

BELLCOMM, INC.

1100 Seventeenth Street, N.W. Washington, D. C. 20036

SUBJECT: LM Weight Reduction Task Force
Case 320

DATE: April 25, 1968

FROM: T. L. Powers

MEMORANDUM FOR FILE

The attached vu-graphs were presented at the Apollo Program Office 8:30 meeting on April 25. I estimated the cost of this weight reduction to be about \$30,000 per pound with the caution that this number was based on preliminary GAEC estimates. In response to the vu-graph of possible weight savings under study, Dr. Turnock stated that the program is committed to doing everything possible to carry ALSEP on the first lunar mission with the implication that offloading ALSEP was not a likely weight savings item. It was pointed out that many of the items were undesirable but were under study to determine the payoff and penalties involved.

T. L. Powers
T. L. Powers

2031-TLP-sam

Attachments
Vu-graphs

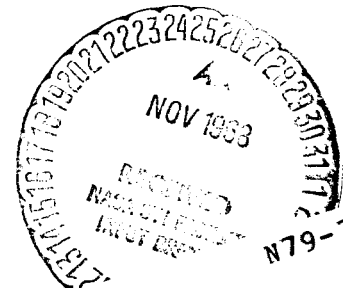
Copy to

- Messrs. L. E. Day - NASA/MAT
- G. H. Hage - NASA/MA-A
- J. K. Holcomb - NASA/MAO
- J. B. Skaggs - NASA/MAP
- G. C. White, Jr. - NASA/MAR

- J. F. Goree - MSC/PD5
- O. E. Maynard - MSC/PD

- A. P. Boysen, Jr.
- J. L. Marshall
- J. Z. Menard
- V. S. Mummert
- I. M. Ross
- R. L. Wagner

Central Files
Department 2031
Department 1023
Library



(NASA-CR-97632) LM WEIGHT REDUCTION TASK
FORCE (Bellcomm, Inc.) 12 P

00/18
Unclas
11288

FF No. 0	12	(THRU)
	4597632	NONE
	(NASA CR OR TMX OR AD NUMBER)	(CODE)
	(CATEGORY)	

AVAILABLE TO NASA RESEARCH CENTERS ONLY

EXTRA COPY
CENTRAL FILES

LUNAR MODULE
WEIGHT REDUCTION TASK FORCE

CANDIDATE CHANGES FOR LM WEIGHT REDUCTION

LM WEIGHT REDUCTION TASK FORCE

- MEETS WEEKLY AT MSC
- RECOMMENDATIONS TO MSC CCB WEEKLY

CHAIRMAN:

O. MAYNARD

SYSTEMS ENGINEERING

MEMBERS:

P. DEANS

ENGR & DEV

J. HANNIGAN

FLIGHT OPERATIONS

G. FRANKLIN

FLIGHT CREW OPERATIONS

D. CARPENTER

MISSION OPERATIONS

D. WISEMAN

SAFETY OFFICE

T. POWERS

MAS/BELLCOMM

A. KEMP

GAEC

LUNAR MODULE WEIGHT REDUCTION

- WEIGHT REDUCTION TO BE ACHIEVED BY
 - ELIMINATING NONESSENTIAL FUNCTIONS
 - DESIGN CHANGES FOR IMPROVED WEIGHT EFFECTIVENESS
- WEIGHT REDUCTION REQUIRED
 - IMMEDIATE - ASCENT STAGE 50 LBS
 - - DESCENT STAGE 150 LBS
- ADDITIONAL TO OFFSET GROWTH AND PERFORMANCES
- DEFICIT 200 LBS OR EQUIVALENT DESCENT INERT WEIGHT
- FUNCTIONAL CAPABILITY DELETIONS
- TO BE INVESTIGATED AND PROPOSED BY MSC
- DESIGN / HARDWARE CHANGES
- TO BE INVESTIGATED AND PROPOSED THROUGH CONFIGURATION CONTROL PROCEDURES BY GAEC

GAEC CHANGE SUBMITTAL NO. 1

APPROVED BY MSC CCB

AS

OXYGEN PURGE SYSTEM ADAPTER	1.1 LBS
REDUCE CABIN NETTING: AMOUNT AND WEIGHT	3
REDESIGN MID-SECTION SHELF & PLSS SUPPORT HANDLE	2.4
REDESIGN MID-SECTION CONTAINERS FOR GFE	6.1
REVISE ROUTING OF PULSE TORQUE ASSEMBLY GLYCOL LINE	0.5
REDESIGN -Z27 BULKHEAD UPPER WIRE SUPPORT BRACKET	1.4
REDESIGN MID-SECTION FIFTH SHIELD FILLER BLOCKS	1.3
REDESIGN AFT EQUIP BAY LINES SUPPORT BRACKET	<u>0.3</u>
TOTAL	16.1

DISAPPROVED

REDESIGN STRUCTURAL SUPPORT PANELS 1, 2, & 3	1.1 - 20 DAYS DELAY
REDESIGN FORWARD HAND GRIPS	0.3
REDESIGN WATER BOILER & GLYCOL ACCUMULATOR BRACKETRY	0.8 - VIBRATION TEST RQD
REDESIGN S-BAND ANTENNA SUPPORT	<u>1.2 - VIBRATION TEST RQD</u>
	3.4

APPROVED FOR IN-LINE EFFECTIVITY

CABLE REROUTING

-4.3

GAEC CHANGED SUBMITTAL NO. 2

APPROVED BY MSC CCB

	WEIGHT, LBS
	AS DS
LIGHTEN AFT EQUIP BAY PRESSURE PANEL	2.8
CHEM MIL FITH SHIELD SUPPORT STRUTS	0.7
REDESIGN INGRESS - EGRESS PLATFORM	5.6
REDESIGN DEDA TABLE	0.5
REDESIGN FLIGHT DATA STORAGE CONTAINER	3.5
TOTAL	<u>13.1</u>

DISAPPROVED

ELIMINATE LUNAR DUMP TEST PORTS - DS 0.7 LBS - COST TOO HIGH

RESUBMIT

REDESIGN OXYGEN PURGE SYSTEM ASCENT STOWAGE - AS 2.7 LBS - STUDY FLOOR MOUNT
 REDESIGN DSKY TABLE - AS 1.0 LBS - RETAIN DSKY PROTECTION
 ACA & TTCA CABLE STOWAGE - AS 0.8 LBS - RETAIN ISOLATION
 DELETE APS & DPS QUAD CHECK VALVE TEST LINES - AS 1.1 LBS - RETAIN LINES, DELETE QD'S
 DS 1.6 LBS AS 0.8 LBS, DS 0.8 LBS

GAEC CHANGES SUBMITTAL NO. 3

APPROVED FOR SUBMISSION TO CCB

	WEIGHT, LBS	DS
DELETE RCS MODULE ON PANEL 2	0.4	
LIGHTEN AS LOWER HEAT SHIELD TUB SUPPORTS	1.2	
LIGHTEN WIRING AND PLUMBING COVERS	1.4	
MODIFY RH STOWAGE CONTAINERS	5.1	
REDESIGN LH MID SECTION SUPPORT INSTALLATION	2.6	
REDESIGN MIRROR AND MOUNT	0.6	
	<hr/>	
TOTAL	11.3	

DEFERRED

REMOVAL OF REDUNDANT DPS HELIUM PRESSURE SENSOR - AS .4 LBS - CONSIDER WITH DELETION OF AMBIENT START SYSTEM

RESUBMIT AT CCB ON APRIL 24

CHANGE RCS MIXTURE RATIO TO 1.3 - AS 29 LBS

REDESIGN RCS INTERCONNECT BRACKETRY - AS 1 LB - EFFECTIVE LM-10

MSC CHANGES TO BE PRESENTED TO CCB

WEIGHT, LBS
AS DS

DELETE AUTOMATIC SPOTOMETER	1.90	
DELETE 2 SUNGLASSES AND POUCHES	.16	
REDUCE FOOD REQUIREMENTS 1/3 TO 1/2	2 - 3.6	
REMOVE SOME DEBRIS NETTING	2	
COMBINE AND SIMPLIFY PLSS CONDENSATE AND URINE COLLECTION SYSTEM	5	
MOVE RADIATION SURVEY METER TO CM	2.2	
DELETE 2 OF 3 SPARE PLSS BATTERIES AND LIOH CARTRIDGES		24
	<hr/>	<hr/>
	13.26 - 14.86	24

POSSIBLE WEIGHT SAVINGS UNDER STUDY

LIMIT SUN ANGLE TO 45° MAX

DELETE LM-ACTIVE DOCKING

REDUCTIONS IN CAPABILITY

DELETE ALSEP

DELETE ALSEP DEPLOYMENT MECHANISM

DELETE 1 OF 2 SAMPLE RETURN CONTAINERS

DELETE TV CAMERA

DELETE FILM CAMERAS

DELETE S-BAND ERECTABLE ANTENNA

DELETE ANTIBACTERIAL FILTERS

DELETE DPS QUANTITY GAGING SENSORS

DELETE 4 REDUNDANT RCS INTERCONNECT VALVES

DELETE AMBIENT START SYSTEM FOR DPS

DELETE ORDEAL

DELETE 1 OF 2 FDAI'S

	AS	DS
DELETE ALSEP		287
DELETE ALSEP DEPLOYMENT MECHANISM		10
DELETE 1 OF 2 SAMPLE RETURN CONTAINERS		19.6
DELETE TV CAMERA		12.5
DELETE FILM CAMERAS		19
DELETE S-BAND ERECTABLE ANTENNA		13.9
DELETE ANTIBACTERIAL FILTERS	1.0	
DELETE DPS QUANTITY GAGING SENSORS		6
DELETE 4 REDUNDANT RCS INTERCONNECT VALVES		7
DELETE AMBIENT START SYSTEM FOR DPS		14
DELETE ORDEAL	7	
DELETE 1 OF 2 FDAI'S	7	

POSSIBLE CONSUMABLES REDUCTIONS UNDER STUDY

	AS	DS
OFFLOAD FOR 24 HOUR STAY		
WATER	15.8*	15.5
OXYGEN	1.1	16.2
ELIMINATE 1 OF 4 DS BATTERIES		140

**ADDITIONAL 35 LBS POSSIBLE BY DELETION OF 1 OF 2 TANKS

MSC CHANGES TO BE PRESENTED TO CCB

WEIGHT, LBS
AS DS

DELETE AUTOMATIC SPOTOMETER	1.90	
DELETE 2 SUNGLASSES AND POUCHES	.16	
REDUCE FOOD REQUIREMENTS 1/3 TO 1/2	2 - 3.6	
REMOVE SOME DEBRIS NETTING	2	
COMBINE AND SIMPLIFY PLSS CONDENSATE AND URINE COLLECTION SYSTEM	5	
MOVE RADIATION SURVEY METER TO CM	2.2	
DELETE 2 OF 3 SPARE PLSS BATTERIES AND LIOH CARTRIDGES		24
	<hr/>	<hr/>
	13.26 - 14.86	24

SUMMARY

"ODDS AND ENDS" WEIGHT SAVINGS MORE EXTENSIVE THAN EXPECTED

(~50 LBS AS AND 24 LBS DS)

DS PROPULSION IMPROVEMENT PROBABLY ALSO REQUIRED

OFFLOADING ALSEP AND/OR DESCENT BATTERY ARE BIGGEST ITEMS

NO CHANGES WITH SCHEDULE IMPACT HAVE BEEN APPROVED

ALMOST ALL CHANGES ARE EFFECTIVE ON LM-6