

APOLLO

GUIDANCE, NAVIGATION AND CONTROL

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APOLLO GUIDANCE AND NAVIGATION PROGRAM

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R-567

GUIDANCE SYSTEM OPERATIONS PLAN
FOR MANNED LM EARTH ORBITAL AND
LUNAR MISSIONS USING
PROGRAM LUMINARY 1C (LM131 REV. 1)

SECTION 2 DATA LINKS
(Rev. 8)

MARCH 1970

MIT

CAMBRIDGE MASSACHUSETTS 02139

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R-567

GUIDANCE SYSTEM OPERATIONS PLAN
FOR MANNED LM EARTH ORBITAL AND
LUNAR MISSIONS USING
PROGRAM LUMINARY 1C (Rev. 130)

SECTION 2 DATA LINKS

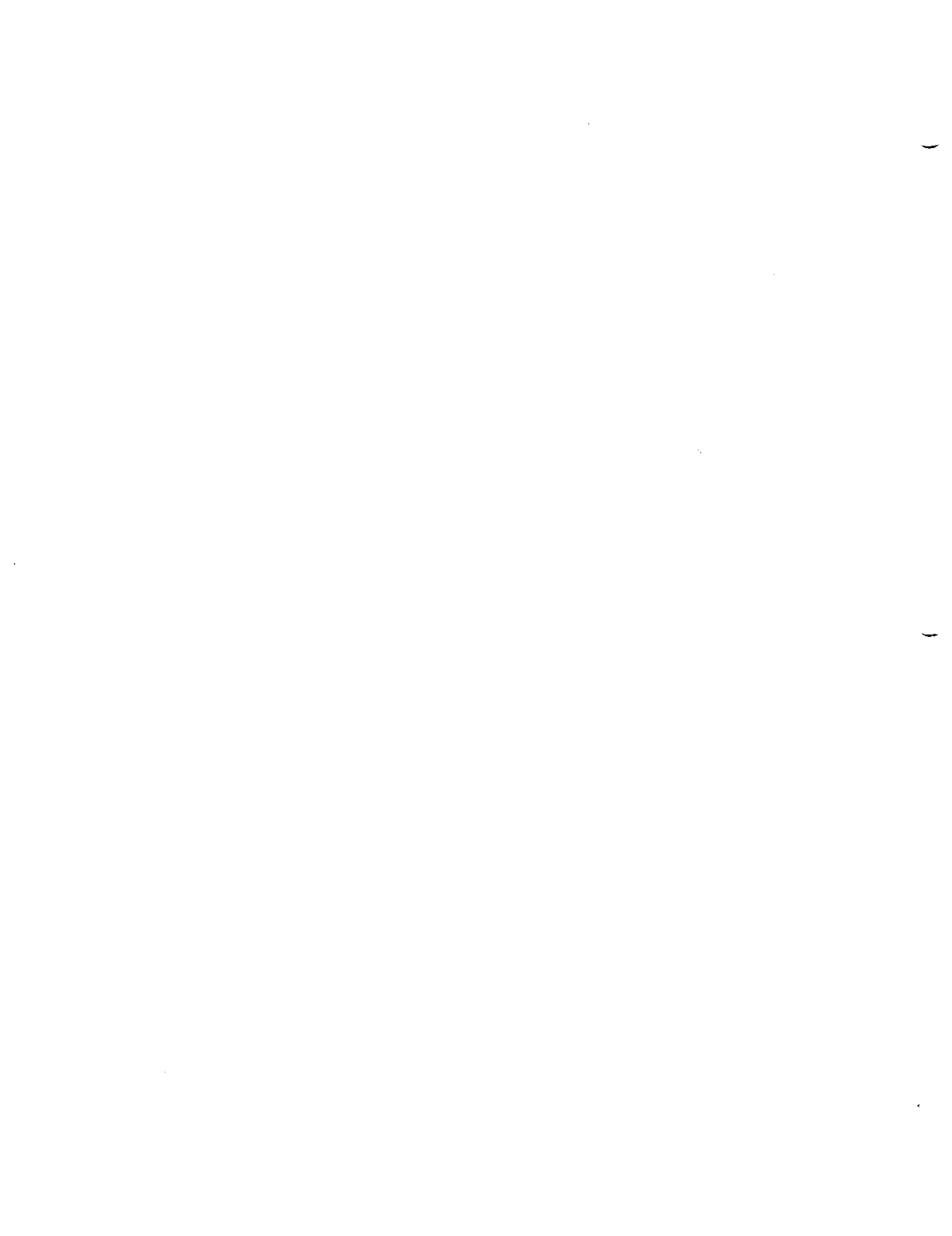
(Rev. 7)

Signatures appearing on this page designate approval of this document by NASA/MSC.

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REVISION INDEX COVER SHEET
GUIDANCE SYSTEM OPERATIONS PLAN

GSOP #R-567 Title: For Manned LM Earth Orbital and Lunar Missions Using Program LUMINARY

Section #2 Title: Data Links (Rev. 1)

This publication, a complete new revision (Rev. 1), incorporates revisions and additions as indicated below:

	Rev. 1
PCR-(PCN)	Description of Change
PCR-105	Delete P-46, LM-CSM separation monitor
PCR-106	Delete P-11, Predicted Launch Time (DT)
PCR-138	Delete P-10, Predicted Launch Time (CFP)
PCR - 163	Change format of Lambert Target Updates
PCR - 207.2	Update GSOP, Sec. 2, for typing errors, scaling changes, extra detail and description.
PCR - 230	Addition of 4 parameters to the Ascent/Descent Downlist.
PCR - 243	Additional detail, description, and typing corrections.
PCR - 417.2	Deletion of ENDSAFE.
PCR-468.2	Changed R32 to P76, Target Delta V
PCR-470	Added P68, Confirm Lunar Landing
PCN-494*	Added landing site vector (X, Y, Z) to Ascent/Descent list.
PCN-532*	Correct error in documentation
PCN-554*	Delete GUIDANCE THRUST CMD and CMDSTODECA from Orbital Maneuvers downlist.

Because of the numerous changes required by PCR #207.2 in Revision 1, there will be no PCR/PCN reference information at the bottom of any page which changed as a result of PCR #207.2 only.

Additional UPLINK information resulted in the following new sections:

2.1.5	Use of the Contiguous Block Update VERB.
2.1.5.1	LGC CSM/LM State Vector Update.
2.1.5.2	LGC Desired REFSMMAT Update.
2.1.5.3	LGC External DELTA V Update.
2.1.5.4	LGC Lambert Target Update.
2.1.6	Use of the Scatter Update VERB.
2.1.6.1	LGC Landing Site Update.

*Indicates an MIT Program Change Notice (PCN)

Date: December 1968

REVISION INDEX COVER SHEET
GUIDANCE SYSTEM OPERATION PLAN

GSOP # R-567 Title: For Manned LM Earth Orbital and Lunar
Missions Using Program LUMINARY

Section # 2 Title: Data Links (Rev. 2)

This publication, a complete new revision (Rev. 2), incorporates the
NASA/MSC approved changes listed below.

PCR/PCN	Description of Change
265	Assure time homogeneous set of LR Data
589	LR Raw Data Downlist
615	Allows running of R04 during P47
616	Downlink Jet Control Torque
644	Section 2 Correction
264	Add TALIGN to Coast and Align List

Date: March 1969

REVISION INDEX COVER SHEET
GUIDANCE SYSTEM OPERATION PLAN

GSOP # R-567 Title: For Manned LM Earth Orbital and Lunar Missions
Using Program LUMINARY

Section # 2 Title: Data Links (Rev. 3)

This publication, a complete new revision (Rev. 3), contains no new PCR or PCN changes.

Date: June 1969

REVISION INDEX COVER SHEET
GUIDANCE SYSTEM OPERATIONS PLAN

GSOP #R-567 Title: For Manned LM Earth Orbital and Lunar
Missions Using Program LUMINARY 1A (Rev. 099)

Section #2 Title: Data Links (Rev. 4)

This publication, a complete new revision (Rev. 4), incorporates revisions and additions as indicated below.

<u>PCR-(PCN)</u>	<u>Description of Change</u>
PCR-259	Omit Zone 1 from Descent Logic
PCR-260	Preferred Orientation During LM Aborts
PCR-267	Time homogeneous RR downlink data from P20, P22
PCR-271	Downlink Change
PCR-647	Replace Lambert with "A" steer in P40, P41, and P42
PCR-670	Simplification of Landing Programs
PCR-700	Improve the Rate of Descent Mode (P66) Performance
PCR-719	Speed up P21
PCR-722	Improve performance of RR designate procedure on Lunar Surface
PCR-740	Display TLAND in P52, option 4
PCN-765*	New Propulsion System Constants
PCR-824	Update GSOP, Sec. 2, for typing errors and extra detail and description.

Because of the numerous changes required by PCR#824 in Revision 4, there will be no PCR/PCN reference information at the bottom of any page which changed as a result of PCR#824 only.

* Indicates an MIT Program Change Notice (PCN).

REVISION INDEX COVER SHEET
GUIDANCE SYSTEM OPERATIONS PLAN

GSOP #R-567 Title: For Manned LM Earth Orbital and Lunar Missions
Using Program LUMINARY 1B (Rev. 116)

Section #2 Title: Data Links (Rev. 5)

This publication, a complete new revision (Rev. 5), incorporates revisions and additions as indicated below.

<u>PCR-LNY</u>	<u>Description of Change</u>
PCR 277	A fixed DUMPCNT.
PCR 279	Variable insertion computation with capability to abort at any time.
PCR 284	VGTIGs on C/A downlist.
PCR 802.2	Save alarm data after "error reset".
PCR 816	Modify R03 to permit astronaut setting of 1° deadband.
PCR 823	Delete P31 (Lambert aim point guidance program).
PCR 827	Add ZDOTD to Ascent/Descent downlist.
PCR 839	R12 and LR reposition routine improvements.
PCR 841	PGNCS derived vehicle attitude rates on FDAI error needles.
PCR 844	Deletion of P38/P78 and P39/P79.
LNY 89*	State vector integration in P00, P27.
LNY 90*	Response to V97 in P63.

* Anomaly.

Date: October 1969

REVISION INDEX COVER SHEET
GUIDANCE SYSTEM OPERATIONS PLAN

GSOP #R-567 Title: For Manned LM Earth Orbital and Lunar
Missions Using Program LUMINARY 1B (Rev. 116)

Section #2 Title: Data Links (Rev. 6)

This publication is a revision to the previous issue of this document, Rev. 5, dated August 1969 and incorporates the NASA/MSC approved PCRs, described below.

<u>PCR-(PCN)</u>	<u>Description of Change</u>
PCR 702	Add COAS Calibration Option to R52.
PCR 780	Provide pure RR Range, Range Rate, and Time Tag during P20, P22 and P25.
PCR 791. 2	Do not allow a proceed response to a V21, V22, or V23.
PCR 798. 2	Reset GLOKFAIL in R00.
PCR 805	Don't allow V66 on the surface.
PCR 812. 2	Resetting and setting of the External Delta V Flag.
PCR 814	Reduce keystrokes required to check and approve LR data.
PCR 838	Prevent RCS jet firings on lunar surface.
PCR 845	Do not turn on R29 during P70/P71.
PCR 847	Eliminate possible lock-out of pitch-over from P12, P70 and P71.
PCR 854	Provide a flexible method for crew to modify RLS.
PCR 855	Begin reading LR Velocity as soon as Velocity Data Good appears.

Date: November 1969

REVISION INDEX COVER SHEET
GUIDANCE SYSTEM OPERATIONS PLAN

GSOP No. R-567 Title: For Manned LM Earth Orbital and Lunar Missions
Using Program LUMINARY 1C (Rev. 130)

Section No. 2 Title: Data Links (Rev. 7)

This publication, a complete new revision (Rev. 7),
incorporates revisions and additions as indicated
below.

<u>PCR-(PCN)</u>	<u>Description of Change</u>
PCR 863.2	Make P76 set NODO flag
PCR 893.	Abort targeting flagbit
PCR 285	Remove check of auto throttle discrete

DATE: March 1970

REVISION INDEX COVER SHEET
GUIDANCE SYSTEM OPERATIONS PLAN

GSOP No. R-567 Title: For Manned LM Earth Orbital and Lunar
Missions Using Program LUMINARY 1C
(LM131, Revision 1)

Section No. 2 Title: Data Links (Revision 8)

Revision 8 is published as change pages to Section 2 LUMINARY GSOP. Substitution of these pages for those in Revision 7 makes Section 2 the control document for the re-release of Program LUMINARY 1C (LM131, Revision 1). The following NASA/MSC approved changes are included in Revision 8:

<u>PCR (PCN*)</u>	<u>TITLE</u>	<u>PAGES AFFECTED</u>
942	LR Update Cutoff	61
988	AUTO P66	22, 34, 48, 60, 105

NOTE: A solid bar, |, in the margin indicates a change in specification authorized by the PCR (PCN*) listed at the bottom of the page.

