

RIPMAN LIGHTING CONSULTANTS

31 LEXINGTON STREET
BELMONT, MASSACHUSETTS 02178
(617) 489-3366

Smart Machines

The Computer Museum
Gallery Lighting Strategies

Ripman Lighting Consultants
14 May 1987

Analysis

Our goal is to achieve a combination of several somewhat conflicting objectives. These include:

- Energy Limitations
- Fixture Cost
- Installation Cost
- Overall Room Appearance
- Exhibit Appearance
- Support of CRT screens

There are several factors which distinguish the Smart Machines gallery from the rest of the space. First, the exhibits are smaller, more partitioned, and involve more detailed graphics. Second, there are more interactive CRTs than some other areas. Third, the gallery is a new facility, and the supply of existing equipment is limited. Fourth, the gallery must be completed in mid-June.

The existing cans alone are not adequate. Because the partitions do not run along an axis of the space, the present track arrangement would have to be extensively modified. I have some strong reservations about perpetuating a jury-rigged system; this does not prevent us using what we have, but it seems a substantial new investment should not be made in haste.

Of the four paths suggested here, two are the main ones. If we use fluorescents, there would

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Smart Machines - Gallery Lighting

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be no reason not to supplement them with some existing cans. That brings us to choices 3, flourescents with cans, or 4, incandescent only.

The most important difference between the two is aesthetic. The color quality of flourescent lighting is just not as good as incandescent. Where there will be extensive graphics in the space, the quality of light is very important. The wood ceiling rules out a computer-room style indirect system, so both will create some (solvable) problems with glare on screens.

The earth tones selected for the panel coverings do not thrive under flourescent. If we go the flourescent route, I will need to pick a lamp type in response to these colors, but they will never look as good as under incandescent.

The next difference is the directionality of the light. Flourescents will light the entire space. The ceiling, the panels, and other non-specific elements will be more prominent under flourescent than incandescent. The incandescent approach only lights the topics of interest, which serves to direct the viewer's attention. A more general scheme allows the eye to wander more easily.

An early approach to incandescent was to simply replace all the existing bus duct. It turns out that GE makes an adapter for the duct which provides a standard U-ground receptacle; according to GE they are available and cost about \$10.00 each. That would let us use standard track with a cord and plug, powered from the existing duct, at very low installed cost.

This would be an easy choice if the numbers made the decision for us. They do not. The installed cost of a flourescent system with existing cans as supplements is almost the same as an all-incandescent system. The flourescent requires my time right now to lay out the

fixture locations, where with the smaller incandescent heads we could wait until final focus to aim them.

The power requirements of the systems are not that dissimilar. This is reasonable. While flourescents are more efficient, they are also less directed. The goal of either design is to provide adequate levels on the task surfaces: reading panels, exhibits, and the like. To accomplish this with flourescent we have to also light less relevant surfaces. The incandescents are all quite directional, so they are not horrendously inefficient in this application. The bottom line is that I believe we have the 20 Amps per leg required by the incandescent system.

May the best system win.

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Possible Concepts:

1. Flourescents on Existing Track

Arrange 1x4 2 lamp flourescents with parabolic louver along the pattern of the track, and power them from the track. Preferably use GE LWRPA track receptacles and cord-and-plug fixtures.

No. of Fixtures	~ 32
Power Draw	2816 Watts
	~ 7.8 Amps / @
Cost per Fixture	\$150 + \$10
	(Fix + Recep)
Installation	\$25 / Fixture
System Cost	~\$6000
Glare Control	Good
Color Rendition	Fair to Good
General Distribution	Good
Accent on Exhibits	Poor

2. Flourescents Aligned with Exhibits

Similar to option 1, but with fixtures distributed along the lines of the exhibits. This will require somewhat more installation cost, as some of the units will require new receptacles.

No. of Fixtures	~ 38
Power Draw	3344 Watts
	~ 9.3 Amps / @
Cost per Fixture	\$150 + \$10
	(Fix + Recep)
Installation	\$40 / Fixture
System Cost	~\$7600
Glare Control	Good
Color Rendition	Fair to Good
General Distribution	Good
Accent on Exhibits	Good

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3. Flourescents with Exhibits plus Existing Cans

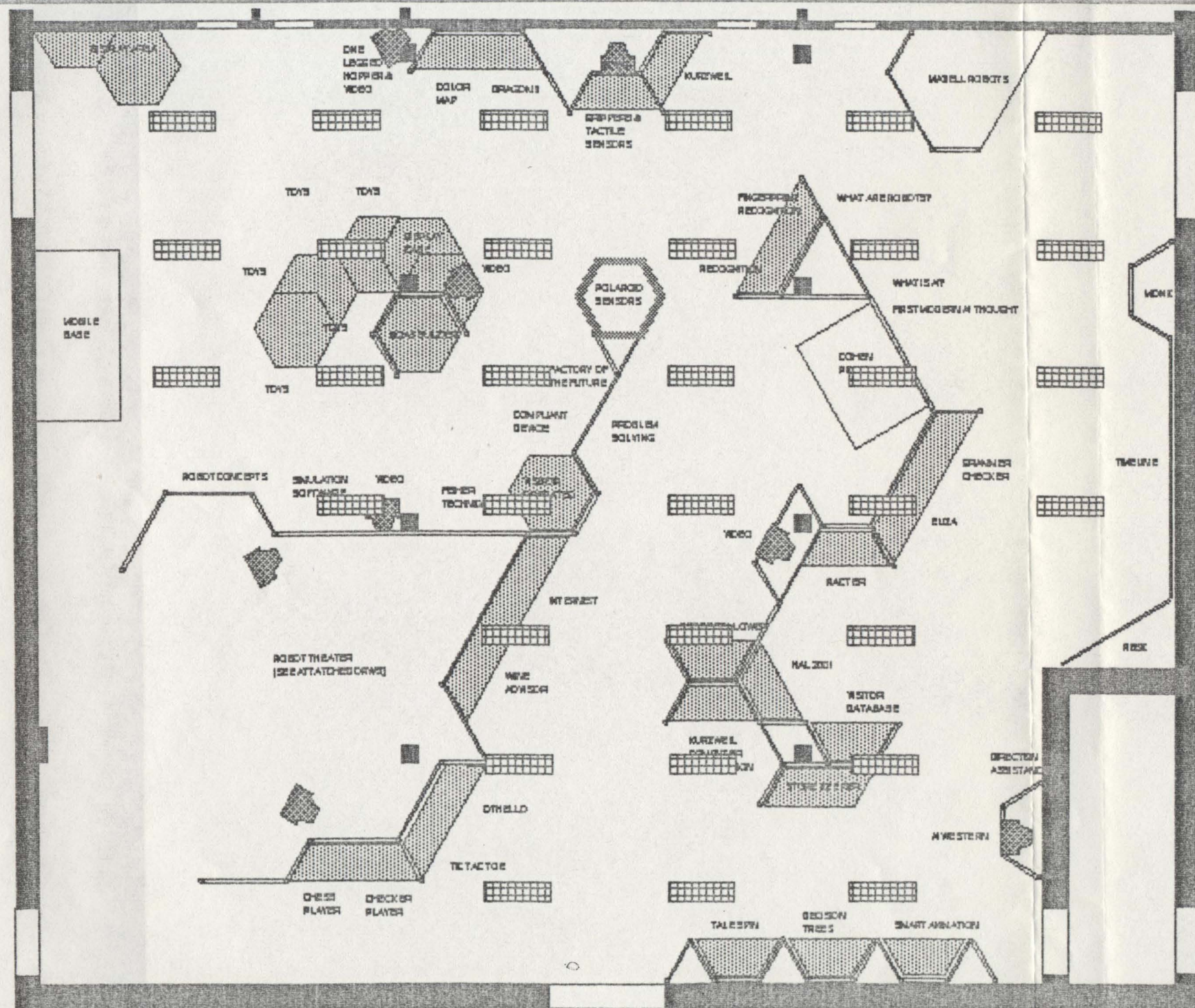
Use existing cans to supplement flourescent lighting (# 2). We will assume 30 cans, relamped with better lamps. Retaining the existing track layout means that we will not be able to get near some exhibits. Assume that the cans will cost an average of \$10 each to refurbish, and another \$10 for lamps and/or adapters.

No. of Fixtures	~ 38 fl + 30 incandescent
Power Draw	5594 Watts
	~ 15.5 Amps / @
Cost per Fixture	\$150 + \$10 flourescent (Fix + Recep)
	\$20 inc. (lamps & repair)
Installation	\$40 / Fixture flourescent \$5 / fixture incandescent
System Cost	~\$8200
Glare Control	Good
Color Rendition	Better
General Distribution	Good
Accent on Exhibits	Better

4. Existing Cans with Additional Pin-up Heads

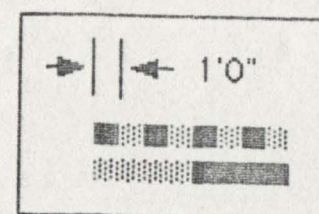
We will assume that we have now 30 cans, relamped with better lamps. A first guess says we would need about 95 fixtures to light the space in incandescent. The additional fixtures would be some track units on surface adapters (powered from the existing track) and some display-mounted units. This has to be fairly sketchy, because I have not had time to fully assimilate the exhibit plan.

No. of Fixtures	30 incandescent cans 40 track heads 20 track sections w/ plug 25 display units
Power Draw	7125 Watts ~ 19.8 Amps / @
Cost per Fixture	cans: \$20 (lamps & repair) heads: \$95 incl. lamp track: \$40 / section display mount: \$60
Installation	\$5 / fixture cans & heads track \$30 each display units \$15 each



1x4 Flourescent
1x4 Flourescents
On Existing
Grid

Not a real layout -
for example only
32 Fixtures
2816 Watts
7.8 Amps / Ø



SMART MACHINES

MICHAEL SAND, INC.
MUSEUM PLANNING CONSULTANTS

PROGRESS PRINT

Projects Remaining:

Smart Machines Gallery
June 23, 1987

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11 LEXINGTON STREET
CAMBRIDGE, MASSACHUSETTS 02175
(617) 489-3368

To: Dr. Oliver Strimple and Dr. Leah Hutton,
The Computer Museum

From: Alan Symonds, Ripman Lighting Consultants

Re: Outstanding items in the new gallery

Here is an attempt to list those items which are incomplete in the theatre and gallery. With the work Adam and I did Friday and Saturday, I feel we achieved substantial completion; what follows here are (generally) items which seem relevant now that we see the facility in action, or items which would add to the quality without being mandatory. I would appreciate an opportunity to go over this list with you and see which items you feel are worth following.

My work estimates are for your guidance, but must be somewhat rough as we have not detailed any of these tasks. There is substantial overlap in the time; if we do more than one or two of the items I expect the total labor to be less than the sum of the parts.

I have limited this list to things which affect my part of the work. We should clearly have a meeting with Michael Sand's office and your staff to work out who does what.

Once-again, thank you for your many courtesies during our long installation week. I am pleased with the results, and your dedication, support, and ideas were a vital part of the project.

Part 1 - Theatre

Signs outside Theatre

Design & have built signs which go outside the theatre area saying "Show Starting" or something similar. We have two 16' lengths of chase tubing which could be used here;

*Being built
Ext. cords*

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they were originally intended for the rail but would be more effective in signs. I don't feel a real need for the rail tubing, although Michael Sand may have another feeling. Our software allows a 30 second interval between button press and start of video during which the signs could be doing something special.

Work Estimate:

Design signage:	Michael Sands' office
Fabricate signs:	TCM
Wire signs:	RLC, 1.5 hours
Cue signs:	RLC, .5 hours

Make video switcher and scanner work

(With Michael Callahan). We own the hardware to allow a video camera to operate when the show is not in progress. This would presumably be synchronized with the Mars rover.

Work Estimate:

Install hardware:	CA/RLC, 1 hour RLC
Cueing:	RLC, .5 hours

Action between shows, and in rail

We need to cue some action into the lighting between shows, so people who come around the corners don't just go away. One way to do this would be small lamps within the rail tied to the various specials, so the rail graphics and related objects could cycle through during off-show times.

Work Estimate:

Install hardware:	RLC, 8 hours
Cueing:	RLC, 2 hours

Move Minsky Arm

The Minsky arm is placed to use the Consight frame for support. This does not show its shape well. We need a new support for the hand end, and then we will want to re-focus the lights.

Work Estimate:

Move arm:	TCM staff, 1 hour
Refocus:	RLC, .5 hour

Synchronize w Tom

DONE
leaps only if reqd.
cueing - FB

\$

Mount Mars Hardware on Turntable

It has been suggested that the Mars Hardware prototype be placed on two 'lazy susans', so the steering motors could be actuated.

Work Estimate:

Mount rover: TCM staff, 1.5 hours
Add rover control: RLC, 2 hours
Cueing: RLC, .5 hours

Note: we have three spare relay channels - one originally a spare, and two for Consight. If Consight comes on line and we decide to operate the treads we will need another channel, from Michael Callahan.

Improve action of Shakey Turntable

We need to improve the balance and action of the turntable, so it turns reliably and so Shakey's more interesting side is toward the audience.

Work Estimate:

Mechanics: 1.5 hours, RLC

Paint UV around Sea Rover

The design concept for Sea Rover was omitted due to time: a painted surround with UV paint, so the blacklight strips could provide a sea effect. This will require a little touch-up cueing when it is done.

Work Estimate:

Paint: 2.5 hrs, MS, Liz H-S,
or RLC
Refocus and cue: .5 hours, RLC

Complete effect on Page Turner

We planned a lighting fade on page turner to illustrate the movement. The lights for that got borrowed by Sea Rover. It needs a piece of cable and some cueing to complete.

Work Estimate:

Hardware: 1 hour plus \$15
expenses, RLC
Cueing: 1 hour, RLC

Add Avatar

When Avatar arrives it will need a light (borrowed in the fray), a cable, and a cue.

Work Estimate:

Hardware: 1 hour plus \$15
expenses, RLC
Cueing: .5 hour, RLC

June 23, 1987

Extension
cost needed

Power for Able

Able needs 120VAC power to charge the batteries.

Work Estimate:

by TCM

Make Charley work

I am told the manufacturer would make Charley functional. If cued in, this would add a lot to the assembly section of the video.

Work Estimate:

Install control box: 2 hours, RLC with LH-S and/or MS

Cueing: 1 hour

See relay note at Mars rover.

Make Consight work

When the Consight arm becomes functional it will need to be hooked up and cued. Cueing is somewhat tricky, as the video treats Consight as just an object recognition system.

Work Estimate:

Wire: 1 hour RLC (assuming limit switches)

Cueing: .75 hours, RLC

See relay note at Mars rover.

New case and lighting for Bipers

These small units are out of scale in the display, and get lost. One suggestion is a case set into the wall of the control booth with internal illumination.

Work Estimate:

Case design: MS Inc.

Fabrication: TCM

Lighting: 1 hour RLC

Top Lighting on the Stanford cart

In the rush, the Stanford cart lost its top light, and only got two of four chase circuits. Restoring those would improve the look of this object.

Work Estimate:

Hardware: 1 hour and \$30 expenses

Cueing: .5 hours, RLC

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1 channel

2 channels

RB

Projects Remaining:

Smart Machines Gallery

June 23, 1987

Control Booth Door

Time ran out on the door for the control closet. This should be put up, and a transparent insert showing the controls is quite important.

Work Estimate:

Fabrication:

TCM

Return Rayflashes

Two Rayflash units with controllers from Times Square arrived with problems and were not used. The museum should return these and get money back.

Install Rail Signage

By MS Inc.

Button Box

Clean Theatre and Finish Black Drape

By MS Inc. and TCM, with RLC help.

Train Museum Staff in Theatre Maintenance

I intend to collect the documentation on the theatre equipment and lighting into a manual for your staff. I suggest a 1 1/2 hour session with two (or more) TCM staff to show them how to change lamps, check lamps, and check the show. My suggestion would be that someone make a half-hour lamp check once a week, and that I or someone from my staff come by about every two or three months for an hour to verify the focus and accuracy of the system.

Part 2 - Gallery

Lighting in Object Recognition booth

This display seemed stable when we left, but there may be room for improvement. The system is sensitive to shadows, and the camera does not have enough contrast control to avoid picking up shadows. We adjusted the lighting to a point where image recognition was quite reliable. There was some talk of going to a color system and/or moving the camera, which would exacerbate the lighting question. The best solution would be a light mounted on the camera itself, so the view angle always coincides with the shadows.

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*Kend
+ Indigutier*

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Projects Remaining:

Smart Machines Gallery
June 23, 1987

There is also the question of image burn. Michael Bergman planned to ask Michael Callahan for a relay which would turn off the light except when the camera is active. This is a good idea, and should be done. If it is put in, we will need to modify the area lighting so that viewers can see when the camera light is off.

Work Estimate:

Camera light:	\$80
Control:	Callahan Associates
Area Light:	.5 hours, RLC

Re-mix Maxell tape, then re-cue lighting

Several observers have suggested that the Maxell tape is too long. People watching the display for a short time are not aware that anything is happening, and a four-minute cycle means they pass away from the viewing area before an event. Also, the heartbeat level is not consistent throughout the cycle, so the display appears static. We need to discuss this with Steve Cummings. If a new mix is made, the lighting will need to be re-cued.

Work Estimate:

Tape:	Steve Cummings
Cueing:	2 hours, RLC
Dub to cartridge:	Callahan Associates

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3 LEXINGTON STREET
BELMONT, MASSACHUSETTS 02178
(617) 489-3366

13 May 1987

Smart Machines Lighting - The Computer Museum

Mr. Michael Bergman
Mr. Oliver Strimple
The Computer Museum
300 Congress Street
Boston, MA

Dear Michael and Oliver:

Thank you for meeting recently to review the designs for the Smart Machines gallery at the Computer Museum. It would be a pleasure to work with you and the assembled team to design the lighting for this project.

I submit for your consideration and approval the following proposal for design services. This is a complex project which must be done well to succeed. I feel our background, combining architectural lighting, theatrical engineering, and computer science, places us in a unique position to complete this job.

Because the design effort is proceeding on a very rapid basis toward your June opening, the entire nature of the work will be difficult to establish. I will attempt below to describe the scope of the work as I see it. The time and cost estimate covers this work scope. If the work scope increases significantly, I will discuss the matter with you to provide an efficient and economical design process.

The work scope described here assumes that Michael Sand's office acts as project coordinator.

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13 May 1987

Smart Machines Lighting - The Computer Museum

We at Ripman Lighting prefer to take an active, hands-on role in our design projects. What follows may seem to be a rather dry and conservative document; my intent is to try to protect both the museum and Ripman Lighting Consultants by describing the work scope envisioned in our cost estimate. We find this to be a very exciting project, and will make every effort to bring the work in at minimal cost and maximum effect.

As I understand it, we would assume responsibility for the design of lighting for:

- (1) Analysis of the architectural lighting requirements of the new gallery;
- (2) Determination, with the Museum and Mr. Sand's office, of a design basis and fixture type for the gallery;
- (3) Layout and design of the gallery lighting, including a fixture schedule and cuts;
- (4) Power coordination of the gallery with the Robot Theatre; in conjunction with Mr. Bergman, preparation of phasing requirements and loadings for electrical power distribution;
- (5) Design of specific task lighting at gallery exhibit stations (not including custom fixture design);
- (6) Interaction with other members of the design team to consider signage, display layout, and other factors affecting or affected by lighting;
- (7) Concept development for the Robot Theatre lighting;
- (8) Preparation of a lighting design for the Robot Theatre, including a fixture schedule and cuts;

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13 May 1987

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- (9) Design of the power distribution system for the Robot Theatre, including a circuit schedule;
- (10) Development of a support structure for lighting units in the Robot Theatre (engineering drawings, should they be required, by others);
- (11) Specification, in conjunction with Michael Callahan, of a lighting control and dimming system for the Robot Theatre;
- (12) Consultation with the Electrical Contractor on Robot Theatre lighting installation;
- (13) Preparation of lighting cues based on the video script and the Robot Theatre concept;
- (14) Design of specific lighting effects within or around the Robot Theatre artifacts (e.g. placement of lighting within devices, special effects lighting, etc. but excluding custom fixture design);
- (15) Preparation and recording of cues for lighting and effects control in the Robot Theatre.

These 15 items constitute the Basic Scope of Services (Basic Scope).

I envision the following process:

- (1) Regular production meetings with the design team and the museum representatives;
- (2) Project coordination through Mr. Sand's office;
- (3) Equipment purchase by the Museum directly;
- (4) Establishment of a rapid process for design review, to ensure satisfaction of the Museum with the design while maintaining a rapid pace;

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(5) All hardware installation by the Museum or its contractors.

I have assumed in my time estimates that:

(1) The Museum will be able to provide RLC with an MS-DOS computer suitable for writing light cues;

(2) The Museum will arrange for reasonable parking and job site access while working and meeting at the site;

(3) The required elements, including video script and rehearsal tape, will be in place in time for light cueing.

A "wild card" in pricing this task is on-site time. My price estimate here assumes only my time on site from RLC, and assumes no more than 20 hours for other RLC staff members on-site. We have several other experienced people available, but I hope we will be able to do the job without substantial extra staff and the associated costs. If time pressures change this assumption I will consult with the Museum. I have budgeted about 40 hours of my own time for the final cue "blitz".

For these Basic Scope services, I submit for your approval an upset limit on professional fees (exclusive of normal architectural reimbursable expenses) of \$13,500. Services of principal will be billed for this project at \$75.00 per hour; services of staff, at three times direct payroll; normal architectural reimbursable expenses, at cost.

Invoices are issued on or before the first of each month and are due net 30 days. Invoices not paid in a timely manner will bear interest at the rate of 1.5% per month (18% per year).

13 May 1987

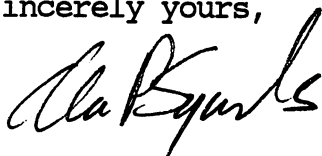
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If this proposal meets with your approval please so indicate by signing the attached copy of this letter stamped "OFFICE COPY" and return it to this office.

Looking forward to working with you to bring this project to a successful and timely conclusion, I remain

Sincerely yours,



Alan P. Symonds
Project Manager
RIPMAN LIGHTING CONSULTANTS

APS/mac

cc: Michael Sand, Inc.

Approved for The Computer Museum

Date

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OS

Approved for The Computer Museum

5/29/87

Date

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ASK+

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This would be an easy choice if the numbers made the decision for us. They do not. The installed cost of a flourescent system with existing cans as supplements is almost the same as an all-incandescent system. The flourescent requires my time right now to lay out the

fixture locations, where with the smaller incandescent heads we could wait until final focus to aim them.

The power requirements of the systems are not that dissimilar. This is reasonable. While flourescents are more efficient, they are also less directed. The goal of either design is to provide adequate levels on the task surfaces: reading panels, exhibits, and the like. To accomplish this with flourescent we have to also light less relevant surfaces. The incandescents are all quite directional, so they are not horrendously inefficient in this application. The bottom line is that I believe we have the 20 Amps per leg required by the incandescent system.

May the best system win.

RIPMAN
LIGHTING
CONSULTANTS

Smart Machines - Gallery Lighting

4

Possible Concepts:

1. Flourescents on Existing Track

Arrange 1x4 2 lamp flourescents with parabolic louver along the pattern of the track, and power them from the track. Preferably use GE LWRPA track receptacles and cord-and-plug fixtures.

No. of Fixtures	~ 32
Power Draw	2816 Watts
	~ 7.8 Amps / @
Cost per Fixture	\$150 + \$10
	(Fix + Recep)
Installation	\$25 / Fixture
System Cost	~\$6000
Glare Control	Good
Color Rendition	Fair to Good
General Distribution	Good
Accent on Exhibits	Poor

2. Flourescents Aligned with Exhibits

Similar to option 1, but with fixtures distributed along the lines of the exhibits. This will require somewhat more installation cost, as some of the units will require new receptacles.

No. of Fixtures	~ 38
Power Draw	3344 Watts
	~ 9.3 Amps / @
Cost per Fixture	\$150 + \$10
	(Fix + Recep)
Installation	\$40 / Fixture
System Cost	~\$7600
Glare Control	Good
Color Rendition	Fair to Good
General Distribution	Good
Accent on Exhibits	Good

Smart Machines - Gallery Lighting

5

3. Flourescents with Exhibits plus Existing Cans

Use existing cans to supplement flourescent lighting (# 2). We will assume 30 cans, relamped with better lamps. Retaining the existing track layout means that we will not be able to get near some exhibits. Assume that the cans will cost an average of \$10 each to refurbish, and another \$10 for lamps and/or adapters.

No. of Fixtures	~ 38 fl + 30 incandescent
Power Draw	5594 Watts
	~ 15.5 Amps / @
Cost per Fixture	\$150 + \$10 flourescent (Fix + Recep)
	\$20 inc. (lamps & repair)
Installation	\$40 / Fixture flourescent \$5 / fixture incandescent
System Cost	~\$8200
Glare Control	Good
Color Rendition	Better
General Distribution	Good
Accent on Exhibits	Better

4. Existing Cans with Additional Pin-up Heads

We will assume that we have now 30 cans, relamped with better lamps. A first guess says we would need about 95 fixtures to light the space in incandescent. The additional fixtures would be some track units on surface adapters (powered from the existing track) and some display-mounted units. This has to be fairly sketchy, because I have not had time to fully assimilate the exhibit plan.

No. of Fixtures	30 incandescent cans 40 track heads 20 track sections w/ plug 25 display units
Power Draw	7125 Watts
	~ 19.8 Amps / @
Cost per Fixture	cans: \$20 (lamps & repair) heads: \$95 incl. lamp track: \$40 / section display mount: \$60
Installation	\$5 / fixture cans & heads track \$30 each display units \$15 each

RIPMAN LIGHTING CONSULTANTS

3 LEXINGTON STREET
BELMONT, MASSACHUSETTS 02178
(617) 489-3366

TCM: Professional Labor
24 June 1987

Dr. Oliver Strimple
The Computer Museum
300 Congress St.
Boston, MA 02210

*Watkinson Electric Bulk Callaghan
Museum Dinette*
*estimate \$2140 expenses - 1250 wire Callaghan
- not 200 supplies*
\$18,000 - Total outstanding

Dear Oliver,

Here is the way the remaining budget works out. To begin with, our expenses for cable, lamps, and other things that were purchased directly due to time pressures total around \$2150.00. All of these expenditures were pre-approved. As for labor, of the original approved fee limit of \$13,500.00, we had used up about \$9350.00 as of 6/13, the end of our last billing cycle and the Saturday of our put-in. That left us \$4150.00 in professional fees, and at that time all was well.

In the week following, we both spent seventy-seven and one-half hours on the job, and a few hours have been added since then. But just for those known hours, at Adam's billing rate of \$30.28/hr. and my rate of \$50.49/hr. the balance for our labor totals \$6259.68. This is an apparent overrun of around \$2100.00. But much of our time was spent on construction and on other things outside of the scope of our original proposal.

Adam spent almost 100% of his time Monday, Tuesday, and Wednesday working on the stage, soundproofing its walls, modifying the theatre railings, and doing a number of other general projects, including drywall repair and mounting monitors. Of the seventy-seven and one-half hours that he worked in the past week, thirty-eight were directly related to the theater, gallery, and Maxell lighting, and thirty-nine and one-half were spent on those other projects.

My hours were much more concentrated on things within the scope of what we had agreed to do. But the Maxell exhibit took up a large block of my time, and I spent a certain amount of time coordinating construction events with the various areas of lighting put-in and focus. Of my own seventy-seven and one-half hours, perhaps ten were construction-related, and eighteen were spent on Maxell.

TCM: Professional Labor
24 June 1987

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CONSULTANTS

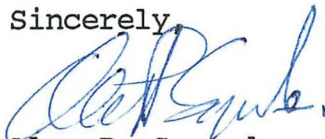
The Maxell exhibit was much more involved than I had expected. When I wrote the original proposal, I had no idea that the exhibit would be animated. Even so, the lighting represents only a small fraction of the time I spent on the exhibit. Most of my time was spent in reconstructing the exhibit, which could be considered exhibit design, and as such was outside of my responsibilities. The same is actually true of some of Adam's hours and for some of the casual labor hours, but is most significant in my case. I would say fifteen of the eighteen hours I spent on Maxell are extra.

So by subtraction, fifty-two and one-half hours of my time were spent on lighting, twenty-five on extras.

At our respective billing rates, for the hours we spent in the last week on the lighting we agreed upon, we come out to a total of \$3801.37 - less than our remaining fee limit. The balance then is not really a cost overrun. We are underbudget on the services we originally proposed, and the remainder of that fee and the overrun are for the additional services. We were asked to perform these services, and that's what it took to pull the whole thing together. I hope in retrospect that the additional expense seems justified.

As I indicated, we have not arrived at a final bill, but there should be no more surprises. The only hours spent since last weekend have been in coming up with this accounting. If you have any questions about these figures, don't hesitate to ask.

Sincerely,



Alan P. Symonds
Project Manager
RIPMAN LIGHTING CONSULTANTS

APS/ask

TCM: Casual Labor

24 June 1987

RIPMAN LIGHTING CONSULTANTS

3 LEXINGTON STREET
BELMONT, MASSACHUSETTS 02178
(617) 489-3366

Dr. Oliver Strimple
The Computer Museum
300 Congress Street
Boston, MA 02210

Dear Oliver:

This is the hard part. After all our work, now I have to give you bad news about money.

The topic is casual labor. The attached page gives crew names, addresses, social security numbers, hours worked, and total pay. This should simplify things for your accounting staff. As these are individuals with irregular incomes, they would appreciate payment at your earliest convenience, and where possible to be paid on a casual labor payroll, as opposed to one that would involve withholding or 1099's.

Everyone is listed at \$12.00/hr. This is the standard rate at the American Repertory Theatre, which supplied much of the crew. I had hoped to find others at a lower rate, but they all worked so hard and so well that it is impossible to distinguish levels of skill and pay.

I promised you a breakdown of hours for lighting versus construction. The delays in our schedule are hard to assess, so the distinction is not as clear as one might hope. Of the 326 hours of casual labor, roughly 150 hours went to lighting the theatre, the gallery, and Maxell. A major reason we went over my early 102 hour estimate is that we decided to make the cables; code would not permit the use of extension cords, and it cost less to make cable than to buy it ready-made. Part of the labor overrun reflects this savings in supplies. Another labor-intensive job was putting connectors on the instruments. Much of this was unforeseeable; the extreme rush nature of some of the orders accounts for many of the instruments coming in "kit" form.

I have dealt with professional time and expenses separately. Thank you again for your help, and please call if I can be of any further service.

Sincerely,


Alan P. Symonds
RIPMAN LIGHTING CONSULTANTS

RIPMAN LIGHTING CONSULTANTS

3 LEXINGTON STREET
BELMONT, MASSACHUSETTS 02178
(617) 489-3366

WE ARE SENDING YOU

If enclosures are not as noted please notify us at once.

THESE ARE TRANSMITTED

ACTION REQUIRED

REMARKS

LETTER OF TRANSMITTAL

DATE
JOB
RE

25 June 1987
87044.0 - The Computer Museum

Dr. Oliver Strimple
The Computer Museum
300 Congress Street
Boston, MA 02210

☒ Attached ☐ Under separate cover via: _____ the following items:
☐ Fixture cuts _____ dated _____ (_____ copies)
☐ Fixture schedule _____ dated _____ (_____ copies)
☐ Lighting layouts _____ dated _____ (_____ copies)
☐ Sketches _____ dated _____ (_____ copies)
☐ Cost estimates _____
☐ Energy studies _____
☐ Plans _____
☐ Shop drawings _____
☐ Change order _____
☐ Copy of letter to _____ dated _____
☐ Samples _____
☐ Photometrics _____
☐ Proposal _____
☐ Brochure _____
☐ _____

☐ As requested ☐ For review and comment by _____
☒ For your use ☐ Approved as submitted on _____
☐ For approval ☐ Approved as noted _____
☐ For your information ☐ Returned for revisions needed by _____
☐ For pricing purposes ☐ Submit _____ copies by _____
☐ For construction ☐ Please incorporate into your drawings and send us _____ copies
☐ For distribution to _____
☐ _____

_____ by _____

1. Letter re casual labor
2. Time sheet for casual labor
3. Letter re professional labor
4. Memo re projects remaining
5. Copy of #4 for Leah
6. Maintenance information binder
7. Gallery and Theatre Lighting Drawings

Best regards.

SIGNED

COPY TO



Alan P. Symonds

13 May 1987

Smart Machines Lighting - The Computer Museum

OFFICE COPY

**RIPMAN
LIGHTING
CONSULTANTS**

3 LEXINGTON STREET
BELMONT, MASSACHUSETTS 02178
(617) 489-3366

Mr. Michael Bergman
Mr. Oliver Strimple
The Computer Museum
300 Congress Street
Boston, MA

Dear Michael and Oliver:

Thank you for meeting recently to review the designs for the Smart Machines gallery at the Computer Museum. It would be a pleasure to work with you and the assembled team to design the lighting for this project.

I submit for your consideration and approval the following proposal for design services. This is a complex project which must be done well to succeed. I feel our background, combining architectural lighting, theatrical engineering, and computer science, places us in a unique position to complete this job.

Because the design effort is proceeding on a very rapid basis toward your June opening, the entire nature of the work will be difficult to establish. I will attempt below to describe the scope of the work as I see it. The time and cost estimate covers this work scope. If the work scope increases significantly, I will discuss the matter with you to provide an efficient and economical design process.

The work scope described here assumes that Michael Sand's office acts as project coordinator.

13 May 1987

Smart Machines Lighting - The Computer Museum

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CONSULTANTS

We at Ripman Lighting prefer to take an active, hands-on role in our design projects. What follows may seem to be a rather dry and conservative document; my intent is to try to protect both the museum and Ripman Lighting Consultants by describing the work scope envisioned in our cost estimate. We find this to be a very exciting project, and will make every effort to bring the work in at minimal cost and maximum effect.

As I understand it, we would assume responsibility for the design of lighting for:

- (1) Analysis of the architectural lighting requirements of the new gallery;
- (2) Determination, with the Museum and Mr. Sand's office, of a design basis and fixture type for the gallery;
- (3) Layout and design of the gallery lighting, including a fixture schedule and cuts;
- (4) Power coordination of the gallery with the Robot Theatre; in conjunction with Mr. Bergman, preparation of phasing requirements and loadings for electrical power distribution;
- (5) Design of specific task lighting at gallery exhibit stations (not including custom fixture design);
- (6) Interaction with other members of the design team to consider signage, display layout, and other factors affecting or affected by lighting;
- (7) Concept development for the Robot Theatre lighting;
- (8) Preparation of a lighting design for the Robot Theatre, including a fixture schedule and cuts;

13 May 1987

Smart Machines Lighting - The Computer Museum

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- (9) Design of the power distribution system for the Robot Theatre, including a circuit schedule;
- (10) Development of a support structure for lighting units in the Robot Theatre (engineering drawings, should they be required, by others);
- (11) Specification, in conjunction with Michael Callahan, of a lighting control and dimming system for the Robot Theatre;
- (12) Consultation with the Electrical Contractor on Robot Theatre lighting installation;
- (13) Preparation of lighting cues based on the video script and the Robot Theatre concept;
- (14) Design of specific lighting effects within or around the Robot Theatre artifacts (e.g. placement of lighting within devices, special effects lighting, etc. but excluding custom fixture design);
- (15) Preparation and recording of cues for lighting and effects control in the Robot Theatre.

These 15 items constitute the Basic Scope of Services (Basic Scope).

I envision the following process:

- (1) Regular production meetings with the design team and the museum representatives;
- (2) Project coordination through Mr. Sand's office;
- (3) Equipment purchase by the Museum directly;
- (4) Establishment of a rapid process for design review, to ensure satisfaction of the Museum with the design while maintaining a rapid pace;

13 May 1987

Smart Machines Lighting - The Computer Museum

OFFICE COPY

(5) All hardware installation by the Museum or its contractors.

I have assumed in my time estimates that:

(1) The Museum will be able to provide RLC with an MS-DOS computer suitable for writing light cues;

(2) The Museum will arrange for reasonable parking and job site access while working and meeting at the site;

(3) The required elements, including video script and rehearsal tape, will be in place in time for light cueing.

A "wild card" in pricing this task is on-site time. My price estimate here assumes only my time on site from RLC, and assumes no more than 20 hours for other RLC staff members on-site. We have several other experienced people available, but I hope we will be able to do the job without substantial extra staff and the associated costs. If time pressures change this assumption I will consult with the Museum. I have budgeted about 40 hours of my own time for the final cue "blitz".

For these Basic Scope services, I submit for your approval an upset limit on professional fees (exclusive of normal architectural reimbursable expenses) of \$13,500. Services of principal will be billed for this project at \$75.00 per hour; services of staff, at three times direct payroll; normal architectural reimbursable expenses, at cost.

Invoices are issued on or before the first of each month and are due net 30 days. Invoices not paid in a timely manner will bear interest at the rate of 1.5% per month (18% per year).

RIPMAN
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13 May 1987

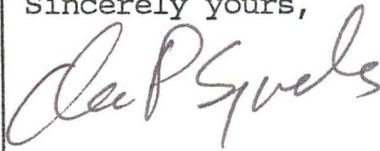
Smart Machines Lighting - The Computer Museum

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If this proposal meets with your approval please so indicate by signing the attached copy of this letter stamped "OFFICE COPY" and return it to this office.

Looking forward to working with you to bring this project to a successful and timely conclusion, I remain

Sincerely yours,



Alan P. Symonds
Project Manager
RIPMAN LIGHTING CONSULTANTS

APS/mac

cc: Michael Sand, Inc.

Approved for The Computer Museum

Date

RIPMAN
LIGHTING
CONSULTANTS

18 May 1987

Hardware Requirements: Second Look

Ripman Lighting Consultants 18 May 1987 APS

1.	Sky-Scan System (via Michael Callahan)			
	1	Thyme box (controller)		1000
	2	Sugar boxes (interface)	2800	5600
		Σ = 16 analog & 64 open-collector channels		
2.	Teatronic dimmer packs			
	4	TPI 1212	1900	7600
3.	Lighting instruments: stage and stock items (est.)			8000
4.	Special lighting: built-in, strobes, other units (est.) (Allowance for items fabricated on-site)			4000
5.	Allowance for support grid and structure			<i>By others</i>
6.	Allowance for contractor wiring			<i>By others</i>
Total hardware and E.C.				\$26200

The museum will supply an MS-DOS computer with 9600 baud serial port and (at least) dual floppy drives, 512KB RAM for development and programming.

An MS-DOS computer (specs to be determined, but not very fancy) will be supplied by the Museum for permanent attachment to the lighting control system. These could well be one and the same.

Robot Theatre: Electrical Contractor Initial Steps

This assumes a control system such as the Sky-Scan with four TPI1212 dimmer packs is purchased.

1. Main Feed. Supply a 3Ø 4 wire load panel on the pillar in the Robot Theatre area. Use a 100 Amp panel. Supply wiring should be rated 60 Amps per leg with full capacity neutral.

Note: Theatre load will have to stay below about 30 Amps per leg to meet overall galley power requirements. However, the theatre panel should be wired with 60 Amp conductors because:

1. Power line noise caused by SCR dimmers is sharply increased by a high-impedance feed;
2. The panel size needed to house the required breakers will not take small gauge wire;
3. Tungsten surge loads should have generous feeds.

2. Breakers. Provide in the theatre panel four 2-pole 40 Amp breakers and three single-pole 20 amp breakers. The four 40A 2Ps are to power the dimmer packs. Attach to the panel three boxes, each with two duplex U-ground outlets each. These will power the control system, the computer equipment, and the sound and video equipment located in the Robot Theatre.

The exact location of the feed panel will be discussed at the meeting on May 18th.

It is quite likely that it would be better to provide power receptacles for the four dimmer packs as part of the power panel. Since different manufacturers use different connectors, we cannot specify this until a buy decision has been made. We would use something like range connectors close-nippled to the panel. A decision on this will be made ASAP.

18 May 1987

General Lighting

Initial Construction Strategy

It is assumed here that we will go with the all-incandescent strategy, described as choice 4 in my memo of May 14th. In short, this plan calls for plugging receptacles into the existing GE bus duct, and using those receptacles to power short sections of track. The track would be equipped with cord and plug adapters, so it can be located anywhere within 15' of a receptacle.

As many existing cans as can be found, or renovated economically, will be used. My calculations assumed an average lamp load of 75 Watts per unit. This would consist of:

- 20, 50, or 75 Watt MR-16s in new track heads
- 50 or 75 Watt R and ER lamps in old cans, with some fancier lamps (e.g. Capsylite, etc.) where required
- 50 or 75 Watt A lamps in task / display fixtures.

Purchasing

The critical path purchase is the group of bus duct receptacles. We should buy 25 of these (I am not aware of the museum owning any, although I could be wrong). They are GE type LWRPA or LWRTB - either will do, they can be converted to each other in the field. GE tells me they should be "stock to four weeks", so if we order them right away we will be all right. They list for \$9.80 each. A copy of the catalog page, with a phone number, is attached.

We have a fall-back position, which is wiring U-ground outlets directly to the bus duct supply. That will take more time and money, so we should try to avoid it. The fall-back could be implemented quickly, so we can postpone that decision for a while.

The new track units will be mounted to short sections of track screwed to the ceiling. I recommend Lightolier, because they have a wide range of fixtures, a quick-ship program, and several very good distributors in the

18 May 1987

area. We will restrict our selection of track heads to those we can get in time.

I need to study the exhibit plan in more detail before I can specify the track parts. I assumed in my price estimate that we would buy 20 pieces of track with cord and plug sets. I have to know which heads will be adjacent to each other before I can make up a cut list for the track.

I attach catalog pages from Lightolier. We will be using 4' track with the 6062 or 6072 cord and plug sets. These are "Fast-Track" items, which means we should not have delivery problems. By the end of this week I expect to have enough analysis of the exhibits to order the track parts.

Projects Remaining:

Smart Machines Gallery

June 23, 1987

Timing, 1st day fixing broken things

*Were in the entrance
Was entrance to low?*

Spider up & down? Handicapped

RIPMAN LIGHTING CONSULTANTS

3 LEXINGTON STREET
BELMONT, MASSACHUSETTS 02178
(617) 489-3366

To: Dr. Oliver Strimple and Dr. Leah Hutton,
The Computer Museum

From: Alan Symonds, Ripman Lighting Consultants

Re: Outstanding items in the new gallery

Here is an attempt to list those items which are incomplete in the theatre and gallery. With the work Adam and I did Friday and Saturday, I feel we achieved substantial completion; what follows here are (generally) items which seem relevant now that we see the facility in action, or items which would add to the quality without being mandatory. I would appreciate an opportunity to go over this list with you and see which items you feel are worth following.

My work estimates are for your guidance, but must be somewhat rough as we have not detailed any of these tasks. There is substantial overlap in the time; if we do more than one or two of the items I expect the total labor to be less than the sum of the parts.

I have limited this list to things which affect my part of the work. We should clearly have a meeting with Michael Sand's office and your staff to work out who does what.

Once again, thank you for your many courtesies during our long installation week. I am pleased with the results, and your dedication, support, and ideas were a vital part of the project.

Part 1 - Theatre

Signs outside Theatre

Design & have built signs which go outside the theatre area saying "Show Starting" or something similar. We have two 16' lengths of chase tubing which could be used here;

Priority

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Projects Remaining:

Smart Machines Gallery

June 23, 1987

they were originally intended for the rail but would be more effective in signs. I don't feel a real need for the rail tubing, although Michael Sand may have another feeling. Our software allows a 30 second interval between button press and start of video during which the signs could be doing something special.

Work Estimate:

Design signage:	Michael Sands' office
Fabricate signs:	TCM
Wire signs:	RLC, 1.5 hours
Cue signs:	RLC, .5 hours

2

Make video switcher and scanner work

(With Michael Callahan). We own the hardware to allow a video camera to operate when the show is not in progress. This would presumably be synchronized with the Mars rover.

Work Estimate:

Install hardware:	CA/RLC, 1 hour RLC
Cueing:	RLC, .5 hours

5

Action between shows, and in rail

We need to cue some action into the lighting between shows, so people who come around the corners don't just go away. One way to do this would be small lamps within the rail tied to the various specials, so the rail graphics and related objects could cycle through during off-show times.

Work Estimate:

Install hardware:	RLC, 8 hours
Cueing:	RLC, 2 hours

3

Move Minsky Arm

The Minsky arm is placed to use the Consight frame for support. This does not show its shape well. We need a new support for the hand end, and then we will want to re-focus the lights.

Work Estimate:

Move arm:	TCM staff, 1 hour
Refocus:	RLC, .5 hour

RIPMAN LIGHTING CONSULTANTS

? Did we get the
Cueing model?

ASK what
the effect
is

Projects Remaining:

Smart Machines Gallery

June 23, 1987

5

Mount Mars Hardware on Turntable

It has been suggested that the Mars Hardware prototype be placed on two 'lazy susans', so the steering motors could be actuated.

Work Estimate:

Mount rover: TCM staff, 1.5 hours

Add rover control: RLC, 2 hours

Cueing: RLC, .5 hours

Note: we have three spare relay channels - one originally a spare, and two for Consight. If Consight comes on line and we decide to operate the treads we will need another channel, from Michael Callahan.

Improve action of Shakey Turntable

We need to improve the balance and action of the turntable, so it turns reliably and so Shakey's more interesting side is toward the audience.

Work Estimate:

Mechanics: 1.5 hours, RLC

Paint UV around Sea Rover

The design concept for Sea Rover was omitted due to time: a painted surround with UV paint, so the blacklight strips could provide a sea effect. This will require a little touch-up cueing when it is done.

Work Estimate:

Paint: 2.5 hrs, MS, Liz H-S,
or RLC

Refocus and cue: .5 hours, RLC

5

Complete effect on Page Turner

We planned a lighting fade on page turner to illustrate the movement. The lights for that got borrowed by Sea Rover. It needs a piece of cable and some cueing to complete.

Work Estimate:

Hardware: 1 hour plus \$15
expenses, RLC

Cueing: 1 hour, RLC

2

Add Avatar

When Avatar arrives it will need a light (borrowed in the fray), a cable, and a cue.

Work Estimate:

Hardware: 1 hour plus \$15
expenses, RLC

Cueing: .5 hour, RLC

2
4
3
1
1

RIPMAN
LIGHTING
CONSULTANTS

Projects Remaining:

Smart Machines Gallery
June 23, 1987

Power for Able

Able needs 120VAC power to charge the batteries.

Work Estimate:
by TCM

Make Charley work

I am told the manufacturer would make Charley functional. If cued in, this would add a lot to the assembly section of the video.

Work Estimate:

Install control box: 2 hours, RLC with LH-S and/or MS

Cueing: 1 hour

See relay note at Mars rover.

Make Consight work

When the Consight arm becomes functional it will need to be hooked up and cued. Cueing is somewhat tricky, as the video treats Consight as just an object recognition system.

Work Estimate:

Wire: 1 hour RLC (assuming limit switches)

Cueing: .75 hours, RLC

See relay note at Mars rover.

New case and lighting for Bipers

These small units are out of scale in the display, and get lost. One suggestion is a case set into the wall of the control booth with internal illumination.

Work Estimate:

Case design: MS Inc.

Fabrication: TCM

Lighting: 1 hour RLC

Top Lighting on the Stanford cart

In the rush, the Stanford cart lost its top light, and only got two of four chase circuits. Restoring those would improve the look of this object.

Work Estimate:

Hardware: 1 hour and \$30 expenses

Cueing: .5 hours, RLC

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CONSULTANTS

Start Button
The show will start in 30 sec
ask Callahan

Projects Remaining:

Smart Machines Gallery

June 23, 1987

Control Booth Door

Time ran out on the door for the control closet. This should be put up, and a transparent insert showing the controls is quite important.

Work Estimate:

Fabrication: TCM

Return Rayflashes

Two Rayflash units with controllers from Times Square arrived with problems and were not used. The museum should return these and get money back.

Install Rail Signage

By MS Inc.

Clean Theatre and Finish Black Drape

By MS Inc. and TCM, with RLC help.

Train Museum Staff in Theatre Maintenance

I intend to collect the documentation on the theatre equipment and lighting into a manual for your staff. I suggest a 1 1/2 hour session with two (or more) TCM staff to show them how to change lamps, check lamps, and check the show. My suggestion would be that someone make a half-hour lamp check once a week, and that I or someone from my staff come by about every two or three months for an hour to verify the focus and accuracy of the system.

Part 2 - Gallery

Lighting in Object Recognition booth

This display seemed stable when we left, but there may be room for improvement. The system is sensitive to shadows, and the camera does not have enough contrast control to avoid picking up shadows. We adjusted the lighting to a point where image recognition was quite reliable. There was some talk of going to a color system and/or moving the camera, which would exacerbate the lighting question. The best solution would be a light mounted on the camera itself, so the view angle always coincides with the shadows.

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Projects Remaining:

Smart Machines Gallery
June 23, 1987

There is also the question of image burn. Michael Bergman planned to ask Michael Callahan for a relay which would turn off the light except when the camera is active. This is a good idea, and should be done. If it is put in, we will need to modify the area lighting so that viewers can see when the camera light is off.

Work Estimate:

Camera light:	\$80
Control:	Callahan Associates
Area Light:	.5 hours, RLC

Re-mix Maxell tape, then re-cue lighting

Several observers have suggested that the Maxell tape is too long. People watching the display for a short time are not aware that anything is happening, and a four-minute cycle means they pass away from the viewing area before an event. Also, the heartbeat level is not consistent throughout the cycle, so the display appears static. We need to discuss this with Steve Cummings. If a new mix is made, the lighting will need to be re-cued.

Work Estimate:

Tape:	Steve Cummings
Cueing:	2 hours, RLC
Dub to cartridge:	Callahan Associates

Boat Builder

Smart Machines Theatre Buy List

June 5, 1987

4:06 PM

Summary after purchases:

All light fixtures are ordered and scheduled for delivery by Friday, 12 June. We have suggested planning a lighting installation session on the weekend (13th and 14th), so all is on track. Most of the fixtures were ordered from vendors we know well and trust, so we have confidence in the quoted delivery dates.

The budget is on target. The prices shown in the first part of this note include lamps, and so do not directly compare to the purchase orders cut to date. Where I estimated \$7004 for stage lighting, we have spent \$6035.51. Some of the lamps, and the clamp-on heads have not been bought.

For the effects lighting, I estimated \$3270.00, and we have spent \$1751.00. We are committed to another \$1000 for the Big Bang Strobes, which will come from Sky-Scan via Michael Callahan.

In summary:

	<u>Approved Budget</u>	<u>Estimate App 4 June</u>	<u>Actual To Date</u>
Stage suppliers	8000	7004	6036
Special FX	4000	3270	2751
Additions expected			1200
Total	12000	10274	9987

Please note this also includes equipment for the Maxell display.

The bottom line is we are on target. I see no reason to expect an overrun, and fully expect to come in under budget.

APS 5 June 1987

Smart Machines Theatre Buy List

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<u>Item</u>	<u>Name</u>	<u>Spots</u>	<u>Fres.</u>	<u>Maxis</u>	<u>Clips</u>	<u>FX</u>
5	Sea Rover	1				UV tubes
7	Mars 1	2	2			
8	Mars 2	2	1			Mirror B./Pin Spot
10	Odex	5				chase
12	Shakey	2			2	interior + neon
13	Beast	2			1	lit outlet + neon
14	Stanford Cart	2		4		chase
15	Pluto	2			1	interior + neon
16	Snake	1	2+2			
17	Quadruped	1	1+1			
21	IRI M50	2	2+2			BigBang welder
22	Charley	2				shape + neon
25	Consight	1	3+3			show action + neon
27	Stanford Arm	1				Rayflash
29	Minsky Arm	1	2+2			Rayflash
	Orm	1	1+1			shape
30	Silver	1	2+2			color + tube + neon
31	DDA	2	4+2			color + tube + neon
32	Page Turner	1	2+2			motion effect
33	Rancho arm	1	2+1			color + neon
34	Avatar	1			2	interior
35	Able	1			2	interior
36	Spider	1		2		dramatic angle
	General area lighting		12			
	Maxell			4	6	BigBang strobe

2" PAR Cans	36		x 92 =	\$3384.00
3" Fresnels		36	x 60 =	\$1954.00
3" Fresnels framing adapters		18	x 32 =	\$576.00
Maxistars			x 74 =	\$740.00
Clamp-on heads			14 x 25 =	\$350.00
Total stage				\$7004.00
UV Fixtures and lamps			2 x 80 =	160.00
Mirror ball and Pin Light			1 x 160 =	160.00
Rayflash effect with controller			2 x 175 =	350.00
Big Bang Strobe			2 x 500 =	1000.00
Chase Tube with control & extension			2 x 200 =	400.00
<u>Neon Colorsticks</u>			<u>8 x 150 =</u>	<u>1200.00</u>
Total FX				\$3270.00
Total stage + FX				\$10274.00

Smart Machines Theatre Buy List

June 5, 1987

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Buy List

Note: *this document is revised as actual prices are given. Prices vary slightly from those quoted due to quantity discounts, case lots, and so forth. When an order has been placed and a price is shown that indicates a vendor has given me an exact price quote. The header shows the date and time of this revision of this document.*

From: **City Lights, Inc. - Greg Goldsmith** 202-289-1090
1232 9th Street N.W.
Washington, D.C. 20001

36 Thomas 2" Par cans with single
transformers and clamps 2952.00
>> Ordered 4 June 1987 5:30 PM on CM PO 060487MHB2

From: **Galley Lighting - Charles Galley** 475-1577
POB 202
Andover, MA 01810

36 Altman #100 3" Fresnels
with small c-clamp, frame,
6' cord and parallel blade plug 38.50 1386.00

18 Altman #99 picture frame
adapters for 3" Fresnel 32.00 576.00

36 ESR lamps - 100 Watt ~20.30 730.71

Galley Total 2692.71

>> Ordered 5 June 1987 10:05 AM on CM PO 060487MHB1

Smart Machines Theatre Buy List

June 5, 1987

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From: Times Square Lighting 212-245-4155
318 West 47th Street
New York, New York 10036

2	BB40 Blacklight Fixtures	70.00	140.00
1	M832 10" Mirror Ball	55.50	55.50
1	RL36 Rain Light	25.00	25.00
1	4515 lamp	7.00	7.00
1	PCS clamp	5.50	5.50
2	RT40 Rayflash Effects	85.00	170.00
2	RTC40 controllers	90.00	180.00
2	TL16 chase tube	33.00	66.00
2	EX16 extension cord	20.00	40.00
2	<u>RLC40 controllers</u>	<u>67.00</u>	<u>134.00</u>

TOTAL 823.00

>> Ordered 5 June 3:30PM from Len on PO 060587MHB1 shipping COD

From: Litelab Corporation
251 Elm Street
Buffalo NY 14203

8	LCS-155 Neo-Blue Color Stik with light-duty c-clamps	116.00	928.00
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>> Ordered 5 June 87 3:40PM on PO 060587MHB2 shipping COD

From: Barbizon Light
3 Draper Street
Woburn, MA 01801

12	Osram Ministar SP41301	28.80	345.00
4	Osram 41900SP spare lamps	11.30	45.20

Barbizon Total 390.80

>> Ordered 5 June 87 3:40PM on PO 060587MHB3

From: Higgins Armory Museum - John Stevens, director
100 Barber Avenue, Worcester, MA 01601

The Higgins Museum is willing to sell us a quantity of transformers available after their recent renovations. At this writing, I do not know how many units are available, but I expect enough to meet our needs. We will need to determine a fair price and send the Higgins a check.

Name	6/13	6/14	6/15	6/16	6/17	6/18	TOTAL
✓ Alma Bair 12 Marlyn Rd. Medfield, MA 02052 063-42-6455	7.0						7.0 \$84
✓ Charles G. Barnes c/o Alan P. Symonds Ripman Lighting Consultants 3 Lexington St. Belmont, MA 02178 033-64-1799		11.5					11.5 \$138
✓ Thomas Curtis 80 Park Ave. East Lowell, MA 02143 104-54-1460	8.5	8.0					16.5 \$198
✓ Michelle Deskus 148 School St. Somerville, MA 02143 042-72-9193	9.5	13.0	9.0	6.0	11.5	18.0	67.0 \$804
✓ Chris Fousek 8 Brastow Ave. #1-L Somerville, MA 02143 074-64-3765	8.5	8.0					16.5 \$198
✓ Steven Hillson 50 Boston St. Somerville, MA 02143 150-44-1661			10.5	9.0	13.5	12.0	45.0 \$540
✓ Joe Levendusky 222 Concord Ave. #2 Cambridge, MA 02138 152-50-9449	5.5						5.5 \$66
✓ Max Leventhal 210 Armory #2L Jamaica Plain, MA 02130 049-36-0217	8.5						8.5 \$102
✓ Gary Mueller 7 Exeter Park Cambridge, MA 02140 047-52-9534			9.0	7.5	11.5	18.0	46.0 \$552
✓ Kurt Vredenburg 7 Exeter Park Cambridge, MA 02140 204-56-3013	6/12 8.0	9.5	13.0	9.0	13.5	11.5	18.0 82.5 \$990
✓ Thomas Wood 24 Greenleaf Rd. Medford, MA 02154 055-54-1691	8.5	11.5					20.0 \$240

\$3912

Notify
them when
they go out