INTER OFFICE

GTE SYLVANIA INCORPORATED

Electronic Components Group
Circuit Module Operation
P.O. Box 360
Muncy, Penna. 17756
717 546-3191

SUB./DATE: Mattel - GTE Sylvania (CPD) Production Plan Meeting of May 14, 1979

May 14, 1979

TO:

Mattel	GTE
A. Secor	R. Asplund
R. Henderson	J. Ballotti
	F. Fedorko
	J. Robertson
	R. Smith

CPD = Circuit Products Dev.

The meeting was convened and the objective established to define the best achievable production plan for the Mattel Intellivision product. A draft plan of an event flow diagram, attachment #1, which describes the sequence of events that must occur in order to achieve the deliveries described in E1, E2, etc. were reviewed in detail. The comments on this review are as follows:

A - Component Evaluation Test Program

A1 Stress Test - Configuration S' includes the 74LS86 IC kludged cartridge, the "old color chip and crystal", Rev G power supply printed circuit board with Rev H components, the Rev S logic printed circuit board reworked to the Rev T schematic plus addition of 1 diode, and an "untuned" modulator (Rev B).

A2, A3, A4 High, Medium and Low Temperature Tests - Configuration S'; plus the "clock circuit change" consisting of changing 2 resistor values and adding 2 Zener diodes, the elimination of 2 Potentiometers and the addition of 1 each resistor and capacitor (the .01uF bypass capacitors were not included as specified for Rev T).

A5 Humidity Test - Configuration same as used for temperature test.

A6 Thermal Shock Test - Same units used for Stress Test.

A7 Establish Design Adequacy - That the product is designed to be "Producible/Manufacturable". This is accomplished partly through the product/component testing program being presently conducted to gather data for Mattel on short term and long term component failures for reliability predictions over time and temperature. Thereupon Mattel will verify adequacy of component specifications and establish burn-in requirements to assure that any product built correctly with properly valued components will perform to spec. under specified conditions and environment.

Then the proof lots are built to assure "Manufacturability" by establishing that:

1. Any set of components falling within their specified tolerances will indeed provide a satisfactory manufacturing yield of properly built (i.e. no workmanship defects) sub-assemblies which do perform to spec.

This means there is no problem encountered if components of specified tolerances and/or sources are interchanged.

2. Any arbitrary set of sub-assemblies assembled to workmanship standards will provide a 100% yield of the complete product performing to spec. This means there is no problem encountered if sub-assemblies yielded from 1 above are interchanged.

It was agreed that the start of this activity would be moved ahead to week ending 5/11/79 since it had already begun. A. Secor suggested that the second paragraph, item 2 may require clarification of the "100% yield".

(Note: To further clarify this point, the "proof lots" must assure that any sub-assembly meeting its performance requirements, will be interchangeable with any other like sub-assemblies and that any set of sub-assemblies shall meet the product performance specification. This is essential to assure manufacturability as well as field repair which has to be done by merely changing sub-assemblies.

A8 Establish Interim Burn-In Requirements - No Comments

A9 Update Burn-in Requirements - No Comments

A10 Finalize Burn-in Requirements - No Comments

A11 Mattel Develop Product Reliability Specifications - No Comments

A12 Evaluate Rev T over Temperature - was added to the production plan as a requirement, but was not scheduled pending final definition of modulator change and resolution of the 74LS86 IC availability problem. This test will be run when the following items have been incorporated: "new color chip", new crystal (7.15909 MHz), final version of modulator (presently being revised), 74LS86 IC mounted on logic board. Test A2 will be repeated on 18 units with these changes.

B - Product Design

B1 (Exhibit C) - Mattel freeze product design and issue authorized and complete parts list for quantity production, including resolution of modulator design and associated changes, and the 1.0 μF alum cap (non-polar), and any other changes - No Comments

C - Component Qualification and Documentation

C1 (Exhibit C) Mattel issue authorized and complete product performance spec. - No Comments

C2 - Mattel issue design, assem, and testing specs as follows:

Item	Art Work	Schematic	Outline	Assem Draw	Test Proc.	Test Spec.
Complete Assembly	-	2	-	3	3	3
Logic Board Assembly	2	2	2	2	-	3
Power Supply Board Assem	1	2	2	1	-	3
Football Cartridge Assem	-	-	-	-	-	3
Hand Controller	-	-	-	-	-	3
Individual Consigned IC's	-	-	-	-	-	2
Consigned Chip Sets ("Chips")	-	-	-	-	2	2

Legend
1 GTE
2 GI
3 Mattel

The legend and preparation responsibility for each design, assembly and testing specification were confirmed during the meeting. Also it was agreed to add a start schedule for this event during week ending 5/18/79.

C3 - GTE submit documentation package to Mattel including recommended component sources and specifications, it was agreed to add a start schedule for this event under week ending 5/18/79.

C4 - Mattel review and if it deem necessary, analyze and test the components recommended by GTE - No Comments

C5 - Mattel Approve Documentation Package - No Comment

D Equipment and Tooling

D1 Mattel supply 25 test cartridges (Exhibit D) - CPD was requested to provide a quote to Mattel to build these 25 test cartridges. (Quote and P.O. go-ahead will be targeted for 5/16/79.)

D2 Assembly Capacity 200/day, Testing Capacity 500/Day - No Comment

D3 Assembly Capacity 2,000/Day, Testing Capacity 1,200/Day - No Comment

D4 Assembly Capacity 3,500/Day, Testing Capacity 3,500/Day - No Comment

E Production Plan

E1 - 500 unit proof cut as described in A7
E2 - 1,500 units in July
E3-11,000 units in August
E4-40,000 units in September
E5-65,000 units in October
E6-70,000 units in November
E7-12,000 units in December

1 500
1 500
11 000
40 000
65 000
35,000
153,000

Comments regarding material availability were as follows:

1. Individual Carton Labelled

   Mattel to provide 2,000 labels by 6/8/79 — A. Secor
   First cartons available from above by 7/6/79 — J. Ballotti
   Artwork to be supplied by Mattel by _____ — A. Secor
   First production cartons to be delivered 8 weeks from receipt of artwork — J. Ballotti

2. Label FCC/Serial No.

   Require Mattel approval of design by 5/18/79 — A. Secor

   Require official confirmation of FCC No. TV-631 from Mattel — A. Secor

   Don't Locate Label Appl.

3. Inlays

   Require Mattel approval of production samples of inlay's, plain and controls. (Samples will be hand carried for approval on 5/17/79.) — A. Secor

4. Ferrite Beads (Added by 4/30/79 Parts List

   Deliveries as of 5/14/79 only confirmed for 1300 units (2/unit). Next delivery, from specified vendor is 7/15/79. CPD will continue to expedite. — J. Ballotti

5. Modulator - A three phase program will be implemented as follows:

   Phase 1 - 2,000 Rev B modulators will be completed by Aztec and delivered to CPD by 6/8/79. To use these units will require trimming the modulator to match the power supply. Sound level will be 18 to 26 db below main carrier signal. The filtering for the modulator B+ is being investigated and may require a component value change. This will be resolved by 5/18/79 by Mattel. — A. Secor

   Phase 2 - Aztec will deliver 4,500 units to CPD between June 8 and June 30. These units will not require trimming. Sound level will be 18 to 26 db below main carrier signal. 12 volts must be routed to the modulator on the logic board. The filtering for the modulator B+ is being investigated and may require a component value change. This will be resolved by 5/18/79 by Mattel. — A. Secor

   Phase 3 - To be determined by Mattel

6. 74LS86 IC - Added by 4/30/79 Parts List - This product is on "allocation" from all known suppliers and has not, as of 5/14/79, been confirmed for delivery. Action - CPD continue to pursue source including consultation with Mattel purchasing. — J. Ballotti

   Mattel - Has requested GI to evaluate alternate material or ways of meeting requirements since serious shortage of this component is expected throughout 1979

F - Consigned Chip Sets ("Chips") and Cartridge Delivery Schedule to GTE

F1 300 in May

F2 2,000 in June

F3 4,500 in July

F4 10,000 in August

F5 50,000 in September

F6 75,000 in October

F7 50,000 in November

F8 8,200 in December

A new schedule of weekly Chips deliveries was provided. Due to the short time remaining prior to A. Secor's departure, only limited discussion was held. (Note: The uncertainty of the quantity for delivery the weeks of June 22 and 29 and no July delivery until the week of July 20 must be reviewed.)

Production Plan Summary - CPD will continue its efforts in preparation for production of this product. The unresolved problems associated with the RF Modulator and the 74LS86 IC precludes establishment of a firm schedule of product beyond the next 1-2 thousand units. CPD and Mattel purchasing will aggressively prusue commitments for additional 74LS86 IC's.

ADD

As soon as we have further information on the schedule for Phase 3 of the modulator problem and final determination of the solution to the availability of the 74LS86 IC, we will update and re-issue the Mattel Production Plan.

Not included in the Production Plan, but discussed during this meeting was the allocation of EPROM's as follows: Mattel has authorized the procurement of 250 EPROM's of which 125 have been received by CPD and 125 will be delivered by 5/29/79. These devices will be required to manufacture test cartridges.

"CES Video Cartridge" requirements were telefaxed to CPD on 5/14/79. Item 2 of this memo sets forth a requirement for (3 sets for each of 11 different programs) 33 sets of EPROM's for a total of 132. A. Secor changed initial allocation to (2 sets for each of 11 different programs) 22 sets of 4 EPROM's for a total of 88 to this program.

Note:

A suggested allocation for the balance of 162 is as follows:

CPD IMI Testers	28
GI IMI Testers (to be replaced by GI)	40
Mattel Test Cartridges (for CPD Consignment)	60
Reserve	134
Total	162

CPD has initiated a search for an additional 200 units of this device. If located, authorization to procure, will be requested from Mattel.

DAVE CHANDLER

5/14/79

TEMPERATURE PROFILE ON COMPLETED MATTEL UNIT WITH R. F. SHIELD

The following temperatures were monitored with the unit continuously operating with a baseball cartridge between 5/10/79 and 5/14/79:

1. Maximum room ambient during this period = 28.4°C.
   - Temperature inside plastics (between P.S. Bd. and Transformer) = 39.9°C.
   - Temperature inside R.F. shield (away from active devices) = 42.4°C.
   - Temperature of 1610 CPU (center of case top) = 95.9°C.
   - Temperature of 5 V Regulator (on device fin) = 96.3°C.
   - Temperature of 12 V Regulator (on device fin) = 88.9°C.

2. Minimum room ambient during this period = 24.7°C.
   - Temperature inside plastics (between P.S. Bd. and Transformer) = 37.6°C.
   - Temperature inside R.F. shield (away from active devices) = 41.2°C.
   - Temperature of 1610 CPU (center of case top) = 95.0°C.
   - Temperature of 5 V Regulator (on device fin) = 90.6°C.
   - Temperature of 12 V Regulator (on device fin) = 82.4°C

It was noted that no significant difference in temperature occurred when the baseball game was played over the idle condition with the Mattel Electronics displayed on the T.V. screen.

The monitoring equipment used was a Fluke Model 2240B with Type V iron-constantan thermocouples attached with thermal epoxy.

JCH:cem

DAVE - PER OUR DISCUSSION I AM REQUESTING THAT LARRY & CLIFF PROCEED POST HASTE TO FIND COST EFFECTIVE HEAT SINKING FOR THESE ITEMS ABOVE 70°C CASE TEMP - IT IS MY OBJECTIVE TO NOT HAVE COMPONENT TEMP. (CASE) ABOVE 70°C WHEN OPERATING IN A 25°C AMBIENT.

J. Hunt

cc: CLIFF PERRY
LARRY ATKINSON

A. SECOR
5/16/79

GTE Sylvania Incorporated
PO Box 360
Muncy PA 17756
717 546 3191

Electronic Systems
and Services

Mr. Thomas Dineen,
Director of Material
Mattel Electronics Division
Mattel Incorporated
5150 Rosecrans Avenue
Hawthorne, California 90250

May 23, 1979

Subject: MATTEL PRODUCT/COMPONENT TESTING PROGRAM
INTELLIVISION VIDEO SYSTEM

Dear Tom,

In relation to the subject program submitted to you by my letter dated May 16, 1979, attached please find a copy of the temperature and voltage variation test results relative to the stress testing portion of the program.

Should you have any questions, please do not hesitate to contact me.

Very truly yours,

GTE SYLVANIA INCORPORATED

JOHN R. ROBERTSON
Sales Engineer

Attachment
cc: A. Secor - Mattel
F. Fedorko - GTE Sylvania

JRR/nlr

D. Chandler

GTE SYLVANIA

Electronic Components Group
Circuit Module Operation
P.O. Box 360
Muncy, Penna. 17756
717 546-3191

SUB./DATE: Mattel Product/Component Testing Program - Temperature and Voltage Variation Test Results May 18, 1979

TO: F. A. Fedorko

Following is a summary report on the results of the oven temperature and voltage stress testing of the logic board assemblies and power supply assemblies.

I. Logic board assemblies (Revision S P.C. Bds. with cut traces and jumper wires to parallel the diode on 12V line to the CPU and RAM chips).

The P. C. Board assemblies were exercised with an IMI cartridge and in a circulating air temperature chamber with the temperature raised in 5°C increments from 25°C. The units were operated for 15 minutes at each temperature. The units were powered with external commercial power supplies.

A. Units #1 and #2 - Nominal power supply voltages:

(1) Unit #1 - lost color at 65°C
- failed auto test at 90°C
- color came back at 90°C
- lost sound at 95°C
- test stopped at 110°C with very poor video

(2) Unit #2 - lost color at 55°C
- lost some sound tones at 75°C
- lost sound at 100°C
- test stopped at 110°C with very poor video

B. Units #3 - (5V power supply set at 5.25V)
(12V power supply set at 12.6V)

- lost color and failed auto test at 55 C
- extraneous characters on pattern at 85°C
- test stopped at 110°C as unit would not stay reset.

C. Unit #4 - (5V power supply set at 4.75V)
(12V power supply set at 11.4V)

- lost color at 45°C
- lost some sound tones at 80°C
- auto tests fail at 90°C
- color came back at 105°C
- test stopped at 120°C as unit would not stay reset.

NOTE: (a) The color burst frequency dropped off on all four (4) units as the temperature increased to a low frequency between 75 C and 100 C and then increased as the temperature was raised beyond this range. The color loss and regain followed the frequency dip pattern on all units.

(b) All four (4) units operated properly after the temperature was returned to 25°C

II. Power supply assemblies (Rev. G boards with Rev. H parts)

The assemblies were operated in a circulating air temperature chamber with the temperature raised in 5°C increments from 25°C. The units were operated for 15 minutes at each temperature and checked at both low A.C. line (108V) and high A. C. line (126V). The supplies were loaded as follows:

5V load = 1 amp.
12V load = 170 ma.
16V load = 80 ma.
-3V load = 1 ma.

Unit #1 - Operated properly to 110°C where transformer fuse went out.

Unit #2 - Lost the 12V regulator at high A.C. line at 80°C
- Lost the 12V regulator at low A.C. line at 90°C
- Transformer fuse went out at 110°C

Unit #3 - High ripple on 5V high A.C. line at 100°C
- Transformer fuse went out at 110°C

Unit #4 - Operated properly to 105°C where transformer fuse went out.

III. Following is temperature rise data above ambient at 45°C on selected components on both the logic assemblies and the power supply assemblies. (These temp. rises are typical of the units over the full ambient range that they were run):

	Unit #1	Unit #2	Unit #3	Unit #4
1. U1(1610)	16.2°C	34.9°C	18.6°C	24.4°C
2. U4(8900)	5.0°C	8.3°C	8.6°C	5.0°C
3. U6(8914)	0.9°C	4.1°C	2.5°C	1.2°C
4. U10(8915)	4.6°C	9.4°C	8.4°C	0.0°C
5. U9(9502)	4.4°C	5.1°C	6.5°C	4.2°C
6. U5(9503)	2.0°C	2.7°C	3.0°C	0.5°C
7. U3(9504)	3.0°C	13.0°C	10.3°C	8.9°C
8. U2(9600)	2.6°C	6.9°C	5.1°C	3.5°C
9. U7(3539)	7.3°C	8.5°C	8.6°C	3.9°C
10. U8(3539)	4.4°C	4.6°C	5.8°C	2.3°C
11. U12(3539)	6.0°C	2.4°C	3.9°C	2.7°C
12. U11(7407)	7.9°C	8.1°C	6.4°C	3.4°C
13. Q2(Clock Amplitude Reg)	6.1°C	11.6°C	8.6°C	8.2°C
14. Transformer	8.8°C	11.1°C	7.8°C	11.8°C
15. R1(Current limiter for-5V Zener)	14.9°C	19.9°C	20.2°C	20.3°C
16. D1(Part of 5V bridge)	28.0°C	32.0°C	16.8°C	27.6°C
17. 5V Reg. (7805)	19.4°C	31.4°C	17.1°C	25.2°C
18. D6(Part of 12V Bridge)	9.9°C	12.7°C	11.1°C	8.0°C
19. 12V Reg. (7812)	23.4°C	31.8°C	43.8°C	36.4°C

IV. A fifth, of the foregoing logic assembly and power supply assembly configurations, was completely assembled as a game with R. F. Shields. This unit was exercised with a baseball cartridge for 96 hours with the following temperatures monitored by use of thermocouples attached with thermal epoxy:

Room ambient temperature	24.7°C (min)	28.4°C (max)
Inside plastics (between P.S. Assy. and transformer)	37.6°C	39.9°C
Inside R.F. Shield (away from active devices)	41.2°C	42.4°C
Center of the 1610 CPU case top	95.0°C	95.9°C
Device fin of 5V regulator	90.6°C	96.3°C
Device fin of 12V regulator	82.4°C	88.9°C

From the results of the foregoing tests, the three (3) life test stress temperatures were selected as follows;

High temperature - 100°C
Mid temperature - 85°C
Low temperature - 70°C

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717 546 3191

Electronic Products
and Services

Mr. Thomas Dineen,
Director of Material
Mattel Electronics Division
Mattel Incorporated
5150 Rosecrans Avenue
Hawthorne, California 90250

May 23, 1979

Subject: MATTEL PRODUCT/COMPONENT TESTING PROGRAM
INTELLIVISION VIDEO SYSTEM

Dear Tom,

Attached please find an amendment for the Statement of Work on the subject program as submitted to you by my letter of May 16, 1979.

This amendment describes the test and identifies the deliverable items for "Thermal Shock Testing" and "Humidity Testing". While the costs for these two tests were included in our quotation, the description of the test and the deliverable items were inadvertently omitted.

Please accept my apologies for any inconvenience this omission may have caused.

Very truly yours,

GTE SYLVANIA INCORPORATED

JOHN R. ROBERTSON
Sales Engineer

Attachment
cc: A. Secor - Mattel
F. Federko - GTE Sylvania

JRR/nlr

AMENDMENT

STATEMENT OF WORK - MATTEL PRODUCT/COMPONENT TESTING PROGRAM

A. Thermal shock test on finished units -

Select four (4) units and perform ten (10) cycles of thermal shock (non-operating) at temperatures of -55°C and +80°C. The units are to be stabilized at the temperature extremes for thirty (30) minutes during each cycle. The transfer time between the temperature extreme to be one (1) minute maximum. The units will be electrically tested at room temperature for function after completion of the thermal cycling. Failures will be isolated and recorded for failure mode and submitted to Mattel along with the failed components.

B. Humidity test on finished units -

Select fifteen (15) units and perform a five hundred (500) hour humid test. The humidity chamber will be at a relative humidity of 97%. Start test at 25°C with temperature increased over a 2½ hour period t 65°C and maintained at this temperature for three (3) hours. Then th temperature will be reduced over a 2½ hour period to 25°C. This completes one 8-hour cycle. This cycle will be repeated until completio of the 500 hours.

The units will be powered after the first twenty-four (24) hour cycle and exercised. Following the first twenty-four (24) hours the units will be powered continuously except for two (2) hours once every twen four (24) hours. The units will be monitored for function every twen four (24) hours following the two (2) hour off period at 25°C. Failu will be isolated and recorded for time of failure and failure mode, a submitted to Mattel along with any failed components.

The units will be electrically tested for function at 25°C within twenty-four (24) hours after the units have completed the five hundre (500) hour humidity test. The results of this test and any failed components will be submitted to Mattel.

FAF/am
5/21/79

MATTEL ELECTRONICS

May 25, 1979

Mr. Fritz Fedorko
GTE Sylvania
P. O. Box 360
Old Route 220
Muncy, Pa 17756

SUBJECT: Astec modulator

Dear Fritz:

The Astec modulator we are using has two problems which we are attempting to solve as follows:

Problem 1 - Noise in sound
Solution - A) Increase sound carrier level
B) Improve B+ filtering on logic board
C) Roll-off high frequency video

Problem 2 - RF frequency sensitivity to supply voltage and mechanical shock.
Solution - Add internal regulation to modulator and use better construction osc. coil.

The modulator improvements will be incorporated by Astec in two stages and to the following schedule:

2000 June production systems - Stage 1

Use REV B modulator (UM 1285-1 Astec P/N) which will have increased sound carrier level. This will be considered an acceptable deviation of current REV B specs.

4000 July production systems - Stage 2

Use REV C modulator (UM 1285-8 Astec P/N) which will have internal 5 volt zener and new osc. coil.

All production logic boards must also incorporate a 47 MFD electrolytic from modulator supply pin to ground and C33 on modulator video imput pin must be 220 pf disc capacitor.

Ken Greenberg should be authorized to proceed with necessary logic board changes to provide +12V through a dropping resistor to the modulator supply pin and to provide for 47 MFD electrolytic from modulator supply pin to ground.

I would recommend that new logic boards be available before REV C modulators come on stream.

Mattel Toys, a division of
Mattel, Inc. General Offices, 5150 Rosecrans Avenue, Hawthorne, California 90250 Telephone (213) 644—0411 Twx — 910 · 325 · 71

Either REV B or REV C modulator may be used once the new logic board is available.

REV C modulators could be made to work in old REV "T" logic boards with some difficulty by cutting and rerouting the modulator supply line and adding "off board" resistor and electrolytic.

REV B modulator can be made to work in new logic boards by simply addding, off board, 5 volt zener at modulator supply pin.

The Mattel parts list is being updated to show the REV C modulator, 47 MFD electrolytic, new value of 220 PF for C33 and dropping resistor for modulator supply.

Clif Perry

CP:bf

cc: John Robertson -- Sylvania
Bob Asplund "
John Dorin "
Roland Henderson "

Al Secor -- Mattel
Dave Chandler "

Ken Greenberg -- General Instrument