

For conference call

1-30-78

~~Parts list~~ ~~Cartridge ROMs require separate #5 for each~~

Schematic

pull-up resistors to +11 or +16?

DB 15 does not go to Cartridge ROMs

add Power & ground to schematics

Magnavox part # for conical spring for push buttons.
plus push-on washers
Antenna cable — 461218-6
antenna switches
Round feet

Unrealized:

Interconnection between PS & Logic board
Transformer-switch-PS board connection
Cartridge connector
Control cable & connector
Fink paper

March 6, 1978

C O N F I D E N T I A L

REVISED MARCH 8 1978

VIDEO GAME SPECIFICATIONS FOR GENERAL INSTRUMENTS 49

Dr. David P. Chandler

1. GENERAL

The objective of the systems engineering task is to develop a program-
mable video game which is attractive, versatile, offers sophisticated
game play and captivating visual and sound effects, and meets F.C.C.
and UL requirements -- all at the minimum cost consistent with these
objectives.

2. GENERAL INSTRUMENTS RESPONSIBILITIES

The portions of this engineering task for which General Instruments
is responsible are:

A. Circuit development and design, except for the controllers, which
are Mattel responsibility. The circuit design is to be separated
into three printed circuit boards:

- (1) Logic board
- (2) Power supply board
- (3) Cartridge board

B. Development of test procedures and equipment to perform:

- (1) 100% testing of parts delivered by General Instruments to
Magnavox.
- (2) Sampled receiving inspection at Magnavox of General Instrument
integrated circuits tested as sets.
- ~~(3) 100% go-no-go testing of each assembled printed circuit board.~~
- ~~(4) Fault isolation testing of failed printed circuit boards.~~
- 3 (5) 100% go-no-go testing of assembled systems for use as final
inspection at Magnavox and as sampled receiving inspection
by Mattel.

C. Management of preparation for and obtaining F.C.C. approval.

3. FUNCTIONAL CHARACTERISTICS

The electrical functional characteristics are most accurately defined

by identifying the major circuit elements to be designed into this system, which are:


- A. 1 1610 CPU
- B. 1 STIC II TV Interface Chip (per spec dated
- C. 1 20K ROM (40pin) Graphics ROM (GROM)
- D. 512 X 8 RAM Graphics RAM (GRAM)
- E. 1 RA-3-9600 Background RAM, Bus Buffer, and 112 X 16 Scratchpad RAM
- F. 128 X 8 RAM Additional Scratchpad RAM
- G. 1 20K ROM (40Pin) Resident Program ROM
- H. 1 Sound - I/O IC
- I. Place for 1 additional 20K (28 Pin) Resident ROM
- J. 1 ASTEC 1284 Modulator, with channel 3-4 select and both color and sound modulated.
- K. 1 or 2 20K ROM (28 Pin) Cartridge Program ROM per Cartridge
- L. All the necessary circuitry (including power supply) to make these work properly

4. PHYSICAL CHARACTERISTICS

The physical constraints imposed on the various printed circuit boards are defined by Mattel's drawings: Layout (2609), Layout P.C.B. (2609).

5. LOGIC BOARD

All the parts listed in section 3 above except the cartridge ROM(s) are mounted on the logic board. It is a two-sided board with plated through holes, which is mounted with components-side down. The functional interfaces with this board are:

- A. Cartridge (I/O) - 22 Pin (0.100 Centers, single sided, part number to be determined) edge connector into which cartridge P.C. board plugs. Note that cartridge housing completely surrounds this connector and the tongue of the logic board as far back as the depth of the connector housing. Signals on this connector are DBO-DB14, ^{15, 16} 4 control lines, ground, and 2 +5 volt lines. (The cartridge connects +5 volt power back to the logic board.)

- B. Controllers (Input) - Two 9 Pin connectors (Magnavox part # 181254). See layout P.C.B. drawing for desired location. On each connector, pin 1 is ground, pins 2-9 are 8 bit input character going to sound-I/O IC. Pin 2 is least significant bit. Controllers are 8 switches to the ground line with a maximum of 100 ohms series resistance per switch.
- C. Power (Input) - 5 pin connector (Magnavox part #181300). See 181031-5

layout P.C.B. drawing for desired location. Pin designation left up to General Instruments.

- D. Antennae Cable (Output) - Phono socket on modulator. RF signal suitable for driving all properly operating T.V.'s through antennae cable and switch (Magnavox part #461218 and 701702-005).
- E. Channel Select (Input) - Slide switch (Magnavox part #160556-2).
- F. Reset Switch (Input) - Momentary, normally open contacts (Magnavox part #160599-1 and 160599-2). These parts must be attached to circuitry side of P.C. board and may require special holes. Coordinate with Cliff Perry.

Note that (1) logic board should be designed for two resident ROMS (only the 40 pin one is presently planned to be used, (2) all 28 and 40 pin IC's should have single sided pin holes with no copper on the component side and no plating through the holes so that components can be removed without destroying the P.C. board, (3) if logic board length approaches the maximum length, the controller connectors will have to be recessed to provide clearance from the power supply board and the transformer.

6. POWER SUPPLY BOARD

The power supply board is a single sided P.C. board which is mounted with the components side up. The space allocated for the power supply board is shown on the layout drawing. The length of the power supply board can be extended if the logic board is not made the maximum length. Note that enough space must be left between the two boards.

The power supply board is used as a junction between the transformer and the on-off switch. Thus, all the transformer secondary leads are connected to the power supply board using a 5 pin connector (Magnavox part #181300-6).

The output power from the power supply board to the logic board is transmitted by a 5 wire cable with leads soldered into the power supply board.

The three lines to be switched go to and come from the on-off switch through a 6 lead cable which is soldered into the power supply board. 181013-5

7. CARTRIDGE PRINTED CIRCUIT BOARD

The printed circuit board in the cartridge is a single sided board with edge fingers to mate with the connector on the logic board and is designed to mount 1 or 2 28 pin ROMS. The physical constraints for the board are indicated on the drawing. The circuit connections are those described in 5A. An example of the circuit connections using the standard ROM pinout is shown in attached *sketch*.

March 6, 1978

C O N F I D E N T I A L

VIDEO GAME SPECIFICATIONS FOR GENERAL INSTRUMENTS

Dr. David P. Chandler

1. GENERAL

The objective of the systems engineering task is to develop a programmable video game which is attractive, versatile, offers sophisticated game play and captivating visual and sound effects, and meets F.C.C. and UL requirements -- all at the minimum cost consistent with these objectives.

2. GENERAL INSTRUMENTS RESPONSIBILITIES

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- (4) Fault isolation testing of failed printed circuit boards.
- (5) 100% go-no-go testing of assembled systems for use as final inspection at Magnavox and as sampled receiving inspection by Mattel.

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- L. All the necessary circuitry (including power supply) to make these work properly

4. PHYSICAL CHARACTERISTICS

The physical constraints imposed on the various printed circuit boards are defined by Mattel's drawings: Layout (2609), Layout P.C.B. (2609).

5. LOGIC BOARD

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- A. Cartridge (I/O) - 22 Pin (0.100 Centers, single sided, part number to be determined) edge connector into which cartridge P.C. board plugs. Note that cartridge housing completely surrounds this connector and the tongue of the logic board as far back as the depth of the connector housing. Signals on this connector are DB0-DB14, 4 control lines, ground, and 2 +5 volt lines. (The cartridge connects +5 volt power back to the logic board.)
- B. Controllers (Input) - Two 9 Pin connectors (Magnavox part # 181254). See layout P.C.B. drawing for desired location. On each connector, pin 1 is ground, pins 2-9 are 8 bit input character going to sound-I/O IC. Pin 2 is least significant bit. Controllers are 8 switches to the ground line with a maximum of 100 ohms series resistance per switch.
- C. Power (Input) - 5 pin connector (Magnavox part #181300). See

181031-5

181293-2205 (?) → 181236-105 transformer
181013-5 PSRA

layout P.C.B. drawing for desired location. Pin designation left up to General Instruments.

- D. Antennae Cable (Output) - Phono socket on modulator. RF signal suitable for driving all properly operating T.V.'s through antennae cable and switch (Magnavox part #461218 and _____).
- E. Channel Select (Input) - Slide switch (Magnavox part #160556-2).
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Note that (1) logic board should be designed for two resident ROMS (only the 40 pin one is presently planned to be used, (2) all 28 and 40 pin IC's should have single sided pin holes with no copper on the component side and no plating through the holes so that components can be removed without destroying the P.C. board, (3) if logic board length approaches the maximum length, the controller connectors will have to be recessed to provide clearance from the power supply board and the transformer.

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The power supply board is used as a junction between the transformer and the on-off switch. Thus, all the transformer secondary leads are connected to the power supply board using a 5 pin connector (Magnavox part #181300-6). The output power from the power supply board to the logic board is transmitted by a 5 wire cable with leads soldered into the power supply board.

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March 6, 1978
Revised March 8, 1978

C O N F I D E N T I A L

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Dr. David P. Chandler

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Objectives
underlying The objective of the ~~systems engineering task is to develop~~ a program-
mable video game which is attractive, versatile, offers sophisticated
game play and captivating visual and sound effects, and meets F.C.C.
and UL requirements -- all at the minimum cost consistent with these
objectives. *Characteristics,* *this specification is*

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include wiring

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- A. Cartridge (I/O) - ~~22~~ ^{22 position edge connector} Pin (0.100 Centers, single sided, part number to be determined) edge connector into which cartridge P.C. board plugs. ^{method} Note that cartridge housing completely surrounds this connector and the tongue of the logic board as far back as the depth of the connector housing. Signals on this connector are DBO-DB15, 3 control lines, ground, and 2 +5 volt lines. (The cartridge connects +5 volt power back to the logic board.)

The 22 contacts on the side away from the PC board are used to interface the single sided cartridge P.C. board

signals on this side of the connector. The following signals are to be put on these contacts for future use: MCLR, #1

- B. Controllers (Input) - Two 9 Pin connectors (Magnavox part # 181254). See layout P.C.B. drawing for desired location. On each connector, pin 1 is ground, pins 2-9 are 8 bit input character going to sound-I/O IC. Pin 2 is least significant bit. Controllers are 8 switches to the ground line with a maximum of 100 ohms series resistance per switch.

(right angle header, 0.025" square pins on 0.100" centers)

- C. Power (Input) - 5 pin connector (Magnavox part #181031-5). See

(right angle header, 0.045" square pins on 0.156" centers)

INTERRUPT INTERRUPT SOUND IN. In addition it is desirable to have the five branch external leads brought out to the

layout P.C.B. drawing for desired location. Pin designation left up to ~~General Instruments~~. *GI*.

- D. Antenna Cable (Output) - Phono socket on modulator. RF signal suitable for driving all properly operating T.V.'s through antenna cable and switch. (~~Magnavox part #461218 and 701702-005~~).
- E. Channel Select (Input) - Slide switch (~~Magnavox part #160556-2~~). *mounted on PC board.*
- F. Reset Switch (Input) - Momentary, normally open contacts. (~~Magnavox part #160599-1 and 160599-2~~). These parts must be attached to circuitry side of P.C. board and may require special holes. ~~Coordinate with Cliff Perry.~~

X
Note that (1) logic board should be designed for two resident ROMS (only the 40 pin one is presently planned to be used, (2) all 28 and 40 pin IC's should have single sided pin holes with no copper on the component side and no plating through the holes so that components can be removed without destroying the P.C. board, (3) if logic board length approaches the maximum length, the controller connectors will have to be recessed to provide clearance from the power supply board and the transformer.

6. POWER SUPPLY BOARD

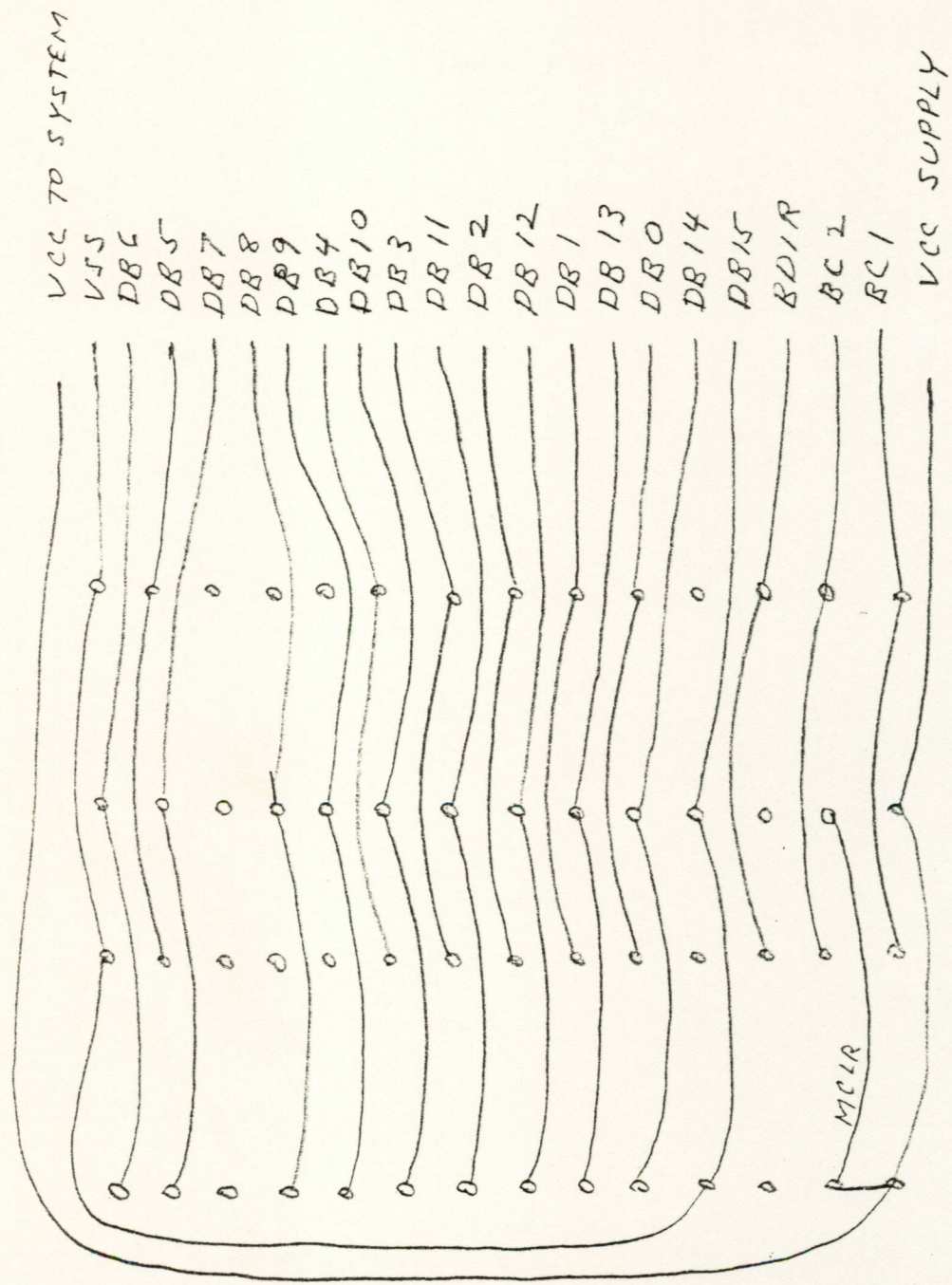
Beyond that shown on the reference drawings
The power supply board is a single sided P.C. board which is mounted with the components side up. The space allocated for the power supply board is shown on the layout drawing. The length of the power supply board can be extended if the logic board is not made the maximum length. Note that enough space must be left between the two boards. *for controller connectors access.*

replace
The power supply board is used as a junction between the transformer and the on-off switch. Thus, all the transformer secondary leads are connected to the power supply board using a 5 pin connector (Magnavox part #181013-5). The three lines to be switched go to and come from the on-off switch through a 6 lead cable which is soldered into the power supply board. The output power from the power supply board to the logic board is transmitted by a 5 wire cable with leads soldered into the power supply board.

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replace
The printed circuit board in the cartridge is a single sided board with edge fingers to mate with the connector on the logic board and is designed to mount 1 or 2 28 pin ROMS. The physical constraints for the board are indicated on drawing # _____. The circuit connections are those described in 5A. An example of the circuit connections using the standard ROM pin-out is shown in attached sketch.

11-10-77
D.P. CHANDLER
REVISED 3-8-78



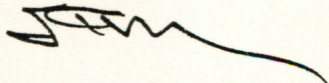
CARTRIDGE PC BOARD FROM CONDUCTOR (TOP) SIDE,
(ROMS ARE ON BOTTOM SIDE)

M.S. 316

TO: Distribution
FROM: Kent Wall
DATE: May 10, 1978
SUBJECT: Sales Meeting and CES - June 7-15

This is to outline the schedule for both the Sales Meeting and the Consumer Electronics Show (CES) in Chicago. I have included a list of as many of the coordinating details as can be defined at this time. Please review the attached as it affects your specific area of responsibility and get back to me with any questions and/or problems.

Information on hotel accommodations, etc. will be coordinated directly by Sylvia Meza (Ext. 1852).



SKW:slm

Distribution:

- A. Adler
- D. Bogart
- A. Carlson
- D. Chandler
- R. Chang
- H. Cohen
- J. Dickerman
- J. Kingsbury
- E. Krakauer
- M. Kuhn
- F. Murnane
- S. Platt
- H. Reekie
- J. Rochlis
- J. Rubenstein
- P. Towne
- S. Verduzco

cc: Steve Goldstein
Jeff Heimback
Gus Lizzi
Missy Powell

O U T L I N E / S C H E D U L E
S A L E S M E E T I N G A N D C E S 1 9 7 8

DATE	TIME	ACTIVITY	LOCATION	EQUIPMENT/RESPONSIBILITY
6/6	9:00 A.M.	Booth St Up	McCormick Place 23rd and The Lake Chicago, Illinois	All booth materials, carpet, furniture, etc. are the responsibility of DGC.
			Lobby Level, Booth #2055	Other requirements include: <ul style="list-style-type: none"> - 21" TV set for Video Room DGC - in booth. - Cassette tape of video O&M* - commercial. O&M* - Cassette tape of "Football" and "Basketball" commercials. O&M* - Mounted Pinball Print Ad . . . O&M* - Mounted Video Print Ad . . . O&M* - 16mm print of Basketball, Football, and Video System . O&M* - Cassette tape of audio/visual presentation for the Video System H. Reekie* - 200 salesmen's briefcases . . DGC
6/7	9:00 A.M.	Booth Set Up	McCormick Place	* Stored in Mattel's suite at the Ritz-Carlton Hotel until 6/10.
		Mattel personnel and equipment arrive throughout the day.	Mattel Suite at the Ritz-Carlton Hotel	Booth set up continues by DGC.
			Three (3) Las Vegas Pinball Machines (Jim Kingsbury)	
		- One with arcade graphics set up and working in the suite		
		- One with arcade graphics and one with woodgrain finish stored in the suite		

OUTLINE/SCHEDULE
 SALES MEETING AND CES 1978

DATE	TIME	ACTIVITY	LOCATION	EQUIPMENT/RESPONSIBILITY
6/7	9:00 A.M.	Mattel personnel and equipment arrive throughout the day.	Mattel Suite at the Ritz-Carlton Hotel	<p>Two (2) Video System Emulators (David Chandler)</p> <ul style="list-style-type: none"> - One set up and working in the suite - One stored in the suite. <p>Two (2) Decorated Video Consoles (David Chandler and Shel Platt)</p> <ul style="list-style-type: none"> - One hooked up in the suite to emulator - One stored in the suite <p>Six (6) Cassettes and Six (6) Cassette Pkgs. (Shel Platt and Allen Adler)</p> <ul style="list-style-type: none"> - One unit for each cartridge theme decorated and with copy in suite - Two demo instruction/play books <p>One (1) Video Console Package (Shel Platt)</p> <ul style="list-style-type: none"> - One unit decorated front and back if possible stored in the suite <p>One (1) Video System In-Store Demo Unit (LesJay Company)</p> <ul style="list-style-type: none"> - One prototype unit set up in the suite <p>One (1) Pinball Owner's Manual (Allen Adler)</p> <ul style="list-style-type: none"> - One comp in suite <p>One (1) Lady Luck Display (LesJay Company)</p> <ul style="list-style-type: none"> - One prototype unit in suite

OUTLINE/SCHEDULE
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DATE	TIME	ACTIVITY	LOCATION	EQUIPMENT/RESPONSIBILITY
6/7	9:00 A.M.	Mattel personnel and equipment arrive throughout the day.	Mattel's Suite at the Ritz-Carlton Hotel	500 Pinball Warranty Statements (John Dickerman) - Stored in the suite
				500 Lists of GE Service Centers (John Dickerman) - Stored in the suite
				500 Pinball Press Kits (Joel Rubenstein) - Stored in the suite
				500 Hand-Held Press Kits (Joel Rubenstein) - Stored in the suite
				200 Video Press Kits (Joel Rubenstein) - Stored in the suite
				50 Demonstrator Scripts for Each Hand-Held Game (Sylvia Meza) - Stored in the suite
				Six (6) Hand-Held Counter Demo Units (Denny Bogart) - Stored in the suite
				12 Units Each Hand-Held Game with Pkgs. (Denny Bogart and Shel Platt) - Stored in the suite
				10,000 Hand-Held Game Brochures (Denny Bogart and Sylvia Meza) - Stored in the suite

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DATE	TIME	ACTIVITY	LOCATION	EQUIPMENT/RESPONSIBILITY
6/7	9:00 A.M.	Mattel personnel and equipment arrive throughout the day.	Mattel's Suite at the Ritz-Carlton Hotel	3,000 Pinball Brochures (Denny Bogart and Sylvia Meza) - Stored in the suite 2,000 Video System Brochures (Denny Bogart and Sylvia Meza) - Stored in the suite Electric Company Math Storyboard (Denny Bogart) - Stored in the suite TV Set and Video Playback Equipment (Denny Bogart---rent in Chicago) - Set up in the suite
6/8	9:00 A.M.	Key Account Presentation by <u>Appointment Only</u>	Mattel's Suite at the Ritz-Carlton Hotel	One (1) Cassette of Audio/Visual Presentation of Video System (Denny Bogart & Howard Reekie) - Available in suite All equipment listed for suite under 6/7 will remain in the suite and be stored out of sight except for the following items which will be set up for Key Account Presentations (D. Bogart, M. Kuhn, K. Wall, D. Chandler, J. Kingsbury): - Video System with Football, Space Game, Baseball and Las Vegas PROM set up with one representative frame for Basketball and Math if possible. - Las Vegas Pinball - One Unite - One each of hand-held games iwth package - One hand-held counter demo unit - Video Playback Equipment to show TV

OUTLINE/SCHEDULE
 SALES MEETING AND CES 1978

DATE	TIME	ACTIVITY	LOCATION	EQUIPMENT/RESPONSIBILITY
6/8	9:30 A.M.	Booth Set Up	McCormick Place	commercials for Video System, Basketball and Football games and the Video System AV presentations - Video System Prototype In-Store Display - All Video System cassettes and packages - Video Print Ad (mounted) - Pinball Print Ad (mounted) - Video System console package comp - Lady Luck Display Prototype - Pinball Owner's Manual - 100 Salesmen's Brochures for Video, Pinball, and Hand-Held Games - Video System Audio/Visual Presentation
6/8		DGC continues booth set up		
6/9	9:00 A.M.	Key Account Presentations by <u>Appointment Only</u> until noon	Mattel's Suite at the Ritz-Carlton Hotel	Same set up and equipment as outlined for 6/8
6/9	9:00 A.M.	Booth Set Up	McCormick Place	DGC continues booth set up
6/9	1:00 P.M. to 4:00 P.M.	RS Training	Mattel's Suite at the Ritz-Carlton Hotel	Kent Wall, Sharon Verduzco, and Mal Kuhn will train RS personnel on Pinball, and Hand-Held games

Outline/SCHEDULE
 SALES MEETING AND CES 1978

DATE	TIME	ACTIVITY	LOCATION	EQUIPMENT/RESPONSIBILITY
6/10	9:00 A.M.	Set Up for Sales Meeting	Ritz-Carlton Meeting Room	Denny Bogart, Kent Wall, Mal Kuhn, David Chandler, and Jim Kingsbury will move the following equipment from the suite to the meeting room: - Video System with Football, Space Game, Baseball, and Las Vegas PROM set up along with representative frames for Basketball and Math if possible - Three Las Vegas Pinball Machines - Three each of all hand-held games with packages - Three hand-held game counter demo units - Video tape playback equipment for TV commercials as back up to film system and to show A/V presentation on Video System - *16mm film of Football, Basketball, and Video System commercials - Lady Luck Display Prototype - Video System Prototype In-Store Demo Unit - All Video cassettes and packages - 200 salesmen's brochures for Video, Pinball, and Hand-Held games - Electric Company Storyboard - 200 Salesmen's Briefcases

*NOTE: Sharon Verduzco will arrange for a 16mm sound projector, 35mm slide carousel unit and a large screen for the Sales Meeting. All price lists, etc. will be the responsibility of Sharon Verduzco and Mal Kuhn.

OUTLINE/SCHEDULE
SALES MEETING AND CES 1978

DATE	TIME	ACTIVITY	LOCATION	EQUIPMENT/RESPONSIBILITY
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6/10	1:00 P.M.	Sales Meeting Begins	Ritz-Carlton Meeting Room	Attendance by all sales reps plus Ed Krakauer, Mal Kuhn, Kent Wall, Frank Murnane, Jeff Rochliss, Sharon Verduzco, David Chandler (or Rick), and Jim Kingsbury.
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6/10	4:00 P.M.	Sales Meeting Ends		At the conclusion of the Sales Meeting the following items will be moved to the McCormick Place booth by Denny Bogart, Jim Kingsbury, and David Chandler:
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- All Pinball machines
- All Hand-Held games and packages except for one set which stays in the suite
- All counter demo units for hand-held games except for one which stays in the suite
- Lady Luck Display
- Video System In-Store Display
- All video cassettes, packages, and console package
- All press releases except for 10 which remain in the suite
- All salesmen's brochures except for 100 which remain in the suite
- All price lists and order forms
- Video emulators and game programs
- Video cassettes of Video System commercial, Football and Basketball commercials, and Video A/V presentation
- Pinball and Video System Print ads
- Brochures of GE Service Center Listings
- Pinball Warranty Statements
- Pinball Owner's Manual
- Electric Company Storyboard

OUTLINE/SCHEDULE
 SALES MEETING AND CES 1978

<u>DATE</u>	<u>TIME</u>	<u>ACTIVITY</u>	<u>LOCATION</u>	<u>EQUIPMENT/RESPONSIBILITY</u>
6/10	4:05 P.M.	Cocktail Party for Reps	Ritz-Carlton Meeting Room	
6/11-14	9:00 A.M.	CES Begins	McCormick Place	Booth manned by Kent Wall, Sharon Verduzco, Mal Kuhn and five RS Personnel
	6:00 P.M.	Show Ends		

6/15

All equipment is packed and returned to Hawthorne or New York.