

# RCA

*J. T. Raleigh*

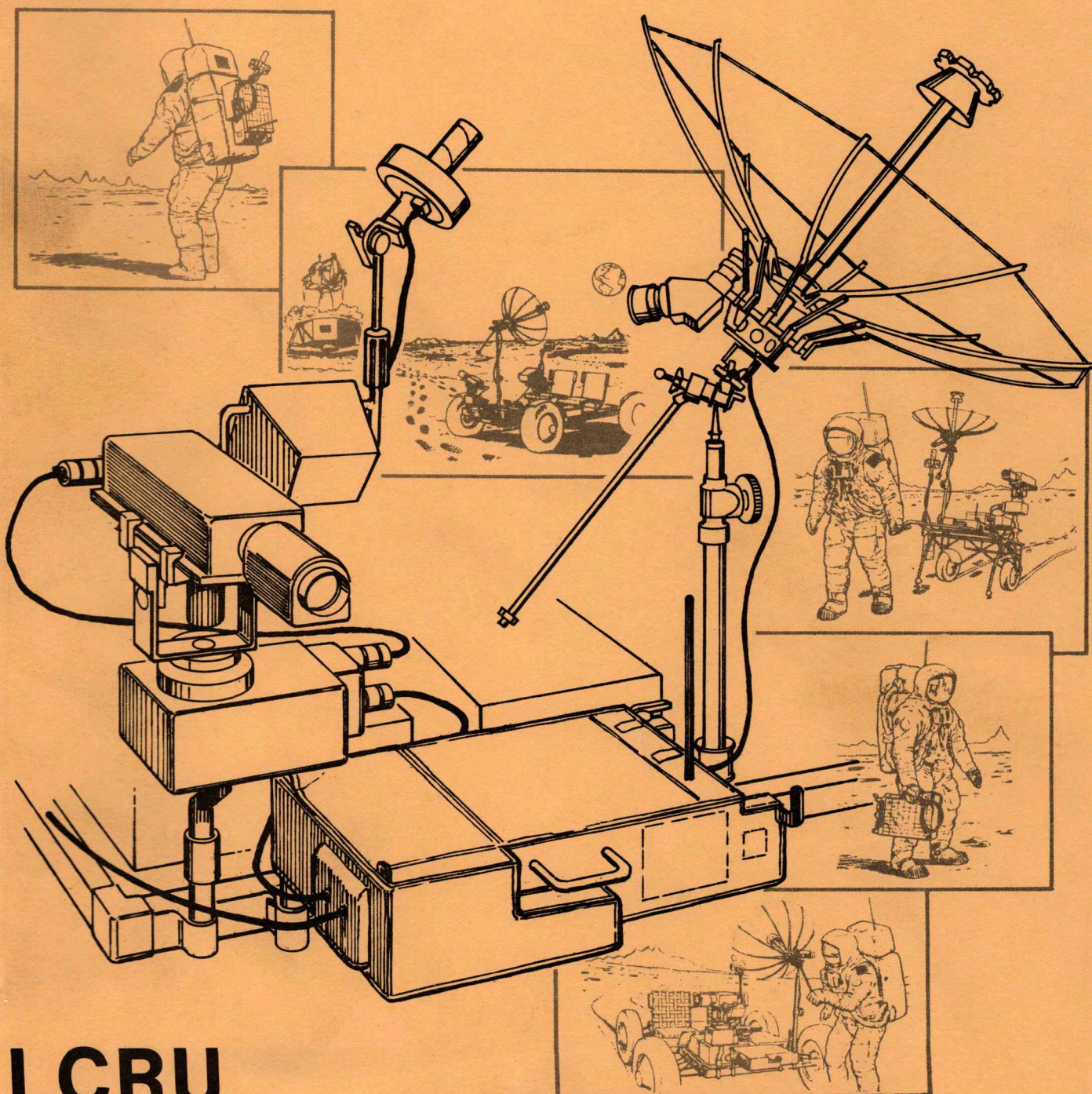
## Lunar Communications Relay Unit (LCRU)

Critical Design Review Report

NASA/MSC, Houston, Texas

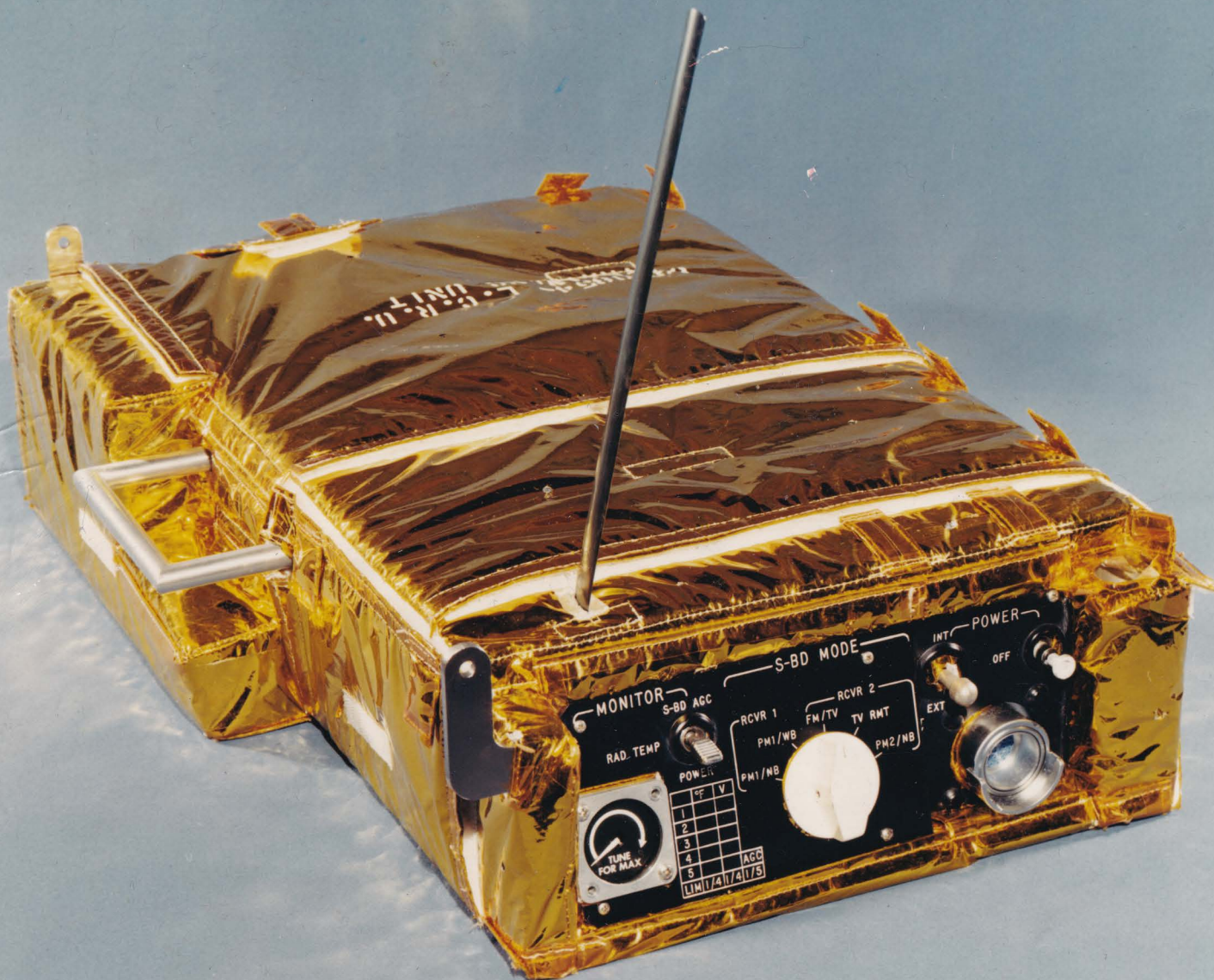
Sept. 15, 16, 17, 18, 1970

Volume 1



# LCRU











LUNAR COMMUNICATIONS RELAY UNIT (LCRU)

CRITICAL DESIGN REVIEW

NASA/MSC HOUSTON, TEXAS

15, 16, 17 and 18 SEPTEMBER 1970

21 SEPTEMBER 1970 - DELTA CDR

VOLUME I

LUNAR COMMUNICATIONS RELAY UNIT • PROGRAM MANAGEMENT OFFICE  
RCA • DEFENSE COMMUNICATIONS SYSTEMS, CAMDEN, N.J.



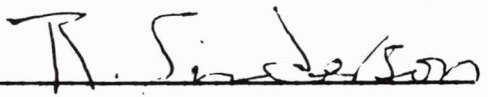
LUNAR COMMUNICATIONS RELAY UNIT (LCRU)

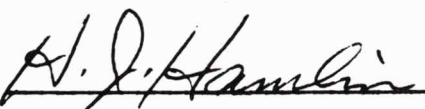
CRITICAL DESIGN REVIEW

NASA/MSC - HOUSTON, TEXAS

SEPTEMBER 15, 16, 17, 18, 1970

  
\_\_\_\_\_  
NASA W. SPEIER

  
\_\_\_\_\_  
NASA R. SINDERSON

  
\_\_\_\_\_  
RCA H.J. HAMLIN

These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.



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**AGENDA**  
**LUNAR COMMUNICATIONS RELAY UNIT**  
**CRITICAL DESIGN REVIEW**  
**SEPTEMBER 15, 16, 17, 18, 1970**

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9/15/70  
9:00 AM

General Session - Chairman: W. Speier - Minutes: A.M. Burke  
Co-Chairman: H.J. Hamlin

- 1.0 GROUND RULES/INTRODUCTION W.M. Speier/  
H.J. Hamlin
  - 1.1 Purpose
  - 1.2 What we were to do
  - 1.3 What you will see
- 2.0 MANAGEMENT OVERVIEW H.J. Hamlin
  - 2.1 Organization
  - 2.2 Schedule
    - Design Status
    - Manufacturing Status
    - Material Status
  - 2.3 Problems
- 3.0 SUBCONTRACT SUMMARY D.A. Orendac
- 4.0 CIRCUIT MARGIN SUMMARY B.M. Trachtenberg
- 5.0 CONFIGURATION OVERVIEW A.M. Burke
  - 5.1 LCRU Configuration - LRV
  - 5.2 LCRU Assembly Operations
  - 5.3 LCRU Configuration - Walk Mode
  - 5.4 Alternate Mode Capability
  - 5.5 Thermal Considerations
- 6.0 PERFORMANCE SUMMARY J.J. Connelly
  - 6.1 Design
  - 6.2 Weight Budget
  - 6.3 Power Budget





# AGENDA

## LUNAR COMMUNICATIONS RELAY UNIT

### CRITICAL DESIGN REVIEW

### SEPTEMBER 15, 16, 17, 18, 1970

9/15/70 Splinter Meeting  
1:00 PM  
to  
9/16/70  
5:00 PM  
Room ( )

7.0 ELECTRICAL DESIGN - Chairman: R. Sinderson - Minutes: V. Carita  
Co-Chairman: J. Connelly

7.1 System Design B.M. Trachtenberg

7.1.1 Circuit Margins B.M. Trachtenberg

7.1.2 Signal Design B.M. Trachtenberg

7.1.3 Link Analyses B.M. Trachtenberg

7.1.4 Sub-System Configuration B.M. Trachtenberg

7.2 Electrical Interface Design

7.2.1 LCRU Design J.J. Connelly

7.2.2 EM Test Status J.J. Connelly

7.2.3 EMI & Grounding G. Houck

7.3 LCRU Internal Electrical Design

7.3.1 VHF Antenna Triplexer E. DeBaecke

7.3.2 S-Band Diplexers E. DeBaecke

7.3.3 VHF Receiver I. Grasheim

7.3.4 VHF Transmitter C. Montini

7.3.5 Down-Link Signal Processor  
Including VCO's C. Montini

7.3.6 Voltage Regulator C. Montini

7.3.7 S-Band Transmitters V.J. Carita

7.3.8 S-Band Receivers H.E. Hawk

7.3.9 Up-Link Signal Processor O. Ramanis

7.3.10 DC-DC Converter R. Erdman

7.3.11 Battery D.V. Howard

7.3.12 Low Gain Antenna D.V. Howard

7.3.13 High Gain Antenna F.J. Nangle

7.4 Integration Design

7.4.1 Case Electrical Integration  
Signal Flow and Grounding H. Comfort

7.4.2 Control Panel H. Comfort

7.4.3 Cabling H. Comfort

7.4.4 LCRU Power Utilization H. Comfort

7.5 External Electrical Design H. Comfort

7.5.1 LCRU LRV TV Cables

7.5.2 HGA LGA Cables



# AGENDA

## LUNAR COMMUNICATIONS RELAY UNIT

### CRITICAL DESIGN REVIEW

#### SEPTEMBER 15, 16, 17, 18, 1970

9/15/70 Splinter Meeting - Chairman: H. Schultz - Minutes: J. Liggett  
1:00 PM Co-Chairman: J. Liggett  
to  
9/16/70  
5:00 PM  
Room ( )

8.0 MECHANICAL DESIGN

8.1 Mechanical Interface Design R. Holston

8.1.1 LCRU/LRV  
8.1.2 HGA/LRV  
8.1.3 LCRU-LM-MESA  
8.1.4 Battery - LM-MESA

8.2 LCRU Mechanical Design R. Holston

8.2.1 Subassembly Arrangement R. Holston  
8.2.2 LCRU Weight Analysis R. Holston  
8.2.3 Subassemblies L. Krawitz

8.2.3.1 VHF Receiver L. Krawitz  
8.2.3.2 VHF Transmitter  
8.2.3.3 VHF Triplexer  
8.2.3.4 Down Link Signal Processor  
8.2.3.5 Up Link Processor  
8.2.3.6 Voltage Regulator  
8.2.3.7 Battery  
8.2.3.8 S-Band Receiver  
8.2.3.9 S-Band Transmitters  
8.2.3.10 Diplexer  
8.2.3.11 VHF Antenna  
8.2.3.12 DC-DC Converter L. Krawitz  
8.2.3.13 Antenna Connector W. Babcock  
8.2.3.14 High Gain Antenna W. Babcock  
8.2.3.15 Low Gain Antenna W. Babcock

8.2.4 Case Design R. Holston  
8.2.5 Cover Design  
8.2.6 Wax Package Assembly  
8.2.7 Control Panel Design  
8.2.8 LCRU/LRV Mounting Design  
8.2.9 HGA Mast and Interface Design  
8.2.10 Stowage Container Design  
8.2.11 Vibration and Stress Analysis





# AGENDA

## LUNAR COMMUNICATIONS RELAY UNIT

### CRITICAL DESIGN REVIEW

#### SEPTEMBER 15, 16, 17, 18, 1970

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9/16/70 Splinter Meeting - Chairman: E. Chimenti - Minutes: H. Rosenthal  
9:00 AM Co-Chairman: G. Grube

to  
9/16/70  
5:00 PM

#### 9.0 THERMAL DESIGN

##### 9.1 Design Analyses

B. Shelpuk

- 9.1.1 Multinode Thermal Analysis
- 9.1.2 Component Hot-Spot Analysis
- 9.1.3 Parking Orientation Analysis
- 9.1.4 Walk Back Analysis
- 9.1.5 Phase Change Freezing Analysis
- 9.1.6 Phase Change Material Package Design

##### 9.2 Thermal Design

G. Grube

- 9.2.1 Radiator
- 9.2.2 Thermal Blanket
- 9.2.3 Thermal Finishes
- 9.2.4 Component Temperatures

##### 9.3 Thermal Testing

- 9.3.1 Test Approach
- 9.3.2 Test Results

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9/16/70 Splinter Meeting - Chairman: J. Miller - Minutes: R. Virostek  
9:00 AM Co-Chairman: R. Virostek

to  
9/16/70  
5:00 PM

#### 10.0 TEST PROGRAM

- 10.1 Thermal
- 10.2 Engineering Model
- 10.3 DVT
- 10.4 QTP
- 10.5 ATP
- 10.6 Test Equipment Design
- 10.7 MSC/KSC Test Program
- 10.8 MSC Special Test Program



# AGENDA

## LUNAR COMMUNICATIONS RELAY UNIT

### CRITICAL DESIGN REVIEW

#### SEPTEMBER 15, 16, 17, 18, 1970

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9/16/70	Splinter Meeting - Chairman: D. Becker	- Minutes: W. Carlino
9:00 AM	Co-Chairman: W. Carlino	
to		
9/16/70	11.0 PROGRAM SUPPORT	
5:00 PM	11.1 Reliability	W. Carlino
Room ( )	11.1.1 RCA Status	
	11.1.2 Subcontractor Status	
	11.1.3 Reliability Design Status	
	11.1.4 Parts Qual.	H. Farcus
	11.1.5 Parts Usage: APL, Derating	H. Farcus
	11.1.6 FMEA	H. Farcus
	11.2 Configuration Control	H. Yarbrough
	11.2.1 Program Control and Status	
	11.2.2 Response to MSC Con Con Comments	
	11.3 Quality Assurance	G. Floyd
	11.3.1 RCA Quality Program Status	
	11.3.2 Subcontractor Controls and Status	
	11.3.3 Equipment Flow Charts	

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9/17/70	12.0 GENERAL SPLINTER & RID REVIEWS	
9:00 -	Chairman: W. Speier	- Minutes: A.M. Burke
10:00	Co-Chairman: H.J. Hamlin	
to		
1:00 -	12.1 Electrical Design Splinter Review	J.J. Connelly
5:00	12.2 Mechanical Design Splinter Review	J. Liggett
	12.3 Thermal Design Splinter Review	G. Grube
	12.4 Test Program Splinter Review	R. Virostek
	12.5 Program Support Splinter Review	W. Carlino

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9/17/70	13.0 DEMONSTRATION	B.M. Trachtenberg/
10:00 AM		J.J. Connelly
to		
12:00 AM		

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9/18/70	14.0 CDR REVIEW BOARD	R. Johnston
9:00 AM		
to		
12:00		

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9/18/70	15.0 MINUTES REVIEW AND SIGNOFF	W. Speier
		R. Sinderson
1:00 -		H.J. Hamlin
ON		A.M. Burke
		J.J. Connelly
		D. Orendac
		W. Carlino
		R. Virostek
		J. Liggett



AGENDA

LCRU CREW STATION REVIEW

MSC/BLDG. 5, SEPTEMBER 21, 1970

DELTA CDR

9/21/70

16.0

LCRU Crew Station Review

H.J. Hamlin

**LCRU** Lunar  
Communications  
Relay  
Unit

**CRITICAL DESIGN REVIEW**

**RCA**

9-15-70 thru 9-18-70



# SUMMARY OF REVIEW ITEM DISPOSITIONS

## AGENDA ITEM 1.0 thru 6.0

<u>RID</u>	<u>RESP</u>	<u>DISPOSITION</u>	<u>DATE</u>
CDR-G-001 MSC Test Schedule Support Requirements	-	Withdrawn - See RID-T-012	-
CDR-G-002 MSC SR/TV Down Time	MSC	Referred to LCRU CDR board. See RID's under Agenda Item 14.0	-

Agenda Item 7.0 Electrical

<u>RID</u>	<u>RESP</u>	<u>DISPOSITION</u>	<u>DATE</u>
CDR-E-001 Subsystem Schematic	MSC	Determine need for additional sub-contractor data	
CDR-E-002 Hand carry mode testing	RCA	Evaluate effects of VHF antenna orientation	TI-6
CDR-E-003 70 KHz/PRN Mode	MSC	Perform tests to define PRN characteristics	9/21/70
CDR-E-004 TV Channel Set-up adjustments	-	Withdrawn	-
CDR-E-005 LCRU Transmission Mode Nomenclature Standardization	RCA	Use consistent nomenclature	-
CDR-E-006 Downlink Signal Processor Requirements	RCA	Confirm capability of meeting specs in SE-C-0043A	TI-5
CDR-E-007 Subassembly Design Parameters	RCA	Update in-house built subassembly performance characteristics	TI-5
CDR-E-008 Design Configuration Control	MSC	Generate requirements for review with RCA and negotiate concurrently with CDR-E-009.	
CDR-E-009 LCR Unit End-to-End Design Parameters	MSC/RCA	Negotiate attached LCRU input/output test requirements (Black Box I/O Test Req-1-49)	10/3/70
CDR-E-010 Signal Modulation Tolerances	RCA	Preliminary report on tolerance build-ups Final analysis to be scheduled at	TI-5 TI-5
CDR-E-011 Potential Signal Point Failure, 14 VDC Supply	RCA	Add fuse on front panel TB to protect 14 V to GCTA and indicate design changes	TI-5

Agenda Item 7.0 Electrical

<u>RID</u>	<u>RESP</u>	<u>DISPOSITION</u>	<u>DATE</u>
CDR-E-012 Conic Transmitter Failures	MSC	Review NASA/TCSD failures for any impact on LCRU	10/3
CDR-E-013 Comparison of NASA and RCA Subcontractor Specifications	-	Withdrawn - See E-008	-
CDR-E-014 LRV EMI	MSC	Provide information	TI-5
CDR-E-015 Up Link Signal Processor	RCA	Present data on tolerance build-up and distortion	TI-5
CDR-E-016 S-Band Receiver SCD	RCA	Provide ECN to SCD	9/22/70
CDR-E-017 S-Band Transmitter Humidity Fix	RCA	Review MSC recommendation for impact	10/1/70
CDR-E-018 Conic Frequency Adjustment	RCA	Review impact of increased frequency change, determine if RCA can change adjustment	10/1/70
CDR-E-019 FM/PM Transmitter SCD	RCA	Review impact of change from IFM to IPM; supply verbal information on deviation and frequency response.	10/1/70
CDR-E-020 Squelch Audio Output Noise	RCA	No change at this time	-
CDR-E-021 Subcarrier Squelch Control Location	RCA	Determine EMI coupling paths, and feasibility of subcontractor performed susceptibility test.	TI-5
CDR-E-022 LCRU-EVA Range	RCA	Evaluate UL and DL signal performance for VHF path losses	TI-6
CDR-E-023 VHF Transmitter Variations	RCA	No action required, presented data at CDR	-
CDR-E-024 Comparison of Up Link and Down Link Voice Processing	RCA	No action required, presented answer at RID review	-



Agenda Item 7.0 Electrical

<u>RID</u>	<u>RESP</u>	<u>DISPOSITION</u>	<u>DATE</u>
CDR-E-025 Audio Levels at EVCS	MSC	Perform analysis of LM VHF and LCRU VHF post detection levels at EVA's.	TI-5
CDR-E-026 VOX Setting Range	RCA	Supply range of ULSP DTV adjustment	10/1/70
CDR-E-027 Double Talking	MSC	Perform analysis for receiving simultaneous EVA inputs	TI-5
CDR-E-028 LCRU Communication System Signal P&I Spec	RCA	Provide comments on latest P&I Spec.	9/28/70
CDR-E-029 Apollo MEAS #	RCA	Implement Apollo measurement numbers in future applicable documentation	-
CDR-E-030 Battery SCD	RCA	Investigate need and impact for painting inside of battery case	10/1/70
CDR-E-031 Up Link Voice Quality	RCA	Attempt voice quality demonstration at TI-5	TI-5
CDR-E-032 Squelch		Withdrawn	
CDR-E-033 Document Errors	RCA	Review attachment and make necessary changes	Before Eng'g release
CDR-E-034 VHF Antenna Trimming	RCA	Incorporate procedure in drawings	10/9/70
CDR-E-035 RF Connector Lock Wiring	RCA	Secure RF connectors prior to delivery, show method on drawings.	10/9/70
CDR-E-036 RF Connector SCD 8555284	RCA	ECN for lengthened body	10/9/70
CDR-E-037 Thermal Analysis Report - LCRU on Lunar Surface	RCA	Refer to CDR item 5.0 - No additional action required.	-

Agenda Item 7.0 Electrical

	<u>RID</u>	<u>RESP</u>	<u>DISPOSITION</u>	<u>DATE</u>
	CDR-E-038 Failure Mode and Effects Analysis, LRTR-FMEA-1 Rev. A	RCA	Submit erratta sheet for corrections, and discuss case pressure seal	10/9/70
	CDR-E-039 Interconnection Diagram 8370878 Incomplete	RCA	Correct to show pressure sensor	10/9/70
	CDR-E-040 Schematic Wiring Diagram 8670946 Requires correction	RCA	Make corrections and resubmit	10/9/70
	CDR-E-041 Pressure Sensor SCD 8553610	RCA	Provide response to recommendations	9/22/70
	CDR-E-042 Cover Plate Control Panel 8670948 Requires correction	RCA	Correct errors. Evaluate meter calibration chart	9/25/70
on	CDR-E-043 LCRU/LRV Cable Drawing required	RCA	Complete design drawing and submit	10/1/70
	CDR-E-044 Delinquent Action Items	RCA	Complete all A.I.'s by 9/25 except those with later due dates	9/25/70
	CDR-E-045 Capacitor Assembly 8670967 DC/DC Convertor	RCA	No action required, presented answer at RID review	-
	CDR-E-046 Cable Assembly 8670957	RCA	Will utilize 75 $\Omega$ coax and correct drawings	10/9/70
	CDR-E-047 Switchs, Toggle SCD 8555254 Drawing Error	RCA	Will correct drawing	10/9/70
	CDR-E-048 Circuit Breaker 8555264 Drawing Error	RCA	Will test trip rating in Incoming Inspection correct documentation	10/9/70
	CDR-E-049 Monitor Meter SCD Drawing Errors	RCA	Will correct drawing	10/9/70
	CDR-E-050 14.5 KHz VCO SCD	RCA	Correct drawing and/or provide rationale	10/1/70
	CDR-E-051 1.25 MHz SCO SCD	RCA	Correct drawing and/or provide rationale	10/1/70

Agenda Item 7.0 Electrical

<u>RID</u>	<u>RESP</u>	<u>DISPOSITION</u>	<u>DATE</u>
CDR-E-052 Documentation Errors - Electrical Review	RCA	Correct errors per attachment	10/1/70
CDR-E-053 Documentation Clarifications - Electrical Review	RCA	Correct errors per attachment	10/1/70
CDR-E-054 MSFN Deficiency	MSC	Referred to LCRU CDR board - See RID under Agenda Item 14.0	-



Agenda Item 8.0 Mechanical

	<u>RID</u>	<u>RESP</u>	<u>DISPOSITION</u>	<u>DATE</u>	
	CDR-M-1	LGA Vibration Enviroment Requirements	MSC	To supply vibration data	10/1
	CDR-M-2	LGA Adjustment	-	Withdrawn - See M-22	-
	CDR-M-3	Hand Carry Adjustment	RCA	No action required	-
	CDR-M-4	HGA Latching	RCA	Increase detent in collar	10/9/70
	CDR-M-5	LRV/LCRU Interface	RCA	Review interference with GCTA when removing LCRU. Coordination with Boeing is required	TI-5
✓	CDR-M-6	HGA Pointing Assembly Changes	-	Rejected	-
	CDR-M-7	HGA Sight	RCA	Incorporate change for increased viewing angle and complete design	TI-5
	CDR-M-8	Zero-G Connector	RCA	Contact MSFC for required information	10/1
	CDR-M-9	Removal of LCRU for Hand Carry	-	Withdrawn - See M-5	-
	CDR-M-10	Auxiliary Power Connector (ECP-32)	MSC	Forward contractual coverage	9/25/70
	CDR-M-11	Crew Training Documentation	RCA	Provide preliminary procedures	10/15/70
	CDR-M-12	Placement of LGA 8 Foot Cable	-	Referred to LCRU CDR board. See RID under Agenda Item 14.0	-
	CDR-M-13	Optical Sight Design	-	Withdrawn See M-7	-
	CDR-M-14	LM/LCRU Interface	-	Referred to LCRU CDR board. See RID under Agenda Item 14.0	-

Agenda Item 8.0 Mechanical

	<u>RID</u>	<u>RESP</u>	<u>DISPOSITION</u>	<u>DATE</u>
CDR-M-15	Stowage Container	-	Referred to LCRU CDR board. See RID under Agenda Item 14.0	-
CDR-M-16	Case Drawing 8370873 (Handle design)	MSC	Evaluate CSR findings on handle configuration and advise RCA	9/21/70
CDR-M-17	Case Drawing 8370873 Late changes not included	RCA	Incorporate changes in CDR drawing sign-off	10/1/70
CDR-M-18	Thermal Blanket VHF Slot	RCA	Provide design details for VHF antenna hole to enable VHF curvature	10/1/70
CDR-M-19	ICD LID 340-25162-B	MSC	Forward comments to GAC. Negotiate with GAC on 9/23-24.	9/21/70
CDR-M-20	TV Camera Mast Insert	RCA	LCRU will provide inserts for camera per agreement with AED. No MSC/RCA action required	-
CDR-M-21	Pre-Launch Assembly Items	-	Referred to LCRU CDR board. See RID under Agenda Item 14.0	-
CDR-M-22	LGA Pointing Adjustment Resolution	-	Referred to LCRU CDR board. See RID under Agenda Item 14.0	-
CDR-M-23	Launch Depressurization Requirements	RCA	Review requirement changes and make recommendations	TI-5
CDR-M-24	LRV/LCRU Mounting Interface Tolerance Analysis	-	Rejected	-
CDR-M-25	LM ICD Dimension	-	Withdrawn	-
CDR-M-26	Crew Interface Visual Markings	RCA	Will add information to drawings	10/1/70
CDR-M-27	Crew Interface Design Delta CDR	RCA	Will have training mock-up completely updated for crew review	Closed

Agenda Item 8.0 Mechanical

<u>RID</u>	<u>RESP</u>	<u>DISPOSITION</u>	<u>DATE</u>
CDR-M-28 Functional Schematic - LCRU	RCA	Will include on drawing tree	-
CDR-M-29 HGA Pointing Friction Adjustment	RCA	Supply information via CSR on 9/21/70	9/21/70
CDR-M-30 LCRU VHF Antenna Stow during Walk	-	Withdrawn - See CDR-E-002	-
CDR-M-31 IRN's R15 and R16 to ICD 13MO7391	MSC	MSC to provide via CCA	9/25/70
CDR-M-32 Missing Documentation	RCA	Provide workmanship spec. 8030020	9/21/70
CDR-M-33 LCRU Power Cable Stowage; LGA Cable Tiedown on LRV	RCA	Provide LCRU/LRV and LGA cable drawings also see CDR-E-043; and CDR-M-012	10/1/70
CDR-M-34 Some Mechanical drawings required sign-off for release.	RCA	Complete outstanding drawings and review with MSC.	9/28 week



Agenda Item 9.0 Thermal

	<u>RID</u>	<u>RESP</u>	<u>DISPOSITION</u>	<u>DATE</u>
	CDR-T-001 LCRU Circuit Breaker Thermal Design	RCA	Determine whether SR/TV test is to be done on circuit breaker alone, or entire LCRU.	TI-5
	CDR-T-002 HGA Orientation between Sorties	-	Referred to LCRU CDR Board. See RID under Agenda Item 14.0	-
	CDR-T-003 Conic S-Band Transmitters	-	Withdrawn. See CDR-R-14	-
	CDR-T-004 Thermal Mock-up Solar Radiation Test No. 2	-	Referred to LCRU CDR Board. See RID under Agenda Item 14.0	-
5	CDR-T-005 SCD S-Band LGA/HGA 8555260/8555262	RCA	ECN 8555260 Rev. A changes LGA lunar surface temperature criteria to be consistent with HGA. No additional action required.	-
	CDR-T-006 SCD HGA 8555262 - Hot/Cold deployment testing	MSC	Evaluate performing these tests under SR/TV during Kent or DVT testing	TI-5
	CDR-T-007 Zero-G Connector Thermal "Bootie"	RCA	Change drawing to show "Bootie"	10/1/70

# Agenda Item 10.0 Test

<u>RID</u>	<u>RESP</u>	<u>DISPOSITION</u>	<u>DATE</u>
CDR-C-001 LRV Vibration in LM-MESA	-	Withdrawn. See CDR-M-21	-
CDR-C-002 LGA Assembly Vibration on LRV	-	Withdrawn. See CDR-M-1	-
CDR-C-003 Acceleration testing of LCRU Battery	MSC	Will investigate PLSS battery qualification	-
CDR-C-004 Battery and Cell Container Burst Pressure Levels	RCA	Will provide information	10/1/70
CDR-C-005 LCRU Battery Evacuation Activation	RCA	(a) Provide impact for Yardney to implement procedure for DVT and Qual batteries	9/23/70
	MSC	(b) Provide RCA direction to implement if req'd	9/25/70
CDR-C-006 Acceptance Test - Thermal Cycling	RCA	Provide plan for Thermal Cycling for evaluation and direction	TI-5
CDR-C-007 LRV/LCRU EMC Test-Battery Requirements	RCA	Provide impact of reallocating first two flight batteries.	10/1/70
CDR-C-008 Deletion of Use of Radio-active Material on LCRU Control Panel	-	Referred to LCRU CDR board. See RID under Agenda Item 14.0	-
CDR-C-009 LCRU Qual Test-R ndom Vibration	RCA	Will perform recomondations for random vibration and operating test during vibration	With Test Plan
CDR-C-010 LM MESA Vibration Test Data	-	Referred to LCRU CDR board. See RID under Agenda Item 14.0	-
CDR-C-011 LCRU Battery Qual Test Shock, Rupture	RCA	Delete shock rupture test	With Test Plan
CDR-C-012 LCRU Engineering Model/MSFN Systems Test at MSC	-	Referred to LCRU CDR Board. See RID under Agenda Item 14.0	-
CDR-C-013 Signal Strength Meter Measurement Tolerance	-	Withdrawn. See CDR-E-006	-

Agenda Item 10.0 Test

<u>RID</u>	<u>RESP</u>	<u>DISPOSITION</u>	<u>DATE</u>
CDR-C-014 ATP Vibration Operations	RCA	Perform operating vibration test in a PM 1 mode. Specify parameters in ATP plan	With ATP Plan
CDR-C-015 Dummy Batteries for KSC Test	RCA	Submit impact of providing batteries	TI-5
CDR-C-016 DVT Test Program Plans	RCA	Investigate sequential mission test of one battery and advise of impact	9/23/70
	MSC	Investigate means for testing HGA during SR/TV Testing	TI-5
CDR-C-017 Qualification Test Program Plans	RCA	Advise on deleting HGA TV test and switching SR/TV test from DVT to Qual	TI-5
CDR-C-018 Test Parameter Definitions	RCA	(1) Will submit HGA, LGA and battery procedures applicable to those portions of End Item which require approval.	ASAP
	RCA	(2) Will discuss LCRU parameters to be tested during DVT and Qual tests	TI-5
	RCA	(3) Will provide subassembly vendor DVT and ATP's for information only.	ASAP
CDR-C-019 Stowage Container Testing	-	Referred to LCRU CDR board. See RID under Agenda Item 14.0	-
CDR-C-020 Battery Testing	RCA	Advise MSC on recommendation for deleting battery vibration testing in DVT and Qual.	9/25/70
CDR-C-021 LCRU Acceptance Testing	RCA	Will perform recommended tests per comments in RID	With ATP Plan



Agenda Item 10.0 Test

<u>RID</u>	<u>RESP</u>	<u>DISPOSITION</u>	<u>DATE</u>
CDR-C-022 LCRU Acceptance Testing	RCA	(a) Will perform 2nd and 3rd order intermodulation products of two sinusoidal signals at video input.	With ATP Plan
	RCA	(b) Provide impact of procuring pattern TV generator	TI-5
CDR-C-023 MSC Test of LCRU EM	RCA	Evaluate EM hardware problem and provide results	TI-5
CDR-C-024 LCRU Battery - Cell Lot Testing	MSC	Provide direction to increase sample size if required	10/1/70

Agenda Item 11.0 Program Support

<u>RID</u>	<u>RESP</u>	<u>DISPOSITION</u>	<u>DATE</u>
CDR-R-001 Family Tree - LCRU Flight Model	RCA	No action required	-
CDR-R-002 Family Tree - LCRU Flight Model	RCA	Will make corrections as required	10/1/70
CDR-R-003 Parts	RCA	Will submit preliminary derating tabulation Will be updated for DVT data.	10/6/70
CDR-R-004 Seal Tests	RCA	Is providing means for checking internal LCRU pressure; no action required	-
CDR-R-005 NASA Document Approval	MSC	Provide comments/approval on RPP, EPL, PS and FMEA	TI-5
CDR-R-006 Burn-in and Screen Parts for DVT #2	-	Referred to LCRU CDR board. See RID under Agenda Item 11.0	-
CDR-R-007 Qual. Test Plan	RCA	Will submit qual test plan 75 days prior to start of test	1/20/70
CDR-R-008 Design Verification Test Plan	RCA	Will submit DVT plan 75 days prior to start of test	11/6/71
CDR-R-009 Battery Venting of Electrolyte	-	Withdrawn See CDR-C-003	-
CDR-R-010 VHF Antenna Orientation (Walk Mode)	-	Withdrawn See CDR-E-002	-
CDR-R-011 Battery Removal from Storage	MSC	Determine action, if any, to modify battery tracks at LM D/S C <sup>2</sup> F <sup>2</sup> at GAC.	10/1/70
CDR-R-012 Interference HGA and TV Camera	RCA	Advise fixes and impact	TI-5
CDR-R-013 Vibration Testing	-	Referred to LCRU CDR board. See RID under Agenda Item 11.0	-

Agenda Item 11.0 Program Support

<u>RID</u>	<u>RESP</u>	<u>DISPOSITION</u>	<u>DATE</u>
CDR-R-014 High Stress on EEE Parts	RCA	Will provide parts application data. See CDR-R-003	10/6/70
CDR-R-015 Parts Qualification Data	RCA	Being implemented via ECP-20. No additional action required	-
CDR-R-016 S-Band Transmitter Transistor 16010099	RCA	Will conduct survey of vendor	10/1/70
CDR-R-017 S-Band Transmitter MOSFET 3N154	RCA	Substitution part being reviewed by Conic- Impact required by	10/1/70
CDR-R-018 Circuit Breaker	RCA	(1) Will refinish button in-house (2) Will perform temperature test. See CDR-E-048 (3) Will use -0086 in lieu of -0085 if feasible. No additional action required	- - -
CDR-R-019 Time Share Switch MOSFET 3N138	RCA	Evaluate if 2N3822 can replace 3N138 and advise MSC	9/25/70



Agneda Item 14.0 LCRU CDR Board

<u>RID</u>	<u>RESP</u>	<u>DISPOSITION</u>	<u>DATE</u>
CDR-G-002 MSC SR/TV Down Time	MSC	Will investigate Test equipment problems to determine if any additional corrective action can be taken	TI-5
CDR-E-054 MSFN Deficiency	-	Disapproved, demodulator modifications being explored by GSFC	-
CDR-M-012 Placement of LGA 8 Foot Cable	MSC	PD to resolve using ground rules established by CDR Board.	9/21/70
CDR-M-014 LM/LCRU Interface Error	MSC/GAC/RCA	Negotiate stowage enviromental ICD's.	9/23-24
CDR-M-015 Stowage Container Interface	MSC/GAC/RCA	Negotiate stowage enviromental ICD's.	9/23-24
CDR-M-021 Pre-Launch Assembly Items	MSC	Provide CCA coverage	9/21
	RCA	Provide items	10/19
CDR-M-022 LGA Pointing Adjustment Resolution	MSC	Provide CCA coverage	9/23
	RCA	Submit ECP as required	10/5
CDR-T-002 HGA Orientation between Sorties	MSFC	Should perform study based on Thermal IRN	
CDR-T-004 Thermal Mock-up Solar Radiation Test #2	MSC	ASPO negotiate Chamber D priority with SETD for 10/5 - 10/16. TCSD forward test request memo to SETD	9/22/70
CDR-C-008 Deletion of Use of Radio Active Material on the LCRU Control	-	Rejected, crew requirement. No action required.	-
CDR-C-010 LM MESA Vibration Test Data	MSC	Provide data to RCA	9/21
CDR-C-012 LCRU EM/MSFN Systems Test at MSC	RCA	Downgrade DVT-2 to second EM. Deliver 12/16/70. Retain 4th Fl. unit in production	12/16
CDR-C-019 Stowage Container Testing	RCA	Continue presently planned testing No action required	-

Agenda Item 14.0 LCRU CDR Board

<u>RID</u>	<u>RESP</u>	<u>DISPOSITION</u>	<u>DATE</u>
CDR-R-006 Burn-in and Screen Parts for DVT #2	-	Withdrawn	-
CDR-R-013 Vibration Testing	MSC	Provide LM test data,	9/21
		Provide LRV test data	10/1

CRITICAL DESIGN REVIEW

GENERAL SESSION 9/15/70

Agenda Items 1.0 - 6.0

ATTENDEES:

NASA:

J. Allman  
E. Baca  
L. N. Bates (GE)  
D. D. Becker  
D. R. Brooks  
E. T. Chimenti  
J. H. Dabbs  
B. C. Embrey  
E. I. Fendell  
N. B. Farmer  
W. B. Goeckler  
R. W. Kubicki  
H. Kyle  
J. McKenzie  
J. D. Miller  
C. Ritterhouse  
R. S. Sawyer  
H. Schultz  
H. Scott  
R. Sinderson  
W. M. Speier  
J. L. Vyner

RCA:

W. S. Babcock  
A. M. Burke  
V. J. Carita  
W. L. Carlino  
J. J. Connolly  
E. DeBaecke  
I. Grasheim  
G. Grube  
H. J. Hamlin  
H. E. Hawlk  
R. E. Holston  
G. A. Houck  
J. A. Liggett  
C. Montini  
D. A. Orendac  
O. Ramanis  
H. Rosenthal  
B. M. Trachtenberg  
R. F. Virostek

BELLCOMM:

J. T. Raleigh

LEC:

R. J. Elbert  
W. J. Shannahan

BOEING:

R. H. Pacey  
J. E. Siemers

KSC:

H. W. Cochran  
R. L. Whitson

GAC:

C. I. Howard

## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 1.0 & 2.0

SUBJECT Introduction/Ground Rules

Management Overview

### SUMMARY OF DISCUSSION:

RCA stated that the strike has been settled and personnel have returned to work as of 9/11/70. The LCRU Program is on schedule and no cost growth is expected. In addition, RCA stated that the LCRU engineering model has been completely assembled on schedule (August 31) and testing has started. The EM is now in Houston as demonstration support for the CDR. H.J. Hamlin stated that he is pleased to say that he has seen TV and heard EVCS on the EM before the EM left RCA for MSC. This was done at room temperature so that much must still be done in this regard including design test variable effort, evaluate full system performance and capability.

RCA stated that the LRV/LCRU/TV interference problem is with regard to mechanical interference under certain operational aspects. It was agreed that detail evaluation of these interferences would be accomplished during the Mechanical Splinter Meeting - Agenda Item 8.0

RCA took exception to the MSC test schedules stating that MSC's plans to utilize the LCRU engineering model has significant interference with RCA's planned uses.

### ACTION ITEMS:

**NOTE:** These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.



## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 3.0 & 4.0

SUBJECT Subcontract Summary

Circuit Margin Summary

### SUMMARY OF DISCUSSION:

The subcontract summary and Circuit Margin Summary were presented without significant discussion and no RID's.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 5.0

SUBJECT Configuration Overview

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### SUMMARY OF DISCUSSION:

MSC questioned the desirability of folding the LCRU VHF antenna down during walk mode. RCA stated that this was an MSC suggested tie-down and further RCA feels that sufficient VHF power is available to maintain communication - particularly since there is better polarization compatability. However, this cannot be calculated. RCA suggested that this being an operational procedure item, it can be checked out during crew training exercises for best performance.

RCA stated that functional schematics will be on drawing tree.

MSC questioned the lack of availability of drawings for subcontractor items. RCA stated that the CDR is supported in this regard with SCD's and technical data - not with drawings - and this is consistent with SE-C-0043A requirements.

### ACTION ITEMS:

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## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 6.0

SUBJECT Performance Summary

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### SUMMARY OF DISCUSSION:

Performance Summary information was presented without significant discussion and no RID's.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION 1-2		NUMBER CDR-4-1
VEHICLE:				COORDINATION
DATE: 9/15/70				
INITIATOR H.J. Hamlin	ORGANIZATION RCA	SYSTEM LCRU	TEAM NAME	
DISCREPANCY/PROBLEM		TITLE MSC Test Schedule Support Requirements		
<p>RCA cannot support MSC test schedule for LCRU/LRV EMI (EMC) testing during 12/11 - 1/8; LCRU/MSFN performance analysis - 1/8/71, and may not be able to support LRV/LCRU thermal vacuum test 12/1/70 - 12/15/70.</p>				
<p><b>JUSTIFICATION</b></p> <p>RCA has pressing application for the LCRU Engineering Model including ancilliary items throughout the entire period from now to Flight deliveries.</p>				
<p><b>RECOMMENDATION</b></p> <p>LCRU/LRV EMC - RCA to support 12/15 to 12/31.</p> <p>MSC to evaluate their needs and find other means to support their test program requirements rather than take RCA's Engineering Model Components. RCA can supply a second Engineering Model by 12/15/70 at a cost of approximately \$100K making maximum utilization of DVT 2 stock parts and EVCS stock parts. Authorization required by 9/18.</p>				
CONTRACTOR'S COMMENT				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS <i>Withdraw see CDR-C-12 H.J. Hamlin</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE				



TYPE OF REVIEW: CDP		REVIEW ITEM DISPOSITION 1-2		NUMBER CDR-6-1
VEHICLE:				COORDINATION
DATE: 9/15/70				
INITIATOR H.J. Hamlin	ORGANIZATION RCA	SYSTEM LCRU	TEAM NAME	
DISCREPANCY/PROBLEM		TITLE MSC SR/TV Down Time		
<p>MSC SR/TV Chamber is contributing to delays in SR testing.</p>				
<p><b>JUSTIFICATION</b></p> <p>Has impacted the RCA SR/TV tests by 13 days. May impact the DVT and QT Program in 1971.</p>				
<p><b>RECOMMENDATION</b></p> <p>MSC review SR/TV chamber and provide means for reducing or eliminating down time.</p>				
<p><b>CONTRACTOR'S COMMENT</b> MSC COMMENT</p>				
<b>TEAM CAPTAIN RECOMMENDATION</b>				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
<b>BOARD ACTION</b>				
CATEGORY	REMARKS ASPO will investigate equipment problems to determine if any additional corrective action can be taken.			
ACTION				
SUSPENSE				
ACTION	<input checked="" type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN Wm J. Kubiak for R. W. Kubiak	
SUSPENSE				

SPLINTER MEETING  
CDR-ELECTRICAL  
SEPTEMBER 15, 16, 1970  
AGENDA ITEM 7.0

V.J. Carita	RCA
H. Comfort	RCA
J. Connelly	RCA
E. DeBaecke	RCA
R. Elbert	NASA
R. Erdmann	RCA
E. Fendell	NASA
I. Grasheim	RCA
H. Hawk	RCA
G. Houck	RCA
D.V. Howard	RCA
J. McKenzie	NASA
C. Montini	RCA
F. Nangle	RCA
D.A. Orendac	RCA
J. Raleigh	Bellcomm
O. Ramanis	RCA
H. Rosenthal	RCA
R. Sinderson	NASA
B.M. Trachtenberg	RCA
W. Woodward	RCA

## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 7.0  
SUBJECT Electrical

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### SUMMARY OF DISCUSSION:

The electrical portion of the CDR was conducted as a splinter meeting with R. Sinderson, NASA as Chairman, J.J. Connelly of RCA as Co-Chairman with Minutes taken by V.J. Carita of RCA.

Items of the agenda covered on 9-15-70 began with 7.0 and finished with item 7.3.6.

The meeting began at 1:45 with B. Trachtenberg presenting item 7.1, System Design.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 7.1  
SUBJECT System Design

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### SUMMARY OF DISCUSSION:

A vigorous discussion came about on the PRN ranging when J. Raleigh raised the question on why it was not in the design. Mr. Trachtenberg indicated that it was not a design parameter for the LCRU. Mr. J. McKenzie said that he believed it was written in the PDR discussions as a parameter. Mr. E. Fendell of NASA at this point said that there was no requirement for PRN during ascent mode of the LEM. A point was made that this should be so noted in the minutes of the meeting. A RID was written by Mr. Sinderson requesting that the requirement for 70 KHz operation with the PRN ranging be defined.

Mr. Trachtenberg then continued with his disertation.

Chart #7.1 - 23 Link Analysis Secondary Voice Mode (Baseband PM) is to be corrected under Effective Isotropic Radiated Power (EIRP) change the value from 12.5 dbw to 12.7 dbw.

Chart #7.1 - 29 Link Analysis Up Link Voice Mode (FM/PM) is to be corrected for error. The high gain antenna resultant antenna gain is to be changed from 18.5 db to 22.0 db.

The Predetection noise bandwidth of 494 KHz was a minimum and shall be changed to a maximum of 525 KHz.

It was noted that Mr. Trachtenberg's values are peak to peak/RMS and that Mr. Sinderson calculations were RMS to RMS meaning that the RCA presentation was different by 9 db from what NASA expected to see. No real concern was shown by NASA except that RCA's values should be consistent in notating.

### ACTION ITEMS:

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## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 7.1 (Continued)  
SUBJECT Electrical

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### SUMMARY OF DISCUSSION:

J. McKenzie questioned whether the new packaged VHF receiver met the + 1.3 db AGC tolerance. J.J. Connelly replied that the tests on the VHF receiver have not been completed.

Mr. Trachtenberg presented to NASA the latest schematics for the functional LCRU #8370895 (Preliminary) with copies to R. Sinderson - 2, E. Fendell - 2, J. McKenzie - 1, J. Raleigh - 1, R. Elbert - 1.

J. McKenzie requested that the view graph presentations use mode switch nomenclature instead of the functional terms used by Mr. Trachtenberg. This portion of the presentation was over at 2:50 without further questions.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 7.2.1 & 7.2.2  
SUBJECT Electrical

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### SUMMARY OF DISCUSSION:

When Mr. Connelly began his presentation he did not have hard copies for distribution and said they would be furnished later. His items of the agenda were 7.2.1 and 7.2.2. There were no questions during his presentation other than Mr. Sinderson asked how the antennas were isolated from the Rover. Mr. Connelly explained that there were fibre glass post separators in the masts. Mr. Sinderson said that he was not aware of this from the RCA drawings. Mr. Connelly suggested that the Engineering Model was available for inspection.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 7.2.3  
SUBJECT Electrical

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### SUMMARY OF DISCUSSION:

Mr. G. Houch then presented Item 7.2.3 of the agenda.

Mr. Sinderson asked whether the RF Signal leads in the LCRU were grounded at both ends, the reply was "yes, in almost all cases". Mr. Sinderson then asked if RCA worked with the TV people on the grounding of the LCRU. RCA answer was yes definitely". RCA uses spot welds for a positive ground in the LCRU.

J. McKenzie asked if helicoils were used for mounting subassemblies. RCA answered yes but the LCRU does not depend on these for electrical grounds.

Mr. Sinderson asked to what extent are the 29V lines twisted. Mr. Houck replied that the 70 KHz was twisted double, 1.25 MHz was 2 leads twisted, 29 V was 2 leads twisted.

Mr. J. Raleigh questioned whether the LCRU used Miniature bulkhead coax connectors for TV Video. RCA explained that even though the Engineering model had one on the RFI filter, it would be removed from future modes. NASA reacted favorably to this

Mr. Sinderson questioned Conic's transmitter on power noise susceptibility.

J. McKenzie wanted a copy of Conic's answer to the A.I. presented at Conic's CDR.

Mr. V.J. Carita said that he would forward it to Mr. McKenzie.

Since there were no further questions the presentation on EMI was concluded.

### ACTION ITEMS:

**NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.**

## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 7.3  
SUBJECT Electrical

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### SUMMARY OF DISCUSSION:

Mr. E. DeBaecke presented the VHF Antenna and triplexer. The only question to come up was that raised by Mr. Sinderson. He was concerned about the mechanical trim that had to be done to the top of the antenna. Mr. DeBaecke said that a KSC procedure is used. NASA wanted to know where this procedure would be but RCA said they have not determined this as yet. The antenna will be trimmed by RCA in a LCRU configuration in order to insure that it was cut correctly.

Mr. Grasheim presented the VHF AM Receiver. Only one significant point was raised during this presentation. Mr. Sinderson asked why the dynamic range of -139 dbw and the audio sensitivity of -132 dbw are different. RCA contended that the specifications are tighter here to make the test processes compatible, with the EVCS. It was finally agreed between NASA and RCA to change these values to 106 dbw for presentation material.

Chart #7.3.3-6 is to indicate that the test was made with 30% AM.

The VHF Am transmitter characteristics were presented and NASA wanted to know what range the input impedance went to. The chart 7.3.4 - has 10K nominal but will be around 15K. Mr. Sinderson was satisfied that 15K was all right.

A correction to chart #7.3.4-2 was noted as changing 650 MW output to 500 MW min.

Mr. Grasheim concluded his presentation with no other questions.

### ACTION ITEMS:

**NOTE:** These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.



## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 7.3.5  
SUBJECT Electrical

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### SUMMARY OF DISCUSSION:

Mr. C. Montini reviewed items 7.3.5 the Down Link Signal Processor. Mr. J. Raleigh raised the question that when EVA #1 and EVA #2 are talking where is the Voltage limiting in this unit? RCA said that there was nothing in the shape filter to limit the modulation. Receiver is a linear modulating system therefore there is no problem. In answer to J. McKenzie, RCA said that there was no AGC or clipping in the downlink processor. It is linear up to 3 MHz. RCA stated that NASA can listen to tapes on the Engineering Model to see that there is no problem here.

Mr. McKenzie wanted to know if the 1.25 and 14.5 KHz schematics were available and Mr. DeBaecke said they were. Mr. McKenzie said he would like to have copies.

Chart #7.3.5-2 Mr. Sinderson said that a discussion was necessary between RCA and NASA concerning the Voltage Sensor Output and its end to end function versus requirements.

On Chart #7.3.5-3 Mr. Sinderson questioned the TV out linearity. RCA explained that the AC linearity consisted of 2 MHz signal riding on a DC Voltage. Mr. Sinderson questioned whether this was also taking DC linearity? RCA replied that it did. Mr. Sinderson agreed that it was permissible to do it this way.

Mr. Sinderson wanted to know what the DC out shift was with temperature. Mr. Montini pointed them out but admitted that there were no limits on them. He said that RCA would probably specify it at  $\pm 60$  MV.

Item #7.3.6 Voltage Regulator was the final item for the day. NASA wanted to know what was the max output load before the fuse would blow in Chart #7.3.6-4.

Mr. Montini said that they were 3/4 amp fuses and would probably blow at 1 amp, there-

### ACTION ITEMS:

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## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 7.3.5 (Continued)  
SUBJECT Electrical

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### SUMMARY OF DISCUSSION:

fore there was a 2 amp capability in the +14 V circuit. For the +10V circuit the current limiters would take over with a max of 200 MA's on the output before limiting. The current limiters on the +14 V circuit would not take care of shorts on the input.

Since there were no more questions, Mr. Montini concluded his presentation.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/16/70 MEETING NUMBER CDR AGENDA ITEM 7.3.7 & 7.3.8  
SUBJECT Electrical

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### SUMMARY OF DISCUSSION:

The meeting on 9/16/70 began with item 7.3.7 - S-Band Transmitters. This was given by V.J. Carita. A description of the FM/PM and PM/PM transmitter circuits was presented from functional schematics. RCA agreed to modify diagrams to show control voltages to voltage regulator. RCA stated that the FM/PM stability will be  $\pm 0.01\%$  over temp. range of  $0^{\circ}\text{F}$  to  $140^{\circ}\text{F}$ . Transmitter operational characteristics were described. Concepts were presented to control the humidity problem. RCA stated DVT tests will assure that screws will not loosen during vibration. RCA **stated** that at this time the FM frequency adjustment is not a customer adjustment. Transmitter EM Test Data was presented. PCDR-3 and PCDR-5 action items was answered. NASA stated that RCA should impose an **IPM Spec. for the WB PM Transmitter.**

The next item on the agenda was 7.3.8 S-Band Receivers given by H. Hawlk. RCA presented the S-Band Receiver spec. requirements and corresponding measurements from the E.M. RCA presented the new squelch level requirements ( $-131$  DBW or below for decreasing signals and  $-127$  DBW or below for increasing signals).

The squelch analysis presentation was made. No comments except the following. Put  $1.4$  Radians on Chart #7.3.8.4-4A - add the audio output curve to this chart.

The revised circuit for subcarrier squelch was presented. A request was made by NASA to explain the schematic in detail.

Squelch Performance Data on the Engineering Model was presented. RCA agreed to correct Chart #7.3.8.7-6, the titles  $0^{\circ}$ ,  $\text{AMB}$  and  $160^{\circ}$  will be put over the values. Also the first column is to be changed to decreasing output noise level. There was no subcarrier presented. The Chart #7.3.8.8-7 is to have added to it a statement "that this is with both squelch enabled".

### ACTION ITEMS:

**NOTE:** These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/16/70 MEETING NUMBER CDR AGENDA ITEM 7.3.7 & 7.3.8 (Cont)  
SUBJECT Electrical

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### SUMMARY OF DISCUSSION:

Audio Frequency Response EM #2 Chart #7.3.8.9-8 is to have added to it dbM to the abscissa.

No questions were asked during the characteristics and the Signal Strength Output.

The review of PCDR-4 was then presented. It was accepted except for the following. The specification should read in each paragraph 3.4.4.2, 3.4.4.3 and 3.4.5.1. "The dynamic range of the receiver shall be held". A RID was generated for this.

Mr. Sinderson said that the EMI conducted Susceptibility should be specified as a minimum. A RID was written on this.

Mr. Sinderson indicated he was satisfied with the presentation but expects to get more data information.

### ACTION ITEMS:

**NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.**



## MINUTES OF MEETING

DATE 9/16/70 MEETING NUMBER CDR AGENDA ITEM 7.3.9  
SUBJECT Electrical

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### SUMMARY OF DISCUSSION:

The next presentation was by O. Ramanis

A block diagram of the up-link signal processor was given with no questions arising.

In VOX Threshold response presentation, J. McKenzie raised the question of input level of the VOX and its turn "on". Connelly explained that H. Fox was consulted on this matter and he had agreed that what RCA presently had was more than adequate.

J. Raleigh indicated displeasure over the Distortion of the Motorola receiver and indicated that the processor should have its diodes removed to improve this. RCA indicated that Mr. Raleigh should listen to the Engineering Model demonstration.

The presentation was satisfactorily received by NASA and no further questions were asked.

The presentation of Agenda Item 7.3.10 - DC to DC Converter was given by R. ERdmann. NASA was satisfied that this design was more than adequate.

### ACTION ITEMS:

**NOTE:** These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/16/70 MEETING NUMBER CDR AGENDA ITEM 7.3.12  
SUBJECT Electrical

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### SUMMARY OF DISCUSSION:

Mr. D. Howard presented Agenda item 7.3.12, the Low Gain Antenna. He had no hard copies to distribute. No questions were raised at this presentation.

The High Gain Antenna was presented by Mr. F. Nangle and Mr. W. Woodward with no technical questions arising. There were corrections to chart #3, the spelling of BIFILAB to be corrected to BIFILAR.

Chart # -15 is to be corrected by reversing the lettering R & L on the Second Parabola Reflection in both places where they appear.

On Chart # -16, correct the spelling of PARAHOLIC to PARABOLIC.

Mr. D. Howard made the presentation on the Battery, No hard copies were available. There were no questions except in the area of the PCDR 14-13-24.

14-4 to be modified in next drawing revision. Mr. Sinderson was not concerned whether it was deleted or not.

14.5 Investigation of the pointing of the cover and inside case is to be done by D. Howard at Mr. Sinderson's request. Also, what is the hard potting referred to in this item. This information is to be sent to Mr. Sinderson.

An RID was written on 14-8 by NASA to run a pressure test on the battery in DVT.

14.9 Vibration and Temperature should be done on the same battery. An RID was written by Mr. Sinderson to run a simulated mission on one battery.

14-10 Mr. Sinderson said he would like to keep this open until the DVT Testing. NASA to supply copy of procedure on pulling the vacuum.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/16/70 MEETING NUMBER CDR AGENDA ITEM 7.4  
SUBJECT Electrical

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### SUMMARY OF DISCUSSION:

Item #7.4 was presented by Mr. H. Comfort

H. Comfort - Item 7.4 - In a discussion of Mode Switching 7.4-4, J. Connolly explained a possible failure mode in the Remote TV position and said that he would present a Reliability trade off plan tomorrow. A suggestion was made by NASA to put a fuse in the 14V TV line so that a short in the camera will not knock out all communications. It was mutually agreed by RCA and NASA to recommend fusing the 14V TV line for DVT models.

FM PM & PM PM Transmitter currents of .29 should be changed to 0 on chart #7.4.-51.

This concluded the Electrical portion of the LCRU Splinter Meetings.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-001
VEHICLE:				COORDINATION
DATE: 9-15-70				
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME
E. Fendell		Flight Control	LCRU	Electrical
DISCREPANCY/PROBLEM		TITLE		
		Subsystem Schematics		
<p>There are not available for this CDR or any other review any subsystem schematics for systems that are not built by RCA. These were to have been provided in the CDR Data Pack.</p>				
JUSTIFICATION				
<p>It is impossible to review any subsystem without schematics. This is a definite function of a CDR.</p>				
RECOMMENDATION				
<p>RCA provide <u>all</u> subsystem schematics to NASA ASAP. These schematics are presently available at RCA/Camden.</p>				
CONTRACTOR'S COMMENT				
<p>RCA provided functional schematics of all LCRU subassemblies during CDR on RCA drawing 8370895. If MSC requires additional subcontractor data or drawings, RCA will evaluate impact of request as it is not a current requirement of SE-C-0043A.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concurs with RCA comment <i>[Signature]</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-002
VEHICLE:				COORDINATION
DATE: 9-15-70		ORGANIZATION	SYSTEM	TEAM NAME
INITIATOR		Flight Control	LCRU	Electrical
DISCREPANCY/PROBLEM		TITLE Hand Carry Mode Testing		
<p>RCA proposes that during the hand carry mode, the VHF antenna will be strapped down to the LCRU. They feel that because of the power available the antenna does not need to be deployed. There is no pre-mission test to verify that this configuration will work.</p>				
<p><b>JUSTIFICATION</b></p> <p>There is a very good chance that this mode will not work properly to the astronaut carrying the LCRU or the other astronaut a distance away and blocked from the LCRU by the carrying astronaut.</p>				
<p><b>RECOMMENDATION</b></p> <p>RCA provide a plan whereby this would be checked in a test already in the schedule to verify the antenna operation in this mode.</p>				
<p><b>CONTRACTOR'S COMMENT</b></p> <p>RCA will evaluate effects of VHF Antenna orientation and will report on test result by TI-6.</p>				
<b>TEAM CAPTAIN RECOMMENDATION</b>				
CATEGORY	REMARKS MSC concurs with RCA comment <i>A. J. [Signature]</i>			
ACTION				
SUSPENSE				
<b>BOARD ACTION</b>				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-003
VEHICLE:				COORDINATION
DATE: 9-15-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson	MSC/EEL6	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		70 KHZ/PRN Mode		
<p>Requirement for 70 KHZ operation with PRN ranging must be defined. The P&amp;I spec gives this mode. This subject was discussed at the LCRU PDR and it was the opinion of the originator that PRN/70K operation was required.</p>				
JUSTIFICATION				
RECOMMENDATION				
<p>MSC to confirm requirement for TV operation during PRN ranging.</p>				
CONTRACTOR'S COMMENT				
<p>RCA will advise NASA of test requirements and program impact of evaluating TV operation during PRN ranging two weeks after MSC defined requirement. Noise effects in 70KC S-Band Receiver output channel must be determined. MSC must define PRN signal levels and characteristics that will be received by LCRU.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS <i>MSC will perform tests during week of 9/21/70.</i> <i>No action is required by RCA.</i> <i>Wm. J. H.</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-004
VEHICLE:				COORDINATION
DATE: 9-15-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
J. Connelly	RCA	LCRU	Electrical	
DISCREPANCY/PROBLEM	TITLE			
	TV Channel Set-up Adjustments			
<p>RCA can adjust gain of DC video amplifier to produce a desired S-band frequency deviation sensitivity or a center frequency at 0.5 V input. Both requirements may not simultaneously be met.</p>				
JUSTIFICATION				
<p>It is desired to adjust video amplifier output to satisfy mission requirements.</p>				
RECOMMENDATION				
<p>MSC to direct RCA on desired method of adjustment.</p>				
CONTRACTOR'S COMMENT				
<p>MSC- RCA should set frequency as close as possible with S-band transmitter "diddler" and set deviation of transmitter by matching gain of signal processor to match sensitivity of transmitter.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS RCA WITHDRAWS H. J. Hanks with spec			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-005
VEHICLE:				COORDINATION
DATE: 9-15-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
B. C. Embrey	MSC/EE72	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		LCRU Transmission Mode Nomenclature Standardization		
<p>RCA uses many names for the LCRU downlink transmission modes that do not correspond with the LCRU front panel mode switch (e.g., "secondary", "TV voice", "backup", "TV standby", etc.)</p>				
<p><b>JUSTIFICATION</b></p> <p>All documentation should be standardized to avoid confusion, errors, etc. by all parties concerned.</p>				
<p><b>RECOMMENDATION</b></p> <p>RCA use only the nomenclature for the LCRU transmit modes as found on the front panel switch (that is: PMI/WB, PMI/NB, FM/TV, TV/RMT, and PM2/NB) on all documentation.</p>				
<p><b>CONTRACTOR'S COMMENT</b></p> <p>RCA will be consistent in future TI presentation documentation for transmission mode nomenclature.</p>				
<b>TEAM CAPTAIN RECOMMENDATION</b>				
CATEGORY	REMARKS MSC concurs with [unclear] H. J. Hamilton			
ACTION				
SUSPENSE				
<b>BOARD ACTION</b>				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



TYPE OF REVIEW: CDR		<b>REVIEW ITEM DISPOSITION</b>		NUMBER CDR-E-006	
VEHICLE:				COORDINATION	
DATE: 9/15/70					
INITIATOR R. Sinderson		ORGANIZATION MSC/EE16		SYSTEM LCRU	
				TEAM NAME Electrical	
DISCREPANCY/PROBLEM		TITLE Downlink Signal Processor Requirements			
<p>The RCA stated specifications of the DLSP will not allow the overall LCRU assembly to meet the requirements of MSC contract spec SE-C-0043A, and the LCRU/GCTA ICD.</p>					
<p><b>JUSTIFICATION</b></p> <p>The above referenced MSC specs state overall LCRU requirements.</p>					
<p><b>RECOMMENDATION</b></p> <p>RCA should confirm, if possible, that they can meet the present MSC specs for measurement and TV processing as follows: End-to-End Requirements:</p> <ul style="list-style-type: none"> <li>(1) Temp Telemetry <math>\pm 5^{\circ}\text{F}</math> (0-160<math>^{\circ}\text{F}</math>)</li> <li>(2) Voltage Telemetry <math>\pm 0.5\text{ VDC}</math> (25-33 VDC)</li> <li>(3) AGC Meter <math>\pm 2\text{ db}</math> (-104 to -65 dbm)</li> <li>(4) TV Channel Freq. Response DC- 3 MHZ <math>\pm 1\text{ db}</math></li> <li>(5) TV Channel Linearity <math>\pm 3\%</math> BSL</li> <li>(6) TV Channel Distortion 2% max</li> <li>(7) FM XMTR Center Freq. <math>\pm 0.01\%</math></li> <li>(8) FM XMTR Deviation 1.7 <math>\pm 4\%</math></li> </ul>					
<p>CONTRACTOR'S COMMENT - RCA has designed to the above except 3 should be <math>\pm 5\text{ db}</math> (-100 to -60 dbm). RCA will make use of EM test data and component performance analysis to confirm wherever possible capability of meeting MSC specs. RCA will report on status of spec. confirmation at TI-5.</p>					
<b>TEAM CAPTAIN RECOMMENDATION</b>					
CATEGORY		<div style="font-family: cursive;">           MSC concurs with RCA comment except for item 3            - further analysis must be provided by TI-5.            H. J. Hamilton            Wm. J. J.         </div>			
ACTION					
SUSPENSE					
<b>BOARD ACTION</b>					
CATEGORY		<div style="font-family: cursive;">           MSC concurs with RCA comment except for item 3            - further analysis must be provided by TI-5.            H. J. Hamilton            Wm. J. J.         </div>			
ACTION					
SUSPENSE					
ACTION		<input type="checkbox"/> Approved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE		<input type="checkbox"/> Disapproved			

TYPE OF REVIEW:		REVIEW ITEM DISPOSITION		NUMBER <u>CDR-T-007</u>
VEHICLE:				COORDINATION:
DATE:				
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME
R. Sinderson				Electrical
DISCREPANCY/PROBLEM		TITLE Subassembly Design Parameters		
<p>The subcontracted LCRU subassemblies have their design parameters (input/output) defined in detail by RCA SCDs. However, RCA has not supplied adequate detailed design interface data on the RCA supplied subassemblies.</p>				
<p><b>JUSTIFICATION</b></p> <p>The LCRU overall design cannot be verified by MSC without an understanding of the subassembly input/output design requirements.</p>				
<p><b>RECOMMENDATION</b></p> <p>RCA should supply the necessary design interface requirements at the CDR in order to allow MSC to positively confirm the overall LCRU design.</p>				
<p><b>CONTRACTOR'S COMMENT</b></p> <p>RCA has provided detail discussions and data on these at the various T.I.s and will review for completeness performance characteristics of in house built subassemblies that were presented at the CDR. The characteristics will be updated for TI-5.</p>				
<b>TEAM CAPTAIN RECOMMENDATION</b>				
CATEGORY	<p>REMARKS</p> <p><i>MSC concurs with RCA comments</i>  <i>/s/ J. Hamilton</i>  <i>WMS</i></p>			
ACTION				
SUSPENSE				
<b>BOARD ACTION</b>				
CATEGORY	<p>REMARKS</p>			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE	<input type="checkbox"/> Disapproved			



TYPE OF REVIEW:		REVIEW ITEM DISPOSITION		NUMBER	CDR-E-008
VEHICLE:				COORDINATION	
DATE:					
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson				Electrical	
DISCREPANCY/PROBLEM		TITLE			
		Design Configuration Control			
<p>The basic LCRU assembly and subassembly design, as defined by RCA at the CDR, is not adequately covered in the MSC contract specification and therefore MSC/RCA configuration control cannot be assured.</p>					
JUSTIFICATION					
<p>If the basic LCRU assembly and subassembly design parameters are not in the MSC contract, major class I changes could be implemented by RCA without prior approval of MSC.</p>					
RECOMMENDATION					
<p>Update MSC contract specification to include the primary input/output design parameters of the LCRU assembly and subassemblies.</p>					
CONTRACTOR'S COMMENT					
<p>RCA will continue to provide MSC with all SCD changes to enable MSC to control LCRU performance. RCA will implement SCD changes to make subassemblies compatible with CDR design baseline. Future changes which would change LCRU end to end performance objectives will be submitted to MSC for approval prior to implementation. Changes that do not affect LCRU end-to-end performance will not be submitted. RCA must have the latitude to manage LCRU within its end-to-end performance without being constrained to detail subcontractor requirements in SE-C-0043A.</p>					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY		REMARKS <i>MSC to negotiate with RCA to attempt to reach agreement - MSC to generate "generic" requirements for review with RCA. Wm J. Hamilton</i>			
ACTION					
SUSPENSE					
BOARD ACTION					
CATEGORY		REMARKS			
ACTION					
SUSPENSE					
ACTION		<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE					

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-009
VEHICLE:				COORDINATION
DATE: 9-16-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson	MSC/EE16	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		LCRU Unit End-to-End Design Parameters		
<p>The RCA CDR presentation does not define all of the LCRU design parameters on an end-to-end unit basis.</p>				
<p><b>JUSTIFICATION</b></p> <p>The above information is required to understand the "black box" capability of the LCRU design and to provide test personnel with assembly parameter tolerances for acceptance, DVT, qual, and KSC testing.</p>				
<p><b>RECOMMENDATION</b></p> <p>MSC has prepared a baseline outline (attached) for RCA review and approval. The negotiated baseline should then be included in the MSC contract specification in order to properly definitize the RCA LCRU assembly electrical design.</p>				
<p><b>CONTRACTOR'S COMMENT</b></p> <p>RCA will review all parameters listed and offer concurrence or change recommendations by TI-5.</p>				
<b>TEAM CAPTAIN RECOMMENDATION</b>				
CATEGORY	REMARKS <i>MSC/RCA to negotiate the attached parameters during the week of 10/3/70. won't press</i> <i>A. J. Hamlin</i>			
ACTION				
SUSPENSE				
<b>BOARD ACTION</b>				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



LCR UNIT  
(Black Box Input/Output Test Requirements)

<u>PARAMETER</u>	<u>REF SPEC</u>	<u>REQUIREMENT</u>
1. S-Band Uplink Sensitivity		PML/WB and FM/TV modes, VHF Recvd S/N and items 2, 5. (-97 dbm input)
2. 70 KHZ Output	MSC TV ICD 3.2(6)(b)	.7 to 3.5 V P-P, 2 V nominal at 0.8 $\pm 10\%$ Rad
3. 70 KHZ Output (STBY)	MSC TV ICD 3.2(6)(b)	.7 to 3.5 VP-P at 1.1 $\pm 10\%$ Rad.
4. 70 KHZ Frequency Response	MSC TV ICD 3.2(6)(a)	Within 1 DB of 70 KHZ level for 70 $\pm 10$ KHZ at 1.1 rad. pk dev.
49 5. 70 KHZ S/N	MSC TV ICD 3.2(6)(d)	10 DB min at -97 DBM rcvr input, 30 DB at higher RF input
6. 70 KHZ S/N with 30 HZ SC, Stby Mode	MSC TV ICD 3.2(6)(d)	Same as above
7. S-Band Uplink 2-tone I.M. Distortion	MSC TV ICD 3.2(6)(e)	I.M. distortion 30 DB below 70 KHZ level at -97 dbm input
8. S-Band Uplink Dynamic Range	MSC 43	-97 to -64 dbm (0 dbm without damage)
9. Squelch Level, VOX operation	MSC 43	Squelch -99 to -104 dbm, no chatter. Noise VOX trigger within +3 db of squelch level, VOX threshold -16.7 $\pm 1$ db, no S.C. squelch
10. Clipping Level and AGC, VHF XMTR Input	MSC 43	12 db voice clipping, AGC operation -7.5, +14 db from nom. audio level
11. VHF Power Output	MSC 43	0.32 min, 0.36 nom.
12. VHF Output Frequency	MSC 43	296.8 MHz $\pm .003\%$

LCRU UNIT  
(Black Box Input/Output Test Requirements)

<u>PARAMETER</u>	<u>REF SPEC</u>	<u>REQUIREMENT</u>
13. Uplink Voice Frequency Response	MSC 43	+ 3 db, 300 HZ to 3 KHZ
14. VHF Transmitter Modulation		70 10% with +7.5% deviation on 124 U.L. SC.
15. Signal Strength Meter Check	MSC 43	+ 3 db, -104 dbm to -65 dbm (30, 70, 130 F)
16. Transmitter Remote Control (STBY)	MSC 43	FM XMITR-verify OFF/ON control
17. 1.25 MHZ SCO Remote Control (STBY)		Verify OFF/ON control
18. VHF Received Sensitivity	MSC 43	-88 dbm for 35 db S/N at received S-Band audio
19. VHF Received Dynamic Range	MSC 43	-88 to +9 dbm
20. Downlink Voice Frequency Response	MSC 43	+ 1 db, 300 HZ to 3000 HZ
21. VHF Received Squelch	MSC 43	Squelch, -104 dbm to -110 dbm
22. S-Band Power Output	MSC 43	7.4 dbw min., 8.2 dbw nom. (RF J1) 8.45 dbw min, 9.2 dbw nom. (RF J2)
23. Transmitter Dev. 1.25 MHZ VCO's	MSC 43 Table I	1.85 +10%, PMI/WB , 400 KHZ +10%, FM
24. 1.25 MHZ Frequency	RCA SCD 3.4.4	1.25 MHz +.15% center freq, +0.5% over DBW
25. EVCS Voice/VCO Freq. Dev. 1.25 MHZ SCO	MSC 43 Table I	3.9=2.7 KHZ, 5.4=3.0 KHZ, 7.35=5.2 KHZ 10.5=6.1 KHZ, 14.5=7.6 KHZ, Voice= 6.6 KHZ, Tol=+15%

(Black Box Input/Output Test Requirements)

	REF SPEC	REQUIREMENT
<u>PARAMETERS</u>		
26. EVCS Voice/VCO Phase Dev. Baseband PM	MSC 43 Table I	3.9=.23 rad, 5.4=.25 rad, 7.3=.43 rad 10.5=.51 rad, 14.5=.4 rad, voice=.98 rad Tol=+15%
27. TV Channel Freq. Response	MSC TV ICD 3.2(5)(b)	+ 1 db, DC to 3 MHz
28. TV Channel Linearity	MSC TV ICD 3.2(5)(c)	+3% of BSL up to 2.5 MHz XMTR dev.
29. TV Channel Distortion	MSC 43	2% max
30. TV Channel S/N	MSC 43	31 db Sp-p/Hrms min. test receiver output for case receiver input under 210 ft. ant. conditions.
31. TV Channel Deviation	MSC 43	+ 1.7 + 4% MHz for + 0.5 V input
32. S-Band XMTR Frequency	MSC 43	PM: 2265.5 MHz +.003% max FM: 2265.5 MHz +.01% max
33. Status Measurements, TLM and Meter	MSC 43	AGC: -65 to -104 dbm +3 db (meter only) VOLT: 25-33, +.5 VDC, TEMP: 0-160°F, + 5°F
34. Load Gen. Noise, LRV Interface	MSC 43 4.3.6	100 MV P-P across series one ohm resistor
35. 14 and 10 VDC Regulation	RCA CDR	14 +.1, -.3V, Input 15.6 to 19.1; 10 +.1V Input 15.6 to 19.1
36. Redundant Reg, Z.G. Connector	MSC 43	Z.G. pin C to pin E NMT 0.1 V differ- ential
37. DC/DC Converter Regulation	MSC 43	23.5 +4%, 16.5+4% for 32 -44 V input

TEST UNIT  
(Black Box Input/Output Test Requirements)

	<u>PARAMETER</u>	<u>RFT SPEC</u>	<u>REQUIREMENT</u>
38.	Power Supply Bus Noise	MSC 43	28 V: 50 MVP-P max 10/14 V: MVP-P max
39.	Performance, 27 to 33 V Battery Voltage	MSC 43	Performance per SE-C-0043, 27 to 33 VDC
40.	VOX Disabled, TV Remote	4.30	Verify VOX disabled in remote mode
41.	Uplink-Downlink Cross Talk	4.1	All S/N remain within spec value
42.	RF Radiation Check	4.1	Antennas radiate and receive when connected to LCRU
43.	Power Consumption, Int. Battery	MSC 43	IMI/WB, 51/8.5, PMJ/WB, 51/9.0, FM/TV, 57/9.0, TV RMT, 2.0/5.5, PM2/NB 57/8.5
44.	Power Consumption, LRV Power	MSC 43	TBD watts at 32 volts (FM/TV), 81 watt at 36 volts, TBD watts at 44 volts
45.	Ground Isolation	MSC 43	NIT 20 megohms, chassis to LRV power com. (Int. Pwr Mode); chassis to LRV legs, HGA and LGA LRV mech. interface
46.	TEM Time Share SW Cycle Times	RCA CDR	TEMP: 10±2 sec, VOLT: 20±3 sec
47.	Warm Up Time	4.37	15 sec. max
48.	Uplink Interference Rejection	MSC 43	
49.	Compartment Pressure		7.5 ±1 psia



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-01.0
VEHICLE:				COORDINATION
DATE: 9/15/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson	MSC/EE16	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		Signal Modulation Tolerances		
<p>The RCA charts on "degradation factors, downlink" lack a summary statement which concludes that the tolerance buildup will not be allowed to exceed the overall LCRU modulation parameter tolerances.</p>				
JUSTIFICATION				
<p>RECOMMENDATION</p> <p>RCA should state positively that their present design will meet the MSC contract requirements for modulation tolerances.</p>				
<p>CONTRACTOR'S COMMENT</p> <p>RCA will analyze degradation factors and will provide preliminary report on tolerance build up effects at TI-5. Final analysis will be presented upon completion.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS <i>MSC concurs with RCA comment</i> <i>H. J. [Signature]</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-011
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR R. Sinderson	ORGANIZATION MSC/EE16	SYSTEM LCRU	TEAM NAME Electrical	
DISCREPANCY/PROBLEM		TITLE Potential Single - Point Failure, 14 VDC Supply		
<p>GCTA 29V short is protected by LCRU circuit breaker. However, GCTA 14V short would blow the 14V/10V supply fuses, thereby disabling the entire LCRU.</p>				
<p>JUSTIFICATION</p> <p>Single-point voice link failures must be minimized, especially if caused by a TV system failure.</p>				
<p>RECOMMENDATION</p> <p>RCA to determine what easily implemented corrective action could be taken to eliminate this SPF.</p>				
<p>CONTRACTOR'S COMMENT</p> <p>RCA recommends a fuse be added to the terminal board assembly on the LCRU front panel to protect the 14V line to the GCTA.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concurs with RCA comment - RCA should implement <i>A. J. Hamilton Spec</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-012
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
J. McKenzie	MSC/PD 9	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		Conic Transmitter Failures		
<p>NASA/TCSD has a separate contract with Conic for some S-Band Transmitters. Numerous failures have occurred. RCA stated at the CDR that Conic had advised RCA that the NASA transmitter failures were not applicable to the LCRU S-Band transmitters program. The NASA/TCSD should verify that these failures are in fact applicable to the LCRU Program.</p>				
<p><b>JUSTIFICATION</b></p> <p>Due to the critically of the LCRU S-Band transmitters, any possible applicable failure history should be seriously considered in the LCRU S-Band transmitter development.</p>				
<p><b>RECOMMENDATION</b></p> <ol style="list-style-type: none"> <li>1. TCSD to determine if the Conic transmitter failures experienced for the NASA/TCSD program are applicable to the LCRU.</li> <li>2. If the failures are not applicable, no further action required.</li> <li>3. If the failure are applicable, provide direction to RCA for corrective action as necessary.</li> </ol>				
<p><b>CONTRACTOR'S COMMENT</b></p> <p>RCA does not object.</p>				
<b>TEAM CAPTAIN RECOMMENDATION</b>				
CATEGORY	REMARKS MSC will do. <i>[Signature]</i>			
ACTION				
SUSPENSE				
<b>BOARD ACTION</b>				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-013
VEHICLE:				COORDINATION
DATE: 9/16/70		INITIATOR		TEAM NAME
J. Raleigh		ORGANIZATION	SYSTEM	Electrical
		MAS/Bellcomm	LCUR	
DISCREPANCY/PROBLEM		TITLE		
		Comparison of NASA & RCA Subcontractor Specifications		
<p>Several subcontract items have requirements controlled by the NASA contract specification.</p>				
JUSTIFICATION				
<p>During the S-Band Receiver Review, Motorola requirements of such things as weight and volume were identified as NASA contract requirements.</p>				
RECOMMENDATION				
<p>The controlling NASA requirements should be identified to avoid unnecessary acceptance problems (There may be electrical and mechanical areas).</p>				
CONTRACTOR'S COMMENT				
<p>RCA concurs.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	<p>REMARKS</p> <p><i>Withdrawn SEE CDR-E-008 HJ [Signature] 10/1/70</i></p>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	<p>REMARKS</p>			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER
VEHICLE:				CDR-E-014
DATE: 9/16/70		COORDINATION		
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
J.J. Connelly	RCA	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		LRV EMI		
<p>NASA expressed concern over EMI coupling from LRV to S-Band Receiver circuits.</p>				
JUSTIFICATION				
<p>EMI design compatability problems must be resolved as early as possible to minimize program impact.</p>				
RECOMMENDATION				
<p>MSC shall provide RCA with projected LRV EMI level projections.</p>				
CONTRACTOR'S COMMENT				
<p>MSC COMMENT</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	<p>REMARKS</p> <p>MSC will supply the requested information within 14 days</p>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	<p>REMARKS</p>			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-015
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson	MSC/EE 16	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE Up Link Signal Processor		
<p>1. The USP frequency response RCA spec. will not allow the overall LCRU to meet a voice response of 300 Hz - 3 KHz (<math>\pm 3</math> db) since the S-Band Receiver and AM transmitter have similar tolerances</p> <p>2. The harmonic distortion spec. of 8% under Low signal conditions (no clipping) is not representative of the present design.</p> <p>3. The USP should be set to allow noise trigger of VOX within +3 db of decreasing signal squelch level.</p>				
JUSTIFICATION				
<p>RECOMMENDATION</p> <p>RCA must show that the up link tolerance buildup from their subassembly specs. will not exceed the overall LCRU voice response of 300 - 3 KHz.</p>				
<p>CONTRACTOR'S COMMENT</p> <p>1. RCA will analyze the tolerance build up and will present the data and recommendations at TI-5.</p> <p>2. RCA will measure distortion below the clipping level and will revise the 8 db distortion spec. New limit will be defined at TI-5.</p> <p>3. RCA concurs</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concurs with RCA comment <i>H. J. Handlin</i> wmspec			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-016
VEHICLE:				COORDINATION
DATE: 9-2-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson	MSC/EE16	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		S-Band Receiver SCD		
<p>A. Need SCN for following changes:</p> <ol style="list-style-type: none"> <li>1. Audio output level 1.5 VRMS Nom.=10% (-133 dbw to -95 dbw)</li> <li>2. Dynamic range (3.4.4.5) should not be under only the audio section (3.4.4).</li> <li>3. Squelch changes</li> <li>4. 70KHZ output impedance</li> <li>5. 70KHZ output level</li> <li>6. Signal strength range (-135 dbw to -100 dbw) 3.4.6.1 and 3.4.6.3</li> <li>7. Signal strength cal data accuracy</li> <li>8. Polarity reversal?</li> <li>9. Audio output freq. response</li> <li>10. 70KHZ output freq. response</li> <li>11. Uplink mode combinations, e.g..8+10%, 1.1+10%</li> </ol> <p>B. Provide rational for the following:</p> <ol style="list-style-type: none"> <li>1. Parameters in 3.4.4.2, 3.4.4.3, 3.4.5.1 are to be measured in non-mission RF input levels.</li> <li>2. EMI conducted susceptibility does not include reduced level audio noise.</li> </ol>				
<p>RECOMMENDATION</p> <p>Provide SCN and rational as requested above.</p>				
<p>CONTRACTOR'S COMMENT</p> <p>ECN will be supplied by 9/22/70</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concurs with RCR comment H. J. Hamilton WWSpec			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-017
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson	MSC/EE 16	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		S-Band Transmitter Humidity Fix		
Humidity in transmitter affects power and frequency.				
JUSTIFICATION				
RECOMMENDATION				
The transmitter should be environmentally sealed with removable screw parts which can be used to open the transmitter directly prior to RCA purging and nitrogen pressurization.				
CONTRACTOR'S COMMENT				
RCA will review recommendation and provide recommendations and program impact by 10/1/70.				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS  MSC concurs with RCA comment <i>A. J. Sinderson</i> wmspec			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE	<input type="checkbox"/> Disapproved			



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-018
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson	MSC/EE 16	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		Conic Frequency Adjustment		
<p>The Conic proposed frequency adjustability of 50 KHz (.002%) is not acceptable.</p>				
JUSTIFICATION				
<p>RECOMMENDATION</p> <p>The adjustment range should be at least (.05%) 115 KHz to adequately off set any long term drift.</p>				
<p>CONTRACTOR'S COMMENT</p> <p>RCA concurs that increased frequency adjustment is desirable. RCA will review performance impact of increased frequency change. RCA will also determine if the adjustment can be changed by RCA.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC Concurs with RCA comment Wm Green H. Hamelin			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW, CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-019
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson	MSC/EE 16	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		FM/PM Transmitter SCD		
<p>Ref. PCDR-3.(1) WB PM spec. should be changed from IFM to IPM (not more than that allowed for LM. (2) Verbal information is needed from Conic concerning the max., as designed, FM deviation and freq. responses.</p>				
JUSTIFICATION				
RECOMMENDATION				
As stated above.				
CONTRACTOR'S COMMENT				
RCA will review change from IFM to IPM and provide impact if any by 10/1/70. Verbal information on Transmitter deviation and frequency response will be supplied to MSC by 10/1/70.				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS <i>MSC agrees with RCA comment</i> <i>A. J. Hamilton WMSpec</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-020
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
J.T. Raleigh	MAS/Bellcomm	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		Squelch Audio output Noise		
<p>The data shows an increasing squelched audio output noise with decreasing signal level.</p>				
<p><b>JUSTIFICATION</b></p> <p>The noise output goes to the VOX and could key the VHF transmitter. The noise that does exist may be due to receiver decoupling and other manufacturing processes.</p>				
<p><b>RECOMMENDATION</b></p> <p>RCA should consider having the 170 Kc detector control switch the audio output (Buffer) stage instead of the discriminator.</p>				
<p><b>CONTRACTOR'S COMMENT</b></p> <p>At this time, preliminary test show that maximum output voice of the receiver during squelched conditions is more than 15 db below the VOX triggering level. Therefore, there is no need to consider a major change at this time.</p>				
<b>TEAM CAPTAIN RECOMMENDATION</b>				
CATEGORY	REMARKS MSC concurs with RCA comment <i>A. J. Franklin</i>			
ACTION				
SUSPENSE				
<b>BOARD ACTION</b>				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-021
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
J.T. Raleigh	MAS/Bellcomm	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		Subcarrier Squelch Control Location		
<p>The Subcarrier squelch controls limiter power and remainder of receiver may be susceptible to EMI pick up.</p>				
JUSTIFICATION				
<p>The primary reason for squelch is to control output noise. The discriminator and audio stages are not squelched. Some earlier justifications on space and physical layout do not appear valid.</p>				
RECOMMENDATION				
<p>RCA should determine the susceptibility of the uncontrolled stages and investigate the problems of controlling the receiver audio output.</p>				
CONTRACTOR'S COMMENT				
<p>RCA will review S-Band receiver mechanical and schematic drawings to determine EMI coupling paths. A report on the review will be presented at TI-5. RCA does not anticipate an EMI problem since receiver test data indicates relatively low noise exists at audio output stages when receiver is squelched. RCA will determine feasibility of having an RF radiated susceptibility test performed by the sub-contractor.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS <i>msl concurs with eca comment</i> <i>A. J. Hamlin</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



TYPE OF REVIEW: CDR	REVIEW ITEM DISPOSITION		NUMBER CDR-E-022
VEHICLE:			COORDINATION
DATE: 9/16/70			
INITIATOR J.T. Raleigh	ORGANIZATION MAS/Bellcomm	SYSTEM LCRU	TEAM NAME Electrical
DISCREPANCY/PROBLEM	TITLE LCRU - EVA Range		

What is the maximum LCRU-EVA Range?

#### JUSTIFICATION

All RCA analysis has assumed strong VHF signal levels. It may be necessary to walk away from the LCRU to the LM. One must know how to know difference in voice quality between EVA and LCRU and LCRU and MSFN.

#### RECOMMENDATION

Compare the up link and down link voice quality as a function of VHF path loss and S-Band path loss (such as omni angles.)

#### CONTRACTOR'S COMMENT

RCA will evaluate uplink and downlink signal performance for maximum to minimum VHF path losses during engineering model test program and provide results to MSC when that portion of tests is completed.

#### TEAM CAPTAIN RECOMMENDATION

CATEGORY	REMARKS <i>MSC concurs with RCA comment A. J. Hamilton WMSpec</i>
ACTION	
SUSPENSE	

#### BOARD ACTION

CATEGORY	REMARKS	
ACTION		
SUSPENSE		
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN
SUSPENSE		

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-023
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
J.T. Raleigh	MAS/Bellcomm	LCRU	Electrical	
DISCREPANCY/PROBLEM	TITLE VHF Transmitter Variations			
<p>It was reported that the EVCS voice processor and VHF transmitter were complementary compensated.</p>				
<p><b>JUSTIFICATION</b></p> <p>One of the justifications for using the EVCS processing is to watch the transmitter. Possible changes in signal processor may require knowledge of transmitter characteristics.</p>				
<p><b>RECOMMENDATION</b></p> <p>RCA should determine VHF modulation sensitivity and tolerance vs temperature and manufacture.</p>				
<p><b>CONTRACTOR'S COMMENT</b></p> <p>RCA presented VHF modulation sensitivity data vs temperature at CDR meeting agenda number 7.3.4.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concurs with RCA A. J. Franklin			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-024	
VEHICLE:				COORDINATION	
DATE: 9/16/70					
INITIATOR J.T. Raleigh		ORGANIZATION MAS/Bellcomm	SYSTEM LCRU	TEAM NAME Electrical	
DISCREPANCY/PROBLEM		TITLE Comparison of Up Link and Down Link Voice Processing			
<p>The up link processing apparently has limited range in the receiver and AVC and clipping in the processor. On the down link there is a "linear system" with apparently good dynamic range.</p>					
<p>JUSTIFICATION</p> <p>Two drastically different engineering approaches have been applied. Which one is right?</p>					
<p>RECOMMENDATION</p> <p>RCA should explain why the ground and public should hear good voice while the crew must accept degraded voice.</p>					
<p>CONTRACTOR'S COMMENT The downlink is linear to avoid intermodulation distortion problems in the downlink transmission circuitry, and to minimize interaction between video and voice subcarrier operation prior to transmission. The uplink circuitry contains symmetrical clipping to make VHF transmission consistent with EVCS and LM operation. Wideband video signals are not carried through the VHF transmitter and this enables uplink design to be different from downlink design. To change uplink to linear would result in new modulation index requirement of about 90% AM to maintain same VHF link as non-linear, but tolerance of AM index would be about +25% due to temperatures</p>					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY		REMARKS MSC agrees with comment <i>H. J. Hamilton</i>			
ACTION					
SUSPENSE					
BOARD ACTION					
CATEGORY					
ACTION					
SUSPENSE					
ACTION		<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE					



## CONTRACTOR'S COMMENT (cont'd)

instability of modulator when clippin is removed. (Clippen compensates modulation.) RCA believes the non-linear approach is best choice at this time due to cost and schedule considerations, and provides crew with good voice intelligibility.



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-025
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
J.T. Raleigh	MAS/BELLCOMM	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		Audio Levels at EVCS		
<p>Compare the audio levels at the EVCS headset for the VHF signals from the LM and the LCRU.</p>				
<p><b>JUSTIFICATION</b></p> <p>During the EVCS design the levels of the voice signals and sidetone levels was reviewed. The levels should be maintained to assure EVA-EVA communications.</p>				
<p><b>RECOMMENDATION</b></p> <p>Provide comparison and make changes in LCRU if required (Consideration must be given to the actual EVCS compared to EVCS PDR status.)</p>				
<p><b>CONTRACTOR'S COMMENT</b></p> <p>RCA designed the LCRU/EVCS system to provide an output at the headset of each EVA to be at a level below that attained from LM/EVA's. LM provides 100% AM whereas LCRU provides 70% AM. MSC will perform an analysis of LM VHF and LCRU VHF post detection AF levels at EVA's by TI-5.</p>				
<b>TEAM CAPTAIN RECOMMENDATION</b>				
CATEGORY	REMARKS MSC concurs with RCA comment <i>R. J. Hamilton</i> wmspec			
ACTION				
SUSPENSE				
<b>BOARD ACTION</b>				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE	<input type="checkbox"/> Disapproved			

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-026	
VEHICLE:				COORDINATION	
DATE: 9/16/70					
INITIATOR J.T. Raleigh		ORGANIZATION MAS/BELLCOMM	SYSTEM LCRU	TEAM NAME Electrical	
DISCREPANCY/PROBLEM		TITLE VOX Setting Range			
<p><b>JUSTIFICATION</b></p> <p>The voice dynamic range and noise spectrum from S-Band Receiver may be different that communication carrier and different operating points may be required.</p> <p>The required Knee of the AVC curve with respect to the 12 db clipping and VHF transmitter modulation levels may not be in the proper range to achieve VOX keying.</p>					
<p><b>RECOMMENDATION</b></p> <p>RCA should determine to relative range that the VOX key and AVC can be shifted.</p>					
<p><b>CONTRACTOR'S COMMENT</b> RCA presented a signal level analysis of the output levels of the S-Band Receiver and the associated setting of the VOX threshold and AVC knee at CDR Meeting 7.3.9. The output level of the S-Band Receiver is matched to the ULSP by means of DTV adjustment based on nominal uplink modulation indices. The dynamic range of S-Band Receiver output is handled by ULSP for AF noise outputs of up to -25 dbm (SNR 30.7 db), this is within 1 db of -98 dbm point for SNR = 10 db. At lower RF inputs, output SNR is degraded about 2.5 db/db of RF input, but this is for antenna cone angles of <math>&gt; 120^\circ</math>. RCA will supply the range of the DTV adjustment by October 1.</p>					
<b>TEAM CAPTAIN RECOMMENDATION</b>					
CATEGORY		REMARKS MSC agree with RCA comment workshop H.G. Hamilton			
ACTION					
SUSPENSE					
<b>BOARD ACTION</b>					
CATEGORY		REMARKS			
ACTION					
SUSPENSE					
ACTION		<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE					



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-027
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
J.T. Raleigh	NASA/Bellcomm	LCRU	Electrical	
DISCREPANCY/PROBLEM	TITLE			
	Double Talking			
<p>With a full duplex three-way system it is possible for two EVA's to talk at the same time. For EVCS, RCA and NASA were to evaluate system limitations.</p>				
<p><b>JUSTIFICATION</b></p> <p>Preliminary EVCS tests show that double talking can be relayed to the LM and usable voice can be detected.</p>				
<p><b>RECOMMENDATION</b></p> <p>RCA should show that the LCRU does not degrade the signal received on 259.7 MHz even if it is from two EVA's.</p>				
<p><b>CONTRACTOR'S COMMENT</b></p> <p>RCA will perform analysis on effects of receiving two simultaneous inputs to LCRU VHF receiver when direction is received. RCA feels that the LCRU performance will be consistent with LM performance if two signals are simultaneously received from EVCS.</p> <p><i>This test was performed during EM LCRU demonstration and worked very well.</i></p>				
<b>TEAM CAPTAIN RECOMMENDATION</b>				
CATEGORY	<p>REMARKS</p> <p><i>will perform the necessary analysis as recommended above. - TI-5</i></p> <p><i>H. J. Franklin</i></p>			
ACTION				
SUSPENSE				
<b>BOARD ACTION</b>				
CATEGORY	<p>REMARKS</p>			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE	<input type="checkbox"/> Disapproved			

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-EE- 28
VEHICLE:				COORDINATION
DATE: 9-16-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
B. C. Embrey	MSC/EE72	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		LCRU Communication System Signal P&I Spec		
<p>Reference: Action Item TI-3-26. RCA has not submitted any comments on the proposed P&amp;I Spec, nor has RCA provided the TBD's included therein. MSC has completed review and the spec is now considered to be in final form and content.</p>				
<p><b>JUSTIFICATION</b></p> <p>P&amp;I Spec is required to define the communications system interfaces between the LCRU and MSFN, EVCS, and GCTA.</p>				
<p><b>RECOMMENDATION</b></p> <p>1. MSC impose LCRU Communications System Signal P&amp;I Spec (EE7-70-501, May 1970) into the LCRU contract as a Type I document by September 18, 1970.  2. RCA provide TBD's via official SCN by September 25, 1970.</p>				
<p><b>CONTRACTOR'S COMMENT</b></p> <p>RCA will review latest P&amp;I Spec. and provide comments 9/28/70.</p>				
<b>TEAM CAPTAIN RECOMMENDATION</b>				
CATEGORY	REMARKS MSC concurred with RCA comment <i>[Signature]</i> wmspec			
ACTION				
SUSPENSE				
<b>BOARD ACTION</b>				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-EE-29
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
C. Ritterhouse	APO/EE18	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
<p>RCA is not using Apollo meas # in RCA documentati on.</p>				
JUSTIFICATION				
<p>RECOMMENDATION</p> <p>Include meas #</p>				
<p>CONTRACTOR'S COMMENT</p> <p>RCA will implement Apollo measurement numbers in future applicable documentation.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC covers wm Speer <i>A J Hamilton</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW:		REVIEW ITEM DISPOSITION		NUMBER	CDR-EE-30
VEHICLE:				COORDINATION	
DATE:					
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson					
DISCREPANCY/PROBLEM		TITLE			
		Battery SCD			
<ol style="list-style-type: none"> <li>1. Test battery cell, e.g. DVT, and case pressure to verify adequate safety factor. Apollo requirement.</li> <li>2. Paint inside battery case and cover for electrical insulation purposes.</li> <li>3. Alter DVT and qual test for simulated mission profile-vibration, shock, and thermal-vacuum (wet-stand).</li> <li>4. Battery activation with vacuum imposed to withdraw any trapped air is required, at least for KSC operations.</li> </ol>					
JUSTIFICATION					
As defined above.					
RECOMMENDATION					
CONTRACTOR'S COMMENT					
<p>Item 1 is answered in RID 004 from Agenda Item 10 (checkout)</p> <p>Item 2 the battery cells are non-conductive plastic and this is the only surface touching the battery wall so that paint should not be necessary. RCA will investigate need and impact and advise MSC by 10/1/70.</p> <p>Item 3-These changes have been made and were presented in the test meeting Agenda Item 10</p> <p>Item 4-This is covered in a separate RID from the Test Meeting-Agenda Item 10</p> <p>See RID CDR-C-005.</p>					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY	REMARKS MSC concurs with RCA comment - RCA to conduct investigation (item 2) <i>[Signature]</i>				
ACTION					
SUSPENSE					
BOARD ACTION					
CATEGORY	REMARKS				
ACTION					
SUSPENSE					
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE					

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-031
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR J. T. Raleigh		ORGANIZATION NASA/Bellcomm	SYSTEM LCRU	TEAM NAME Electrical
DISCREPANCY/PROBLEM		TITLE UpLink Voice Quality		
<p>At the Motorola CDR a voice demonstration was conducted. The quality out of the receiver and ULSP was noticable degraded compared to that out of the receiver alone.</p>				
<p><b>JUSTIFICATION</b></p> <p>There appears to be no reason to degrade the voice which is received on the moon. Systems with such distortion tend to fail if not used with near ideal audio input conditions.</p>				
<p><b>RECOMMENDATION</b></p> <p>RCA should explain why this degradation is necessary or acceptable.</p>				
<p><b>CONTRACTOR'S COMMENT</b></p> <p>The 12 db clipping level and associated distortion in the ULSP was reviewed at TI-2. RCA was directed to retain the clipping diodes. Change to the ULSP design at this time would impact schedule. Voice quality should be evaluated at CDR demonstration 9/17/70. RCA recommends no change to the clipping level circuits at this time.</p>				
<b>TEAM CAPTAIN RECOMMENDATION</b>				
CATEGORY	REMARKS MSC concurs with RCA comment except that the voice quality was not adequately demonstrated at MSC - RCA to attempt voice quality demonstration at TI-5 <i>H. H. Hamilton</i>			
ACTION				
SUSPENSE				
<b>BOARD ACTION</b>				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE				



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-032
VEHICLE:				COORDINATION
DATE: 9/16/70		INITIATOR		TEAM NAME
J. McKenzie		ORGANIZATION	SYSTEM	Electrical
		MSC-PD-9	LCRU	
DISCREPANCY/PROBLEM		TITLE		
		Squelch		
<p>RCA has not properly considered the overall LCRU system design considerations in the implementation of the LCRU S-Band squelch. RCA and Motorola has not, (even though requested by NASA), considered the S-Band Squelch used by the CSM and LM. The LCRU S-Band squelch is more complex than needed.</p>				
<p><b>JUSTIFICATION</b></p> <p>In the development of the LCRU, RCA should have utilized the experience that RCA developed for the LM S-Band system as well as the CSM, since it is a proven fact that the LM and CSM have operated extremely well.</p>				
<p><b>RECOMMENDATION</b></p> <ol style="list-style-type: none"> <li>1. RCA to present, at next Technical Interchange meeting, their rationale and justification why the CSM and LM Squelch circuits were not considered from an overall system point of view, for the LCRU.</li> <li>2. RCA to present a FMEA at next Technical Interchange Meeting, for the LCRU Squelch (including receiver to VHF transmitter) this FMEA should include down to the component part level.</li> </ol>				
<p><b>CONTRACTOR'S COMMENT</b></p> <p>RCA investigated why the CSM and LM Squelch Circuits could not be used for the LCRU Receiver and published the results of the investigation in attachment C of NASA-MDA-LR-088 dated 9/3/70. RCA has reviewed the squelch circuit design and the subcontractor's data and feels confident the design will perform the mission requirements.</p>				
<b>TEAM CAPTAIN RECOMMENDATION</b>				
CATEGORY	REMARKS <i>Withdrawn unspc H. Hamilton</i>			
ACTION				
SUSPENSE				
<b>BOARD ACTION</b>				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE				



Squelch (Continued)

CONTRACTOR COMMENT

RCA concluded that it was more economical and that there was less risk by incorporating the squelch in the newly built S-Band Receiver than to get involved with changing designed, tried and tested VHF processing circuitry.

RCA plans no further action on this item unless directed differently.

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-33
VEHICLE:				COORDINATION
DATE: 9-11-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
Multiple	MSC	LCRU	Miscellaneous	
DISCREPANCY/PROBLEM		TITLE		
		Document Errors		
See listing of attached documentation errors.				
JUSTIFICATION				
RECOMMENDATION				
Correct the documentation.				
CONTRACTOR'S COMMENT				
<del>RCA will review proposed requirement change and make recommendations at TI-5.</del> RCA will review and make necessary changes before engineering release.				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS M&L Concur with RCA comment unshere			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE				

ATTACHMENT TO CDR-E-33

1. Wire Connection List 8555272      This drawing apparently free floating.  
It does not reference next assy.
2. Case, LCRU 8370873      This drawing does not show next assy.  
On sheet 5, section XA-XA, hole XA  
function is not known.
3. Drawing 8670957      Correct Next Assy Callout  
Cable Assy, LCRU/LRV/TV      Was: 8370857-501  
Should be: 8370855
4. Drawing 8670967      Correct Next Assy Callout  
Cable Assy, Antenna,      Was: 8151105  
S-Band Hi and Low Gain      Should be: 8670994 and 8670967
5. Drawing 8779375      Add: For parts list P/L 8779375
6. 8779361 Ring Clamp      Correct Next Assy Callout No.  
Was: 8670989  
Should be: 8779373
7. 8151453 Washer, Split Lock      Correct Next Assy Callout No.  
Was: 8779370-501  
Should be: 8779373-501
8. 8779373 Adapter Interface      Needs; Next Assy No.  
(High Gain Antenna)
9. 8779370 Post, Assy      Add: Next Assy No.  
Should be: 8670993
10. SCD's 8555252 1.25 MHz VCO      Correct Next Assy Callout No.  
8555256 14.5 KHz VCO      Was: 8370854  
Should be: 8370553
11. SCD 8555262      Correct Next Assy Callout No.  
S-Band High Gain Antenna      Was: 8151105  
Should be: 8370891
12. 8670967 Cable Assy, Hi and      Correct Next Assy Callout No.  
Low Gain      Was: 8151105  
Should be: 8370891, 8670994
13. Wire Connection List      Add Next Assy No.  
8555272 Control Panel      Should be: 8670945

ATTACHMENT TO CDR-E-30 (CONT'D)

- |  |  |
|--|--|
| 14. 8779310 Knob                               | Add Next Assy Callout No.<br>Should be: 8670945  |
| 15. 8670948 Cover Plate,<br>Control Panel      | Correct Next Assy Callout No.<br>Was: 8370854<br>Should be: 8670845  |
| 16. Cable Assembly 8670957                     | Appears to be error on P2 callout in<br>Dash 501 configuration. Wire braid called<br>for on face of drawing is not specified in<br>parts list. Teflon jacket on face of drawing<br>is not specified. Wire, tape, etc. is not<br>specified for Dash 502 series. |
| 17. Drawing 8370878<br>Interconnection Diagram | 1. Correct VHF triplexer drawing 40<br>Was: 8547878<br>Should be: 8347878<br>2. Battery, add: Assy 8151103<br>3. DC-DC Converter, add: Assy 8670941,<br>Sch 8670942  |
| 18. P/L 8670979 Upper Post Assy                | Item 12: Was: 8151179 coupling<br>Should be: 8151463 coupling assy<br>Item 2: Should be: 8779362-501<br>Item 7: Should be: 8779364-1   |
| 19. P/L 8779365 Upper Mast<br>Assy             | Item 2: Was: 8151447<br>Should be: 8151447-1   |
| 20. P/L 8779362 Handle Assy                    | Items 1, 2 and 4: add: "-1" to part number.  |
| 21. 8151452                                    | Two drawing by the same number.<br>Nut, Jam (Special), and Post  |



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-34
VEHICLE:				COORDINATION
DATE: 9/14/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson	MSC/EE16	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		VHF Antenna Trimming		
Documentation does not show VHF antenna length trimming after installation on LCRU case.				
JUSTIFICATION				
Trimming is required to obtain optimum electrical length.				
RECOMMENDATION				
Place note on drawing.				
CONTRACTOR'S COMMENT				
This is a procedure item requiring an in-process <sup>change</sup> and will be incorporated into the drawings.				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concurs with LCA comment <i>Mr. J. Hendon, Wmspeier</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-35
VEHICLE:				COORDINATION
DATE: 9-14-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson	MSC/EE16	LCRU	Electrical	
DISCREPANCY/PROBLEM	TITLE			
	RF Connector Lockwiring			
<p>RF connectors at the HGA, LGA, and VHF antenna must be lockwired.</p>				
JUSTIFICATION				
<p>Positive connector lock is required.</p>				
RECOMMENDATION				
<p>Show lockwire on drawings.</p>				
CONTRACTOR'S COMMENT				
<p>RCA will secure RF connectors prior to delivery - securing will be shown on the drawings</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concurs <i>[Signature]</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE	<input type="checkbox"/> Disapproved			

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-36
VEHICLE:				COORDINATION
DATE: 9-14-70				
INITIATOR R. Sinderson		ORGANIZATION MSC/EE16	SYSTEM LCRU	TEAM NAME Electrical
DISCREPANCY/PROBLEM		TITLE RF Connector SCD 8555284		
<p>SCD has not been modified to extend scalloped portion of body back 1 inch further. Ref. Item 7 of Crew Station Review Meeting of August 18.</p>				
JUSTIFICATION				
RECOMMENDATION				
Submit ECN.				
CONTRACTOR'S COMMENT				
RCA will comply.				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC covers <i>[Signature]</i> <i>Wm. Pfeiffer</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-37
VEHICLE:				COORDINATION
DATE: 9/14/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson	MSC/EE16	LCRU	Thermal	
DISCREPANCY/PROBLEM		TITLE		
		Thermal Analysis Report		
<p>Report does not include analysis of thermal case where LCRU is placed directly on lunar surface.</p>				
JUSTIFICATION				
<p>The above requirement is found in MSC Spec SE-C-0043A, Para. 4.10.</p>				
RECOMMENDATION				
<p>Perform the required analysis.</p>				
CONTRACTOR'S COMMENT				
<p><i>Reference item 5.0 of the CDR presentation</i></p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	<p>REMARKS</p> <p><i>MSC concurs with RCR comment</i> <i>approved A. J. Hamlin</i></p>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	<p>REMARKS</p>			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-38
VEHICLE:				COORDINATION
DATE: 9-11-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
C. Ritterhouse	MSC EEL8	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		Failure Mode and Effects Analysis, LRTR-FMEA-1 Rev. A.		
<p>Page 3 block diagram shows wrong XMTR frequency; text has not been revised.  Page 6, Paragraph 7, power switch is locked only in OFF position. LCRU case pressure seal is single point failure. RCA has not discussed this case.</p>				
JUSTIFICATION				
RECOMMENDATION				
RCA to correct information and discuss this single point within the FMEA.				
CONTRACTOR'S COMMENT				
<p>For items 1 &amp; 2, RCA will submit errata sheet correct. The LCRU will have corona effects at critical pressure so that a pressure leak should be considered a potential failure.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concurs with RCA comment <i>H. J. Gulin</i> workshop			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER: CDR-E-39
VEHICLE:				COORDINATION
DATE: 9-9-70				
INITIATOR C. Ritterhouse		ORGANIZATION MSC EE18	SYSTEM LCRU	TEAM NAME Electrical
DISCREPANCY/PROBLEM		TITLE Interconnection Diagram 8370878		
<p>Diagram is incomplete, does not show wiring for pressure sensor. This drawing does not specify wire specs, tape wrap, etc., or workmanship specs, etc.</p>				
JUSTIFICATION				
<p>RECOMMENDATION</p> <p>RCA update diagram. RCA to specify wire type, coax type, etc. RCA to specify fabrication specs.</p>				
<p>CONTRACTOR'S COMMENT</p> <p><i>This diagram will be corrected to show the pressure sensor. Materials and fabrication specs do not appear on this drawing.</i></p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concurs on RCA comment <i>pt. J. Hamilton with spec</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER: CDR-E-40
VEHICLE: LCRU				COORDINATION
DATE: 9-10-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
C. Ritterhouse	MSC EE18	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		Schematic Wiring Diagram 8670946		
<p>MODE SW 3 2 poles are make before break and are not shown properly. Shielding not shown properly at C1, C2, C5 and C6. Several splices are shown which undoubtedly are two wires on same terminal. Diagram does not show wiring for pressure sensor.</p>				
JUSTIFICATION				
RECOMMENDATION				
Hold design open until RCA revises drawing and resubmit.				
CONTRACTOR'S COMMENT				
RCA will revise documentation & submit.				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concurs with RCA comment <i>H. J. Hendlin Wmspeier</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-41
VEHICLE:				COORDINATION
DATE: 9-9-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
C. L. Ritterhouse	MSC EE18	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		Pressure Sensor SCD 8553610		
<p>Page 12, Fig. 2 the wires to the transducer are not identified. Transducer is referenced to 14.7 PSIA. Transducer range is rather broad.</p>				
JUSTIFICATION				
<p>RECOMMENDATION</p> <p>Suggest RCA revise drawing to show wire color as function of polarity and transducer function. Request RCA to provide rationale why reference port is sealed at 14.7 PSIA instead of Zero PSIA.</p>				
<p>CONTRACTOR'S COMMENT</p> <p><i>[Signature]</i></p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS RCA will respond by 9/22 for 2nd item. <i>A. J. [Signature]</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER: CDR-E-42
VEHICLE: LCRU				COORDINATION
DATE: 9-10-70				
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME
C. Ritterhouse		MSC EEL8	LCRU	Electrical
DISCREPANCY/PROBLEM		TITLE		
		Cover Plate Control Panel 8670948		
<p>The word "OFF" is shown by wrong switch. The limit values to be engraved should be verified. The meter cal chart should be 0-5, rather than 1-5.</p>				
JUSTIFICATION				
RECOMMENDATION				
RCA to revise drawing, verify limits.				
CONTRACTOR'S COMMENT				
<p>Drawings will be changed for the first 2 items. RCA will evaluate the meter calib. chart requirement and advise MSC by 9/25</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concurs with RCA comment <i>H. J. Hardin</i> writer			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY				
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: <u>CDR</u>		REVIEW ITEM DISPOSITION		NUMBER <u>CDR-E-43</u>
VEHICLE:				COORDINATION
DATE: <u>9-10-70</u>				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson	MSC/EE16	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		LRV Cable		
<p>Cable diameter dimension is required for LRV pre-stowage IRN. Cable form must be positioned in simulated flight mated configuration before lacing, braiding, and jacketing is performed.</p>				
JUSTIFICATION				
RECOMMENDATION				
Make drawing additions as indicated above.				
CONTRACTOR'S COMMENT				
Design drawings will be furnished by 10/1.				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concurs <i>Al Hamilton</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-44
VEHICLE:				COORDINATION
DATE: 9-10-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson	MSC EE16	LCRU		
DISCREPANCY/PROBLEM	TITLE			
	Delinquent Action Items			
<p>RCA is delinquent on providing documentation to the following action items:</p> <p>TI-4: 2, 10, 19, 16, 22, 26, 27, 33</p> <p>TI-3: 19, 26, 40</p> <p>PDR: 4, 6, 16, 18, 32, 52, 55</p> <p>TI-2: 33</p>				
JUSTIFICATION				
RECOMMENDATION				
Submit official documentation which closes out the action items.				
CONTRACTOR'S COMMENT				
RCA will complete all actions by 9/25/70 except those with later action due dates.				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concurs with comment A. J. Hamilton wmsjfer			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER: CDR-E-45
VEHICLE:				COORDINATION
DATE: 9-9-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
C. Ritterhouse	MSC EE18	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		Capacitor Assy 8670967 (DC/DC Converter)		
<p>These large capacitors are held down to board with urethane strap. It is questionable if this arrangement will pass environmental requirements.</p>				
JUSTIFICATION				
RECOMMENDATION				
Redesign hold down method.				
CONTRACTOR'S COMMENT				
<p>urethane strap is a proven technique ~ used on LM &amp; CSM - and considered acceptable for this application.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS			
ACTION	MSC concurs			
SUSPENSE	H. Hamilton Wm. J. J. J.			
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE				



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-46
VEHICLE:				COORDINATION
DATE: 9-9-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
C. Ritterhouse	MSC EE18	LCRU	C. Ritterhouse	
DISCREPANCY/PROBLEM		TITLE		
		Cable Assy 8670957		
<p>RCA did not submit coax cable specification 2010744-178, which apparently is RG 178/U. RG 178/U is 50-ohm coax, RCA should consider use of 75-ohm coax cable since we have 75-ohm LCRU input also error on ZG connector callout. The LCRU/LRV ICD is being changed to change LRV connector.</p>				
JUSTIFICATION				
<p>RECOMMENDATION</p> <p>RCA submit coax spec.  RCA to evaluate 50-ohm vs 75-ohm coax and reply.  Correct error, hold cable design open until ICD is changed.</p>				
<p>CONTRACTOR'S COMMENT</p> <p>RCA will utilize 75-ohm coax, and will correct drawings accordingly</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC <del>clarified</del> concurs <i>A. J. Hardin</i> <i>WMSJ</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS 			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-47
VEHICLE:				COORDINATION
DATE: 9-8-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
C. Ritterhouse	MSC EE18	CLR	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		Switch, Toggle SCD 8555254		
Error in Paragraph 4.4.5 Acceptance test Table IV should be Table III.				
JUSTIFICATION				
Not required.				
RECOMMENDATION				
Correct error.				
CONTRACTOR'S COMMENT				
RCA will copy				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concurs <i>AJ Hamilton</i> <i>unspecified</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE	<input type="checkbox"/> Disapproved			

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-48
VEHICLE:				COORDINATION
DATE: 9-8-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
C. Ritterhouse	MSC EEL8	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		Circuit Breaker RCA Drawing 8555264		
<p>The acceptance test does not require temperature testing. Circuit breaker trip point are function of temperature. (Ref. AI TI-4-22) Paragraph 4.4.11 has several errors.</p>				
JUSTIFICATION				
<p>These circuit breakers are thermal devices.</p>				
RECOMMENDATION				
<p>Revise specification acceptance tests to include trip rating as a function of high temperature. Reference Paragraph 4.4.13. Correct errors.</p>				
CONTRACTOR'S COMMENT				
<p>RCA will test in incoming inspection - RCA will correct documentation errors.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concurs Wm J. J. J. H. J. J. J.			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-49
VEHICLE:				COORDINATION
DATE: 9/4/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson	MSC/EE16	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		Monitor Meter SCD		
1. Fig. 1 - Cal data chart indicates a 2% error allowance for room conditions, but no paragraph in the body of the SCD explains this requirement. 2. Fig. 1 - What is "X5KV" nomenclature on meter face? 3. Fig. 2 - Subgraduation marks are not shown. 4. Para. 3.3.4. - Pointer is not shown in Fig. 2. 5. Para. 3.3.3.3. - No figure is referenced for dial face nomenclature requirement.				
JUSTIFICATION				
RECOMMENDATION				
CONTRACTOR'S COMMENT <i>PLA will review and incorporate <del>these</del> corrections as required.</i>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC Concurs <i>Wm. H. J. Hamilton</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				





TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER: CDR-E-51
VEHICLE:				COORDINATION
DATE: 9/2/70				
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME
R. Sincderson		MSC/EE16	LCRU	Electrical
DISCREPANCY/PROBLEM		TITLE		
		1.25 MHZ SCO SCD		
1. Same as RID on 14.5 KHZ VCO (RDR-7) 2. Same 3. Same 4. Distortion outside of passband is not specified (potential TV interference?)				
JUSTIFICATION				
RECOMMENDATION				
Provide rationale if SCN is not considered to be necessary.				
CONTRACTOR'S COMMENT				
PCA will Review and provide SCN or Rationale by 10/1/70				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concurs with comment H. J. Hamilton			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY				
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-52
VEHICLE:				COORDINATION
DATE: 9/2/70				
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME
R. Sinderson/J. Miller		EE16	LCRU	Electrical
DISCREPANCY/PROBLEM		TITLE		
		Documentation Errors - Electrical Review		
<p>The documentation review found several documentation errors which need correction. See the attached list.</p>				
<p>JUSTIFICATION</p> <p>Incorrect documentation.</p>				
<p>RECOMMENDATION</p> <p>Make required changes at the first opportune time.</p>				
<p>CONTRACTOR'S COMMENT</p> <p>RCA will comply by 10/1/70</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	<p>REMARKS</p> <p>MSC concurs with cannot  <i>1st J. Handlin</i> WMSpec</p>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	<p>REMARKS</p>			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

✓ CORRECTIONS

1. 8670853  
External terminal designations should be physically labeled on the units. As a minimum, the terminal numbers should be referenced on the assembly drawing.
2. 8670995/994  
Show all internal submodules, on family tree drawing; such as VCO's and video amplifier in D.L. signal processor.
3. 8670995  
Schematic number for amplifier, IF/Audio in AM receiver is shown as 8670904; should be 8670905.
4. 8670905  
RF output in number left off - should be pin 4.
5. 8670929  
Pin 6 (audio input return) not shown.
6. 8555259  
Correct Next Ass'y No. Callout was 8370832. Should be 8370872.
7. 8670995  
Cordwood Ass'y Audio XFMR/Filter correct schematic number was 8670986; should be 8659420.
8. 8670923  
Correct Next Ass'y No. Callout should be 8370852.  
  
Correct audio XFMR/Filter Ass'y Callout should be 8670938.  
  
Correct VOX/AGC Ass'y Callout should be 8670937.
9. 8555269  
Spec. cont. dwg. call 8670937 as Next Ass'y; 8670937 does not callout this spec.
10. 8370867  
Correct Next Ass'y No. Callout was 8370850-501 should be 8370864.  
  
On face of dwg: Note: for parts list see Pl 8370867-501, delete "-501".



Attachment to CDR-E-52

11. 8370868 Item No. C11, Sheet 3 has incorrect part no.  
Item 8 of PL 8370868 not flagged on drawing 8370868.
12. 8670906 Correct Next Ass'y No. Callout delete "-501".
13. 8670907 Correct Next Ass'y No. Callout delete "-501".
14. 8670941 Correct Zone 7E delete "Ball 17 to Part E1".
15. 8370853 Parts list, Sheet 5, Item 8 was 8670902-1;  
should be 8779309-1.
16. 8670925 Correct Next Ass'y No. Callout should be 8370853.
17. 8670869 Parts list, Sheet 2, Item 6 should be 8370869-1.
18. 8670985/8670983 Correct Next Ass'y No. Callout should be 8670982.
19. 8670916 Correct Next Ass'y No. Callout should be 8670914.
20. 8555268 Integrated circuit, voltage regulator. This part calls out 8370872 as Next Ass'y, but part not used in Ass'y.
21. DVT Family Tree LGA dwg. assembly no. is incorrect.

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-E-53
VEHICLE:				COORDINATION
DATE: 9/2/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson/J. Miller	EE16	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE		
		Documentation Clarifications - Electrical Review		
<p>The documentation review found several documentation areas which need clarification in order to be consistent with the general format. See attached list.</p>				
JUSTIFICATION				
<p>Format consistency and to facilitate use of design dwgs.</p>				
RECOMMENDATION				
<p>Make document clarification changes at the time (same ECN) of the next technical change, if required.</p>				
CONTRACTOR'S COMMENT				
<p>RCA will comply by 10/1/70</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
<p>MSC concurs.</p> <p>Wm. J. Franklin</p>				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE	<input type="checkbox"/> Disapproved			

CORRECTIONS

1. 8670925 Show schematic number for video ampl/mixer (8670983.
  2. 8670853 Diode attenuator input should be labeled OPEN OR +14 v.
  3. 8670905 Label terminal 1, 2, 4 & 5 on AZ with functional terminology.
  4. 8779305 Label test point pins on AZ with functional terminology.
  5. 8670942 Show schematic numbers on submodules.
  6. 8670925/8670923 Next higher assembly is shown as 8370850; should be 8370854.
  7. 8670922 Show value of fuses.
  8. 8370872 Add next ass'y no. Should be 8370854.
  9. 8370852 On face of drawing for part list callout, delete "-501".
- Parts list, Sheet 2 for 8370852-502 need reference for 8670938-502, 8670937-502.

TYPE OF REVIEW:		REVIEW ITEM DISPOSITION		NUMBER	CDR-E-054
VEHICLE:				COORDINATION	
DATE: 9/17/70					
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME	
B. Trachtenberg		RCA	LCRU	Electrical	
DISCREPANCY/PROBLEM		TITLE			
		MSFN Deficiency			
<p>The LCRU and LM transmission systems exhibit tearing of video in high contrast environment of lunar surface scenes. This phenomena is attributed to the MSFN demodulator.</p>					
<p><b>JUSTIFICATION</b></p> <p>The LCRU can provide improved picture quality if pre-emphasis is used in conjunction with the aperture corrected camera, when working into 85' MSFN dish.</p>					
<p><b>RECOMMENDATION</b></p> <p>Since lunar surface communication and video is available full time with 85' stations, the MSFN should be modified with improved demodulation hardware to enable use of 85' stations.</p>					
<p><del>CONTRACTOR COMMENT</del></p> <p>MSC COMMENT</p> <p>The narrow bandwidth of the MSFN demodulator is a probable cause of video tearing. Demodulator modifications are being explored with GSFC.</p>					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY	REMARKS				
ACTION					
SUSPENSE					
BOARD ACTION					
CATEGORY	REMARKS				
ACTION					
SUSPENSE					
ACTION	<input type="checkbox"/> Approved <input checked="" type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE			Wm. J. ... for R. W. Kubick, 9/18/70		



SPLINTER MEETING  
MECHANICAL DESIGN  
9/15/70  
AGENDA ITEM - 8.0

ATTENDEES:

<u>NAME:</u>	<u>ORG.:</u>	<u>FUNCTION:</u>	<u>PHONE:</u>
J.M. Allman (part time)	NASA-Hq.	Engineering/test	W02-0457
W.S. Babcock	RCA	LGA & Staff-HiG Pointing	PC 6613
D.D. Becker	MSC-NB	Reliability	2868
S. Buttari	RCA	Integration	PC 6036
W.B. Goeckler	MSC-ASPO	LRV Interfaces	3441
R.E. Holston	RCA	Design Engineering	PC 2710
L.J. Krawitz	RCA-LCRU Des.	Subassemblies	PC 6613
J.A. Liggett	RCA-PMO	Interface Coord.	PC 6349
S.F. Martorano	RCA	Integration	PC 6036
D.E. Newbrough	MSC/GE/PD-5	Vibration	3205
G.A. Pennington	MSC-FCD	Flt Cntl/Ops	2267
H.A. Schultz	MSE EE16	Mechanical	4500
H.M. Scott	MSC PD-5	Interfaces	3205

CDR MECHANICAL DESIGN  
September 16, 1970  
AGENDA ITEM - 8.0

ATTENDEES

<u>NAME</u>	<u>ORG</u>	<u>TITLE</u>	<u>PHONE NO.</u>
W. S. Babcock	RCA	LCRU Antenna and Pointing	PC6613
D. R. Brooks	NASA/CF2	Comm Sys Engr	2267
N. B. Farmer	NASA	APO	4507
R. E. Holston	RCA	Design Mech.	PC2710
L. J. Krawitz	RCA	LCRU Sub Assy Des.	PC6613
J. A. Liggett	RCA	PMO Mech Interface	PC6349
F. J. Nangle	RCA	LCRU PMO	PC6047
G. A. Pennington	NASA/FCD	Comm Sys Engr	2267
I. Saulietis	NASA	AST/G&CD	3566
H. Schultz	MSC	Mech	4500
W. Shannahan	LEC	Engr Supervisor	3761
J. E. Siemers	Boeing/MSC/PD5	System Engineering	488-0910 x655
A. B. Stobie	RCA	HGA P.M.	PM3961
O. M. Woodward	RCA	Antenna Engineer	

**MINUTES OF MEETING**

**DATE** 9/15/70 **MEETING NUMBER** CDR **AGENDA ITEM** 8.1

**SUBJECT** Mechanical Interface

---

**SUMMARY OF DISCUSSION:**

Interference between HGA and LRV battery cover is to be investigated at CSR on 9/21.

**ACTION ITEMS:**

**NOTE:** These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 8.1.1  
SUBJECT LM/LCRU Interface

---

### SUMMARY OF DISCUSSION:

LCRU is within envelope requirements.

New stowage concept for HGA and LGA on MESA was presented.

Attention was called to problem in removing spare batteries from MESA.

Potential problems: Impact of increased vibrations levels as a result of MESA and RCA tests.

NASA indicated vibration levels would be available soon.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.



## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 8.1.2  
SUBJECT LCRU LRV Interface

---

### SUMMARY OF DISCUSSION:

A positive indicator for knowing HGA is fully extended is needed.

Interferences between High Gain Antenna and TV Camera and VHF Antenna were demonstrated.

A potential interference problem with the AZ-EL cable was noted.

Nuts on bottom of HGA and TV Camera taper adapters should be lock nuts.

Frame of LRV is to be considered at same temperature as the Lunar Surface. Analysis of thermal expansions must be considered in tolerance dimensioning for mounting LCRU to LRV.

Means of holding tolerance between holes on LCRU with tool was explained and found satisfactory.

A method for holding antenna cables to TV camera is to be considered.

Possible Interference between HGA and LRV battery cover may be a problem and will be investigated at 9/21 Crew Review.

### ACTION ITEMS:

**NOTE:** These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

**MINUTES OF MEETING**

**DATE** 9/15/70 **MEETING NUMBER** CDR **AGENDA ITEM** 8.1.3  
**SUBJECT** LCRU Battery Replacement

---

**SUMMARY OF DISCUSSION:**

No Comment.

**ACTION ITEMS:**

**NOTE:** These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 8.1.4  
SUBJECT LGA/LCRU

---

### SUMMARY OF DISCUSSION:

Elevation increments on LGA are recommended to stay at  $10^{\circ}$ .

Mounts for both LGA and 16MM Camera will be essentially alike and should be supplied from one source.

Azimuth increments on LCRU are recommended to stay at  $20^{\circ}$ :

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 8.2  
SUBJECT LCRU Mechanical Design (Introduction)

---

### SUMMARY OF DISCUSSION:

No Comments.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.



**MINUTES OF MEETING**

**DATE** 9/16/70 **MEETING NUMBER** CDR **AGENDA ITEM** 8.2.1  
**SUBJECT** Subassembly Arrangement

---

**SUMMARY OF DISCUSSION:**

No Problems.

**ACTION ITEMS:**

**NOTE:** These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/16/70 MEETING NUMBER CDR AGENDA ITEM 8.2.2  
SUBJECT LCRU Weight Analysis

---

### SUMMARY OF DISCUSSION:

Weight of stowage container is estimated to 7.0 lbs. Until vibration data is analyzed and design is completed this weight is subject to change.

Except for unknowns total LM stowed weight and LRV weights are within ICD requirements.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 8.2.3.1  
SUBJECT VHF Receiver

---

### SUMMARY OF DISCUSSION:

No Problems.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 8.2.3.1.4  
SUBJECT High Gain Antenna

---

### SUMMARY OF DISCUSSION:

Possibility of removing top of gripping lock ring on HGA base was considered. Antenna base taper can be locked in place without cross pin being in groove. Design should be made so ring cannot be locked without pin being in cross slot. This problem will be investigated at 9/21 Crew Review.

Force of locking ring spring should be in the order of 10 lbs.

Problem of removing TV camera from taper in moon environment was discussed and considered a serious problem.

Astronauts will not take HGA down once it is raised and consequently hinge and cushion spring can be simplified.

Details of HG Antenna were presented.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.



## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 8.2.3.2

SUBJECT VHF Transmitter

---

### SUMMARY OF DISCUSSION:

No Problems.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

**MINUTES OF MEETING**

**DATE** 9/15/70 **MEETING NUMBER** CDR **AGENDA ITEM** 8.2.3.3

**SUBJECT** VHF Triplexer

---

**SUMMARY OF DISCUSSION:**

**ACTION ITEMS:**

**NOTE:** These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 8.2.3.4  
SUBJECT Down Link Signal Processor

---

### SUMMARY OF DISCUSSION:

The DLSP was redesigned to improve maintainability by relocation of test points.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 8.2.3.5

SUBJECT Up Link Processor

---

### SUMMARY OF DISCUSSION:

There were no changes in this chassis since PDR.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.



MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 8.2.3.6  
SUBJECT Voltage Regulator

---

SUMMARY OF DISCUSSION:

No Problems.

ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 8.2.3.8  
SUBJECT S-Band Receiver

---

### SUMMARY OF DISCUSSION:

Motorola is checking possibility of removing gussets for weight reduction.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 8.2.3.9  
SUBJECT S-Band Transmitters

---

### SUMMARY OF DISCUSSION:

No Problems.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 8.2.3.10

SUBJECT Diplexer

---

### SUMMARY OF DISCUSSION:

No Problems.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.



**MINUTES OF MEETING**

**DATE** 9/15/70 **MEETING NUMBER** CDR **AGENDA ITEM** 8.2.3.11

**SUBJECT** VHF Antenna

---

**SUMMARY OF DISCUSSION:**

No Problems.

**ACTION ITEMS:**

**NOTE:** These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 8.2.3.12

SUBJECT DC-DC Converter

---

### SUMMARY OF DISCUSSION:

No Problem.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 8.2.3.14  
SUBJECT High Gain Antenna (Sight)

---

### SUMMARY OF DISCUSSION:

The problem of sighting on the earth when the sun is in close proximity to the earth is a critical problem and was reviewed in detail.

Temperature of internal filter sector mask is computed at 400°F (steady state) above case temperature. Case temperature of 200°F will give filter sun spot temperature of 600°F. NASA indicated that new fused silicon filters have been tested at 600°F and are a possible material for the sector filter.

Due to heating of sun spot on sector filter mask it is necessary to use opaque metallic mask in front of lens. RCA will continue with this design. An ND-4 filter will be used in front of lens.

This mask will also serve as a dust cover.

The coupling of the sector mask to the pull up sight shade will be reviewed further at the 9/21 Crew Review.

Final models of sight will have a rounded tubular body.

Spurious images have been removed by use of a "V" mask in front of lens and moving lens closer to mirror. This mask does not effect the 17° field of view.

Weight balance in flight model will be decreased by changes in housing body but increased by inclusion of invar mounting sleeves.

The sector mask and eye shade mounting reduces the field of view on the ground glass screen. A desired viewing angle was given as +45°. Whether this viewing angle is to the 3° circle or to the edge of field is not defined. The proposed definition is 45° from the 6° radius on the screen.

### ACTION ITEMS:

**NOTE:** These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 8.2.3.14  
SUBJECT High Gain Antenna (Sight) - Continued

---

### SUMMARY OF DISCUSSION:

RCA will continue design using the opaque aluminum sector mask with the ND-4 filter in front of the lens. This will serve as a combination filter/dust cover.

The coupling of the sector mask to the "pull up" sight shade will be reviewed further at the Crew Review on 9/21.

### ACTION ITEMS:

**NOTE:** These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.



## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 8.2.3.15  
SUBJECT Low Gain Antenna

---

### SUMMARY OF DISCUSSION:

IRN has been issued to reflect the current part no. of the auxiliary connector (attached to minutes).

Assembly details and stresses of low gain antenna staff were reviewed.

See also Agenda Item 8.1.4.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## INTERFACE REVISION NOTICE

8.2.3.15-2

AFFECTED ICD		IRN	
1. NO.	REV.	2. TRACKING IDENTIFIER	3. NO.
8. MOD CODE	8. LEVEL		4. SHEET 1 OF 1
TITLE LUNAR ROVING VEHICLE TO STOWED PAYLOAD PHYSICAL AND FUNCTIONAL REQUIREMENTS		LRV-45	5. PANEL AFFECTED MECHANICAL
REASON FOR CHANGE TO REFLECT THE CURRENT PART NO. OF THE AUXILIARY CONNECTOR			6. INITIATED BY THE BOEING CO.
		10. THIS IRN EFFECTIVITY	
		LV	
		SC	
		LC	
		OTHER	LRV F1 THRU F4
CHANGE ICD EFFECTIVITY	12. TO	13. FROM	
14. NO.	15. NEW IRN EFFECTIVITY	16. PREVIOUS IRN EFFECTIVITY	

1. REVISE IRN R2 (LRV-12), SHEET 2 OF 2, ITEM 3 IN DESCRIPTION OF CHANGE AS FOLLOWS:  
CHANGE PART NO. OF AUXILIARY CONNECTOR RECEPTACLE FROM EGOE1511-98SA TO NBOE12-10SNC AND ADD MATING PLUG PART NO. NB6E12-10PNC TO PICTURE.
2. REVISE IRN R12 (LRV-17), BLOCK 17-DESCRIPTION OF CHANGE TO PAGE 19 AS FOLLOWS:
- A. CHANGE PART NUMBER OF AUXILIARY CONNECTOR FROM EGOE1511-98SA PER MSFC SPEC. 40M39550 TO NBOE12-10SNC PER MSFC SPEC. 40M39569.
  - B. DELETE OUTLINE OF PROTECTIVE CAP AND THE 1.75" DIMENSION IN PLAN VIEW
  - C. DELETE ALL REFERENCES TO PROTECTIVE CAP IN PLAN VIEW AND SIDE VIEW.

## 17. DESCRIPTION OF CHANGE

18. PREPARED BY R.S. TRUMBULL 2-11-70		19. APPROVED BY <i>[Signature]</i> 4/11/70		20. ORGANIZATION		21. DATE	
22. CONCURRE.	SIGNATURE & ORGN.	REV	DATE	SIGNATURE & ORGN.	REV	DATE	SIGNATURE & ORGN.
23. SIGN.	KSC APPROVAL	DATE	MSC APPROVAL	DATE	MSFC APPROVAL	DATE	DA
			<i>[Signature]</i>	7/11/70	<i>[Signature]</i>		975
CCSD NO.							

**MINUTES OF MEETING**

**DATE** 9/16/70 **MEETING NUMBER** CDR **AGENDA ITEM** 8.2.4  
**SUBJECT** Case Design

---

**SUMMARY OF DISCUSSION:**

Pressure transducer will be included in design.

**ACTION ITEMS:**

**NOTE:** These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

**MINUTES OF MEETING**

**DATE** 9/16/70 **MEETING NUMBER** CDR **AGENDA ITEM** 8.2.7  
**SUBJECT** Control Panel

---

**SUMMARY OF DISCUSSION:**

No Problems.

**ACTION ITEMS:**

**NOTE:** These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.



## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 8.2.8  
SUBJECT LCRU/LRV Mounting Design

---

### SUMMARY OF DISCUSSION:

LCRU Mounting leg design was presented and possibilities of reducing weight were discussed.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/15/70 MEETING NUMBER CDR AGENDA ITEM 8.2.11

SUBJECT Vibration

---

### SUMMARY OF DISCUSSION:

Data taken on the vibration tests at (Kent) Boeing was presented. This data will be reviewed by MSC and test and design levels confirmed or respecified.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER: CDR-M1
VEHICLE:				COORDINATION:
DATE: 9/15/70		INITIATOR: H.A. Schultz	ORGANIZATION:	SYSTEM:
DISCREPANCY/PROBLEM:		TITLE: LGA		
Need LGA Vibration environment. (LERV handle)				
JUSTIFICATION:  MSC has not supplied as yet.				
RECOMMENDATION:  MSC to supply.				
CONTRACTOR'S COMMENT:  RCA concurs. Information is required by <u>9/25/70</u> to support RCA inhouse vibration test program.				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS:  MSC to supply data to RCA by 10/1/70 RCA concurs.  unifire H. J. Hamilton			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS:			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved	SIGNATURE OF BOARD CHAIRMAN:		
SUSPENSE	<input type="checkbox"/> Disapproved			

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-M2
VEHICLE:				COORDINATION
DATE: 9/15/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
H.A. Schultz	MSC	LCRU	Mech.	
DISCREPANCY/PROBLEM		TITLE		
		LGA Adjustment		
<p>5° vs 10° increments for LGA elevation.</p>				
JUSTIFICATION				
<p>Teeth will get too small thus eliminating the detent "Feel".  Lower spline is 17° - why should upper be so precise.  Electrical angle of antenna is 60°.</p>				
RECOMMENDATION				
<p>Leave as 10°.</p>				
CONTRACTOR'S COMMENT				
<p>RCA concurs.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS <i>within spec - see CDR-M-22</i> <i>unspec</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE	<input type="checkbox"/> Disapproved			



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER: CDR-M3
VEHICLE:				COORDINATION
DATE: 9/15-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
H. Schultz	MSC	LCRU	Mechanical	
DISCREPANCY/PROBLEM		TITLE		
		Hand Carry Adjustment		
<p>20° increments on Rotation of LGA in hand carry mode.</p>				
JUSTIFICATION				
<p>Electrical angle of antenna is 60°, smaller increments not required.</p>				
RECOMMENDATION				
<p>Accept as is.</p>				
CONTRACTOR'S COMMENT				
<p>RCA concurs.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concurs. <i>unspecified</i> <i>H. Hamilton</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER	CDR-M4
VEHICLE:				COORDINATION	
DATE: 9/15/70					
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME	
H. Schultz		MSC	LCRU	Mech.	
DISCREPANCY/PROBLEM		TITLE			
		HGA Latching			
<p><i>Collar detent needs improvement</i></p> <p><del>Able to lock HGA mast to LRV coupling before positioning pin is located.</del></p>					
JUSTIFICATION					
<p><del>Can lock before locating.</del></p> <p>Better detent required.</p>					
RECOMMENDATION					
Reduce spring length and increase load to 10 lbs redesign.					
CONTRACTOR'S COMMENT					
<p><i>Indexing design was approved by crew on 8/17/70. RCA will</i></p> <p><del>RCA will restrict the rotation of the collar to the width of the slot and put mark on mast to facilitate proper alignment.</del></p> <p><i>encase detent in the collar.</i></p>					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY	REMARKS MSC concurs with modified RCA comments <i>amf</i> <i>R.D. Hamilton</i>				
ACTION					
SUSPENSE					
BOARD ACTION					
CATEGORY	REMARKS				
ACTION					
SUSPENSE					
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE					

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-M5
VEHICLE:				COORDINATION
DATE: 9/15/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
H. Schultz	MSC	LCRU	Mechanical	
DISCREPANCY/PROBLEM		TITLE		
		LRV/LCRU/Interface		
<p>Removal of GCTA for LCRU hand carry requirement.</p>				
JUSTIFICATION				
<p>Must have hand carry capability of LCRU.</p>				
RECOMMENDATION				
<p>RCA LCRU Group to talk to RCA GCTA Group to develop recommended solution.</p>				
CONTRACTOR'S COMMENT				
<p>Same as CDR-M9.  RCA to review problem and make recommendations by TI-5.  Problem will require coordination with LRV contractor (Boeing.)</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS <i>MSC concurs with RCA comments  am here  H. J. Hamlin</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-M6
VEHICLE:				COORDINATION
DATE: 9/15/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
H.A. Schultz	MSC	LCRU	Mech.	
DISCREPANCY/PROBLEM		TITLE		
		HGA Pointing Assembly		
<p>Remove 2 plungers and simplify HGA hinge and hinge latch.</p>				
JUSTIFICATION				
<p>HGA will never be lowered, once raised on lunar surface.</p>				
RECOMMENDATION				
<p>Redesign hinge to eliminate unnecessary plungers .</p>				
CONTRACTOR'S COMMENT				
<p>RCA feels that for safety reasons the plungers should be retained.  RCA also believes hinge latch should permit folding down antenna on moon.  <i>be retained to</i></p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS <i>Revert</i> <i>Wm Spaw</i> <i>H. J. Hamilton</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER	CDR-M7
VEHICLE:				COORDINATION	
DATE: 9-16-70					
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME	
H.A. Schultz		MSC/EE-19	LCRU	Mechanical	
DISCREPANCY/PROBLEM		TITLE			
		HGA Sight			
Still in prototype stage.					
JUSTIFICATION					
Late requirement.					
RECOMMENDATION					
MSC should review design when complete.					
Increase viewing angle to 45° from 6° point on screen.					
CONTRACTOR'S COMMENT					
RCA to present final design at TI-5 Meeting. The increased viewing angle is a new interpretation of the required viewing. RCA will incorporate design changes to increase viewing angle and present at TI-5.					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY		REMARKS			
ACTION					
SUSPENSE					
		<i>RCA to supply data at TI-5.</i> <i>amf</i> <i>A. J. Hamilton</i>			
BOARD ACTION					
CATEGORY		REMARKS			
ACTION					
SUSPENSE					
ACTION		<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE					

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-M8
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
L.J. Krawitz	RCA	LCRU	Mechanical	
DISCREPANCY/PROBLEM		TITLE		
		Zero-G Connector		
<p>There does not appear to be any provision for cable strain relief in these connectors.</p>				
JUSTIFICATION				
<p>Motion of the cables should not exert tensile stress on the connector contacts.</p>				
RECOMMENDATION				
<p>1. MSC determine if a method exists for provision of strain relief.</p> <p>2. If necessary RCA to design a replacement for the Knurled ring which will include a cable clamp.</p>				
CONTRACTOR'S COMMENT				
<p>MSC to provide RCA with direction for strain relief mechanization by <u>10/1/70</u>.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS RCA to contact MSFC personnel for required information (Bill McPeak - MSFC - 453-4653) <i>[Signature]</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER	CDR-M9
VEHICLE:				COORDINATION	
DATE: 9-16-70					
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME	
D.R. Brooks		FCSD	LCRU	Mechanical	
DISCREPANCY/PROBLEM		TITLE			
		Removal of LCRU for Hand Carry			
<p>Present design requires removal of GCTA prior to removal of LCRU from LRV for hand carry mode. Thermal cycling and vibration during sortie will likely seat GCTA staff such that removal will be difficult.</p>					
JUSTIFICATION					
Must have hand carry mode.					
RECOMMENDATION					
Modify design to allow adequate clearance for LCRU removal or provide convenient method for positive extraction of GCTA staff.					
CONTRACTOR'S COMMENT					
Same as CDR-M5. The RCA LCRU task does not encompass mounting of the GCTA, however, RCA Camden and AED will jointly review the problem. Cooperation of Boeing the LRV contractor will be essential in this review. Recommendations will be made in TI-5 Meeting.					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY		REMARKS <i>Withdrawn (Report of CDR-M-5) H. J. Handman</i>			
ACTION					
SUSPENSE					
BOARD ACTION					
CATEGORY					
ACTION					
SUSPENSE					
ACTION		<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE					



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER	CDR-M-10
VEHICLE:				COORDINATION	
DATE: 9/16/70					
INITIATOR J. Siemers		ORGANIZATION Boeing/MSD/PD-5	SYSTEM LCRU	TEAM NAME Mechanical	
DISCREPANCY/PROBLEM		TITLE Auxiliary Power Connector			
<p>Per Boeing/Huntsville ECP 1034E (attached) the Zero-G Connector will not be qualified in time to support the LRV schedule.</p>					
<p>JUSTIFICATION LRV schedule slip.</p>					
<p>RECOMMENDATION</p> <ol style="list-style-type: none"> <li>1. RCA implement IRN R-14 to ICD 13M0739 (attached)</li> <li>2. MSC approve RCA TWX ECP 32 (attached)</li> </ol> <p>NOTE: IRN R-14 specifies a receptacle part no. of NBOE12-10SNC and a mating plug part no. of NBCE12-10PNC per MSFC Spec. 40M9569.</p>					
<p>CONTRACTOR'S COMMENT</p> <p>Must have identification of vendor for P.N. N36C 12-10 PNC. RCA will implement change on DVT models if direction to proceed is provided by MSC before 10/1/70 and if the new connector is compatible with the LCRU cable.</p>					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY	<p>REMARKS</p> <p>Further, RCA is using subject ZG Connector at MSC direction and assumes it to be qualified. RCA requires clarification of the entire ZG Connector qual. status.</p> <p><i>MSC will forward contractual review to RCA by 9/20/70</i></p> <p><i>W. M. Spivey</i></p>				
ACTION					
SUSPENSE					
BOARD ACTION					
CATEGORY	REMARKS				
ACTION					
SUSPENSE					
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE					

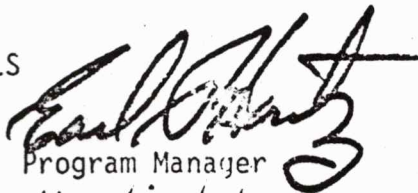


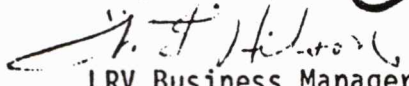
PDS/HUGH SCOTT


THE BOEING COMPANY  
LUNAR ROVING VEHICLE PROGRAM

- LINE 2 ECP 1034E, PCN VS10242
- LINE 3 Priority Urgent
- LINE 4 LRV 209001A F1-F4 and Qual, 209002A Trainer, 209008A Mock-up
- LINE 5 Change to Designation of Auxiliary Power Connector
- LINE 6 The Zero-6 connector will not be qualified in time to support the LRV Schedule so a change to an available qualified connector is necessary to meet LRV schedules.
- LINE 7 ECP 1002R2 relocates the Auxiliary Power Connector as identified on IRN R12 to 13M07391 (PIRN LRV-17 ECP 1002R2). The connector is changed from a Z60E1511-985A to a NBOE 12-10 SCN Per 40M39569 by this ECP. The bracket 209-35127 will be modified to accept the new connector. The NBOE 12-10 SNC connector is qualified and no additional qualification will be performed.
- LINE 8 September 4, 1970
- LINE 9 In line incorporation CEI 209001A F1-F4, Qual Unit retrofit before delivery, 209002A Trainer will be Mod Kit and 209008A will be a Mod Kit
- LINE 12 Spares Affected - No
- LINE 13 ICD affected - 13M07391 - A PIRN will be submitted with the formal to change to the new connector.
- LINE 14 Specification affected - CP20910001A Log Only, CP2091002A Log Only
- LINE 15 This ECP is submitted for approval without an increase in target cost or fee.

APPROVALS

  
Program Manager

  
LRV Business Manager

  
Contracts

  
Engineering

for E. J. Cowart 9/4/70

AFFECTED ICD				IRM			
1. NO. IRM 07391		REV.		2. TRACKING IDENTIFIER LRV-45		3. NO. R-11	
4. ADDTAN CODE		5. LEVEL A				4. SHEET 1 OF 1	
TITLE LUNAR ROVING VEHICLE TO STOWED PAYLOAD PHYSICAL AND FUNCTIONAL REQUIREMENTS				5. PANEL AFFECTED MECHANICAL		6. INITIATED BY THE BOEING CO.	
				10. THIS IRN EFFECTIVITY			
11. REASON FOR CHANGE TO REFLECT THE CURRENT PART NO. OF THE AUXILIARY CONNECTOR				LV			
				SC			
				LC			
				OTHER		LRV F1 THRU F4	
CHANGE ICD EFFECTIVITY		12. TO		13. FROM			
14. IRN NO.		15. NEW IRN EFFECTIVITY		16. PREVIOUS IRN EFFECTIVITY			
<p>1. REVISE IRN R2 (LRV-12), SHEET 2 OF 2, ITEM 3 IN DESCRIPTION OF CHANGE AS FOLLOWS:  CHANGE PART NO. OF AUXILIARY CONNECTOR RECEPTACLE FROM ZG0E1511-98SA TO NBOE12-10SNC AND ADD MATING PLUG PART NO. NB6E12-10PNC TO PICTURE.</p> <p>2. REVISE IRN R12 (LRV-17), BLOCK 17-DESCRIPTION OF CHANGE TO PAGE 19 AS FOLLOWS:  A. CHANGE PART NUMBER OF AUXILIARY CONNECT FROM ZG0E1511-98SA PER MSFC SPEC. 40M39580 TO NBOE12-10SNC PER MSFC SPEC. 40M39569  B. DELETE OUTLINE OF PROTECTIVE CAP AND THE 1.75" DIMENSION IN PLAN VIEW  C. DELETE ALL REFERENCES TO PROTECTIVE CAP IN PLAN VIEW AND SIDE VIEW.</p>							
17. DESCRIPTION OF CHANGE							
18. PREPARED BY R.S. TRUMBULL 2-11-70		19. APPROVED BY <i>[Signature]</i> 2/11/70		20. ORGANIZATION		21. DATE	
CONCUR.	22. SIGNATURE & ORGN.		REV	DATE	SIGNATURE & ORGN.		REV
23. KSC APPROVAL		DATE		MSFC APPROVAL		DATE	
SIGN.				<i>H. M. Smith</i>		<i>7/11/70</i>	
CCSD NO.							



Sept. 3, 1970  
LCRU 1168(-).1



NASA MSC  
Code PD-9  
Houston, Texas, 77058

Attn: Wm. Speier

Subject: LRV Connector Change - ECP 32 - ROM Cost

Per information received from R. Elbert, NASA resident on 9/2/70, the impact of changing the LRV mating connector on the LRV/LCRU/TV cable is as follows:

Based on authorization to cut in the NB6E12-10 PNC connector on the cables for the DVT systems by Oct. 1, 1970, the change can be implemented for a ROM cost of \$3000.

This change will include modifications to the LRV/LCRU/TV cable assembly drawing and connection diagram, preparation of new specification control drawing for the new connector and a new assembly process and modification of the test equipment.

  
H.J. Hamlin

HJH:jbc

cc: R. Sinderson  
J. Cunningham  
J. Idema  
M. D'Andrea  
A. Burke

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-M-11
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
D.R. Brooks	FCOD	LCRU	Mechanical	
DISCREPANCY/PROBLEM		TITLE		
		Crew Training Documentation		
<p>The present publication date for the Crew Training Manual does not adequately support Crew Training for the first LCRU Mission.</p>				
JUSTIFICATION				
<p>A recent redefinition of Apollo Missions and Crew Assignments has resulted in an earlier need date for Crew Training/Flight Checklist reference material. The original training cycle is no longer possible.</p>				
RECOMMENDATION				
<p>It is requested that RCA provide MSC informally with assembly and operation procedures no later than October 15. This information may be in rough, preliminary form, but should include all crew operations necessary to assembly and activate the LCRU. Constraints and any required "Caution Notes" should be included.</p>				
CONTRACTOR'S COMMENT				
<p>RCA has assigned J. Liggett to work with D. Brooks to fulfill above requirement.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concur with RCA comment W. J. Hamilton Wm. H. H.			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE	<input type="checkbox"/> Disapproved			



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-M-12
VEHICLE:				COORDINATION
DATE: 9/10/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
G. Pennington	NASA/FCD	LCRU	Mechanical	
DISCREPANCY/PROBLEM		TITLE		
		Placement of LGA 8-Foot Cable		
<p>Due to design of LRV battery covers, the LGA 8 foot cable would have to drape over the battery covers. This would prevent the battery covers from closing automatically.</p>				
JUSTIFICATION				
<p>Preliminary indication from RCA/Hightstown is that it is not feasible to "clothesline" the LGA cable to the GCTA.</p>				
RECOMMENDATION				
<p>"Clothesline" the LGA Cable to the HGA mast at a height sufficient to clear the LRV Battery Covers. Lengthen the LGA Cable if necessary.</p>				
CONTRACTOR'S COMMENT				
<p>RCA will investigate routing of LGA Cable via HGA mast assembly. RCA considers this a serious problem probably requiring coordination with LRV contractor. Recommendation due T.I. #5.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS			
ACTION	Review SET for 9/21/70			
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION	I identified a problem —			
SUSPENSE	Action: PD to resolve using following ground rule:			
	1. No breaking of RF connectors on lunar surface or lunar			
	2. No lengthening of RF cable			
	3. No release of hardware			
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE			W. J. Allen for R. W. Koonin 9/13/70	

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-M-13
VEHICLE:				COORDINATION
DATE: 9/16/70		ORGANIZATION	SYSTEM	TEAM NAME
INITIATOR N. B. Farmer		APO	LCRU	Mechanical
DISCREPANCY/PROBLEM		TITLE Optical Sight Design		
<p>RCA has not submitted detailed engineering drawings, therefore, the design is held open.</p>				
JUSTIFICATION				
<p>RECOMMENDATION</p> <p>Hold design open until RCA submits complete design drawings.</p>				
<p>CONTRACTOR'S COMMENT</p> <p>RCA will supply MSC with detail design drawings of HGA optical sight at TI-#5.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS <i>Withdraw - (report of CDR-M-7) [Signature]</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-4-14
VEHICLE:				COORDINATION
DATE: 9/16/70		INITIATOR		TEAM NAME
R. Holston		ORGANIZATION	SYSTEM	Mechanical
		RCA	LCRU	
DISCREPANCY/PROBLEM		TITLE		
		LM/LCRU Interface		
<p>ICD Lid 340-25162 Rev. A locates LCRU by rear mounting slot rather than rear mounting hole. (Dimension is 1.562)</p>				
JUSTIFICATION				
<p>Accurate Interface relationship is required.</p>				
RECOMMENDATION				
<p>Locate LCRU envelop from hole rather than slot. (Proper Engineering practice for accurate inspection.) ICD change is required.</p>				
CONTRACTOR'S COMMENT				
<p>MSC COMMENT</p> <p>Agree with above.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS			
ACTION	<p>MSC PONTOR - RCA/MSL/GSC to negotiate at htlc</p> <p>on 9/23-24/70. RCA agrees to support the</p> <p>meeting. <i>uniquen</i> <i>H. J. Hamilton</i></p>			
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION	<p>Negotiate Stowage/Environmental ICD's on 9/23-24/70</p> <p>- Action MSL/GSC/RCA</p>			
SUSPENSE				
ACTION	<input checked="" type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE			<p><i>uniquen</i></p> <p><i>for R. W. Bickel</i></p>	



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-M-15
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
H. Schultz	MSC	LCRU	Mechanical	
DISCREPANCY/PROBLEM	TITLE			
	Stowage Container			
No design drawing of Canister to check proposed ICD Lid 340 25162 Rev. B				
JUSTIFICATION				
RECOMMENDATION				
RCA-GAC and MSC to coordinate new ICD Rev. B.				
CONTRACTOR'S COMMENT				
RCA is proceeding with design of stowage container. RCA will supply MSC with container outline drawing by TI-5. Outline will be in accordance with RCA/GAC Meeting 8-25-70. (Minutes presented at LCRJ CDR.)				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS			
ACTION	CONTAINER INTERVIEW conducted at GAC on 9/23-24/70			
SUSPENSE	RCA to support RCA to submit drawing of container by TI-5. RCA supply envelope container 9/25/70. H. J. Hamlin Wmsper			
BOARD ACTION				
CATEGORY	REMARKS			
ACTION	MSC/GAC/RCA TO NEGOTIATE WITH GAC at GAC on 10/23-24/70			
SUSPENSE	RCA to supply necessary support for sign-off of ICD			
ACTION	<input checked="" type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE			Wmsper for R.W. Kubicki 9/18/70	



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-M-16
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
H. Schultz	MSC	LCRU	Mechanical	
DISCREPANCY/PROBLEM		TITLE Case Drawing 8370873		
<p><i>configuration</i> Handle <del>location</del> may change due to Crew Station Review on September 21, 1970.</p>				
<p>JUSTIFICATION</p> <p>Hand hold must fit gloved hand.  <i>Handhold must enable separate LCRV removal from pallet, removal of LCRV with pallet, and hand carry operation</i></p>				
<p>RECOMMENDATION</p>				
<p>CONTRACTOR'S COMMENT</p> <p>RCA requires inputs from 9-21-70 CSR. Changes will be implemented into DVT models.</p>				
<p>TEAM CAPTAIN RECOMMENDATION</p>				
CATEGORY	<p>REMARKS</p> <p><i>and resolved - to be evaluated, at crew review on 9/21/70 written J. Franklin</i></p>			
ACTION				
SUSPENSE				
<p>BOARD ACTION</p>				
CATEGORY	<p>REMARKS</p>			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE	<input type="checkbox"/> Disapproved			

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-M-17
VEHICLE:				COORDINATION:
DATE: 9/16/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
H. Schultz	MSC	LCRU	Mechanical	
DISCREPANCY/PROBLEM		TITLE		
		Case Drawing 8370873		
<p>Many changes in hardware holes due to incomplete drawings.</p>				
JUSTIFICATION				
RECOMMENDATION				
<p>CONTRACTOR'S COMMENT</p> <p>There is one hold to be changed to extend mounting foot of voltage regulator. Mounting foot was extended to avoid screw interference with terminals. Other mounting holes in shelf were changed to accommodate cabling and mechanical fit of subassemblies. Action resulted from RCA review of Engineering Model. <i>These changes to be incorporated in CDR drawing sign off.</i></p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	<p>REMARKS</p> <p>MSC concurs with signature of J. H. Gordin</p>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	<p>REMARKS</p>			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-M-18
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR H. Schultz	ORGANIZATION MSC	SYSTEM LCRU	TEAM NAME Mechanical	
DISCREPANCY/PROBLEM		TITLE Thermal Blanket		
<p>VHF Antenna hole doesn't have fiberglass and teflon insulation as per T.I. Meeting. VHF antenna cannot assume correct bending curvature.</p>				
<p>JUSTIFICATION</p> <p>Thermal cover only has slit</p>				
<p>RECOMMENDATION</p> <p>Double slit cover to meet curvature</p>				
<p>CONTRACTOR'S COMMENT</p> <p>RCA will review problem and make recommendation by TI-5.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS RCA to provide design detail by 10/1/70 <i>H. J. Anderson</i> <i>mxspace</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-M-19
VEHICLE:				COORDINATION
DATE:				
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME
H. Schultz		MSC	LCRU	Mechanical
DISCREPANCY/PROBLEM		TITLE		
		ICD LID 340-25162-B		
<p>Zone 9B .170/.160 was .190/.80</p> <p>Zone 7A GFE Dim. 1.570 was added to Drawing by eliminating opposite end. 1.550</p> <p>Zone 6A Slot dim omitted</p> <p>Zone 11B Bracket drawing wrong</p> <p>Zone 8 Bed Handle missing</p>				
JUSTIFICATION				
<p>Clarify .2530/2520 holes</p> <p>Shim material was to be teflon - need proposed drawing</p> <p>On Sheet #2 - Shim should be in two directions</p> <p>On Sheet #2 - Clarify where bar holds battery in place</p> <p>On Sheet #3 - Does not show extra lower in board corner space</p>				
RECOMMENDATION				
<p>Zone 9 D .190/.180</p> <p>Zone 7 A - Agree to this change</p> <p>Zone 6A - Add Dim. .625 for elongated slot</p> <p>Zone 11B - Correct</p> <p>Zone B &amp; D &amp; 11 B - Add Handle</p> <p>Zone 19 - Should show RCA outline rather than 10' erectable details</p>				
CONTRACTOR'S COMMENT				
<p>RCA concurs that the corrections should be made in the LM ICD. If the changes were not made the LCRU design could be affected. RCA has received B1 to this ICD and requires contractual status of Rev. B indicated above.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	<p>REMARKS</p> <p>MSC will forward these comments to SAC</p> <p>By 6/21. TO be negotiated with SAC on 6/23-24/70</p> <p>A. J. Franklin</p>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE				



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION 5.0		NUMBER CDR-M-20
VEHICLE:				COORDINATION
DATE: 9/15/70		INITIATOR		TEAM NAME
W. Speier		ORGANIZATION	SYSTEM	
			LCRU	
DISCREPANCY/PROBLEM		TITLE TV Camera Mast Insert		
<p>TV antenna mast insert and interface to LCRU needs to be identical to LCRU HGA Mast insert.</p>				
<p>JUSTIFICATION</p> <p>Interface compatability and cost savings.</p>				
<p>RECOMMENDATION</p> <p>REA / comment to provide ADAPTERS / LCRU INSERTS.</p>				
<p>CONTRACTOR'S COMMENT</p> <p>LCRU will provide inserts for the TV Camera mount per agreement with RCA AED.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	<p>REMARKS</p> <p>MSC concurs with Phil Hamilton</p>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	<p>REMARKS</p>			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION 1-2		NUMBER CDR-M-21
VEHICLE:				COORDINATION
DATE: 9/15/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
H. Scott	MSC	LCRU		
DISCREPANCY/PROBLEM	TITLE Pre-launch assembly items			
<p>MSC/MSFN requires pre-launch assembly items for LRV qual.</p>				
<p><b>JUSTIFICATION</b></p> <p>Required for LRV qualification tests by October 19.</p>				
<p><b>RECOMMENDATION</b></p> <p>RCA supply: LCRU/LRV legs HGA-Insert Cable - with mock-up ZG connector and connector to IRN-R-14 TV insert</p>				
<p><b>CONTRACTOR'S COMMENT</b></p> <p>RCA can supply these items if so authorized. Cost approximately \$2,500. Delivery 10/19. Authorization required by 9/18. MSC to provide LRV connector to RCA by 10/5.</p>				
<b>TEAM CAPTAIN RECOMMENDATION</b>				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
<b>BOARD ACTION</b>				
CATEGORY	REMARKS RCA to provide above items by 10/19/70 MSC to provide CCA coverage by 9/21/70			
ACTION				
SUSPENSE				
ACTION	<input checked="" type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN WMSF for R.W. Kubick	
SUSPENSE				

TYPE OF REVIEW:		REVIEW ITEM DISPOSITION		NUMBER	CDR-M-22
VEHICLE:				COORDINATION	
DATE:					
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson				Mechanical	
DISCREPANCY/PROBLEM		TITLE			
		LGA Pointing Adjustment Resolution			
<p>The mechanical design for the LGA pointing mechanism is totally unacceptable for both elevation and azimuth adjustments. This implementation seriously compromises one of the most important communications design requirements.</p>					
<p><b>JUSTIFICATION</b> The initial requirement for downlink voice/data communications was for omni coverage to preclude manual antenna pointing by the crew. LCRU system tradeoffs showed that total coverage was impractical due to the weight impact. The best beamwidth that could be practically implemented was <math>+30^{\circ}</math> which is marginal at best, considering Rover movements. The crew will be required to re-point the antenna on numerous occasions. The mechanical design of the LGA mast adjustability should in no way further compromise the present beamwidth of <math>+30^{\circ}</math>. However, the present mechanical design has discrete azimuth steps every <math>17^{\circ}</math> and elevation steps at <math>10^{\circ}</math>.</p>					
<p><b>RECOMMENDATION</b></p> <p>Redesign the LGA pointing mechanism to allow for continuous adjustability rather than discrete step adjustments.</p>					
<p><b>CONTRACTOR'S COMMENT</b></p> <p>Elevation - RCA can provide design of elevation hinge to replace teeth with friction surface.</p> <p>Azimuth: RCA can redesign and incorporate a conical slip clutch inside the staff grip to couple the grip to the spline, and key the grip to the staff rather than the spline to the staff.</p> <p>Hand Carry Mode: No changes in disconnect or in discrete positioning of "plug-in"</p>					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY		REMARKS			
ACTION					
SUSPENSE					
BOARD ACTION					
CATEGORY		<p>MSC to provide CCA to RCA by 8/2/70</p> <p>RCA to submit ECP as required</p>			
ACTION					
SUSPENSE					
ACTION		<input checked="" type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE				<p>Wm J. [Signature]</p> <p>for R. W. Klink 9/18/70</p>	

CONTRACTOR'S COMMENT (Continued)

mounting post. Conceptual sketches and mock up will be available by TI-6.  
Estimated Cost is 10K.



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-M-23
VEHICLE:				COORDINATION
DATE: 9/2/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson	MSC/EE16	LCRU	Mechanical	
DISCREPANCY/PROBLEM		TITLE		
		Launch Depressurization Requirement		
<p>1. The launch depressurization spec in the SCDs is not applicable for internal compartment subassemblies.</p> <p>2. The SE-C-0043 spec for the LCRU assembly is in error for the depressurization time, i.e. should be 2 minutes rather than 3.5 minutes.</p>				
JUSTIFICATION				
<p>RECOMMENDATION</p> <p>1. RCA to modify requirement for internal subassembly SCDs if this requirement is affecting the hardware design. Spec should only include the depressurization profile anticipated during LCRU pressure compartment purging.</p> <p>2. Assembly depressurization time should be changed from 3.5 to 2 minutes.</p>				
<p>CONTRACTOR'S COMMENT</p> <p>RCA will review proposed requirement change and make recommendations at TI-5.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concurs with <del>MSC</del> RCA Recommendation <i>Pl. J. Sinderson</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-M24
VEHICLE:				COORDINATION
DATE: 9/1/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
T. H. Chase	BOEING/PD5	LCRU	Mechanical	
DISCREPANCY/PROBLEM		TITLE		
		LRV/LCRU Mounting Interface Tolerance Analysis		
<p>The tolerance analysis used a value of 0.01 for the tolerance on the spacing of the holes on the LRV chassis on which the LCRU will be mounted. This is consistent with IRN R-6 of 13MO7391, the controlling ICD. However, the use of RCA tooling to attach the holes should result in a lower tolerance by an order of magnitude.</p>				
<p><b>JUSTIFICATION</b></p> <p>The tolerance analysis does not represent the actual configuration which will be controlled by the RCA tooling.</p>				
<p><b>RECOMMENDATION</b></p> <p>The tolerance analysis should be repeated using a more realistic number for this tolerance. The ICD's and engineering drawings should be flagnoted to indicate that the dimensions are controlled by the jig.</p>				
<p><b>CONTRACTOR'S COMMENT</b></p> <p>The assembly tool is designed to produce an assembly configuration safely within the 0.01 tolerance permitted by the controlling I.C.D. However, the I.C.D. not the assembly tool, sets the criteria for acceptance. If a change (as recommended by the reviewer) is made in the Boeing Engineering drawings and the controlling I.C.D., the tolerance analysis will be revised accordingly.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS <i>Reject the recommendation - accept RCA comments</i> <i>Ed J. Hulin</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-M-25
VEHICLE:				COORDINATION
DATE: 9-10-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
H. Schultz	MSC/FE19	LCRU	Mechanical	
DISCREPANCY/PROBLEM	TITLE			
	LM ICD Dimension			
LM ICD dimension 1.952 is not confirmed by dimensions on View L-L.				
JUSTIFICATION				
RECOMMENDATION				
Correct drawing.				
CONTRACTOR'S COMMENT				
Cancell (Due to incorrect drawing first supplied)				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS <i>Withdrawn unspec J. D. Hamlin</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

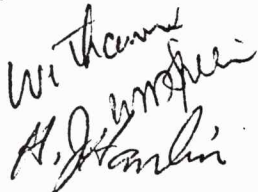


TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-M26
VEHICLE:				COORDINATION
DATE: 9/11/70				
INITIATOR R. Sinderson		ORGANIZATION MSC	SYSTEM LCRU	TEAM NAME Mechanical
DISCREPANCY/PROBLEM		TITLE Crew Interface Visual Markings		
<p>Alignment, color coding, etc. marks are not shown on HGA mast, antenna cables and connectors, ZG connector, etc.</p>				
JUSTIFICATION				
RECOMMENDATION  Add information to drawings.				
CONTRACTOR'S COMMENT  RCA will comply.				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concurs <i>[Signature]</i> <i>[Signature]</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-M-27
VEHICLE:				COORDINATION
DATE: 9/11/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson	MSC	LCRU	Mechanical	
DISCREPANCY/PROBLEM		TITLE		
		Crew Interface Design Delta CDR		
<p>Due to continued design changes, a final engineering model configuration crew station review has not been held. The crew/LRV/LCRU interface design aspects cannot be finally approved until after crew review on September 21, 1970 (delta CDR for crew interface). RCA must have the <del>engineering model subsystem</del> <i>completely</i> updated to CDR design if at all possible, including all alignment/ color code marks.</p>				
JUSTIFICATION				
RECOMMENDATION				
Have delta CDR for crew interface with updated hardware.				
CONTRACTOR'S COMMENT				
RCA will have updated engineering model equipment at the 9-21-70 crew review.				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS <i>MSC concurs</i> <i>was spec'd by Hamilton</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE				



TYPE OF REVIEW: CDR	REVIEW ITEM DISPOSITION		NUMBER CDR-M-29
VEHICLE:			COORDINATION
DATE: 9/14/70	INITIATOR	ORGANIZATION	SYSTEM
	R. Sinderson	MSC/EE16	LCRU
			TEAM NAME
			Mechanical
DISCREPANCY/PROBLEM		TITLE	
		HGA Pointing Friction Adjustment	
<p>Under earth-weight operations, the HGA pointing friction adjustment has been coarse, i.e. a very small movement in the friction handle results in full restraint to zero restraint. If the mechanism is designed for lunar weight, how much angular rotation is allowed from the point of full restraint to the point where the friction will not support the antenna weight?</p>			
JUSTIFICATION			
<p>Adequate adjustment resolution is required in order to ensure smooth pointing by a suited crewman.</p>			
RECOMMENDATION			
<p>Provide the above information for crew review.</p>			
CONTRACTOR'S COMMENT			
<p>RCA will supply information by 9-21-70.</p>			
TEAM CAPTAIN RECOMMENDATION			
CATEGORY	REMARKS		
ACTION			
SUSPENSE			
BOARD ACTION			
CATEGORY	REMARKS		
ACTION			
SUSPENSE			
ACTION	<input type="checkbox"/> Approved	SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE	<input type="checkbox"/> Disapproved		



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION 5.0		NUMBER CDR-M-30
VEHICLE:				COORDINATION
DATE: 9/15/70				
INITIATOR E. Fendell	ORGANIZATION	SYSTEM LCRU	TEAM NAME	
DISCREPANCY/PROBLEM		TITLE LCRU VHF Antenna Stow during Walk		
<p>VHF antenna stow may not be permitted to be flat against LCRU during walk mode.</p>				
<p><b>JUSTIFICATION</b></p> <p>Assurance of communication capability is not available.</p>				
<p><b>RECOMMENDATION</b></p>				
<p><b>CONTRACTOR'S COMMENT</b></p> <p>RCA will conduct some radiation tests and report on their results by TI #6.</p>				
<p align="center"><b>TEAM CAPTAIN RECOMMENDATION</b></p>				
CATEGORY	<p>MSC concurs with RCA Recommendation  <i>Withdrawn in favor of</i>  <i>CDR E-002</i>  <i>H. J. Guehn</i> was here</p>			
ACTION				
SUSPENSE				
<p align="center"><b>BOARD ACTION</b></p>				
CATEGORY				
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE	<input type="checkbox"/> Disapproved			



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-41-31
VEHICLE:				COORDINATION
DATE: 9/17/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
J. Siemens	Boeing/MSD/PD5	LCRU	Mechanical	
DISCREPANCY/PROBLEM		TITLE		
		IRN's R15 and R16 to ICD 13M07391		
<p>IRN's R15 and R16 to ICD 13M07391 (LRV to Payload) are not on RCA's contract. These IRN's define the interface design requirement between the LRV forward chassis and RCA's post assembly and adapter interface.</p>				
<p>JUSTIFICATION</p> <p>RCA design may not meet the LRV design requirements.</p>				
<p>RECOMMENDATION</p> <ol style="list-style-type: none"> <li>1. RCA implement the design requirements on IRN's R15 and R16.</li> <li>2. MSD initiate contractual direction to RCA for incorporating these IRN's into the LCRU top spec.</li> </ol>				
<p>CONTRACTOR'S COMMENT</p> <p><i>RCA has coordinated on the technical contents of R15&amp;16 and will provide response of agreements after receipt of CCA.</i></p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS <i>MSD will provide contractual direction by 9/25/70. Wm. J. Hamilton</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE	<input type="checkbox"/> Disapproved			

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER	CDR-M-32
VEHICLE:				COORDINATION	
DATE: 9/17/70					
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME	
J. Siemers		Boeing/MSD/PD	LCRU	Mechanical	
DISCREPANCY/PROBLEM		TITLE			
		Missing Documentation			
RCA workmanship spec. was not available for review (RCA No. 8030020).					
JUSTIFICATION					
Manufacturing tolerances can not be verified, therefore, ICD compliance can not be checked.					
RECOMMENDATION					
Provide workmanship spec.					
CONTRACTOR'S COMMENT					
RCA will comply by 9/21/70					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY		REMARKS MSC concurs with RCA comment unfettered by J. Hamlin			
ACTION					
SUSPENSE					
BOARD ACTION					
CATEGORY		REMARKS			
ACTION					
SUSPENSE					
ACTION		<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE					

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER <i>CDR-41-33</i>
VEHICLE:				COORDINATION
DATE: <i>9/17/70</i>				
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME
J. Siemers		Boeing/MSFC/PD5	LCRU	Mechanical
DISCREPANCY/PROBLEM		TITLE <i>LCRU Power Cable Stowage/LGA cable Tiedown on LRV.</i>		
<p>Definition of the LCRU Power Cable Stowage on the LRV is an open MSFC/MSFC interface. LRV tiedown provisions for the LGA cable is also open.</p>				
<p>JUSTIFICATION</p> <p>MSFC/Boeing cannot design the LRV stowage and tiedown provisions without this information.</p>				
<p>RECOMMENDATION</p> <ol style="list-style-type: none"> <li>1. RCA provide MSFC with detail design drawing of cables. Drawing should include dimensions and tolerances.</li> <li>2. MSFC/PD5 coordinate RCA Design Requirements with MSFC.</li> </ol>				
<p>CONTRACTOR'S COMMENT</p> <p><i>RCA will submit cable drawing by 10/1/70</i></p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS <i>msc cannot with RCA cannot</i> <i>H. J. Hamilton am spec</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



TYPE OF REVIEW:		REVIEW ITEM DISPOSITION		NUMBER <i>CDE-07-34</i>
VEHICLE:				COORDINATION
DATE:				
INITIATOR  H. A. Schultz		ORGANIZATION  MSC	SYSTEM  LCRU	TEAM NAME  Mechanical
DISCREPANCY/PROBLEM  <i>SOME</i> <del>Most</del> of the mechanical drawings have not been checked and signed off by RCA.		TITLE  Mechanical Drawings		
JUSTIFICATION  Do not have confidence if parts will fit. No way to check.				
RECOMMENDATION  Submit checked and signed off drawings.				
CONTRACTOR'S COMMENT  <i>RCA will bring outstanding drawings and review with MSC during week of 9/28/70</i>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS  <i>MSC concurs with RCA comments.</i> <i>M. J. Hamlin</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE				



THERMAL SPLINTER MEETING  
September 16, 1970  
AGENDA ITEM - 9.0

ATTENDEES

<u>NAME</u>	<u>ORG</u>
W. Bobo	MAS/PD9/GE
E. Chimenti (Chairman)	NASA MSC
J. F. Clawsoy	Boeing/Houston
Ron Creel	NASA/MSFC/S&S-ASTN-PFA
E. Fendell	NASA/MSFC/FC2
G. Grube (Co-Chairman)	RCA LCRU Design
J. H. Hunter	Boeing/Houston
A. W. Joslyn	MSC/PD9
J. W. Orsag	NASA MSC
H. Rosenthal	RCA LCRU PMO
R. Scott	RCA LCRU Design
Ben Shelpuk	RCA LCRU Design

## MINUTES OF MEETING

DATE 9/16/70 MEETING NUMBER CDR AGENDA ITEM 9.1  
SUBJECT Thermal Design

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### SUMMARY OF DISCUSSION:

RCA presented summary of design, time-lines and traverses and analysis.

Boeing questioned affect of dust while keeping cover open during traverse. RCA answered that an  $\alpha$  of .2 as agreed with MSC for dusty radiator will allow proper performance.

MSC asked about effect of TV standby at end of sorties. RCA presented an analysis for hot traverse and indicated that cold traverse was a less severe case.

RCA proposed procedure of radiator to be 35% open, 65%, and 100% for hot traverse, and indicated that cold traverse was a simpler case.

RCA proposed procedure of radiator to be 35% open, 65% and 100% for hot traverse, so that effect of dust is minimized. MSC questioned why the cover can't be opened uniformly each time. Operational procedure will depend on definition of mission.

Component and phase change material (PCM) hot spots were summarized. MSC questioned whether tests verified the analysis. RCA noted discrepancies in current test results and indicated very good correlation of results of first series of tests prior to chamber difficulties.

### ACTION ITEMS:

- CDR-T-001 - Circuit Breaker
- CDR-T-002 - HGA orientation
- CDR-T-005 - HGA & LGA SCD discrepancies
- CDR-T-006 - HGA test for deployment

**NOTE:** These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/16 MEETING NUMBER CDR AGENDA ITEM 9.2  
SUBJECT Thermal Design

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### SUMMARY OF DISCUSSION:

RCA stated the radiating surface spectral properties are based on calculations. There was some discussion of the disadvantages of large cover being attached with velcro only, and what might happen if the cover is lost.

Blanket thermal properties will be confirmed in testing.

RCA presented thermal finishes on LCRU items. MSC questioned finishes on those portions of HGA that might be touched by crew, such as rib supports.

RCA presented component temperatures. Battery is at worst case limit at end of 3rd EVA. MSC questioned if the battery is temp. tested. The temperature is based on analysis and test data.

MSC also questioned junction temp. rises of Conic Transmitter components that exceeded the derating guidelines.

Minutes were reviewed and action items will be covered by RID's.

MSC requested definition of the requirement on the LCRU for temperature limits on parts that the Astronaut would touch. MSC stated that a max. temperature of +250<sup>0</sup> F had been indicated in previous T.I. Meetings. RCA indicated that this figure had not been understood to be a requirement but it would be implemented if this is to be considered as a requirement. (This does not include antenna ribs, mesh, and other items that the Astronaut would not normally handle.)

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/16/70 MEETING NUMBER CDR AGENDA ITEM 9.1 (Contd)  
SUBJECT Thermal Design

---

### SUMMARY OF DISCUSSION:

Radiator temperatures were presented for TV standby between EVA's with radiator full open at end of each EVA. During rest with clean radiator LCRU can tolerate the TV standby mode. MSC suggested that some heat can be cut out of standby analysis mode. More specific data is required on battery power and TV standby mode dissipation to determine feasibility of this mode. MSC is looking for temp. data of LCRU on lunar surface.

MSFC questioned RCA's concentration on 3 EVA mode while they were concentrating on 4 EVA's. RCA stated this was LCRU worst case condition but TV standby could change this.

Parking orientation analysis was discussed with no significant comment.

Walk analysis based on LCRU at 90° start of each EVA allows 4 hours of walk for first two EVA and about 3 hours for 3rd EVA.

Individual components were discussed. Coupling between battery and baseplate assumed to be 3 Btu/hr °F, was verified by test.

Weston meter is very close to qual temp. when parking with left sun.

Circuit breaker analysis noted potential problem of button  $4/\epsilon > .6$  due to handling and if button is tightly coupled to bi-metal. Can only be verified by testing.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.



## MINUTES OF MEETING

DATE 9/16/70 MEETING NUMBER CDR AGENDA ITEM 9.1 (Contd)  
SUBJECT Thermal Design

---

### SUMMARY OF DISCUSSION:

RCA has proposed adding qual testing in ECP 20, for meter and breaker. MSC did not approve performing these tests.

Optical sight is loosely coupled(thermally) to HGA. In cold traverse worst case, cement in optical sight may get as low as -100°F. If this creates a problem thermal testing is indicated.

Discussion concerning closing of HGA during traverse raised questions of plan for deployment of HGA and if there is a resulting thermal problem. HGA drum will be anodized.

Minutes were reviewed and it was agreed that action items will be covered in the attached RID's.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/16/70 MEETING NUMBER CDR AGENDA ITEM 9.3  
SUBJECT Thermal Meeting

---

### SUMMARY OF DISCUSSION:

Thermal Test #2 was run to evaluate thermal characteristics of LCRU with P.C.M. packages during hot mission time line. In response to MSC questions it was stated that TV camera was not included in test to simplify evaluation of thermal effects on LCRU and that thermocouples were on outside of blanket as well as outside of case.

RCA stated that curve of average baseplate temperature (Phase 1) indicates that starting at 90° with clean radiator and PCM solidified the LCRU can get 7-8 hours of operation in worst case.

Predicted highest average baseplate temp. for simulated hot mission did not exceed 125°, and compared very closely to temperatures for first two EVA's before chamber failed. When test was rerun, results did not correlate. It was determined that power was kept on for extra 2 hours to make up for chamber problems in 1st EVA. Data must still be analyzed to evaluate what happened.

Handout was presented of LCRU temperatures for all thermocouples, for Phase I test.

RCA stated that test data evaluated to date confirms analytical results.

Minutes were reviewed and action items will be covered by RID's.

### ACTION ITEMS:

CDR-T-004 Thermal Test #2.

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-T-001
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
E. Chimenti	MSC ES 55	LCRU	Thermal	
DISCREPANCY/PROBLEM		TITLE		
		LCRU Circuit Breaker Thermal Design		
<p>No thermal environment test is planned for circuit breaker and button assembly.</p>				
JUSTIFICATION				
<p>A potential problem of tripping the circuit breaker at low amperage exists if the button coating is severely degraded and the button thermal coupling is strong to the breaker. Coating degradation by the crew glove is likely and the thermal coupling is not exactly known. The most effective way of verifying the design is through a test.</p>				
RECOMMENDATION				
<p>Perform thermal test of circuit breaker and button assembly with worst case degradation of switch (0% to .9/.9).</p>				
CONTRACTOR'S COMMENT				
<p><sup>A</sup>  <del>CDR R-15</del> Solar radiating thermal vacuum test is indicated RCA will determine whether test is to be done on the circuit breaker, alone or the entire LCRU and propose a procedure.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concurs with modified rec. comment. <i>W. J. Hamilton</i> unspecified			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-T-002	
VEHICLE:				COORDINATION	
DATE: 9/16/70					
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME	
R.A. Creel		MSFC S&E-ASTN-PFA	LCRU	Thermal Design	
DISCREPANCY/PROBLEM		TITLE			
		HGA Orientation Between Sorties			
<p>Orientation of high gain antenna between sorties when LRV dust covers are raised.</p>					
JUSTIFICATION					
<p>Improper placement and/or orientation of a folded or unfolded high-gain antenna at the end of a sortie will impact (increase) the cool down period for the LRV batteries.</p>					
RECOMMENDATION					
<p>Further studies are needed to determine the optimum placement of the high gain antenna to minimize the effect on LRV battery cool down time.</p>					
CONTRACTOR'S COMMENT					
<p>RCA will evaluate MSFC's study results on impact to LCRU when results of such studies are available. If requested, RCA will submit a proposal for the analysis upon receipt of detail LRV battery cooling requirements from Boeing.</p>					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY		REMARKS <i>Concur with RCA recommendation at Jiffyline umfress</i>			
ACTION					
SUSPENSE					
BOARD ACTION					
CATEGORY		REMARKS <i>MSFC SHOULD PERFORM STUDY BASED ON THERMAL IRN WHICH WAS PREVIOUSLY AGREED TO BY MSC/MSFC.</i>			
ACTION					
SUSPENSE					
ACTION		<input type="checkbox"/> Approved		SIGNATURE OF BOARD CHAIRMAN <i>umfress</i> <i>for EW Kosick</i> 9/18/70	
SUSPENSE		<input checked="" type="checkbox"/> Disapproved			




TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-T-003
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
Chimenti	MSC ES55	LCRU	Thermal	
DISCREPANCY/PROBLEM		TITLE		
		Conic S-Band XMTRS		
<p>Thermal analysis/test data on the S-Band XMTRS components show that the allowable temperature limits presented will be exceeded (viewgraph 9.2-11).</p>				
<p>JUSTIFICATION</p> <p>Analysis used represents realistic max temperature levels (140°F baseplate) therefore, temperatures are not overly conservative.</p>				
<p>RECOMMENDATION</p> <p>Resolve temperature limits and qualify through test at max expected temperatures.</p>				
<p>CONTRACTOR'S COMMENT</p> <p>CDR-R-14 - Conic/RCA will supply justification for all components that exceed derating guidelines. Refer RID CDR-R-14 for further details.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS <i>WITHDRAWN See CDR-R-14 amf/see A. J. Hamilton</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

NASA — MSC

TYPE OF REVIEW: <u>CDR</u>		REVIEW ITEM DISPOSITION		NUMBER <u>CDR-T-005</u>
VEHICLE:				COORDINATION
DATE: <u>9/16/70</u>				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
E. Chimenti	MSC/ES55 ]	LCRU	Thermal	
DISCREPANCY/PROBLEM		TITLE		
		SCD S-Band Low & High Gain Antenna 8555260/8555262		
<p>The lunar surface temperature criteria for the thermal design (Section 3.1.7) is not consistant between documents. 8555260, LG antenna states +250°F (90° sun angle) and 8555262, HG antenna states +220°F (60° sun angle).</p>				
JUSTIFICATION				
<p>Lunar surface temperature thermal design criteria should be consistent throughout all SCD's.</p>				
RECOMMENDATION				
<p>Correct SCDs by ECN.</p>				
CONTRACTOR'S COMMENT				
<p>ECN 8555260 Rev. A changes LGA to be consistent with HGA.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concurs with RCA comment <i>H. J. Franklin</i> <i>Wm. Speer</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE		<i>Wm. Speer</i>		



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-T-006
VEHICLE:				COORDINATION
DATE: 9-16-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
E. Chimenti	MSC/ES55	LCRU	Thermal	
DISCREPANCY/PROBLEM		TITLE		
		SCD High Gain Antenna 8555262		
<p>No test requirements found for deployment and folding antenna with worst hot and cold conditions on antenna.</p>				
JUSTIFICATION				
<p>A deployment and folding test should be performed with the high gain antenna under worst hot and cold thermal environments to insure that thermal distortions do not impair proper operation.</p>				
RECOMMENDATION				
<p>RCA to provide rationale on why deployment is not in their test plans.</p>				
<p>CONTRACTOR'S COMMENT RCA will exercise the HGA at storage temp during DVT at -65°F and +145°F. The HGA will be removed from the MESA at temps from 50°F to 90°F and it will be deployed in a very short time, certainly well before the temps of the antenna or its opening mechanism change by a watts of a few degrees.</p> <p>Performance of opening - closing tests on the HGA under thermal/vacuum-Solar Simulated condition would require facilitation and equipment which RCA does not possess and the GFE chamber provided by MSC is not large enough. (over)</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS			
ACTION	<p>MSC/LIA action to evaluate possibility of performing this test during test during a dry DVT-tester (chamber A or B provided) was here</p>			
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



## CONTRACTOR'S COMMENT (Continued)

RCA further suggests that this type of test should be considered by MSC during the LRV/LCRU SR/TV tests in December.

CDR-46-7

TYPE OF REVIEW: <u>PRE-CDR</u>		REVIEW ITEM DISPOSITION		NUMBER: <u>PCDR-46</u>
VEHICLE:				COORDINATION
DATE: <u>9-14-70</u>				
INITIATOR  R. Sinderson		ORGANIZATION  MSC/EE16	SYSTEM  LCRU	TEAM NAME  Thermal
DISCREPANCY/PROBLEM		TITLE Z.G. Connector Thermal "Bootie"		
Thermal "bootie" over Z.G. connector is not shown on cable drawing.				
JUSTIFICATION				
RECOMMENDATION  Make drawing addition showing the thermal covering.				
CONTRACTOR'S COMMENT  RCA will supply				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS  MSC concurs with RCA comment <i>A.D. Hamilton won Spec</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE	<input type="checkbox"/> Disapproved			

SPLINTER MEETING - TEST/CHECKOUT

SEPTEMBER 16, 1970

AGENDA ITEM 10.0

ATTENDEES:

W. Cochrane	KSC
E. DeBaecke	RCA
N. Farmer	MSC
T. Grace	MSC
C. Haddick	MSC/LEC
C. Howard	GAC
D.V. Howard	RCA
C. Laubach	MSC
J. Miller	MSC
R. Whitson	MSC

## MINUTES OF MEETING

DATE 9/16/70 MEETING NUMBER CDR AGENDA ITEM 10.0  
SUBJECT Test Program Summary

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### SUMMARY OF DISCUSSION:

MSC indicated that the LRV/LCRU EMC test will slip to right to 16 December 1970 to 8 January 1971 time period. MSC requests that Battery Qualification Test Procedure be supplied for review. RCA will need MSC expedited review to prevent schedule slip of Battery deliveries. MSC battery expert reviewed all battery test plans and agreed with test plans except for comments herein. See Test Program Summary schedules for battery Qualification Test Procedure dates.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.



## MINUTES OF MEETING

DATE 9/16/70 MEETING NUMBER CDR AGENDA ITEM 10.0  
SUBJECT Battery Cell Acceptance Procedure

---

### SUMMARY OF DISCUSSION:

MSC questioned the pressure drop allowed in cell acceptance testing. RCA should verify that the allowable pressure drop (0.3 psig) at cell test represents cell container relaxation rather than allowable leak rate.

RCA indicated that all flight model batteries would be drop - shipped to KSC. None will be included with an LCRU subsystem at RCA sell-off.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/16/70 MEETING NUMBER CDR AGENDA ITEM 10.0  
SUBJECT Battery DVT and Qual

---

### SUMMARY OF DISCUSSION:

MSC questioned the lack of an acceleration test on the DVT or Qual. Test.

MSC indicated that case proof (cell container burst pressures) should be investigated and/or confirmed.

### ACTION ITEMS:

See RID - CDR-C-003

See RID - CDR-C-004

**NOTE:** These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/16/70 MEETING NUMBER CDR AGENDA ITEM 10.0  
SUBJECT Battery Activation Procedure

---

### SUMMARY OF DISCUSSION:

MSC indicated that a new battery vacuum activation procedure is being implemented on all batteries at KSC. MSC recommended that RCA and Yardney follow this new procedure prior to all DVT and Qualification. After filling battery slowly decrease the pressure to 0.5 PSIA max. for about 15 seconds and return to ambient.

Eliminates excess gas and allows electrolyte to go into plates and improves cell voltages.

MSC provided at CDR Preliminary copy of recommended KSC Flight Battery Activation Procedure for RCA/Yardney review.

### ACTION ITEMS:

See RID - CDR-C-005.

**NOTE:** These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/16/70 MEETING NUMBER CDR AGENDA ITEM 10.0

SUBJECT DVT and Qual. Testing

---

### SUMMARY OF DISCUSSION:

RCA requested Reliability and Quality efforts to expedite potential chamber anomalies during qualification SRTV. MSC R & QA indicated real-time support with assistance as required to restart test at the point of anomaly based on engineering judgement.

### ACTION ITEMS:

**NOTE:** These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.



## MINUTES OF MEETING

DATE 9/16/70 MEETING NUMBER CDR AGENDA ITEM 10.0  
SUBJECT DTV EMI Test

---

### SUMMARY OF DISCUSSION:

MSC indicated that the Receiver Front End Rejection EMI test be sensitive to the CSM up link S-Band Frequency (2106.4 MHz).

Also RCA should check this frequency in Qualification EMI Test (Receiver Front End Rejection).

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/16/70 MEETING NUMBER CDR AGENDA ITEM 10.0  
SUBJECT DVT Test

---

### SUMMARY OF DISCUSSION:

MSC agreed that the DVT dust test on LCRU, HGA and LGA will represent Dust Test to qualification requirements.

Solar-Radiation Thermal-Vacuum test coordination meeting with MSC personnel will be required prior to January 1971 to support DVT SRTV Test scheduled for March 1971.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/16/70 MEETING NUMBER CDR AGENDA ITEM 10.0  
SUBJECT LCRU Assembly Qualification Test

---

### SUMMARY OF DISCUSSION:

MSC indicated that the Qualification Assurance Test on the LCRU Assembly should be modified for a  $0.067g^2/Hz$  max. level to be run for 4.0 minutes/axis operating for workmanship shakeout characteristics. This operating test should check the same parameter checked in ATP vibration.

MSC indicated that other qualification tests on the LCRU Assembly were acceptable.

RCA indicated that the equivalent shock test on the ancilliary item stowage container would consist of an additional sinusoidal vibration test to compensate for any resonances between approx. 10 Hz to 30 Hz.

### ACTION ITEMS:

See RID - CDR-C-009

**NOTE:** These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## MINUTES OF MEETING

DATE 9/16/70 MEETING NUMBER CDR AGENDA ITEM 10.0  
SUBJECT Acceptance Test

---

### SUMMARY OF DISCUSSION:

RCA indicated that the Acceptance Random Vibration Test on the LCRU Assembly will be a continuity/operating test with the following spectrum:

20 to 80 Hz 3 db/octave increase  
80 to 350 Hz Constant at  $0.04g^2/\text{Hz}$   
350 to 2000 3 db/octave decrease

MSC indicated that dynamic testing/thermal cycling is required. Details (transient time, stabilization time, etc.) to be specified.

MSC specifically reviewed the HGA and LGA acceptance vibration levels and agreed that these levels and spectrum were acceptable.

### ACTION ITEMS:

Thermal cycling RID - CDR-C-006

**NOTE:** These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.



## MINUTES OF MEETING

DATE 9/16/70 MEETING NUMBER CDR AGENDA ITEM 10.0  
SUBJECT KSC Test

---

### SUMMARY OF DISCUSSION:

KSC requires first flight Y-Cable for LRV Stowage by 5 April 1971. The Y-Cable will be used for testing DVT-2/LRV compatability and stowed with the LRV.

MSC requires second flight Y-Cable at KSC by 9 April 1971 due to requirement of stowing first flight cable on LRV prior to final PIA test on LCRU DVT-2 and/or Flight Model 1.

MSC strongly recommends that first Flight Model HGA and LGA assemblies be provided to KSC to support KSC testing with LCRU DVT-2 and Flight LRV. The attached Preliminary Test and Checkout Plan (Para. 3.16) provided for MSC and RCA information.

KSC requires the following equipment to support LCRU testing at the Cape:

1. Holding test stand capable of accommodating deployed LCRU (including HGA assembly and GCTA and LGA Assembly.)
2. Air Cooling Fixture with filter and means of ducting air.
3. Test Cables with connectors:
  - (a) S-Band R.F. (C-Type to "N" type adapter) Qty. 3
  - (b) Control Panel Interface
    - (1) ZG adapter with diode protection (Provided with LCRU)
    - (2) Y-Cable to interface with ZG adapter and GCTA adapter and Simulated power, Qty. 2.
  - (c) Test Box to interface with Y-Cable and simulate LRV Interface (500 uf Capacitor and 0.2  $\Omega$  series resistance).
  - (d) GCTA Adapter Cable to interface with GCTA and Y-Cable.
  - (e) Simulated Battery Interface with diode protection, Qty. 2
  - (f) Cable to interface with Simulated Battery Connector, Qty. 2

MSC will direct RCA to provide any of the above if required.

KSC will supply sketches of new electrical test designs to MSC by next T.I.

**NOTE:** These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

# TEST And CHECKOUT PLAN

TCP-0041

TCP-0053

TCP-1222

TCP-0042

3.16 LCRU/GCTA

3.16.1 INDEPENDENT LCRU TESTS

3.16.1.1 MEASURE DC POWER CONSUMPTION

A. USING (SIMULATED) LRV POWER

PML/NB MODE	X	
PML/WB MODE	X	
FM/TV MODE	X	
TV/RMT MODE	X	
PM2/NB MODE	X	

X

B. USING (SIMULATED) INTERNAL  
LCRU POWER

PML/NB MODE	X	
PML/WB MODE	X	
FM/TV MODE	X	
TV/RMT MODE	X	
PM2/NB MODE	X	

X

X

X

X

X

3.16.1.2 MEASURE RF POWER USING BOTH (SIMU-  
LATED) INTERNAL AND LRV POWER

A. PML/NB MODE X

X

B. PML/WB MODE X

X

C. FM/TV MODE X

X

D. TV/RMT MODE X

X

E. PM2/NB MODE X

X

F. VHF TRANSMITTER X

X

TCP-0041TCP-0053TCP-1222TCP-0042

- 3.16.1.3 MEASURE TRANSMITTER AND SUBCARRIER  
CENTER FREQUENCIES
- A. S-BAND (4 XMTR MODES)
- B. VHF
- C. 1.25 MHZ (CONTINGENCY ONLY)
- D. 14.5 KHZ (CONTINGENCY ONLY)
- 3.16.1.4 MEASURE TRANSMITTER/VCO FREQUENCY  
DEVIATIONS
- A. 1.25 MHZ (BOTH VCO'S)
- B. BASEBAND PM (BOTH XMTR'S)
- C. PML/WB MODE 1.25 MHZ
- D. FM/TV MODE
- E. TV/RMT MODE
- F. VHF VOICE MODULATION ON CARRIER
- 3.16.1.5 VERIFY RECEIVER CENTER FREQUENCIES  
USING BOTH (SIMULATED) INTERNAL AND  
LRV POWER.
- S-BAND
- 3.16.1.6 MEASURE RECEIVER 70 KHZ (UNMODULATED)  
SUBCARRIER OUTPUT SIGNAL LEVEL USING  
BOTH (SIMULATED) INTERNAL AND LRV POWER

X

X

X

X

X

X

X

X

X

X

X

X

P

P

X

X

X

X

X

TCP-0041TCP-0053TCP-1222TCP-0042TCP-10073.16.1.7 VERIFY LCRU UPLINK VOICE SQUELCH  
OPERATION

A. WITH 124 KHZ SUBCARRIER PRESENT

X

B. WITHOUT 124 KHZ SUBCARRIER

X

3.16.1.8 VERIFY LCRU UPLINK VOX OPERATION

X

3.16.1.9 MEASURE RECEIVER SENSITIVITY

A. S-BAND (BOTH RECEIVERS)

X

X

B. VHF

X

X

3.16.1.10 MEASURE FREQUENCY RESPONSE OF TV LINK

X

3.16.1.11 VERIFY FUNCTION OF LCRU STATUS METER  
READING

A. TEMPERATURE

X

X

B. VOLTAGE

X

X

C. AGC (4 DB INCREMENTS BETWEEN -  
78 AND - 98 DBM AT RECEIVER)

X

X

3.16.1.12 MEASURE REGULATOR VOLTAGES

X

X

3.16.1.13 MEASURE VSWR

A. HIGH GAIN ANTENNA

X

B. LOW GAIN ANTENNA

X

3.16.1.14 BATTERY ACTIVATION

X



TCP-0041TCP-0053TCP-1222TCP-0042

3.16.1.15	BATTERY INSTALLATION AND LCRU VOLTAGE CHECK							X
3.16.1.16	VERIFY FUNCTIONAL OPERATION OF EACH LCRU MODE	X						X
3.16.1.17	REFLECTIVITY TEST							X
3.16.2	LCRU COMPATIBILITY TEST							
3.16.2.1	MEASURE CENTER FREQUENCY							
	PM (3 MODES)						X	
	FM						X	
3.16.2.2	TWO-WAY VOICE							
	LCRU				P		X	
	PML/NB MODE							
	PML/WB MODE							
	FM/TV MODE							
	PM2/NB MODE							
3.16.2.3	GCTA TELEVISION TESTS							
	LCRU							
	FM/TV MODE							
	TV/RMT MODE							
A.	MEASURE MAXIMUM FREQUENCY DEVIATION				P		X	
B.	VERIFY GOOD PICTURE QUALITY				P		X	
C.	VERIFY NO EXCESSIVE EVCS DATA AND LCRU STATUS DATA DEGRADATION				P		X	

TCP-0041

TCP-0053

TCP-1222

TCP-0044

- 3.16.2.4 EVCS DATA (PAM AND EKG) AND  
LCRU STATUS DATA QUALITY
- A. PML/NB MODE
- B. PML/WB MODE
- C. PM2/NB MODE
- 3.16.2.5 VERIFY PROPER LCRU/GCTA COMMAND  
OPERATION FROM MCC
- 3.16.2.6 VERIFY LCRU INTERFERENCE REJECTION  
OF THE LM UPLINK COMBINATIONS
- A. LM 30 KHZ VOICE AND LCRU/GCTA  
70 KHZ COMMAND SUBCARRIERS ON  
UPLINK
- B. LM 30 KHZ VOICE AND LCRU/GCTA  
70 KHZ COMMAND SUBCARRIERS PLUS  
LM PRN RANGING
- 3.16.2.7 VERIFY ACCEPTABLE DEGRADATION  
(USING LRV AND INTERNAL LCRU POWER)  
OPERATING SIMULTANEOUSLY WITH LM  
MODE 9.
- A. LRV OPERATIONAL MODE (MIN. TORQUE  
set at 17 FT. LB.)
- 1) LCRU INT. POWER: PML/WB, PM2/NB.
- 2) LCRU EXT. POWER: PML/WB, PML/NB,  
PM2/NB
- B. LRV ALTERNATE OPERATING MODE (MIN.  
TORQUE SET AT 312 FT. LB)

X X

X X

X X

X P

X P

X P

X

X

TCP-0041

TCP-0053

TCP-1222

TCP-0042

3.16.2.7

B. CONT.

1) LCRU INT. POWER: PML/WB, PM2/NB

2) LCRU EXT. POWER: PML/WB, PML/NB  
PM2/NB

C. LRV STANDBY MODE

X

1) LCRU INT. POWER: FM/TV

2) LCRU EXT. POWER: FM/TV, TV/RMT.

## MINUTES OF MEETING

DATE 9/16/70 MEETING NUMBER CDR AGENDA ITEM 10.0  
SUBJECT Test Equipment

---

### SUMMARY OF DISCUSSION:

MSC requested that Special Test Adapter be provided with the Engineering Model during Link Analysis tests at MSC.

RCA can provide upon request.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.



## MINUTES OF MEETING

DATE 9/16/70 MEETING NUMBER CDR AGENDA ITEM 10.0  
SUBJECT End Item Test Parameters (Downlink)

---

### SUMMARY OF DISCUSSION:

MSC questioned the scope measurement of TV Channel Distortion.

MSC recommended that distortion be a measurement of harmonics of sinusoidal signals at the test receiver output. Test limits will include harmonic distortion of test receiver.

MSC questioned the scope measurement of TV/Voice SC Distortion. RCA indicated that second and third order intermodulation products of two sinusoidal signals (below 600 KHz) into Video input would be measured in lieu of TV/Voice SC Distortion. (Due to Test equipment limitations, certain of the simultaneous uplink test set ups may be disabled to support this test).

### ACTION ITEMS:

Ref. RID-CDR-C-022

**NOTE:** These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

TYPE OF REVIEW:		REVIEW ITEM DISPOSITION		NUMBER	CDR-C-001
VEHICLE:				COORDINATION	
DATE: 9/15/70					
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME	
J. Miller		MSC/EE18	LCRU	Checkout	
DISCREPANCY/PROBLEM		TITLE			
		LRV Vibration in LM MESA at TBC			
<p>New test requirement - it is required that RCA provide:</p> <p>Two (2) LCRU mounting posts</p> <p>Two (2) HGA inserts</p> <p>One (1) Y-Cable</p> <p>Components required at TBC from Oct. 15 thru Dec. 15, 1970</p>					
JUSTIFICATION					
Only vibration test of above hardware in qualification with LRV in stowed configuration.					
RECOMMENDATION					
Hardware does not exist to support this new test requirement. Additional hardware required.					
CONTRACTOR'S COMMENT					
RCA can provide above items to meet required date upon receipt of direction received by 18 September 1970. Approximate cost \$2.5K.					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY	REMARKS <i>Withdrawn in favor of M-21</i> <i>A. J. Hamlin</i> <i>um spec</i>				
ACTION					
SUSPENSE					
BOARD ACTION					
CATEGORY	REMARKS				
ACTION					
SUSPENSE					
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE					

TYPE OF REVIEW:		REVIEW ITEM DISPOSITION		NUMBER	CDR-C-002
VEHICLE:				COORDINATION	
DATE:					
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME	
R. Virostek		RCA	LCRU	Checkout	
DISCREPANCY/PROBLEM		TITLE			
		LGA Ass'y Vibration Requirement on LRV			
<p>LRV ICD does not specify vibration requirements for LGA Ass'y.</p>					
JUSTIFICATION					
<p>LGA assembly test requirements will be required for EM &amp; DVT test.</p>					
RECOMMENDATION					
<p>MSC is requested to provide data to support EM test starting on 15 November 1970. RCA's mechanical design need for data is 25 September 1970.</p>					
CONTRACTOR'S COMMENT					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY	REMARKS <i>Withdrawn in favor of M-1</i> <i>H. J. Hamlin</i> <i>um8per</i>				
ACTION					
SUSPENSE					
BOARD ACTION					
CATEGORY					
ACTION					
SUSPENSE					
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE					



TYPE OF REVIEW:		REVIEW ITEM DISPOSITION		NUMBER	CDR-C-003
VEHICLE:				COORDINATION	
DATE: 9/16/70					
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME	
B. Trout		MSC	LCRU	Checkout	
DISCREPANCY/PROBLEM		TITLE			
		Acceleration Testing of LCRU Battery			
<p>MSC requires proof of electrolyte retention within the cell under acceleration environment.</p>					
JUSTIFICATION					
<p>To demonstrate no electrolyte leakage under an acceleration environment.</p>					
RECOMMENDATION					
<p>Perform test or provide test data on equivalent testing.</p>					
CONTRACTOR'S COMMENT					
<p>The cell being used in the PLSS qualified cell. However, RCA will investigate PLSS/Battery qualification test levels and advise MSC whether additional testing will be performed. If additional testing is required, authorization and direction will be required. RCA believes that Hamilton Standard has the qual tests results on the PLSS cell and these should be available to MSC.</p>					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY	REMARKS MSC concurs & will investigate PLSS battery characteristics by 9/23/70. No action required for RCA. Wm. J. Hamilton				
ACTION					
SUSPENSE					
BOARD ACTION					
CATEGORY	REMARKS				
ACTION					
SUSPENSE					
ACTION	<input type="checkbox"/> Approved		SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE	<input type="checkbox"/> Disapproved				



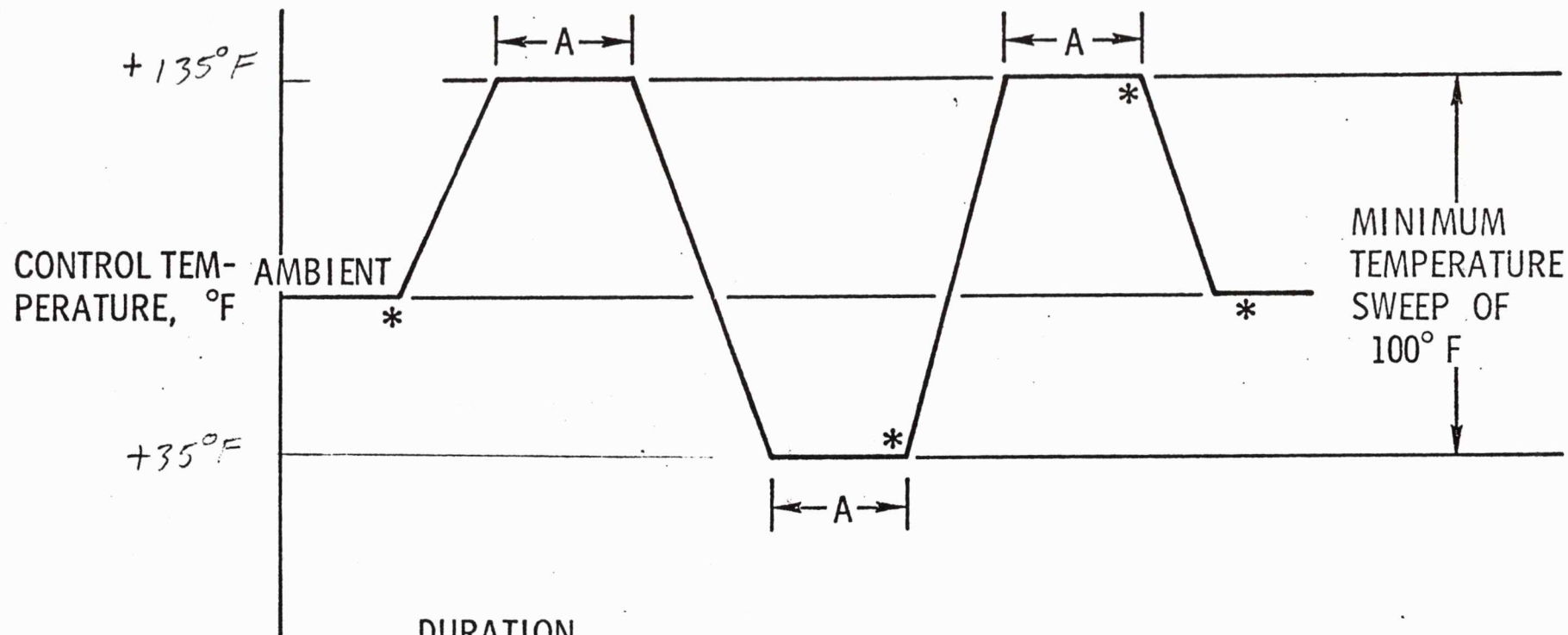
TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-C-004
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
B. Trout	MSC	LCRU	Checkout	
DISCREPANCY/PROBLEM		TITLE		
		Battery and Cell Container Burst Pressure Levels		
<p>Verify battery and cell containers burst pressures is at least 1.3 times the respective relief valve maximum opening pressures.</p>				
JUSTIFICATION				
<p>To assure no container ruptures during operation.</p>				
RECOMMENDATION				
<p>Note that Launch depressurization is conducted in qual test.</p>				
CONTRACTOR'S COMMENT				
<p>RCA will investigate and provide information to MSC. No formal test will be performed unless otherwise directed.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concurs with comment <i>[Signature]</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW:		REVIEW ITEM DISPOSITION		NUMBER	CDR-C-005
VEHICLE:				COORDINATION	
DATE:					
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME	
B. Trout		MSC	LCRU	Checkout	
DISCREPANCY/PROBLEM		TITLE			
		LCRU Battery Evacuation Activation			
<p>During LCRU Battery Cell Activation, after electrolyte insertion, with relief valves removed, evacuate battery down to 0.5 psia max for 15 to 30 sec then raise to ambient.</p>					
JUSTIFICATION					
<p>1. Eliminates excess gas and allows electrolyte to soak into cells.</p> <p>2. Improve cell voltage.</p>					
RECOMMENDATION					
CONTRACTOR'S COMMENT					
<p>RCA/Yardney will implement battery vacuum activation procedure for DVT and Qual batteries, upon direction.</p> <p>MSC/KSC should incorporate into procedure for flight batteries.</p>					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY		REMARKS RCA to provide impact of implementing new procedure at Yardney by 8/23/70 IF required <sup>MSC</sup> provide direction to RCA by 9/25/70. <i>A. J. [Signature]</i> WMSpec			
ACTION					
SUSPENSE					
BOARD ACTION					
CATEGORY		REMARKS			
ACTION					
SUSPENSE					
ACTION		<input type="checkbox"/> Approved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE		<input type="checkbox"/> Disapproved			

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-C-006
VEHICLE:				COORDINATION
DATE: 9-16-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
C. H. Laubach	MCS	LCRU	Checkout	
DISCREPANCY/PROBLEM		TITLE		
		Acceptance Test - Thermal Cycling		
<p>Acceptance Test Program Plans</p> <p>Item I/2 thermal - the thermal test does not meet the Apollo spacecraft program requirements.</p>				
JUSTIFICATION				
<p>The thermal acceptance test is conducted to disclose manufacturing flaws and workmanship defects - and requires operation and or continuity monitoring during temperature transition and at temperature limits to uncover faults.</p>				
RECOMMENDATION				
<p>The thermal acceptance test levels, durations and monitoring shall be to the requirements of the enclosure 1.</p>				
CONTRACTOR'S COMMENT				
<p>Performance of above can be implemented if so authorized and directed. Potential cost and delivery schedule impacts are expected.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS <i>RCA to provide definitive plan at TI-5.</i> <i>A. J. Hendin wmspec</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY				
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE				



## ACCEPTANCE THERMAL TEST LEVEL AND DURATIONS



### DURATION

A - TIME TO STABILIZE EQUIPMENT TEMPERATURE PLUS ONE HOUR MINIMUM

\* - EQUIPMENT OPERATED AND MONITORED

- EQUIPMENT FUNCTIONAL/CONTINUITY CHECKS DURING TEMPERATURE TRANSITION

- THE TEMPERATURE CYCLE & HALF CAN HAVE EITHER TWO HOT OR TWO COLD CONDITIONS.

- TRANSITION TIMES TO BE DETERMINED BY EQUIPMENT WORKING CONDITION EXPOSURE



TYPE OF REVIEW:		REVIEW ITEM DISPOSITION		NUMBER	CDR-C-007
VEHICLE:				COORDINATION	
DATE: 9/16/70					
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME	
J. Miller		MSC	LCRU	Checkout	
DISCREPANCY/PROBLEM		TITLE			
		LRV/LCRU EMC Test - Battery Req.			
<p>It is required that RCA provide three (3) LCRU batteries for use in the integrate EMC test at MSC.</p>					
JUSTIFICATION					
<p>In order to insure optimum EMI performance of the LCRU during the test, substitute external batteries or power supplies with the LCRU battery door open could result in a degraded performance by the LCRU.</p>					
RECOMMENDATION					
CONTRACTOR'S COMMENT					
<p>RCA can divert and replace via additional procurement DVT batteries to support EMC tests, if directed, and authorized. This may require shipment of DVT-2 without batteries and may affect RCA DVT effort. RCA will evaluate and advise MSC of plan, impacts, costs upon receipt, upon request.</p>					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY	REMARKS				
ACTION	<p>RCA to provide impact of reallocation, 1st two flight batteries for EMC testing at MSC</p> <p><i>H. J. Hamilton</i> <i>W. J. H. H. H.</i></p>				
SUSPENSE					
BOARD ACTION					
CATEGORY	REMARKS				
ACTION					
SUSPENSE					
ACTION	<input type="checkbox"/> Approved		SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE	<input type="checkbox"/> Disapproved				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-C-008
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
J. Miller	MSC	LCRU	Checkout	
DISCREPANCY/PROBLEM		TITLE		
		Deletion of Use of Radio Active Material on the LCRU Control		
<p>Radio-luminance (RL) material, Promithium-147, is used for engraving on the LCRU control panel.</p>				
JUSTIFICATION				
<p>Deletion of the:</p> <ol style="list-style-type: none"> <li>1. Amount of paper and spec in handling and controls required due to the use of RL material.</li> <li>2. Normal "Non-RL" engraving would be adequate of lunar use.</li> <li>3. Crew training of LCRU Mode Positions and Ground Control confirmation of crew operation.</li> </ol>				
RECOMMENDATION				
Delete use of Promithium-147 on LCRU control panel.				
CONTRACTOR'S COMMENT				
Present design consists of RL Control Panel based on MSC inputs at TI-1 Action Item. RCA can delete RL if so directed.				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	<p>CREW REQUIREMENT — LUNAR SURFACE LIGHTING REQUIRES USE OF THIS TECHNIQUE</p>			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input checked="" type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE			<i>Wm Miller</i> for R. W. K. BIKKI 9/18/70	

TYPE OF REVIEW:		REVIEW ITEM DISPOSITION		NUMBER	CDR-C-009
VEHICLE:				COORDINATION	
DATE: 9/16/70					
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME	
C. Laubach		MSC	LCRU	Checkout	
DISCREPANCY/PROBLEM		TITLE			
		LCRU Qual Test - Random Vib.			
<p>Qualification Test Program Plans.</p> <p>Item I/1. Random vibration qual. assurance incomplete qual coverage for environmental acceptance test level.</p> <p>RCA interpretation - The Random vibration qualification assurance level (for potential three recycles of ATP vibration of LCRU assembly) is equivalent to the ATP level but should be tested at 1.3 times ATP level. Also operating test should be performed during vibration.</p>					
JUSTIFICATION					
<p>The qualification test should provide the confidence that the acceptance test level has not reduced the hardware useful life by qual test at 1.3 times the acceptance vibration test g-RMS level.</p>					
RECOMMENDATION					
<p>Change I, 1. Random Vibration Qual Assurance to test parameters of: 0.067g<sup>2</sup>/Hz max level for 4.0 minute axis, with a functional/continuity check of hardware during vibration.</p>					
CONTRACTOR'S COMMENT					
RCA will perform recommendation.					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY	REMARKS RCA will DO. <i>AD Hamilton</i> <i>Wm. J. ...</i>				
ACTION					
SUSPENSE					
BOARD ACTION					
CATEGORY	REMARKS				
ACTION					
SUSPENSE					
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN			
SUSPENSE					



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER	CDR-C-010
VEHICLE:				COORDINATION	
DATE: 9-16-70					
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME	
R. F. Virostek		RCA	LCRU	Checkout	
DISCREPANCY/PROBLEM		TITLE			
		LM MESA Vibration Test Data			
<p>LM ICD indicates that LM MESA vibration test data would be available in July 1970.</p>					
JUSTIFICATION					
<p>RCA requires test data by 21 September 1970.</p>					
RECOMMENDATION					
<p>RCA requests test data or indication that the levels of LM ICD are to be used for DVT and Qualification test.</p>					
CONTRACTOR'S COMMENT					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY	REMARKS				
ACTION					
SUSPENSE					
BOARD ACTION					
CATEGORY	REMARKS				
ACTION					
SUSPENSE					
ACTION	<input checked="" type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE			<i>Wm Spiller</i> for R. W. Kubick, 9/18/70		



TYPE OF REVIEW:		REVIEW ITEM DISPOSITION		NUMBER	CDR-C-011
VEHICLE:				COORDINATION	
DATE: 9-16-70					
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME	
J. Miller		MSC	LCRU	Checkout	
DISCREPANCY/PROBLEM		TITLE			
		LCRU Battery Qual Test - shock, rupture			
<p>MSC does not require the 78g shock test.</p>					
<p><b>JUSTIFICATION</b></p> <p>The battery is to be qualified to 60g shock. The rupture test can be qualified to this level.</p>					
<p><b>RECOMMENDATION</b></p>					
<p><b>CONTRACTOR'S COMMENT</b></p> <p>RCA will revise test plans to delete shock rupture test.</p>					
<p align="center"><b>TEAM CAPTAIN RECOMMENDATION</b></p>					
CATEGORY	REMARKS RCA to submit cred, if appropriate. <i>A. J. Hamilton</i>				
ACTION					
SUSPENSE					
<p align="center"><b>BOARD ACTION</b></p>					
CATEGORY	REMARKS				
ACTION					
SUSPENSE					
ACTION	<input type="checkbox"/> Approved	SIGNATURE OF BOARD CHAIRMAN			
SUSPENSE	<input type="checkbox"/> Disapproved				

TYPE OF REVIEW:		<b>REVIEW ITEM DISPOSITION</b>		NUMBER CDR-C-012
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR  H. Kyle	ORGANIZATION  MSC	SYSTEM  LCRU	TEAM NAME  Checkout	
DISCREPANCY/PROBLEM		TITLE LCRU Engineering Model/MSFN Systems Test at MSC		
<p>MSC requires an Engineering Model LCRU to support total systems testing for 30 calendar days at MSC during December 1970-Jan 1971.</p>				
<p><b>JUSTIFICATION</b></p> <p>Total systems performance and compatibility data are mandatory to verify LCRU compliance with design performance and interface parameters. DVT-2 was originally intended to support MSC test. DVT-2 is now flight backup unit.</p>				
<p><b>RECOMMENDATION</b></p>				
<p><b>CONTRACTOR'S COMMENT</b></p> <p>RCA requires Eng Model LCRU through April 1971. Additional EM can be available by 15 December 1970 if direction and authorization is made by 18 September 1970. Budgetary costs for this unit are \$100K.</p>				
<b>TEAM CAPTAIN RECOMMENDATION</b>				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
<b>BOARD ACTION</b>				
CATEGORY	REMARKS <i>RCA to DOWNGRADE DVT-2 UNIT</i> <del>MSC will submit to GFC CEP</del> <i>and provide AS 2nd E.N. Deliver 12/16/70.</i> <i>Retain 4th FLIGHT UNIT IN PRISON.</i>			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN <i>Wm Speer</i> <i>for R. W. Kuzicki 9/18/70</i>		
SUSPENSE				

TYPE OF REVIEW:		REVIEW ITEM DISPOSITION		NUMBER	CDR-C-013
VEHICLE:				COORDINATION	
DATE: 9/16/70					
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME	
R. F. Virostek		RCA	LCRU	Checkout	
DISCREPANCY/PROBLEM		TITLE			
		Signal Strength Meter Measurement Tolerance			
<p>SE-C-0043A Paragraph 4.29 requires a + 2 db tolerance on the S-Band Signal Strength measurement. Present meter (Control Panel) measurement cannot achieve stated accuracy.</p>					
JUSTIFICATION					
<p>The LCRU design is configured to monitor the signal strength (AGC) in the Control Panel meter only. This is no longer a Telemetry Downlink Signal.</p>					
RECOMMENDATION					
<p>Delete the tolerance requirement for Signal Strength in the SE-C-0043A since RCA will provide a calibration curve during Acceptance Test.</p>					
CONTRACTOR'S COMMENT					
<p>MSC to update specification.</p>					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY	REMARKS				
ACTION	<p><i>Withdrawn</i>  <i>See Col-E-006</i>  <i>Wm. J. Hamilton</i></p>				
SUSPENSE					
BOARD ACTION					
CATEGORY	REMARKS				
ACTION					
SUSPENSE					
ACTION	<input type="checkbox"/> Approved		SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE	<input type="checkbox"/> Disapproved				



TYPE OF REVIEW:		REVIEW ITEM DISPOSITION		NUMBER	CDR-C-014
VEHICLE:				COORDINATION	
DATE: 9-16-70					
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME	
N. Farmer		MSC	LCRU	Checkout	
DISCREPANCY/PROBLEM		TITLE			
		ATP Vibration Operations			
<p>RCA has not stipulated its philosophy regarding what ATP checks it will make under the vibration environment.</p>					
JUSTIFICATION					
<p>The voice mode is in operation during rover lunar traverse, therefore the LCRU should be operated in ATP under vibration to (a) ensure quality (b) ensure vibration compatibility.</p>					
RECOMMENDATION					
<p>RCA to define selected tests under ATP vibration. (RCA has already done it for thermal ATP)</p>					
CONTRACTOR'S COMMENT					
<p>RCA will perform an operating vibration test in the PML/WB or PML/NB mode. Specific parameters to be measured will be provided in the ATP Plan, due for submittal by mid October 1970.</p>					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY	REMARKS <i>MSC concurs with RCA comment</i> <i>H. J. Anderson</i>				
ACTION					
SUSPENSE					
BOARD ACTION					
CATEGORY					
ACTION					
SUSPENSE					
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE					



TYPE OF REVIEW:		REVIEW ITEM DISPOSITION		NUMBER	CDR-C-015
VEHICLE:				COORDINATION	
DATE: 9-16-70					
INITIATOR J. Miller		ORGANIZATION MSC	SYSTEM LCRU	TEAM NAME Checkout	
DISCREPANCY/PROBLEM		TITLE Dummy Batteries for KSC Test			
<p>It is required that RCA provide two (2) dummy batteries with Diode protection to support testing at KSC.</p>					
<p>JUSTIFICATION</p> <p>Units required to limit <del>wave</del> on flight connector and reduce potential of damage internal to LCRU battery compartment.</p>					
<p>RECOMMENDATION</p>					
<p>CONTRACTOR'S COMMENT</p> <p>RCA can provide battery interface with diode protection, if directed.</p>					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY		REMARKS RCA submit report by TI-5. <i>A. J. Franklin</i> <i>WMSpec</i>			
ACTION					
SUSPENSE					
BOARD ACTION					
CATEGORY					
ACTION					
SUSPENSE					
ACTION		<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE					

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-C-016
VEHICLE:				COORDINATION
DATE: 9-16-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson	MSC/EE16	LCRU	Checkout	
DISCREPANCY/PROBLEM		TITLE		
		DVT Test Program Plans		
<p>Item 1. HGA is not operated during solar-radiation/thermal-vacuum testing and therefore any design degradation cannot be measured.</p> <p>Item 2. One single battery is not exposed to sequential mission conditions.</p> <p>Item 3. If thermal-vacuum is not deemed necessary in LGA DVT testing, why does Bendix require T-V testing on each flight unit?</p> <p>Item 4. <del>DVT for stowage container is excessive testing.</del></p>				
JUSTIFICATION				
<p>RECOMMENDATION</p> <p>Item 1. Radiate into antenna coupler and compare pre-test received level with during-test level.</p> <p>Item 2. One single battery should undergo the 3 specified vibration levels and then the wet-stand/thermal-vacuum test in order to simulate mission usage.</p> <p>Item 3. RCA to provide rationale for necessity of LGA T-V acceptance testing.</p> <p>Item 4. <del>Delete DVT testing on stowage container.</del></p>				
<p>CONTRACTOR'S COMMENT</p> <p>1. RCA does not recommend - not practical</p> <p>2. RCA is investigating - will advise by 9/23/70.</p> <p>3. RCA recommends no change to Bendix procedure.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS			
ACTION	<p>MSC concurs with RCA comment - MSC will further investigate possibility of accomplishing item 1.</p> <p>Wm. J. Hendlin</p>			
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE	<input type="checkbox"/> Disapproved			

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-C-017
VEHICLE:				COORDINATION
DATE: 9-16-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson	MSC/EE16	LCRU	Checkout	
DISCREPANCY/PROBLEM		TITLE		
		Qualification Test Program Plans		
<p>Item 1: A single battery does not undergo sequential environments.</p> <p>Item 2: HGA thermal-vacuum test is redundant to DVT test.</p>				
JUSTIFICATION				
RECOMMENDATION				
<p>Item 1: Sequence a single battery through the vibration and wet-stand/thermal-vacuum (hot case) environments.</p> <p>Item 2: Delete T-V test and switch S-R/T-V test from DVT to qual test.</p>				
CONTRACTOR'S COMMENT				
<p>1. Refer to CDR-C-016</p> <p>2. RCA will advise by TI-5</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE				



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-C-018
VEHICLE:				COORDINATION
DATE: 9-16-70				
INITIATOR R. Sinderson		ORGANIZATION MSC/EE16	SYSTEM LCRU	TEAM NAME Checkout
DISCREPANCY/PROBLEM		TITLE Test Parameter Definitions		
<p>Item 1: HGA, LGA and battery DVT, qual and acceptance testing are performed at the subcontractors. RCA has not submitted an outline of the electrical parameters which will be verified during these tests.</p> <p>Item 2: RCA has not submitted an outline of those LCRU unit electrical parameters which will be tested during DVT and qual testing. For acceptance testing, thermal but not vibration parameters were listed.</p> <p><del>Item 3: MSC takes exception to some portions of the LCRU unit acceptance test parameter outline.</del></p> <p>Item 3: Test parameter outlines were not submitted for <sup>INTERNAL</sup> electronic subassembly <del>VENDOR</del> DVT and acceptance testing.</p>				
<p>RECOMMENDATION</p> <p>RCA to supply the required information. MSC has prepared parameter outline forms for each LCRU subassembly and for the LCRU assembly. RCA merely requested to provide applicable check marks by the parameter to be verified.</p>				
<p>CONTRACTOR'S COMMENT</p> <p>HGA, LGA AND BATTERY PLANS AND PROCEDURES APPLICABLE TO THESE PORTIONS OF THE END ITEM WHICH REQUIRE DVT &amp; QUAL APPROVAL. Close coordination between MSC &amp; RCA will be required to turn these around quickly.</p> <p>1. RCA will submit these items as required by contract.</p> <p>2. To be discussed &amp; reviewed at T.I.#5</p> <p>3. RCA will provide subassembly vendor DVT &amp; acceptance procedures for information purposes only.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC agrees <i>[Signature]</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS 			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



TYPE OF REVIEW:		REVIEW ITEM DISPOSITION		NUMBER	CDR-C-019
VEHICLE:				COORDINATION	
DATE: 9-17-70					
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson		MSC	LCRU	Checkout	
DISCREPANCY/PROBLEM		TITLE			
		Stowage Container Testing			
<p>Testing of stowage container is excessive.</p>					
JUSTIFICATION					
<p>Cost and schedule saving.</p>					
RECOMMENDATION					
<p>Delete 3g sine vib. in DVT, and humidity and launch depressurization in qual + testing.</p>					
CONTRACTOR'S COMMENT					
<p>1. RCA does not recommend deletion of Sinusoidal Vibration EL/B Test because of:</p> <ul style="list-style-type: none"> <li>a. Pending evaluation of LM MESA vibration levels.</li> <li>b. Random Vibration E L/B levels will not provide adequate verification of design resonances at frequencies below 100 Hz.</li> </ul> <p>2. Deletion of Humidity and Launch Depressurization Tests in Qualification Tests is acceptable to RCA pending results of DVT.</p>					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY	REMARKS MSC agrees with RCA comment 2, not with item 1. <i>Pl. J. Hamilton WMSpec</i>				
ACTION					
SUSPENSE					
BOARD ACTION					
CATEGORY	REMARKS MSC concurs with RCA comment.				
ACTION					
SUSPENSE					
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN			
SUSPENSE		<i>WMSpec</i> for R W Kubiaki 9/18/70			

TYPE OF REVIEW:		REVIEW ITEM DISPOSITION		NUMBER	CDR-C-020
VEHICLE:				COORDINATION	
DATE: 9-17-70					
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson		MSC	LCRU	Checkout	
DISCREPANCY/PROBLEM		TITLE			
		Battery Testing			
Excessive vibration testing.					
JUSTIFICATION					
Cost and schedule saving.					
RECOMMENDATION					
DVT - Delete 3g and 1.5g vibration testing. Add operating test at 2.5g like for qual test.					
Qual - Delete 3g and 1.5g vibration testing.					
CONTRACTOR'S COMMENT					
BATTERY TEST					
RCA does not recommend deletion of DVT vibration testing because:					
1. Actual LM MESA vibration levels are presently being evaluated by GAC.					
2. No acceleration testing or other low frequency testing would be performed on DVT batteries in LM MESA environment or in LCRU Ass'y DVT.					
3. The Yardney DVT will start week of September 27. RCA will investigate performance of an operating 3.0g sine vibration test.					
<u>QUALIFICATION</u>					
Pending results of Yardney's DVT vibration tests and confirmation of LM MESA levels, RCA recommends retention of existing qualification test.					
ACTION		RCA to discuss recommendation with Yardney - advise MSC by 9/25/70 <i>W. J. Henderson</i> <i>WMP</i>			
SUSPENSE					
ACTION		<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved			
SUSPENSE					
		SIGNATURE OF BOARD CHAIRMAN			

TYPE OF REVIEW:		REVIEW ITEM DISPOSITION		NUMBER	CDR-C-021
VEHICLE:				COORDINATION	
DATE:					
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME		
R. Sinderson	MSC	LCRU	Checkout		
DISCREPANCY/PROBLEM		TITLE			
		LCRU Acceptance Testing			
<p>Item 1: RCA listing of test parameters is not totally complete.</p> <p>Item 2: Parameters tested under temperature environment need to be increased.</p>					
JUSTIFICATION					
RECOMMENDATION					
<p>Item 1: Add the following: <u>Pre-ATP</u></p> <ol style="list-style-type: none"> <li>1. 10V/14V regulation</li> <li>2. DC/DC converter regulation</li> <li>3. Bus noise (28V, 16V, 10V, 14V)</li> </ol> <p><u>ATP</u></p> <ol style="list-style-type: none"> <li>1. ULSP AGC check</li> <li>2. Uplink-Downlink Crosstalk</li> <li>3. Ground isolation</li> <li>4. Performance, 27-33V voltage</li> </ol>					
Item 2: Parameters squelch level and vox level should be added for check during temp.					
CONTRACTOR'S COMMENT					
<p>Item 1: a. Pre-ATP</p> <p>RCA will perform stated tests prior to start of ATP</p> <p>b. ATP</p> <ol style="list-style-type: none"> <li>1. ULSP AGC measurement is made as part of the uplink dynamic range test.</li> <li>2. During ATP uplink parameters are measured with respective downlink channel loaded thereby incorporating crosstalk.</li> <li>3. LCRU Ground Isolation Test will be performed.</li> <li>4. Selected tests will be performed at the DC input voltage extremes.</li> </ol>					
Item 2: Uplink squelch will be verified at temperature extremes.					
ACTION		<p>MSC agrees with RCA comments</p> <p><i>[Signature]</i> Wmspec</p>			
SUSPENSE					
ACTION		<input type="checkbox"/> Approved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE		<input type="checkbox"/> Disapproved			



TYPE OF REVIEW:		REVIEW ITEM DISPOSITION		NUMBER	CDR-C-022
VEHICLE:				COORDINATION	
DATE:					
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME	
N. B. Farmer		MSC	LCRU	Checkout	
DISCREPANCY/PROBLEM		TITLE			
<p>Acceptance Testing: TV Channel Distortion (TV RMT Mode) and TV/Voice SC Distortion. Testing advocated by RCA appears minimal in order to verify TV channel distortion and intermodulation problems with SCO.</p>					
JUSTIFICATION					
<p>This is only testing available at RCA to ensure TV channel compatibility.</p>					
RECOMMENDATION					
<p>Buy pattern TV generator and utilize for above testing. Monitor thru receiver on scope.</p>					
CONTRACTOR'S COMMENT					
<p>RCA will perform second and third order intermodulation products of two sinusoidal signals (below 600 KHz) at video input at no cost. Upon direction and authorization, RCA will procure pattern TV generator. Schedule and cost impact to be presented by TI-5.</p>					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY		<p>REMARKS</p> <p>RCA to determine impact by TI-5</p> <p><i>H. J. Hamilton</i> Wmsperin</p>			
ACTION					
SUSPENSE					
BOARD ACTION					
CATEGORY		<p>REMARKS</p>			
ACTION					
SUSPENSE					
ACTION		<input type="checkbox"/> Approved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE		<input type="checkbox"/> Disapproved			



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-C-023
VEHICLE:				COORDINATION
DATE: 9-19-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson	MSC	LCRU	Checkout	
DISCREPANCY/PROBLEM		TITLE		
		MSC Test of LCRU Engineering Model		
1. LCRU EM operated with -85 dbm squelch level (both receivers) rather than -100 dbm. 2. Uplink to downlink turn-around occurred on voice mode.				
JUSTIFICATION				
RECOMMENDATION				
Determine LCRU EM hardware problem;				
CONTRACTOR'S COMMENT				
RCA will evaluate and test the EM and provide results of investigation by TI-5.				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS <i>MSC agrees w/req. 1/4 J. Hamilton</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-C-024
VEHICLE:				COORDINATION
DATE: 9/17/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
B. Trout	MSC	LCRU	Checkout	
DISCREPANCY/PROBLEM		TITLE LCRU Battery - Cell Lot Testing		
<p>Inadequate lot cell sample testing.</p>				
<p>JUSTIFICATION</p> <p>RCA proposed sample level is 2% or less of production lot. This sample level is not adequate.</p>				
<p>RECOMMENDATION</p> <p>MSC requires RCA to sample test the LCRU battery cells at a level of 2 cells per battery with all cells being from the same production lot. This testing level is consistent with LM battery testing.</p>				
<p>CONTRACTOR'S COMMENT</p> <p>The LCRU battery cell is the same as the flight qualified PLSS cell. RCA does not recommend increasing the sample level, but RCA will direct the vendor supplier to increase the sample size upon direction and authorization.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC agrees with RCA comment. <i>H. J. Hamlin</i> <i>WM Speer</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

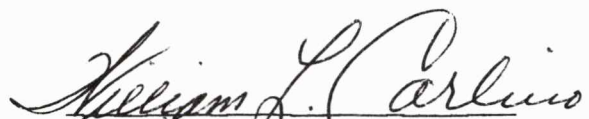
SPLINTER MEETING MINUTES  
LCRU CRITICAL DESIGN REVIEW  
SEPTEMBER 16, 1970

Subject: Program Support: Reliability, Configuration Control, and  
Quality Control

Reference: LCRU Critical Design Review Agenda Item 11.0 "Program  
Support"

These minutes record the Action Items and Discussion Items of the LCRU Critical  
Design Review, Program Support Splinter Meeting.

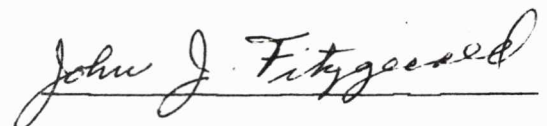
RCA


  
W. L. CARLINO, Program Support

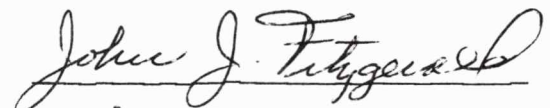
  
G. R. FLOYD, Quality

\_\_\_\_\_

NASA





  
for Dan Becker

## AGENDA ITEM 11.0

### ATTENDEES:

#### NASA:

N. Bates	GE/Rel.
M. Ellinor	GE/Rel.
J.J. Fitzgerald	NASA/ND6
D.D. Becker	MSC/Rel.
B. Fraustro	MSC-LEC

#### RCA:

R.T. Walker	RCA-Reliability
W.L. Carlino	RCA - PMO
G.R. Floyd	RCA - QA
H.B. Yarbrough	RCA - Configuration Management
G.L. Grace	DCAS - DCASO/RCA, Camden, N.J.

### ACTION ITEMS:

All Reliability Action Items were submitted as Review Item Disposition Forms (RIDs) i.e. both RCA and NASA.



Reliability, Configuration Control and  
Quality Control Splinter Meeting

- RDI 1 RCA requested approval of the Reliability Plan. A RID will be submitted for this item.
- RDI 2 RCA submitted an information copy of Part Approval Request LC-45 covering a Kelvin Thermistor Part No. HRL301. RCA will submit this item via ECP for qualification.
- RDI 3 Reference RID No. PCDR-20-1: NASA agreed that this item remains open pending RCA receipt of data from Republic and review of same.
- RDI 4 Reference RID No. PCDR-20-2 Aerovox (EF-5-1000/7405-0110): NASA submitted a letter received by NASA from Aerovox. A copy of this letter was given to RCA at the Splinter Meeting. Based upon the Aerovox letter dated 9/9/70, RCA recommends continuation of qual test effort on this item. The RID response has been modified per above.
- RDI 5 Reference RID No. PCDR-3, ATC-100 (Item 3) NASA did not have any additional life test data . Therefore, the RCA response to this RID still holds.
- RDI 6 RCA submitted Revision C to the RCA Quality Plan in response to ECP 25/CCA 14 and TI-1-13 ECP-3 (Radiological). NASA will review the plan as part of the normal NASA review cycle.
- RDI 7 RCA presented proposed responses to the NASA comments. Also, RCA submitted and presented the actual Configuration Control Plan (LRPL-CC-1) Changes (Revision B). NASA response to the NASA comments are as follows:

<u>NASA COMMENT NO.</u>	<u>NASA RESPONSE</u>
1	NASA agrees
2	NASA agrees. Refer also to RID regarding up- grading SE C 0043 to include additional performance items.
3	NASA agrees
4	NASA agrees
5	NASA agrees
6	The NASA comment is withdrawn pending nego- tiations as part of the NASA RECP.
7	NASA agrees
8	NASA agrees
9	NASA agrees
10	NASA agrees

Reliability, Configuration Control and  
Quality Control Splinter Meeting

RDI 8 QA Review of DVT Flow Charts (SII-QA-1 dated 14 Sept. 1970)  
LCRU CDR

ATTENDEES:

J. Fitzgerald, NASA  
G. Grace, Camden DCAS QA  
G.R. Floyd, RCA

Attached Flow Charts were reviewed and Inspection Points were discussed and finalized. This included both RCA & Inspection Agency mandatory and surveillance Quality coverages.

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<u>SECTION II</u>	<u>INSPECTION INSTRUCTIONS</u>
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TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-R-1
VEHICLE:				COORDINATION
DATE: 9-15-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
N. Bates	MSC	LCRU	Program Support R&QA	
DISCREPANCY/PROBLEM		TITLE		
		Family Tree LCRU Flight Model		
<p>No break down of schematics on S-Band Transmitter or S-Band Receiver.</p>				
JUSTIFICATION				
<p>Drawing tree should reflect schematics as well as assembly drawings.</p>				
RECOMMENDATION				
<p>RCA to submit to MSC <u>all</u> schematics.</p>				
CONTRACTOR'S COMMENT				
<p>1. Drawing tree is not a requirement of contract per SE Contract requires "Good Commercial Drawings"</p> <p>2. A drawing tree is not a requirement of MIL-D-1000; MIL-D-1000 requires an indented parts list</p> <p>3. The drawing tree was supplied as a convenience item. It will reflect the schematic numbers of all RCA items. Since the drawing tree does not go down below the subcontract end-item, subcontractor schematics will not be referenced on dwg.tree</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC agrees with comment undisputed H. J. Handlin			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



## CONTRACTOR'S COMMENT (Continued)

4. RCA has not "required" that subcontractors prepare drawing trees. RCA has required subcontractors to prepare indentured parts lists.

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-R-2
VEHICLE:				COORDINATION
DATE: 9-15-70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
N. Bates	MSC	LCRU	Program Support	
DISCREPANCY/PROBLEM		TITLE		
		Family Tree - LCRU Flight Model		
Baseband conditioner and ampl. IF/Audio have some schematic no.				
JUSTIFICATION				
Drawing tree should reflect correct drawing no.				
RECOMMENDATION				
CONTRACTOR'S COMMENT				
Drawing tree will be reviewed and corrected where required. Drawing tree is a convenience submittal.				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS			
ACTION	<i>MSC agrees with comment</i> <i>A J Franklin Wmspec</i>			
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-R-3
VEHICLE:				COORDINATION
DATE: 9/15/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
D. Becker	MSC	LCRU	R&QA	
DISCREPANCY/PROBLEM	TITLE Parts			
<p>Parts derating tabulation has not been submitted to MSC. The tabulation is to be prepared 3 weeks prior to CDR and is a Class III document (Submit by RCA on request).</p>				
<p>JUSTIFICATION</p> <p>The derating tabulation needs to be reviewed by MSC/Reliability.</p>				
<p>RECOMMENDATION</p> <p>RCA to submit parts derating tabulation to MSC for review.</p>				
<p>CONTRACTOR'S COMMENT - Paragraph 5.5d</p> <p>SEC 0043 requires submittal of Parts Application Reviews "For information two weeks prior to CDR (submitted on request only). RCA will respond to this request two weeks prior to TI-5 (Oct. 20, 1970). <del>The</del> reported in the reliability status this effort has only been completed on a preliminary basis, i.e., calculated or preliminary engineering model data. The derating tabulation will be updated to reflect DVT data.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS <i>MSC agrees with comment</i> <i>[Signature]</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-R-4
VEHICLE:				COORDINATION
DATE: 9/15/70				
INITIATOR D. Becker	ORGANIZATION MSC	SYSTEM LCRU	TEAM NAME R&QA	
DISCREPANCY/PROBLEM		TITLE Seal Tests		
<p>The pressure seal of the LCRU is essential for satisfactory action. Any leaks of the LCRU developed between acceptance test and flight will not be detected. A small leak will permit the internal pressure to go to 14.7 PSIA and will result in overpressure of the case during launch.</p>				
<p>JUSTIFICATION</p> <p>This is a real failure mode and should be protected against.</p>				
<p>RECOMMENDATION</p> <p>Include some method in the PIA test that will ensure the LCRU internal pressure is per specification (7.5 PSIA).</p>				
<p>CONTRACTOR'S COMMENT</p> <p>RCA is providing the facility for checking internal LCRU pressure via a pressure transducer mounted in the pressurized compartment. This will permit pressure measurements during the time interval between acceptance testing and pre-flight tests.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC agrees with comment w/pressure H. J. [Signature]			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-R-5
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
W. Carlino	RCA	LCRU	R & QA	
DISCREPANCY/PROBLEM		TITLE		
		NASA Document Approval		
<p>The following documents have been submitted to NASA in accordance with the contract:</p> <ul style="list-style-type: none"> <li>Reliability Program Plan (Approval)</li> <li>Electrical Parts List (Review)</li> <li>Parts Specification (Review)</li> <li>Failure Mode and Effects Analysis (Review)</li> </ul>				
JUSTIFICATION				
Contract requires NASA approval or comments.				
RECOMMENDATION				
NASA approve or comment as necessary.				
CONTRACTOR'S COMMENT				
MSC reliability will provide to ASPO review/approval comments for each of the above documents. ASPO to provide communication to RCA.				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS Concur on NASA's proposed action. <i>MSC will forward approval/comments by TI-5</i> <i>A. J. Hamlin wms-spec</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-R-6
VEHICLE:				COORDINATION
DATE: 9/15/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
D. Becker	MSC	LCRU	R & QA	
DISCREPANCY/PROBLEM		TITLE		
		Burn-In and Screen Parts for DVT #2		
<p>DVT #2 unit has been designated for flight by CCA #14. CCA #14 states that BI &amp; S parts shall be used "to the greatest" extent possible". MSC I 5330.5 states that all flight equipment shall have 100% BI &amp; S parts. Not all EEE parts in the LCRU will be Burn-In and Screen.</p>				
<p><b>JUSTIFICATION</b></p> <p>MSCI 5330.5 establishes center policy.</p>				
<p><b>RECOMMENDATION</b></p> <p>Provide direction to RCA to expedite BI &amp; S Program for DVT-2 by utilizing screening laboratory approach.</p>				
<p><b>CONTRACTOR'S COMMENT</b></p> <p>RCA does not recommend DVT-2 be used as a flight unit unless in an emergency when a flight unit is not available.</p>				
<b>TEAM CAPTAIN RECOMMENDATION</b>				
CATEGORY				
ACTION				
SUSPENSE				
<b>BOARD ACTION</b>				
CATEGORY	<p style="font-size: 1.2em; text-align: center;"><i>WITHDRAWN by ORIGINATOR</i></p>			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input checked="" type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE		<p style="font-size: 1.2em; text-align: center;"><i>Wm. J. Rukibicki</i> for Rukibicki 9/18/70</p>		


TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-R-7	
VEHICLE:				COORDINATION	
DATE: 9/15/70					
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME	
D. Becker		MSC	LCRU	R & QA	
DISCREPANCY/PROBLEM		TITLE Qual. Test Plan			
<p>Qualification Test Plan has not been submitted to MSC and can not be reviewed for CDR.</p>					
<p>JUSTIFICATION</p> <p>The contract states that the "Qual. Test Plan shall be submitted 75 days prior to intended use".</p>					
<p>RECOMMENDATION</p> <p>RCA to submit Plan as soon as possible to enable earlier MSC review and integration of comments.</p>					
<p>CONTRACTOR'S COMMENT</p> <p>Qualification Test Plan will be submitted 75 days prior to start of test, i.e., 20 January 1971. Test Plan information has been supplied at each T.I. and at the PDR.</p>					
TEAM CAPTAIN RECOMMENDATION					
CATEGORY		<p>REMARKS</p> <p>MSC agrees with comment unperien <i>A. J. Hamilton</i></p>			
ACTION					
SUSPENSE					
BOARD ACTION					
CATEGORY		<p>REMARKS</p>			
ACTION					
SUSPENSE					
ACTION		<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE					



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-R-8
VEHICLE:				COORDINATION
DATE: 9/15/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
D. Becker	MSC	LCRU	R & QA	
DISCREPANCY/PROBLEM		TITLE		
		Design Verification Test Plan		
<p>Verification Test Plan has not been submitted to MSC in Data Package.</p>				
<p>JUSTIFICATION</p> <p>The contracts states that "design verification test plans shall be submitted 75 days prior to intended use".</p>				
<p>RECOMMENDATION</p> <p>RCA to submit design verification test plan.</p>				
<p>CONTRACTOR'S COMMENT</p> <p>Design Verification Test Plan will be submitted 75 days prior to start to test, i.e., 6 November 1970. Test Plan information has been presented at each T.I. and at the PDR and CDR.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC agrees with comment wmfpeu <i>Ar J Hamilton</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE				



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-R-9
VEHICLE:				COORDINATION
DATE: 9/15/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
N. Bates	MSC	LCRU	Program Support R & QA	
DISCREPANCY/PROBLEM		TITLE		
		Potential venting of battery electrolyte could exist onto suit.		
JUSTIFICATION				
Establish safety and reliability of astronauts suit in EVA is a requirement.				
RECOMMENDATION				
Inspect batteries before installation to insure electrolyte doesn't exist on battery.				
CONTRACTOR'S COMMENT				
CDR-C-003 Refer to RID No. <del>13</del> from the test meeting.				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS WITHDRAWN Refer to CDR-C-003 <i>[Signature]</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-R-10
VEHICLE:				COORDINATION
DATE: 9/15/70				
INITIATOR N. Bates	ORGANIZATION MSC	SYSTEM LCRU	TEAM NAME Program Support R & QA	
DISCREPANCY/PROBLEM		TITLE VHF Antenna Orientation (Walk Mode)		
<p>Antenna Polarization (VHF) in walk mode is 90° out of phase.</p>				
<p><b>JUSTIFICATION</b></p> <p>Verification of VHF LCRU Antenna Orientation should be conducted to assure max. range be obtained.</p>				
<p><b>RECOMMENDATION</b></p> <ol style="list-style-type: none"> <li>1. Stow PLSS Antenna or LCRU antenna.</li> <li>2. Perform verification test that will demonstrate satisfactory communication will be obtained.</li> </ol>				
<p><b>CONTRACTOR'S COMMENT</b></p> <p>VHF Antenna during walk is presently in polarization phase, however, RCA will evaluate effects of antenna orientation and make recommendations at TI-6.</p>				
<b>TEAM CAPTAIN RECOMMENDATION</b>				
CATEGORY	REMARKS <i>Withdrawn See CDR-E-002 wmf</i> 			
ACTION				
SUSPENSE				
<b>BOARD ACTION</b>				
CATEGORY				
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-R-11
VEHICLE:				COORDINATION
DATE: 9/15/70		ORGANIZATION	SYSTEM	TEAM NAME
INITIATOR D. Becker		MSC	LCRU	R & QA
DISCREPANCY/PROBLEM		TITLE Battery Removal from Storage		
<p>The battery tends to bind upon removal from storage in LM.</p>				
<p>JUSTIFICATION</p> <p>Binding effect is undesirable. Tracks can be easily modified to prevent binding.</p>				
<p>RECOMMENDATION</p> <p>1. Modify tracks.</p>				
<p>CONTRACTOR'S COMMENT</p> <p>This is a crew interface problem which should be reviewed by the crew at the crew interface meeting scheduled for October 1970. RCA considers this to be a LM-MESA design problem.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	<p>REMARKS</p> <p>LM D/S C<sup>2</sup>F<sup>2</sup> at GAC on October 1, 1970 stuck</p> <p>Review this potential problem. Action <sup>to fix</sup> will be developed at that time, if required. <i>Wm. J. ...</i></p>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	<p>REMARKS</p>			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE	<input type="checkbox"/> Disapproved			



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-R-12	
VEHICLE:				COORDINATION	
DATE: 9/16/70					
INITIATOR D. Becker		ORGANIZATION MSC	SYSTEM LCRU	TEAM NAME R & QA	
DISCREPANCY/PROBLEM		TITLE Interference Hi-Gain Antenna and TV Camera			
<p>It is possible the TV Camera can be moved by ground command and interfere with the High - Gain Antenna if the antenna is not raised to its maximum extent.</p>					
<p><b>JUSTIFICATION</b></p> <p>This potential failure mode is not acceptable due to loss of communication and possible damage.</p>					
<p><b>RECOMMENDATION</b></p> <ol style="list-style-type: none"> <li>1. Provide a mechanical design such that the antenna will not lock unless it is extended to maximum amount.</li> <li>2. Provide marks color barr, or some indication on the present design to show where the antenna should be extended to.</li> </ol>					
<p><b>CONTRACTOR'S COMMENT</b></p> <p>RCA will evaluate the feasibility and impact of implementing the above recommendations and notify NASA of the results by 1 October 1970. RCA is implementing combined RCA-DCSD and RCA-AED evaluation and provide results at TI-5. See RID from mechanical meeting. (11-005)</p>					
<b>TEAM CAPTAIN RECOMMENDATION</b>					
CATEGORY		REMARKS DEFER until evaluation by crew is complete (9/21/70) <i>[Signature]</i> Wm Speer			
ACTION					
SUSPENSE					
<b>BOARD ACTION</b>					
CATEGORY		REMARKS			
ACTION					
SUSPENSE					
ACTION		<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE					



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-R-13
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
N. Bates	MSC	LCRU	Program Support R & QA	
DISCREPANCY/PROBLEM		TITLE		
		Vibration Testing		
<p>Status of LM and LRV Vibration Test results have not been provided to RCA.</p>				
JUSTIFICATION				
<p>It is necessary to establish a timely certification program.</p>				
RECOMMENDATION				
<p>NASA provide data.</p>				
CONTRACTOR'S COMMENT				
<p>Refer to Mechanical Meeting RID where RCA requested such data by <i>as soon as possible</i>.  <i>RCA notes that the results of these tests could have significant cost and schedule impact.</i></p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC will provide data: LM data - 9/21/70 LRV data - <i>nm spec</i> <i>A. J. Hamlin</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS MSC will provide data: LM test data by 9/21/70 LRV test data by 10/1/70			
ACTION				
SUSPENSE				
ACTION	<input checked="" type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE		<i>nm spec</i> <i>for R. W. Kibicki 9/18/70</i>		

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-R-14
VEHICLE:				COORDINATION
DATE: 9/15/70				
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME
D. Becker		MSC	LCRU	R & QA
DISCREPANCY/PROBLEM		TITLE		
		High Stress on EEE Parts		
<p>A number of parts have shown operations higher than the established de-rating value. In some cases the operating value is higher than the vendor's maximum limit.</p>				
<p><b>JUSTIFICATION</b></p> <p>Unacceptable failure mode.</p>				
<p><b>RECOMMENDATION</b></p> <ol style="list-style-type: none"> <li>1. RCA to study and obtain corrective action.</li> <li>2. Provide to MSC for approval justification and rational for all parts that exceed de-rating values prior to release of production.</li> </ol>				
<p><b>CONTRACTOR'S COMMENT</b></p> <p>RCA will provide parts application data and rationale for any parts exceeding the derating and/or manufacturers rating. Refer RID CDR-R-3.</p>				
<b>TEAM CAPTAIN RECOMMENDATION</b>				
CATEGORY	<p>REMARKS</p> <p>MSC concurs with comment w/MSpec A. J. Franklin</p>			
ACTION				
SUSPENSE				
<b>BOARD ACTION</b>				
CATEGORY	<p>REMARKS</p>			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-R-15
VEHICLE:				COORDINATION
DATE: 9/4/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson	MSC/EE16	LCRU	R&QA	
DISCREPANCY/PROBLEM		TITLE		
		Parts Qualifications Data		
<p>CCA No. 13 authorized qual testing on selected parts in the event existing test data is not found. The attachments, to this RID describe the data MSC has obtained from parts vendors. If it is valid, qual testing may be reduced or eliminated.</p>				
JUSTIFICATION				
<p>Cost saving.</p>				
RECOMMENDATION				
<ol style="list-style-type: none"> <li>1. RCA to review information and contact vendors as required for substantiation.</li> <li>2. RCA to make statement concerning validity of data and consequence on planned qual program.</li> </ol>				
CONTRACTOR'S COMMENT				
<p>See Attached sheets.</p>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS <i>MSC agrees with RCA comments</i> <i>[Signature]</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE		<i>[Signature]</i>		



P/N: EF-5-1000/EF-4-1500/7405-0110 (Item 1)

CDR-R-15

Part: Capacitor

Vendor: AEROVOX

Reference Source: AEROVOX/Glen Woody  
Myrtle Beach, S. C.  
803-448-3191 ext. 241

Available Data: Component has been fully qualified per MIL-C-11015  
(Report available from vendor) except for immersion, cycling.

Support Information: Conic Corp. has been using this part for some time.  
Used on a number of other space application.

RCA Comment:

1. Aerovox was not <sup>substandard</sup> per MIL-C-11015, but to an Aerovox drawing MB2097. MB2097 is patterned after EIA commercial standards which contain reduced requirements and broader tolerances.
2. Data is in transit and will be reviewed by RCA.
3. Based upon letter received by NASA from Aerovox (dated 9/9/70)  
RCA recommends that qual test on this device be continued per EDP 20.

*MSC concurs  
with RCA comment*



P/N: IL/IU/IC (Item 2)

CDR-R-15

Part: Capacitor

Vendor: Republic

Reference Source: Republic/W. Eisenberger  
176 East 7th St.  
Paterson, N. J. 07521  
201-279-0300

Available Data: These "TC" temperature compensating capacitors have received equivalent MIL-C-200 testing "in-house".

Test data on these TC capacitors is available from vendor.

Supporting Information:

CONIC has purchased large quantities of these "thinline" radial lead capacitors for several years in their equipment.

These capacitors have been used in numerous space application including Bendix Apollo equipment.

The capacitors are of a high reliability-extremely low drift - temp. compensating (30 parts per million/<sup>o</sup>C) type.

RCA Comment:

1. Republic has QPL listing on a general purpose ceramic capacitor and reports life test with stability readings is available in house. Vendor could not give data results over phone but will conduct in-house search for data and forward to RCA.
2. RCA will review data upon receipt and advise MSC.
3. Item remains OPEN.

*Cancel*

P/N: ATC-100 (Item 3)

CDR-R-15

Part: Capacitor

Vendor: American Technical Ceramics (ATC)

Reference Source: ATC/Vincent Perna  
Huntington Park, N. Y.  
516-271-9600

Available Data: This capacitor has met and exceeds MIL-C-11272B and MIL-C-11015D. It has also been subjected successfully to MIL-C-23269C para. 4.7.20.1 (MIL-STD-202 Method 108A test cond F) - 2000 hr. life test.

Test data available from vendor.

Support Information: This component has been successfully qualified for use in space application by several Aerospace Manufacturers including Hughes Space Systems.

RCA Comment:

1. Vendor does not have test data showing qualification to MIL-C-23269C life test. MSC is requested to forward data to RCA.
2. Original data submitted to RCA and referenced in PAR, LC-2, was test report 68-2 performed by Sylvania. This test did not utilize number of test samples required by MIL-C-11272. Only further data reported by vendor is an ATL conducted test which covered only environmental and not life.
3. Since no new data has been received or is known to exist by vendor, RCA still recommends ECP-20 life testing.
4. Item is considered CLOSED. RCA will reopen if MSC forwards life test data. (i.e. 2000 Hour Life Test Data)

P/N: SMFO-1 (Item 4)

CDR-R-15

Part: Filter

Vendor: Allen-Bradley (A-B)

Reference Source: A-B/Joel Barbieri  
Milwaukee, Wis.  
414-671-2000

Available Data: Vendor has tested the filter to MIL-C-11015D. All tests required by RCA have been conducted in-house at A-B.

Test data available from the vendor.

Supporting Information: This filter has been used extensively in military and space applications by Boeing, Conic, Collins, Packard-Bell and others.

This RFI feed-thru Filter does have a slight disadvantage in that it requires special care in soldering the feed-thru. The vendor prefers to recommend the SMFB-A4 Bolt Mounted Filter Model. It has higher attenuation (-45db) at 125°C - higher temp. - with max voltage of 500 VDC - as opposed to the SMFO-1: -35db attenuation at 25°C, max voltage of 200 VDC.

RCA Comment:

1. Vendor would not confirm that filter is qualified to MIL-C-11015D.
2. Data in transit. RCA will review upon receipt.
3. Item is considered OPEN.
4. NASA to forward data.

P/N: U5F7715312UNQ and U5B7741312UNQ (Items 7 and 17)

CDR-R-15

Part: Intergrated Circuit

Vendor: Fairchild

Reference Source: Fairchild/Gary Lane  
464 Ellis St.  
Mountain View, Calif.  
415-962-5011

Available Data: Both parts have been qualified per MIL-STD-883. Reference Fairchild general procurement specification no. UNIQUE 883.

The U5F7715312UNQ will be fully qualified to MIL-STD-883 (equiv) class "A" including 1000 hr. life test in November 1970. Copies of test report completed to date on file at Fairchild, Mountain View.

The U5F7741312UNQ is fully qualified to MIL-STD-883 (equiv) class "A" including the 1000 hr. life test and test report is on file at Fairchild, Mountain View.

RCA Comment:

1. RSC has forwarded U5F7741312 UNQ data to RCA. RCA will review and advise MSC.
2. Due to lengthy delivery schedule on U5F7715312 UNQ Motorola has changed from FSC to advance micro devices. Motorola reports ALSEP program will qualify new vendor. RCA will review qual test plan and if adequate delete part from ECP-20.
3. Item remains OPEN.



P/N: 2N834 (Item 8)

CDR-R-15

Part: Transistor

Vendor: Motorola

Reference Source: Motorola/Jack Sadler  
Phoenix, Arizona  
602-273-4747

Available Data: Part meets MIL-S-19500, Group B only.

Supporting Information: Vendor states that part selected is acceptable but recommends use of either JAN-TX-2N706A or JAN-TX-2N706B. These parts are high rel and fully qualified to MIL-S-19500.

RCA Comment:

1. As reported in PAR, LC-21, data available is only on generic type, 2N706. The 2N834 has a higher (30-40%) voltage breakdown and faster switching speed. Therefore Group A and steady state operating life of Group B are required.
2. Due to wire bonding problems on MOT 2N2222 reported in NASA Alerter MSFC-69-10 confidence is required that bonding problem no longer exists. Therefore remainder of testing recommended in ECP-20 is required, viz., thermal shock, seal and internal visual.
3. Item is considered CLOSED.

P/N: MTPH-2 and MTPH-3 (Item 14)

CDR-R-15

Part: Capacitor

Vendor: Mallory Capacitor Co.

Reference Source: Mallory/Bill Carrier  
3029 E. Washington St.  
Indianapolis, Ind.  
317-636-5353

Available Data: Parts meet MIL-C-3965 including temperature rating of -55°C to +85°C.

Vendor does not recommend higher than +85°C testing.

Parts will meet MIL-C-39006 requirements.

Parts have met 1000 hr. life test successfully.

Reports available from vendor.

Supporting Information: Parts manufactured to non-standard dimensions, would not meet MIL-C-3965 dimension specifications.

RCA Comment:

1. Parts are not qualified to MIL-C-39006 nor meet requirements included therein which involve 125°C temperature.
2. Application temperature is very close to 85°C. Therefore RCA considers previously recommended life testing at 95°C necessary to assure part qualification for LCRU.
3. Item is considered CLOSED.

P/N: 1768-1030 (Item 3)

CDR-R-15

Part: Transistor

Vendor: Westinghouse

Reference Source: Westinghouse/Bob Hedley; Rick Hamrick  
Youngwood, Pa.  
Electronics Communications Inc. ECI  
Bill Mandakis  
St. Petersburg, Fla.  
813-347-1121

Data Available: Chip 1763 (same as 1768) tested per MIL-S/-19500, Group B. Data available from vendor.

The 1776 transistor has the same case (TO-63) as the 1760. It is a "Hi-Rel" case and has high-reliability application; e.g. ARC-145 Airborne Communications set (200 parts used - no failures) per ECI.

Supporting Information:

1768-1030

- (a) In process of getting JEDEC in assignment
- (b) 3 year old product with present production per quarter being 5,000 to 8,000 units.
- (c) The group has undergone Groups A, B, & C, pre&post burn testing MIL STD 19500.
- (d) Reliability report is due out in two weeks on this family of transistor. Report will show failures of transistors due to mis-application of units in circuits, that is, improper biasing, etc. causing failure of units due to high speed switching use.
- (e) Units in family have undergone 10G vibration testing.

Data obtained from ECI, St. Petersburg, Fla. - Reliability

- (a) 1776-1210 power transistor used in ARC-145 transceiver
- (b) The 1776-1210 transistor in the ARC-145 has undergone test -55°C to +75°C temp., 95% rel humidity per MIL STD 202.
- (c) In two years - no reported 1776-1210 failures

Units have been used in A7, F105, Airlock Program, ARC-145 airborne transceiver.

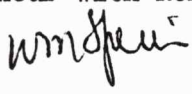

RCA Comment:

1. The 1768 is a smaller chip size and has a higher voltage breakdown than 1776-1210. The 1763 chip is in a TO-3 package; the 1768 is in a TO-63. Data on 1776 and 1763 are not applicable.
2. Only 200 units of 1768-1030 have been produced; 5000-8000 quantity is for all can and all chip sizes.
3. RCA will review reliability report and advise MSC.
4. Item is considered OPEN.

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-R-16
VEHICLE:				COORDINATION
DATE: 9/4/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
R. Sinderson	MSC/EE16	LCRU	R&QA	
DISCREPANCY/PROBLEM		TITLE		
		S-Band Transmitter Transistor 16010099		
Part is not considered to be reliable. 1. Vendor, Sloan, has had limited experience. 2. Only one prototype of this unit has been produced.				
JUSTIFICATION 1. Planned qual testing will cost NASA \$5940. 2. Qual test results in six months will cause large impact to transmitter program if the results are not favorable.				
RECOMMENDATION 1. Make positive determination on whether part can be substituted with better unit. (Conic proprietary barrier cannot be used in this case due to the potential severity of the problem.) 2. If part cannot be substituted, then reliability/part specialist survey of Sloan should be made.				
CONTRACTOR'S COMMENT 1. No known substitute. Sloan device is a 2N3866 chip in a 4 lead TO 46 case with isolated collector and case grounded for RF isolation. 2N3866 is in TO-5 can and grounded collector configuration. 2. RCA will conduct vendor survey of SLOAN. 3. Item remains OPEN pending vendor survey.				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS MSC concurs with comment nm spec H. J. Hamilton			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				



TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-R-17
VEHICLE:				COORDINATION
DATE: 9/4/70				
INITIATOR		ORGANIZATION	SYSTEM	TEAM NAME
R. Sinderson		MSC/EE16	LCRU	R&QA
DISCREPANCY/PROBLEM		TITLE		
Same as PCDR-16		S-Band Transmitter MOSFET 3N154		
JUSTIFICATION				
Same as PCDR-16				
RECOMMENDATION				
Same as PCDR-16. RCA sales personnel, Roger Fournier, have indicated that parts 3N187, 3N200, may be a good substitute since it has diode protection and will be qualified shortly.				
CONTRACTOR'S COMMENT				
<ol style="list-style-type: none"> <li>1. Conic application is amplifier circuit.</li> <li>2. Replacement parts are being review by Conic.</li> <li>3. Item remains <u>OPEN</u>.</li> <li>4. Preliminary indication shows possible substitution but will result in schedule and cost impact.</li> </ol>				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS <i>MSC agrees with comment</i> <i>Alf Hamilton</i> <i>Wingsper</i>			
ACTION				
SUSPENSE				
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	SIGNATURE OF BOARD CHAIRMAN		
SUSPENSE				

TYPE OF REVIEW: CDR		REVIEW ITEM DISPOSITION		NUMBER CDR-R-15/7
VEHICLE:				COORDINATION
DATE: 9/16/70				
INITIATOR	ORGANIZATION	SYSTEM	TEAM NAME	
H. Farcus	RCA	LCRU	R & QA	
DISCREPANCY/PROBLEM		TITLE		
		Circuit Breaker		
<p>1. RCA requires that circuit breaker button be provided with a white finish for thermal considerations.</p> <p>2. RCA requires that supplier acceptance test all circuit breakers at 180°F and 10<sup>-4</sup> MM Hg. In accordance with specification.</p> <p>3. Supplier can supply dash 0086 part from stock. Dash 0085 part which was ordered will take six months. Difference is in construction of terminals.</p>				
JUSTIFICATION				
<p>1. Supplier will not comply with RCA request and in addition disclaims any part responsibility if RCA performs any modifications (i.e. button finish)</p> <p>2. Supplier will not guarantee part at temperature above 150°F and will not perform requested acceptance tests.</p> <p>3. Maintain schedules.</p>				
RECOMMENDATION				
<p>1. RCA will obtain parts with standard finish and refinish in house.</p> <p>2. RCA will perform 180°F @ 10<sup>-4</sup> MM Hg testing on all circuit breakers as part of RCA PMI inspections.</p> <p>3. RCA to establish mechanical differences and if not significant use supplier's dash 0086 part in lieu of dash 0085 part.</p>				
CONTRACTOR'S COMMENT MSC COMMENT				
TEAM CAPTAIN RECOMMENDATION				
CATEGORY	REMARKS			
ACTION	Concur with RCA Actions.			
SUSPENSE	 			
BOARD ACTION				
CATEGORY	REMARKS			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved		SIGNATURE OF BOARD CHAIRMAN	
SUSPENSE	<input type="checkbox"/> Disapproved			

TYPE OF REVIEW: <u>Pre-CDR</u>		<b>REVIEW ITEM DISPOSITION</b>		NUMBER <u>PCDR-16</u>
VEHICLE:				COORDINATION
DATE: <u>9/4/70</u>				
INITIATOR <u>R. Sinderson</u>	ORGANIZATION <u>MSC/EE16</u>	SYSTEM <u>LCRU</u>	TEAM NAME <u>R&amp;QA</u>	
DISCREPANCY/PROBLEM		TITLE <u>Time Share Switch MOSFET 3N138</u>		
<p>RCA Mosfet 3N138 is not considered to be a high reliability component</p> <ol style="list-style-type: none"> <li>1. Part has had very limited previous usage.</li> <li>2. Part does not contain zener diode protection and therefore is very susceptible to damage during handling and installation.</li> <li>3. RCA sales personnel do not recommend this part for hi-rel usage.</li> </ol>				
<p><b>JUSTIFICATION</b></p> <ol style="list-style-type: none"> <li>1. Planned qual testing will cost NASA \$3585.</li> <li>2. Qual testing cannot eliminate the handling/installation susceptibility to damage problems.</li> <li>3. Since the use of MOSFETS with diode protection is customary for hi-rel application, it is not understood why RCA selected the 3N138 part.</li> </ol>				
<p><b>RECOMMENDATION</b></p> <p><del>Substitute part with one which has diode protection and preferably a part with existing test data and considerable previous usage. (SCI may be able to supply a qualified part from their own stock since they are a large user of MOSFET units. RCA parts 3N187 or 3N200 may be possible substitute.)</del></p> <p style="margin-left: 40px;"><i>Substitute part with J-Fet 2N3822, if possible, since it meets MIL-E-19500/375A.</i></p>				
<p><b>CONTRACTOR'S COMMENT</b></p> <p><i>1. RCA will evaluate whether 2N3822 can replace 3N138 - will advise MSC. By 9/25/70</i></p>				
<b>TEAM CAPTAIN RECOMMENDATION</b>				
CATEGORY	<p>REMARKS</p> <p><i>MSC agrees with comment</i></p> <p><i>wm Speer</i></p> <p><i>A. J. Hamilton</i></p>			
ACTION				
SUSPENSE				
<b>BOARD ACTION</b>				
CATEGORY	<p>REMARKS</p>			
ACTION				
SUSPENSE				
ACTION	<input type="checkbox"/> Approved	<p>SIGNATURE OF BOARD CHAIRMAN</p> <p><i>wm Speer</i></p>		
SUSPENSE	<input type="checkbox"/> Disapproved			



## MINUTES OF MEETING

DATE 9/17/70 MEETING NUMBER CDR AGENDA ITEM 12.0

SUBJECT General Session

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### SUMMARY OF DISCUSSION:

A General Session was held starting at 1 P.M. on 9/17 for purposes of review and disposition of Review Item Discussion. The following is a summary of the RID's discussed with disposition. (See attached sheet)

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.



AGENDA ITEM 12.0

265

Orgination/ Agenda Item	Total RIDS	RIDS Closed No Additional Action Req'd.	RIDS Closed MSC Action Req'd.	RIDS Closed RCA Action Req'd.	RIDS Withdrawn or Rejected	RIDS Referred to Board
General 1.0 thru 6.0	2	G-001				G-002
Electrical 7.0	54	E-020, 023, 024, 037, 045	E-001, 003, 008, 009*, 012, 014, 025, 027	E-002, 005, 006, 007, 009*, 010, 011, 015, 016, 017, 018, 019, 021, 022, 026, 028, 029, 030, 031, 033, 034, 035, 036, 038, 039, 040, 041, 042, 043, 044, 046, 047, 048, 049, 050, 051, 052, 053	E-004, 013, 032	E-054
Mechanical 8.0	34	M-003	M-001, 010, 016, 019, 031	M-004, 005, 007, 008, 011, 017, 018, 020, 023, 026, 027, 028, 029, 032, 033, 034	M-002, 006, 009, 013, 024, 025, 030	M-012, 014, 015, 021, 022
Thermal 9.0	7	T-005	T-006	T-001, 007	T-003	T-002, 004
* Joint Action						

Orgination/ Agenda Item	Total RIDS	RIDS Closed No Additional Action Req'd.	RIDS Closed MSC Action Req'd.	RIDS Closed RCA Action Req'd.	RIDS Withdrawn or Rejected	RIDS Referred to Board
Test 10.0	24		C-003, 005*, 016*, 024	C-004, 005*, 006, 007, 009 011, 014, 015, 016*, 017, 018, 020, 021, 022, 023	C-001, 002, -013	C-008, -010, -012, 019
Program Support 11.0	19	R-001, 015, 018	R-005, 011	R-002, 003, 004, 007, 008, 012, 014, 016, 017, 019	R-009, 010	R-006, 013
LCRU CDR Board 14.0	15 - counted in categories above	C-019	G-002, M-012 M-014*, M-015*, M-021*, M-022*, T-002, T-004, C-010, R-013	M-014*, M-015*, M-021*, M-022*, C-012	E-054, C-008 R-006	

## MINUTES OF MEETING

DATE 9/17/70 MEETING NUMBER CDR AGENDA ITEM 13.0  
SUBJECT LCRU Demonstration

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### SUMMARY OF DISCUSSION:

A Demonstration was held on 9/17 with the GCTA/LCRU/MSFN configuration uplink and downlink including TV, voice and data, and uplink command. The demonstration was accomplished in accordance with the LCRU Demonstration Outline provided herein as an attachment entitled "Electronic System Test Laboratory - Demonstration of LCRU Performance for Critical Design Review".

The demonstration results are summarized as follows:

1. TV-210' and 85' link - worst case.

Acceptable on both with some breakup showing when additional pre-emphasis was included. RID-E-054 was issued on this aspect.

2. Downlink voice/data with 1.25 MHz subcarrier - PM-WB and FM downlink 210' and 85' link - worst case. Acceptable - no data dropouts.

3. Downlink voice/data - 210' and 85' link - worst case. On PM-NB and FM and baseband modulation. Acceptable - no data dropouts.

4. Uplink voice/command - 210' and 85' link - worst case. Acceptable.

5. Double Talk - with and without subcarrier - acceptable no data dropouts.

6. Uplink voice/command with PRN ranging 210' and 85' link worst case.

Acceptable; PRN did not cause inadvertant squelch of S-Band receiver; all commands to GCTA simulator were verified; PRN did not trip VHF TX.

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

MINUTES OF MEETING

DATE 9/17/70 MEETING NUMBER CDR AGENDA ITEM 13.0  
SUBJECT LCRU Demonstration

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SUMMARY OF DISCUSSION:

7. Uplink/voice/comparison of LM/EVA and LCRU/EVA VHF links. LM pest detection audio power output was +3.5 db above LCRU level. This compares nominally with modulation indices used.

A report will be prepared on the demonstration test and will be provided to RCA by October 2.

ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.



ELECTRONIC SYSTEMS TEST LABORATORY  
DEMONSTRATION  
OF  
LCRU PERFORMANCE  
FOR  
CRITICAL DESIGN REVIEW

Communication Systems Engineering and Test Branch  
Telemetry and Communications Systems Division  
Manned Spacecraft Center  
September 17, 1970

## LCRU DEMONSTRATION OUTLINE

### I. LCRU FM/TV MODE

- A. Demonstration of TV, voice, pulse amplitude modulated PLSS status data, EKG, and LCRU status data performance through 85 and 210-foot ground stations.
- B. Demonstration of upvoice and television control unit command performance (124 KHz voice subcarrier and 70 KHz command subcarrier).
- C. Demonstration of television control unit command performance and S-band receiver squelch with uplink Combination 7 (30 KHz voice subcarrier and 70 KHz command subcarrier).

### II. LCRU TV REMOTE MODE

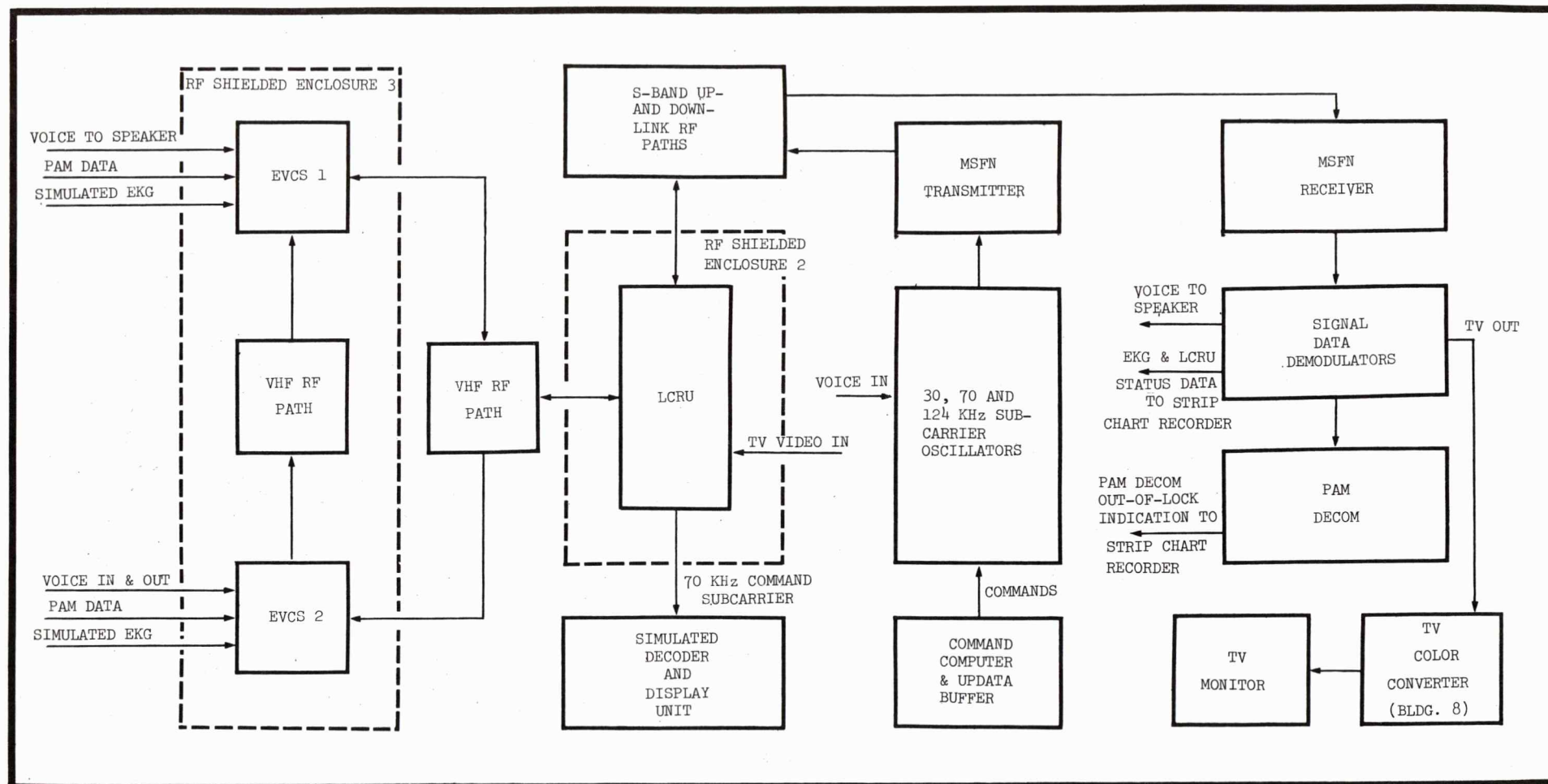
- A. Demonstration of TV performance through 85 and 210-foot ground stations.
- B. Demonstration of television control unit command performance with uplink Combination 7.

### III. LCRU PM WIDEBAND (PML/WB) MODE

- A. Demonstration of voice, pulse amplitude modulated PLSS status data, EKG, and LCRU status data performance through 85 and 210-foot ground stations.
- B. Demonstration of upvoice performance (124 KHz voice subcarrier only).
- C. Demonstration of squelch action as uplink signal level is slowly decreased below squelch threshold.
- D. Demonstration of squelch action as uplink signal level is slowly increased from below squelch threshold.

### IV. LCRU PM NARROWBAND (PML/NB) MODE

- A. Demonstration of downvoice, pulse amplitude modulated PLSS status data, EKG, and LCRU status data performance through 85 and 210-foot ground stations.



ESTI CONFIGURATION FOR LCRU DEMONSTRATION

## MINUTES OF MEETING

DATE 9/18 MEETING NUMBER CDR AGENDA ITEM 14.0  
SUBJECT General Session

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### SUMMARY OF DISCUSSION:

The following RID's were discussed:

General	RID-G-2
Electrical	RID-E-54
Mechanical	RID-M-12, 14, 15, 21, 22
Thermal	RID-T-002, 004
Test	RID-C-008, 010, 012, 019
R&QA	RID-R-6, 13

A RID Summary was presented by MSC.

RCA stated that they would accept RID as direction to submit applicable ECP's.  
MSC requested RCA to proceed on immediate implementation of:

CDR-M-21 - Pre-Launch LRV items  
ECP submittal date \_\_\_\_\_.  
CDR-M-22 - LGA pointing adjustment  
ECP submittal date \_\_\_\_\_.

MSC approved RID-T-004 - Thermal Mockup RID Test No. 2 as written, however MSC will advise RCA of final chamber availability on 9/21.

MSC agrees with RCA comments on RID-T-002 - High Gain Antenna Thermal LRV Interface.

H. J. Hamlin indicated that TI-5 is planned for 20 October 1970 at RCA, Camden, N. J.

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.



## MINUTES OF MEETING

DATE 9/18 MEETING NUMBER CDR AGENDA ITEM 14.0 (Cont'd)  
SUBJECT General Session

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### SUMMARY OF DISCUSSION:

MSC delayed final action on pre-emphasis RID-E-054 until approximately 10/1 since results using the TRW demodulator may be available by then. MSC stated that pre-emphasis tearing on 210' dish was undesirable while the 85' picture without pre-emphasis appeared acceptable.

MSC will provide LM-MESA data to RCA (RID-C-010) on 9/21.

RID-C-019 - MSC concurs in RCA Comment

RID-R-13 - LM data to be supplied on 9/21/70  
LRV data to be supplied on 10/1/70

RID-M-12 - MSC stated that RCA should connect FBU unit (DVT-2) to a second EM deliverable on 12/15/70 and retain Flight Model No. 4 in the Program.

RID-G-2 - MSC is reviewing the SR/TV Chamber for improved reliability.

RID-C-8 - RCA to continue with RL on front panel. RID disapproved.

RID-R-6 - Withdrawn by Originator

### ACTION ITEMS:

NOTE: These Minutes do not constitute contract change authorization. Changes to contract or schedule must be negotiated.

## RID SUMMARY

TOTAL RIDs SUBMITTED	—	140
TOTAL RIDs CLOSED	—	28
RCA ACTIONS REQUIRED	—	90
MJC ACTION REQUIRED	—	23
SUBMITTED TO BOARD	—	15

# RID'S BROUGHT TO CDR BOARD

CDR-E-054	MSFN DEFICIENCY	MSC/GSFC ACTION REQD.
CDR-M-12	PLACEMENT OF LGA 8' CABLE	LRV BATTERY COVER INTER. POSSIBLE MISFC IMPACT
CDR-M-14	LM/LCRU INTERFACE	LM STORAGE ICD OPEN
CDR-M-15	STOWAGE CONTAINER (LACK OF DWS'S)	✓      ✓      ✓      ✓
CDR-M-21	PRELAUNCH ITEMS FOR LRV QVAL	CCA REQUIRED 9/18
275 CDR-M-22	LGA POINTING ADJUSTMENT RESOLUTION	IMPACT ON PRESENT DESIGN
CDR-T-002	EFFECT OF HGA ON LRV THERMAL	MISFC REQUEST
CDR-T-004	THERMAL MOCK-UP SOLAR RADIATION TEST <sup>M</sup>	LCRU OR FACILITY PROBLEMS
CDR-G-002	MSC SR/TU DOWN TIME	TEST TIME LOST
CDR-C-008	DELETION OF USE OF RL MATERIAL ON LCRU CONTROL PANEL	PRESENT DESIGN BASED ON CREW INPUTS; COSTLY & TIME CONSUMING

## RID's BROUGHT TO COR BOARD (CONT)

CDR-C-010	LM MESA VIBRATION TEST DATA	RCA REQUESTING BY 9/21/70
CDR-C-012	LCRU ENGINEERING, MODEL / MISEN SYSTEM TEST AT MKC	REQUESTING 2ND EM
CDR-C-019	STOWAGE CONTAINER TESTING	DELETION OF 35 SIGR VIB
CDR-R-006	BORN-IN & SCREEN PARTS FOR DUT-2	DUT-2 N FLIGHT BACKUP VIB. Reliability wants 100% SQR
CDR-R-013	VIBRATION TESTING	RCA WANTS LM VIB DATA LCRU VIB DATA



# RID Summary

## ELECTRICAL

NO. RIDs SUBMITTED	54
TOTAL RIDs CLOSED	9
RCA ACTION REQUIRED	39
MSC ACTION REQUIRED	7
SUBMITTED TO BOARD	1

RID Summary  
MECHANICAL

NO. RIDS SUBMITTED	34
TOTAL RIDS CLOSED	9
PLA ACTION REQUIRED	20
MSC ACTION REQUIRED	9
SUBMITTED TO BOARD	5

# RID Summary

TITELMAL

NO RIDS SUBMITTED 7

TOTAL RIDS CLOSED 1

ECA ACTION REQUIRED 4

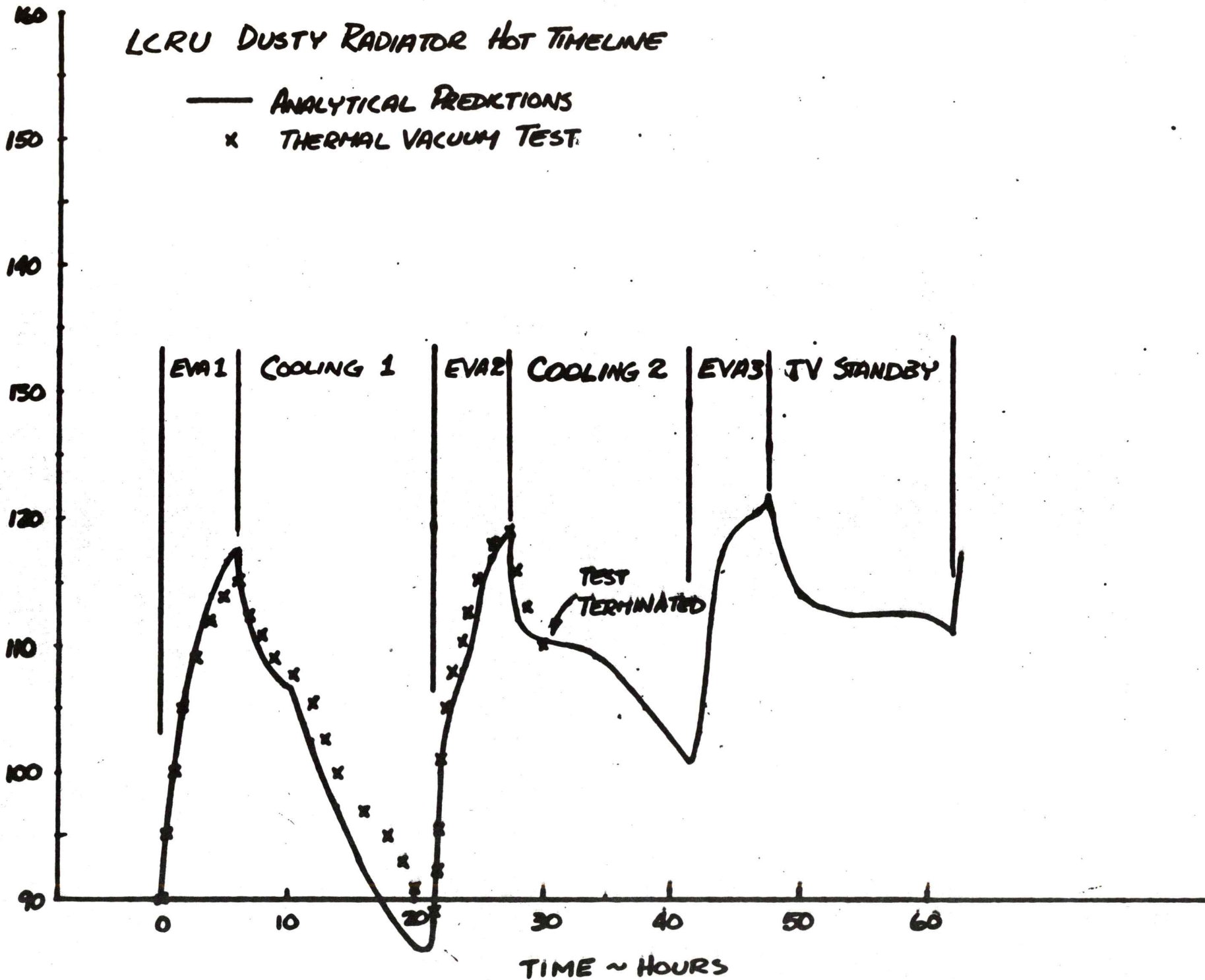
MSC ACTION REQUIRED 1

SUBMITTED TO BOARD 2

# LCRU DUSTY RADIATOR HOT TIMELINE

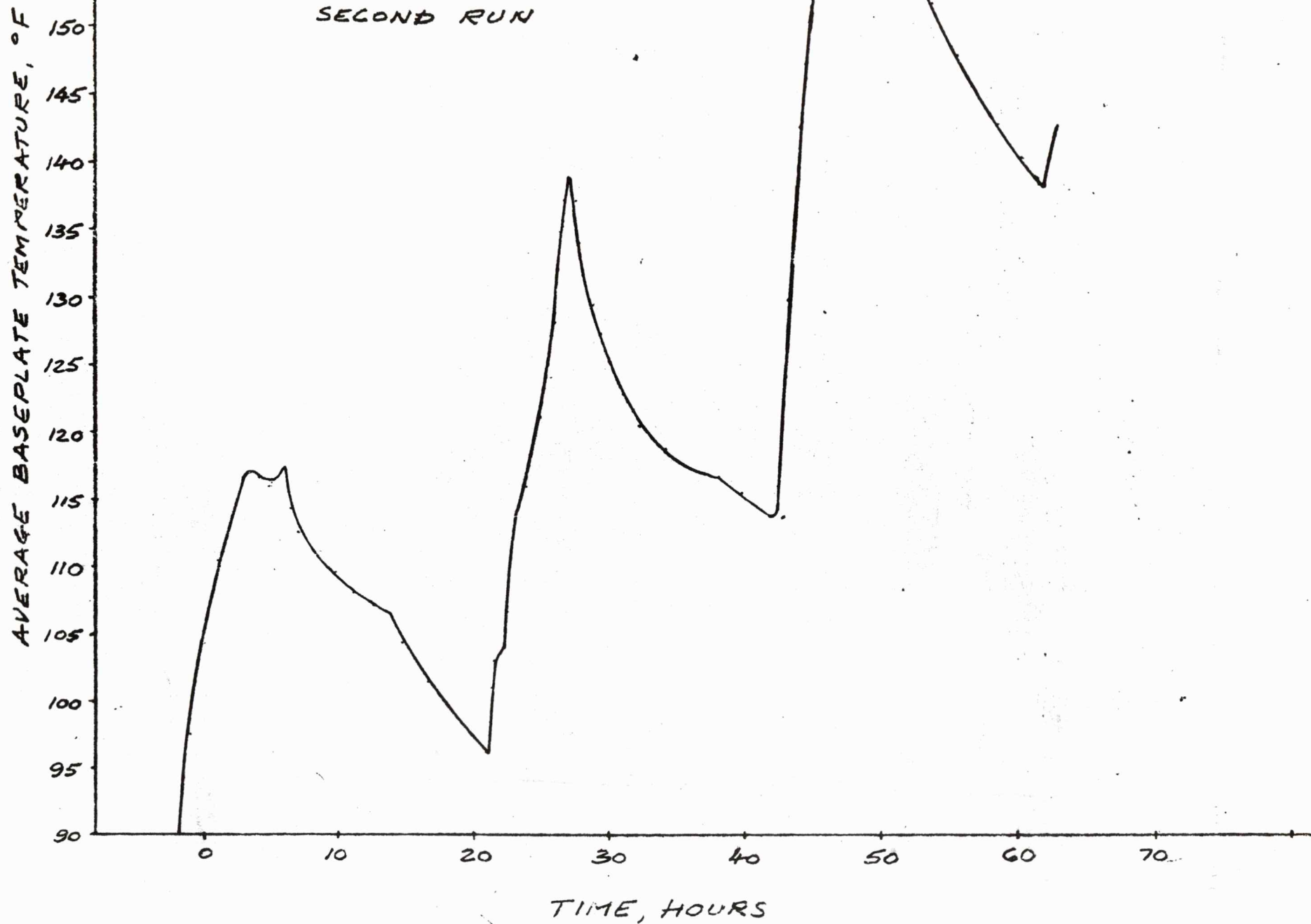
— ANALYTICAL PREDICTIONS  
 x THERMAL VACUUM TEST

280  
 Ave. Radiator Baseplate Temp (°F)





LCRU DUSTY RADIATOR  
HOT TIMELINE  
SECOND RUN



## RID Summary

### TEST

NO RIDs SUBMITTED	24
TOTAL RIDs CLOSED	4
RCA ACTION REQUIRED	15
MSC ACTION REQUIRED	3
SUBMITTED TO BOARD	4

# RID Summary

## R+OA

SUBMITTED	19
TOTAL RIDS CUSTO	4
RCA ACTION REQUIRED	12
MSC ACTION REQUIRED	3
SUBMITTED TO BOARD	2

# LCRU CREW STATION REVIEW

AGENDA ITEM - 16.0

RCA

LCRU Program Manager

MSC

MSC Subsystem Manager

Flight Crew Support

## Attendees:

RCA

J. Hamlin

J. Liggett

R. Holston

MSC

PD9/W. Speier

EE16/R. Sinderson

FC2/E. Fendell

A. Pennington

CF22/D. Brooks

CF/C. Klabosh

EE2/W. Perry

EE16/H. Farmer

C. Ritterhouse

J. Miller

H. Schuliz

EE/R. Sawyer

PA/D. Pendley

CF131/G. Franklin

PD5/H. Scott

W. Goeckler

CF32/J. Roberts

CB/J. Irwin

R. Parker

LEC

C. Coe

C. Haddick



## MEETING MINUTES

LCRU CREW STATION REVIEW  
MSC/Bldg. 5, September 21, 1970

A LCRU crew station review was held as a delta to the CDR to verify hardware interfaces with the LM MESA, the LRV, and the GCTA. Jim Irwin, Apollo 15 crewman, performed simulated mission LCRU deployment and operations in a pressure suited environment.

Only minor difficulties were experienced in the interface operations. One significant potential requirement change was for the LCRU to be strapped on the PLSS as an option to the handcarry mode. The following detailed action items were assigned to RCA, except where noted.

1. Ensure that HGA sight has a positive 90° stop in both CW and CCW extreme positions. (Without this stop, interference can exist which prevents unfolding of the antenna.)
2. Ensure that HGA deployment collars unfold/fold force (10 lbs. max.) is verified by acceptance test and ensure that dust cover (H-Film) does not interfere with mechanical fitment. (The crewman had difficulty in locking the collar in the deployed position.)
3. Determine by test whether the PLSS antenna can pierce the HGA mesh. (The PLSS antenna contacted the HGA mesh on several occasions and this seems to be unavoidable from a practical viewpoint.)
4. HGA cable outlet needs to be moved to prevent interference with the secondary handle position.
5. Ensure adequate strain relief, crimp protection, etc, on HGA cable at outlet of antenna.
6. Contour the HGA mast flange to preclude interference with the end of the pointing handle.
7. Ensure that HGA rib tips do not hang up in their stowed position.
8. Height adjustment mark should be placed on HGA upper mast to show full extension.
9. Ensure that training unit sight is very similar to flight sight mechanical/optical configuration. RCA to advise MSC of possible impact to CQAL5 ROM costing.
10. Light stitch the front edge of the top cover thermal large blanket to prevent inadvertent removal of the cover during normal opening operation.
11. Place nomenclature "Open", with pointing arrow, on top of each radiator thermal cover at the edge which is removed by the crew. Also add "65%" and "35%" to applicable blanket.

12. Redesign right rear corner of the top thermal blanket cover to prevent interference with the cam lever on the LCRU mounting post.
13. Ensure adequate thermal cover opening for VHF antenna considering blanket fitment tolerances. (The training unit was not aligned properly.)
14. Place velcro on top side of top thermal covers for tie-down when covers are opened. (Less crew time than previous method.)
15. The RCA designed handle for the handcarry mode is acceptable and is compatible for direct LCRU removal from the MESA.
16. Place nomenclature "Press" on battery door latch.
17. Change LCRU-LRV cable length from 15 in. to 12 in. Leave LCRU-GCTA cable length at 42 in. Leave HGA and LGA RF cables at previous design lengths.
18. Place velcro "pile" on LGA cable at points 15 in. and 36 in. from front of LCRU RF connector to mate with velcro "hook" to be placed on LRV. The details of this will be documented in LRV IRN by MSC follow-up action. The LGA cable will be routed around the right side of the LRV.
19. Place dust covers on ends of all open connectors to prevent dust entry during initial installation by the crew.
20. Design a tie-down on the LGA staff for the RF cable.
21. Color code Z.G. connectors - red for LCRU, blue for GCTA. (MSC W. Perry to notify RCA/ARD of color code for GCTA marking.)
22. Demonstrate LGA cable tie-down at TI-5 for handcarry mode.
23. Add an end slot curvature (detent) on HGA mast adapter.
24. MSC to ensure that LRV ICD shows alignment mark for HGA mast adapter. (and also GCTA adapter).
25. RCA to present concept and ECP for PLSS LCRU attachment for handcarry mode option at TI-5.
26. MSC To notify GAC that Pallet fabrication technique (overlapping seams) used for training pallet is not in accord with ICD allowed volume dimensions for LCRU. (The LCRU will not fit the training pallet.)