE, DOUBLE THROW
– TWIST TAB

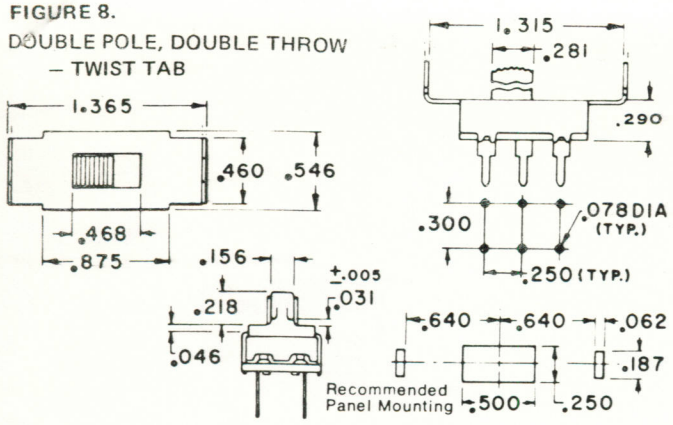
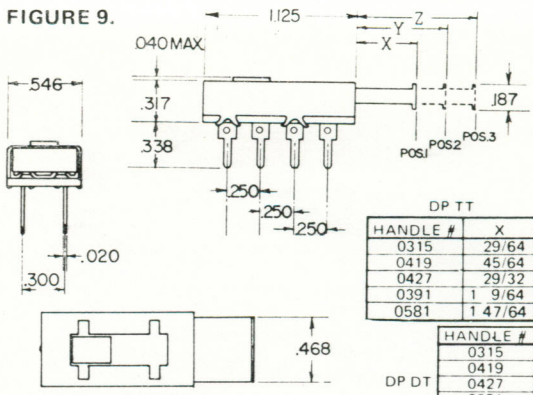


FIGURE 9.



DP TT

HANDLE #	X	Y	Z
0315	29/64	11/16	29/32
0419	45/64	15/16	1 5/32
0427	29/32	1 9/64	1 23/64
0391	1 9/64	1 3/8	1 19/32
0581	1 47/64	1 15/16	2 11/64

DP DT

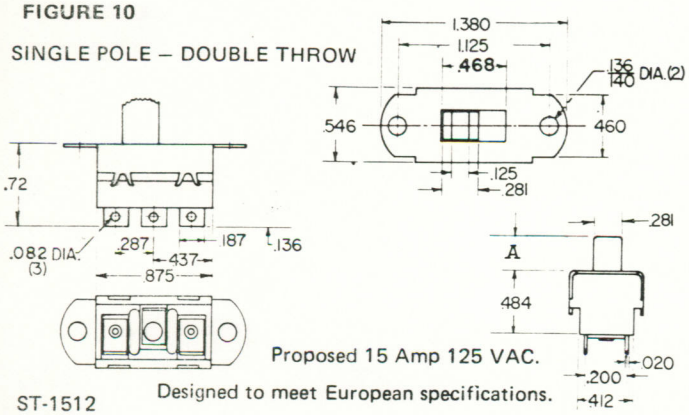
HANDLE #	X	Z
0315	11/16	63/64
0419	15/16	11/64
0427	1 9/64	1 3/8
0391	1 3/8	1 39/64
0581	1 31/32	2 13/64

PUSH-PULL SWITCH

ALSO AVAILABLE WITH FORMED PC TERMINALS

FIGURE 10

SINGLE POLE – DOUBLE THROW

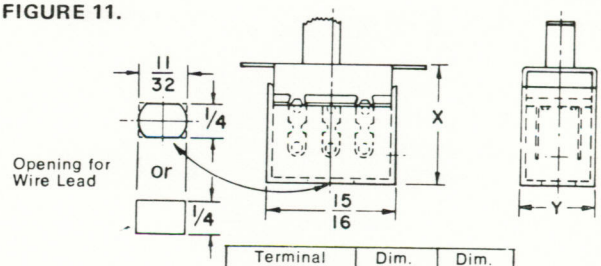


Proposed 15 Amp 125 VAC.

Designed to meet European specifications.

ST-1512

FIGURE 11.



TERMINAL SHIELD

Specify Notched Terminal Board

Terminal Shield	Dim. "X"	Dim. "Y"
Single & Double Pole	.875	.531
Triple Pole	1.000	.718

TRIPLE POLE, DOUBLE & TRIPLE THROW

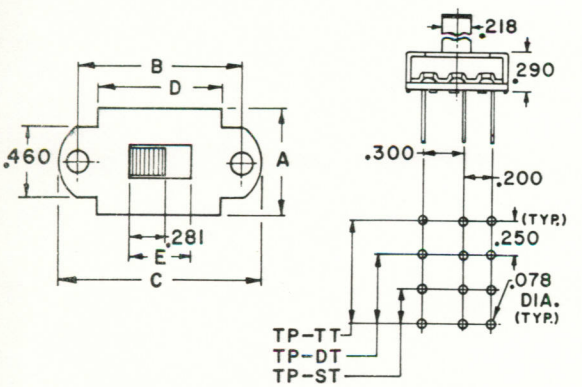


FIGURE 12.

FOUR POLE DOUBLE & TRIPLE THROW
TRIPLE POLE SPRING RETURN

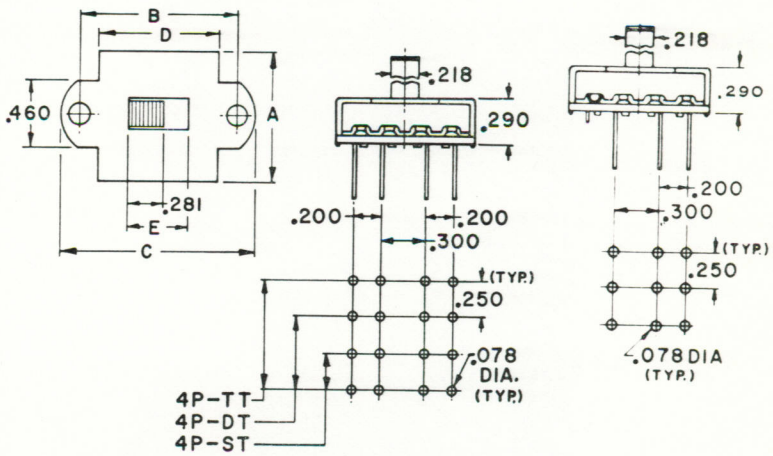
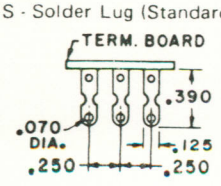


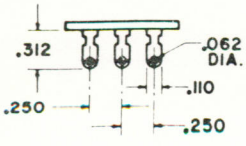
FIGURE 13.

TERMINALS (.020 Thick)

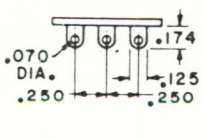
S - Solder Lug (Standard)



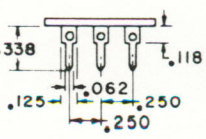
F - Faston



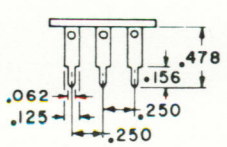
H - Half Terminal (Short Solder Terminal)



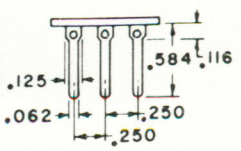
P - Printed Circuit



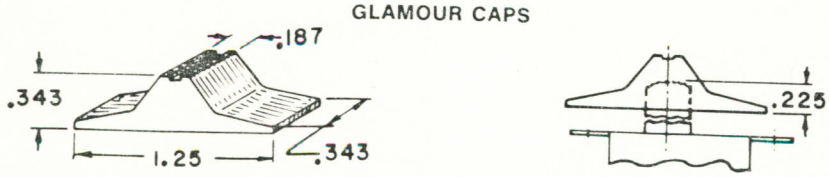
A - Printed Circuit



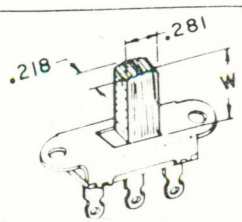
W - Wire Wrap



GLAMOUR CAPS



BUTTONS



ASSESSMENT - WITH NO CHANGE TO H.E.C.

SOFTWARE

1. Roughly equivalent Mattel game play will require 1 1/2 to 2 48K Groms per game.

2. After initial learning period, will require reconceptualization and 100% reprogramming effort.

HARDWARE

3. Lack of mag tape would result in only 10% to 20% of planned Mattel Personal Computer programs (as opposed to game programs) are feasible on H.E.C.

4. Reduced control quality from keyboards and controllers.

ALTERNATES TO CONSIDER

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1. Possible but not very attractive:

   Scale down Mattel games to fit into 1 GROM for present H.E.C.

   Will loose much of the impact of the games.

   Will still require 100% reprogramming.

2. Not likely:

   Squeeze enough executive and GPL into 4K x 8 resident ROM to permit effective single GROM games.

November 20, 1978

TO: Ed Krakauer

FROM: Howard L. Cohen

SUBJ: Video Console Cartridge Status

I. Cost Analysis

Contract price	$ 70.00
G.I. Chip Set price	30.39
Cartridge price	5.00
	$105.39

II. Anticipated Changes

Addition of Revision C parts & labor	1.80	
Addition of RF Shields	2.00	
Addition of Fan	1.00	
Addition of incoming chip inspection	2.00	(wild guess)
Addition of outgoing burn-in	1.00	(wild guess)
	$ 7.80	

III. Anticipated Cost Reductions

Removal of Sockets	1.00
Elimination of cartridge airfreight	.20
Chip set attrition reduction	.20
Volume discount (after 200M)	5.25
Re-engineering (Per Chandler)	2.00
	$ 8.65

IV. Contract Status, Sylvania

Four final copies given to Josh Denham on 11/17/78 for signature. All copies to be sent to Sylvania on or about 11/20/78, signed, and two returned.

V. Contract Status, General Instrument

G.I. to submit suggested contract by 11/27/78 for Mattel review, per meeting of 10/24/78.

VI. Cartridge Orders and Status

Purchasing to request Letters of Credi for Radofin and Wong's (both HK) for initial six cartridges (three each) by 12/4/78. PABS to supply packaging.

Purchasing to issue Purchase Releases to G.I. for ROM's to support cartridge production by 12/4/78. Parts to be supplied via Kaohsiung.

ROM testing method remains undefined.

cc: Fred Held
Paul Ashcraft
Jeff Rochlis
Josh Denham
Frank Murnane
Gary Leonard

December 13, 1978

M E M O R A N D U M

To : Dave Chandler
Howard Cohen
Jim Kingsbury
Frank Murnane
Jeff Rochlis

cc : Richard Chang
Denis Bogart

Subject : RADOFIN

Regarding Radofin's involvement in the development of the PAL video system in Europe and the master components, the following agreements were reached :

	Responsibility
1. The cost of $97 F.O.B. factory which provides duty of 10% was provided.	Howard Cohen
2. Prices for the European market, i.e., the U.K., Germany, and the remainder of Western Europe where Radofin will act as a distributor will be developed.	Ed Krakauer Frank Murnane
3. A schedule for development of the needed chips, i.e. PAL, and the colour chip will be obtained from G.I.	Ed Krakauer

(Tentatively, it is planned to proceed with a PAL version of the STIK chip, and to utilise external colour circuitry which Radofin will provide. At a later date it is intended to have G.I. modify the colour chip for European use, as a cost saving reduction).

December 13, 1978

RADOFIN

		Responsibility
4.	The tape drive and keyboard components are limiting items in developing the housing tool. The target date of December 20 has been set for the selection of both components. At that time alternative solutions for each component along with the advantages and disadvantages of each and the associated costs will be presented, and decisions made.	Dave Chandler
5.	A working bread board to permit programming of the software is required by March 1. Plans are to develop the bread board internally.	Dave Chandler
6.	A meeting will be scheduled with Josh Denham and Frank Sesto to determine if tooling can be accepted.	Ed Krakauer

Ed

Ed Krakauer

December 11, 1978

TO: HOWARD COHEN

FROM: DAVE P. CHANDLER dpc

SUBJECT: REVISIONS TO PLAN FOR FABRICATION OF FIRST 50 INTELLIVISION MASTER COMPONENTS

Because of the time pressure in preparation for CES, GI plans to build 5 systems to satisfy FCC requirements and then build 10 more systems for CES. This is a change from the 10 total that GI was going to build. In addition, we plan to have Sylvania assemble logic boards and power supply boards for 10 systems as quickly as possible and ship them to us for checkout and assembly into 10 more systems for CES. We will also want parts for 2 more systems from Sylvania for use by APH in building the first system using a RAM - emulator board. Sylvania would then build the remaining 23 systems with help from GI on checkout of the boards and systems.

This has been discussed with Sylvania. They are preparing to send 5 more sets of parts to GI. They will also give us a schedule for fabrication of the 10 sets of boards for us. If we proceed on this plan, which I am assuming we will, Sylvania will want documentation from you to this effect. The net cost result should be downward as far as Sylvania is concerned because they will build fewer systems. There may be some added expense associated with rushing the 10 sets of boards through. GI probably will invoice us for the additional cost of building more systems.

GI will use the 10 CES systems they build for preparing the first back-up approach, namely fully working chip systems with PROMS for Executive and Game Programs. We (with APH) will use the 10 systems we check-out and assemble in preparing the intermediate backup approach using an emulation board for the System RAM. If either of these approaches is used at CES, all 20 systems will be available. This will provide 10 spares of the basic systems.

cc: Denny Bogart
Jeff Rochlis
Ed Krakauer
Clif Perry
Chi Wang
Frank Murname

DPC:mu

DATE: DECEMBER 15, 1978

TO: DAVE COHEN

FROM: DAVE CHANDLER DC

SUBJECT: UPDATE OF DECEMBER 11, 1978, MEMO ON FABRICATION OF FIRST 50 SYSTEMS.

Sylvania plans to send us the 2 sets of PC boards and parts Monday, December 18, 1978. They also plan to send us 10 assembled sets of boards and miscellaneous parts December 22, 1978.

In addition (a new requirement), Sylvania will send 17 sets (15 plus spares) of PC boards to G.I. December 18, 1978. At the same time, they will send parts for the additional 5 systems plus the conversion parts for the first 10 systems.

Would you please send the necessary authorization to John Robertson to cover the changes outlined here and in the referenced document.

DC:mu

cc: Denny Bogart
Jeff Rochlis
Ed Krakauer
Clif Perry
Chi Wang
Frank Murname

12-19-78

SEQUENCE OF EVENTS IN PREPARATION FOR CES

D.P. CHANDLER

SOFTWARE FOR EMULATOR SYSTEMS

(SCHEDULE ASSUMES USE OF PAPER TAPE AND A SUCCESSFUL TRANSFER PROCESS)

- DEC 18 — EXEC, BASEBALL, LAS VEGAS I
- DEC 19 — BASKETBALL, BACKGAMMON
- DEC 20 — ELECTRIC CO MATH, TANK
- DEC 22 — FOOTBALL
- TBD — GALACTICA, CHECKERS

EMULATOR SYSTEMS

- GI MODIFYING SYSTEMS FOR CES
- DEC 20 WE SEND 4 HOUSINGS
- DEC 22 WE DECIDE WHETHER TO SEND 4TH EMULATOR
- ONE EMULATOR NEEDED IN LAS VEGAS JAN3 ALONG WITH PROM BOARDS OF ALL PROGRAMS FOR TRAINING

MASTER COMPONENT FABRICATION

COVERED IN MEMOS TO COHEN DATED 12-11-78 and 12-15-78.

RAM EMULATOR BOARDS

- BEING BUILT BY APH
- DEC 23 FIRST SYSTEM EXPECTED IF CHIPS AVAIL. FROM GI BY 12-20-78.
- TEN RAM EMULATORS PLUS SPARES BY CES.

PROM BOARDS FOR MASTER COMPONENT

- PC BOARDS BEING BUILT AND ASSEMBLED BY MARTEK.
  - 1 BD BY 12-27-78
  - 10 BDS BY 12-29-78
  - 14 BDS BY 1-2-79
- PROMS DUE FROM SCHWEBER 12-20-78
- PROMS TO BE PROGRAMMED BY APH AFTER PROGRAMS CHECKED OUT ON RAM EMULATOR SYSTEM.

ASSESSMENT - WITH NO CHANGE TO H.E.C.

SOFTWARE

1. Roughly equivalent Mattel game play will require 1 1/2 to 2 48K Groms per game.

2. After initial learning period, will require reconceptualization and 100% reprogramming effort.

HARDWARE

3. Lack of mag tape would result in only 10% to 20% of planned Mattel Personal Computer programs (as opposed to game programs) are feasible on H.E.C.

4. Reduced control quality from keyboards and controllers.

MATTEL SYSTEM ARCHITECTURE

Mattel system contains:

2K x 8 Graphics ROM

4K x 10 Executive ROM

Necessary RAM and additional circuitry to function as a TV game, including hardware mechanization of such things as:

(a) Hit detect

(b) Scrolling of background fields

(c) Sound generator envelop control

Game cartridges contain 4K x 10 ROM

Full audio/digital tape under computer control

Different keyboard and controller configuration

MINIMUM RECOMMENDED SOLUTION

Add 4K x8 Executive ROM to H.E.C. (change GPL ROM to 8K x 8).

THEN:

1. Roughly equivalent Mattel game play can be programmed into 1 GROM - probably with added frills.

2. Reprogramming effort will be reduced by 30% to 50%.

Still does not solve problem for Personal Computer programs or controller restrictions.

ALTERNATES TO CONSIDER

1. Possible but not very attractive:

   Scale down Mattel games to fit into 1 GROM for present H.E.C.

   Will loose much of the impact of the games.

   Will still require 100% reprogramming.

2. Not likely:

   Squeeze enough executive and GPL into 4K x 8 resident ROM to permit effective single GROM games.