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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

APOLLO 17
ALL LAUNCH DATES

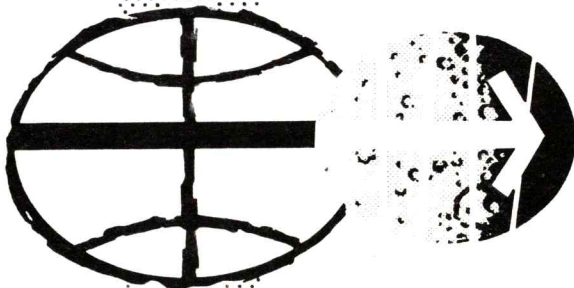
CHANGE A

LM

MALFUNCTION
PROCEDURES

PREPARED BY

EVA AND EXPERIMENTS BRANCH
CREW PROCEDURES DIVISION



MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

NOVEMBER 10, 1972

APOLLO 17
LM MALFUNCTION PROCEDURES

November 10, 1972

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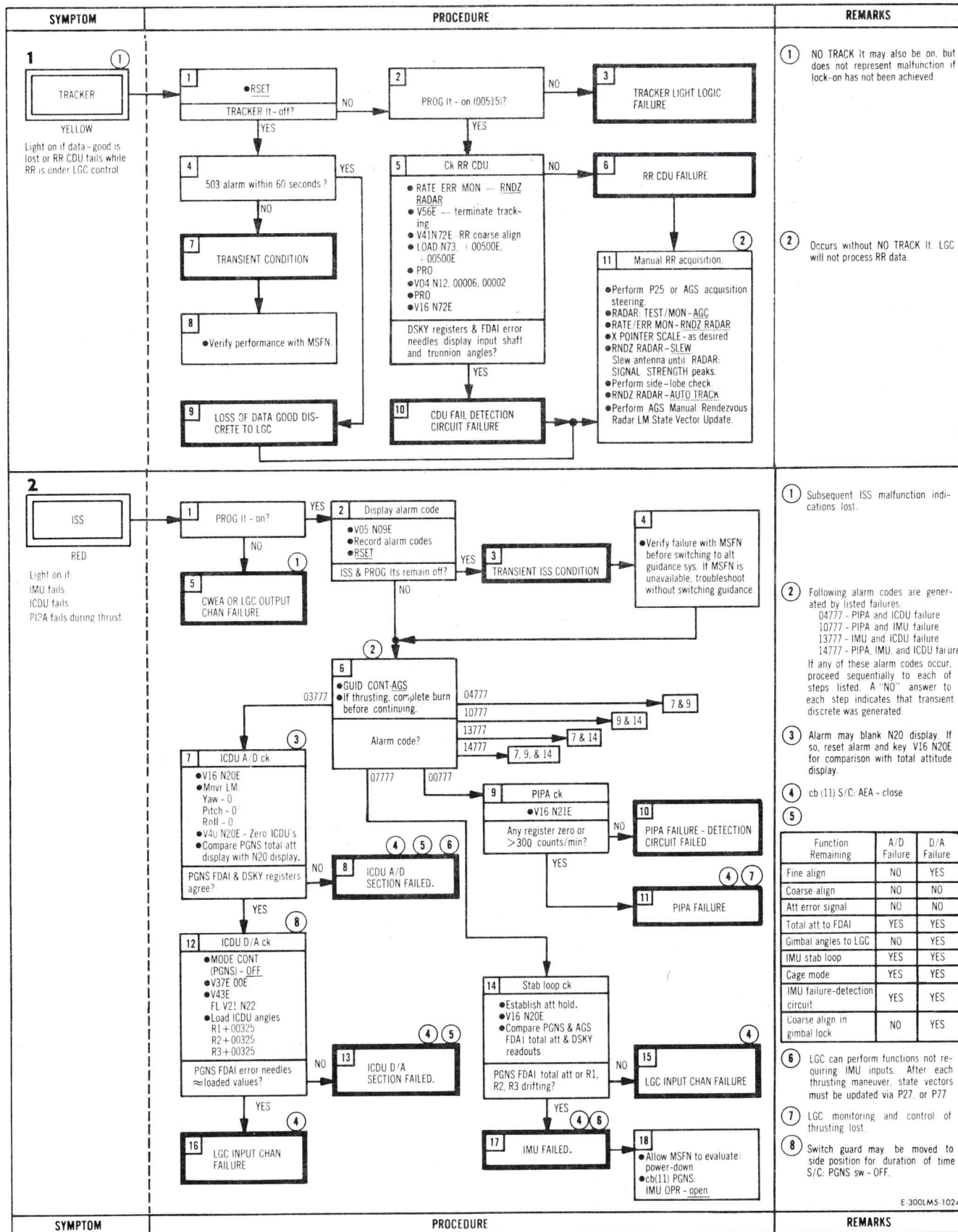
LM MALFUNCTION PROCEDURES

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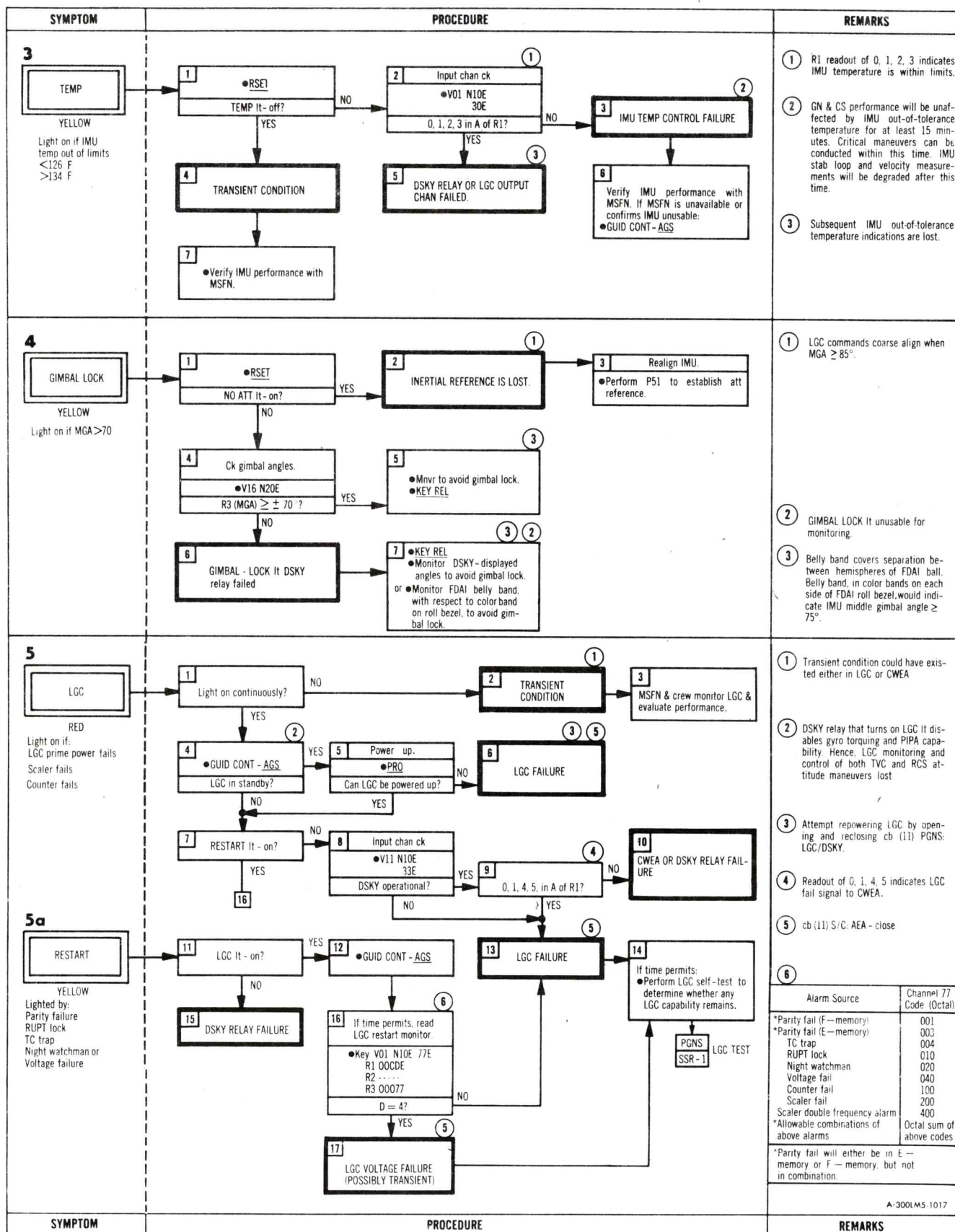
Basic 7/12/72
Change A 11/10/72

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*Current change

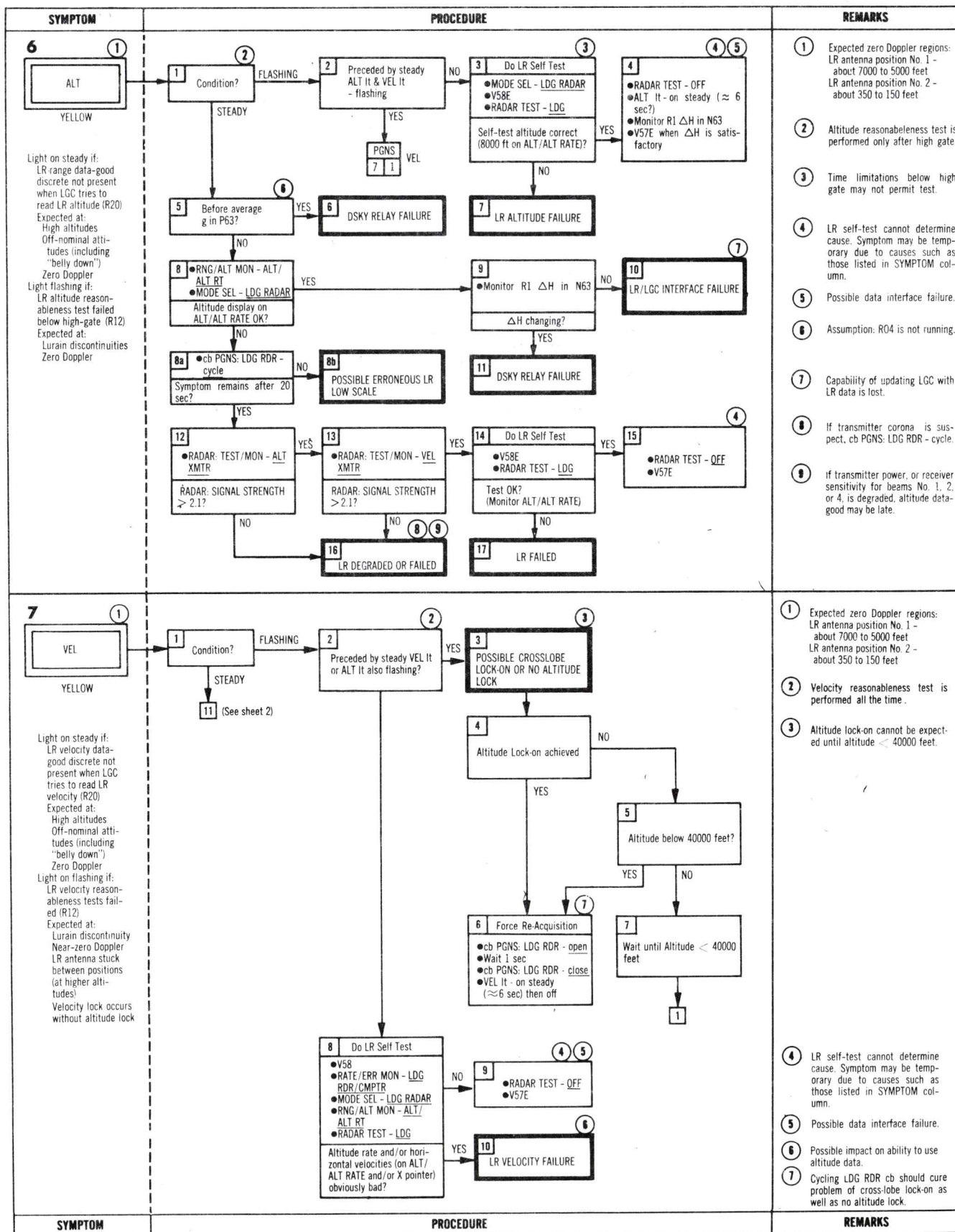
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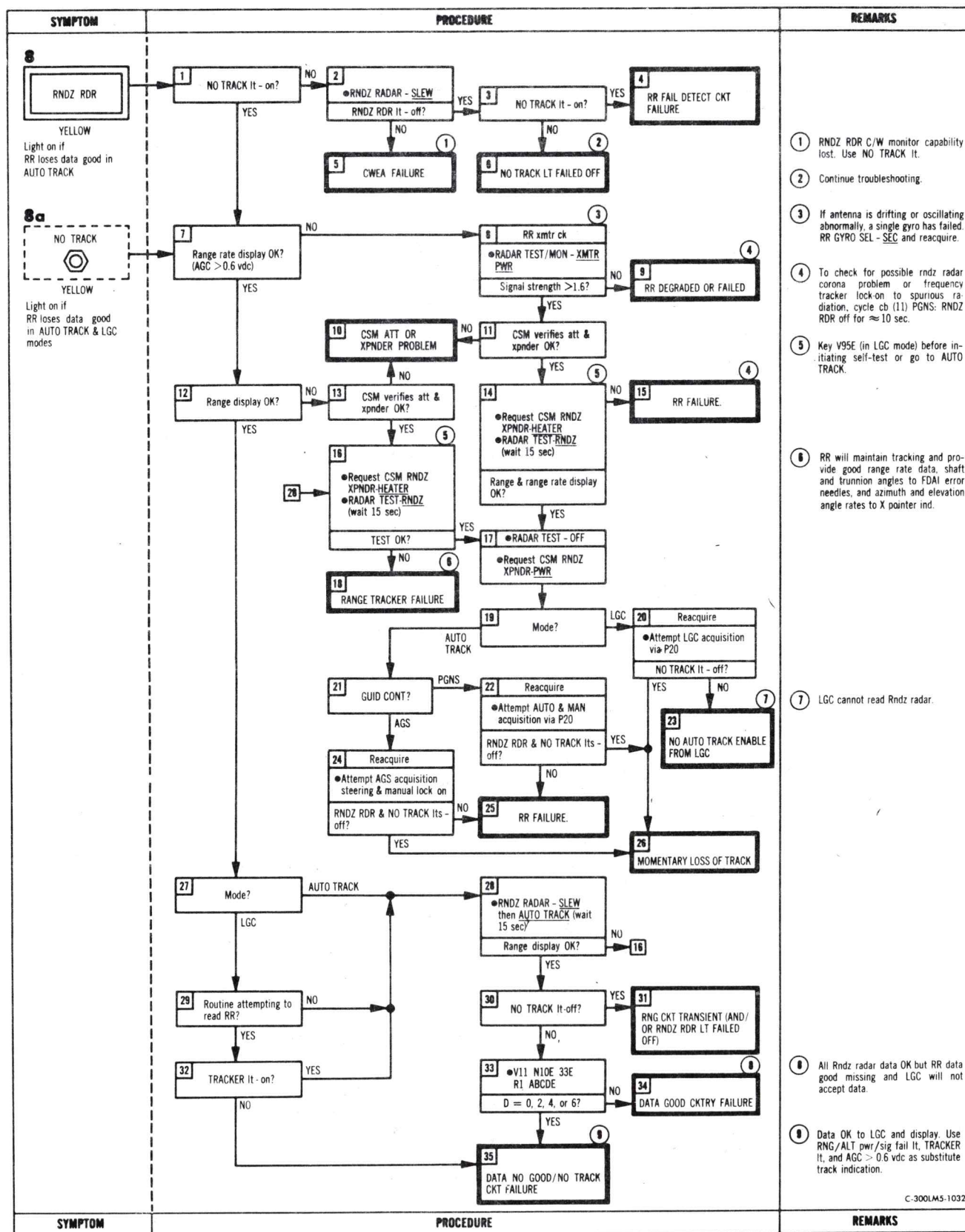
Alarm Source	Channel 77 Code (Octal)
*Parity fail (F-memory)	001
*Parity fail (E-memory)	003
TC trap	004
RUPT lock	010
Night watchman	020
Voltage fail	040
Counter fail	100
Scaler fail	200
Scaler double frequency alarm	400
*Allowable combinations of above alarms	Octal sum of above codes
*Parity fail will either be in E-memory or F-memory, but not in combination.	

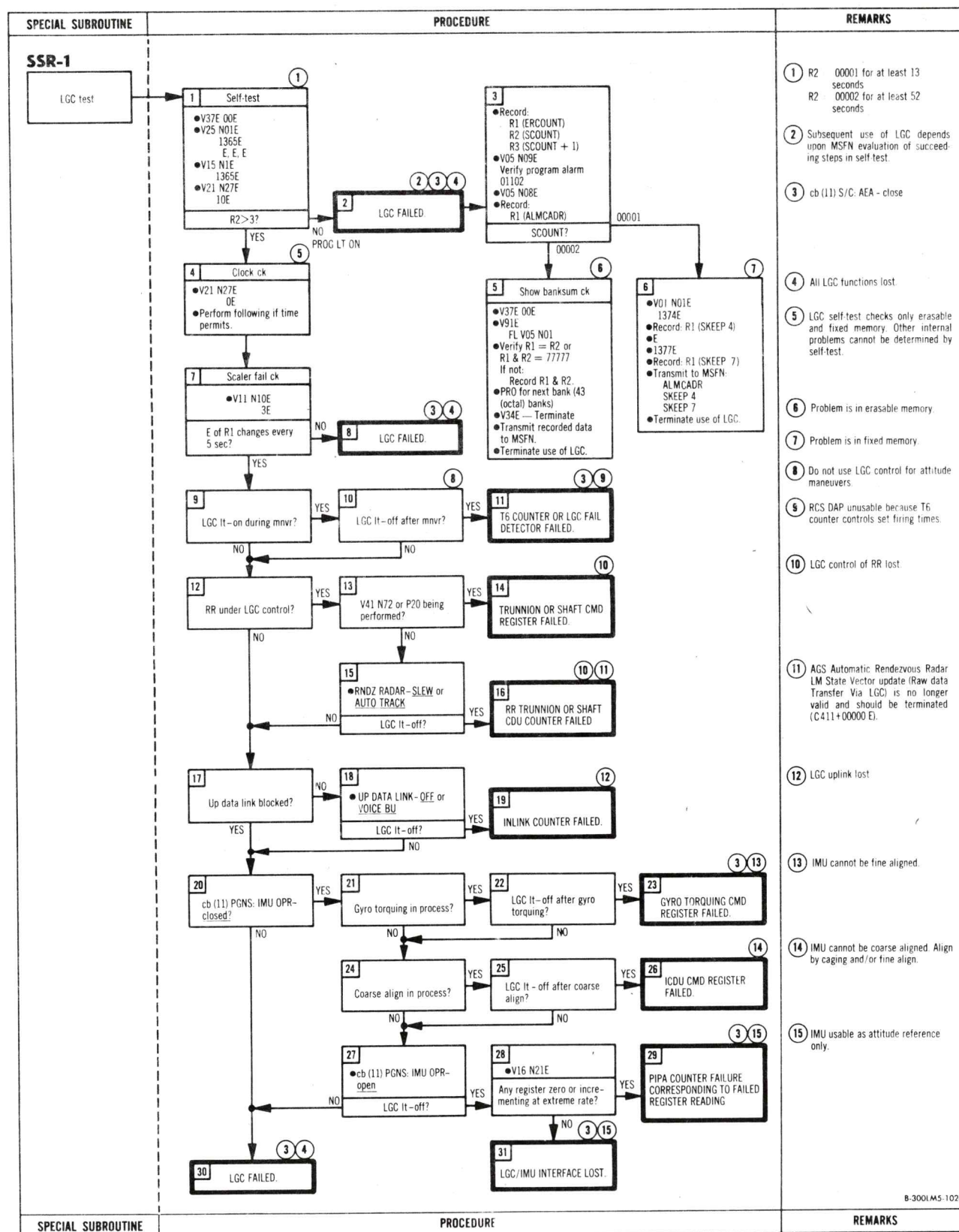
A-300LMS 1017

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7

7
(Cont)

SYMPTOM	PROCEDURE	REMARKS
	1 (From sheet 1) 8 11 Before average g in P63? NO 12 • RING/ALT MON - ALT/ALT RT • MODE SEL - LDG RADAR Altitude rate display changing? YES 11 18 DSKY RELAY FAILED OR LR/LGC INTERFACE FAILURE 20 LR VELOCITY FAILURE NO 13 • cb PGNS: LDG RDR - cycle Symptom remains after 20 sec? YES 15 • RADAR: TEST/MON - VEL XMTR RADAR: SIGNAL STRENGTH > 2.1? NO 16 LR VELOCITY DEGRADED OR FAILED 9 10 YES 12 19 Do LR Self Test • V58E • RADAR TEST - LDG • RATE ERR MON - LDG RDR/CMPT Altitude rate and/or horizontal velocities (on ALT/ALT RATE and/or X pointer) obviously bad? YES 20 LR VELOCITY FAILURE NO 21 • RADAR TEST - OFF • V57E 4 14 POSSIBLE ERRONEOUS LR LOW SCALE	8 Assumption: R04 is not running. 9 If transmitter power, or receiver sensitivity for beam No. 1, 2, or 3 is degraded, velocity data-good may be late. If beam No. 1 and/or 2 is affected, altitude data will also be late. 10 If transmitter corona is suspect, cb PGNS: LDG RDR - cycle. 11 There is no onboard capability for distinguishing between failures. Continue and monitor other data sources. If data-good-discrete interface failed, LR data are not processed. 12 Unless results are obvious, test is inconclusive without report of downlink from MSFN.
SYMPTOM	PROCEDURE	REMARKS

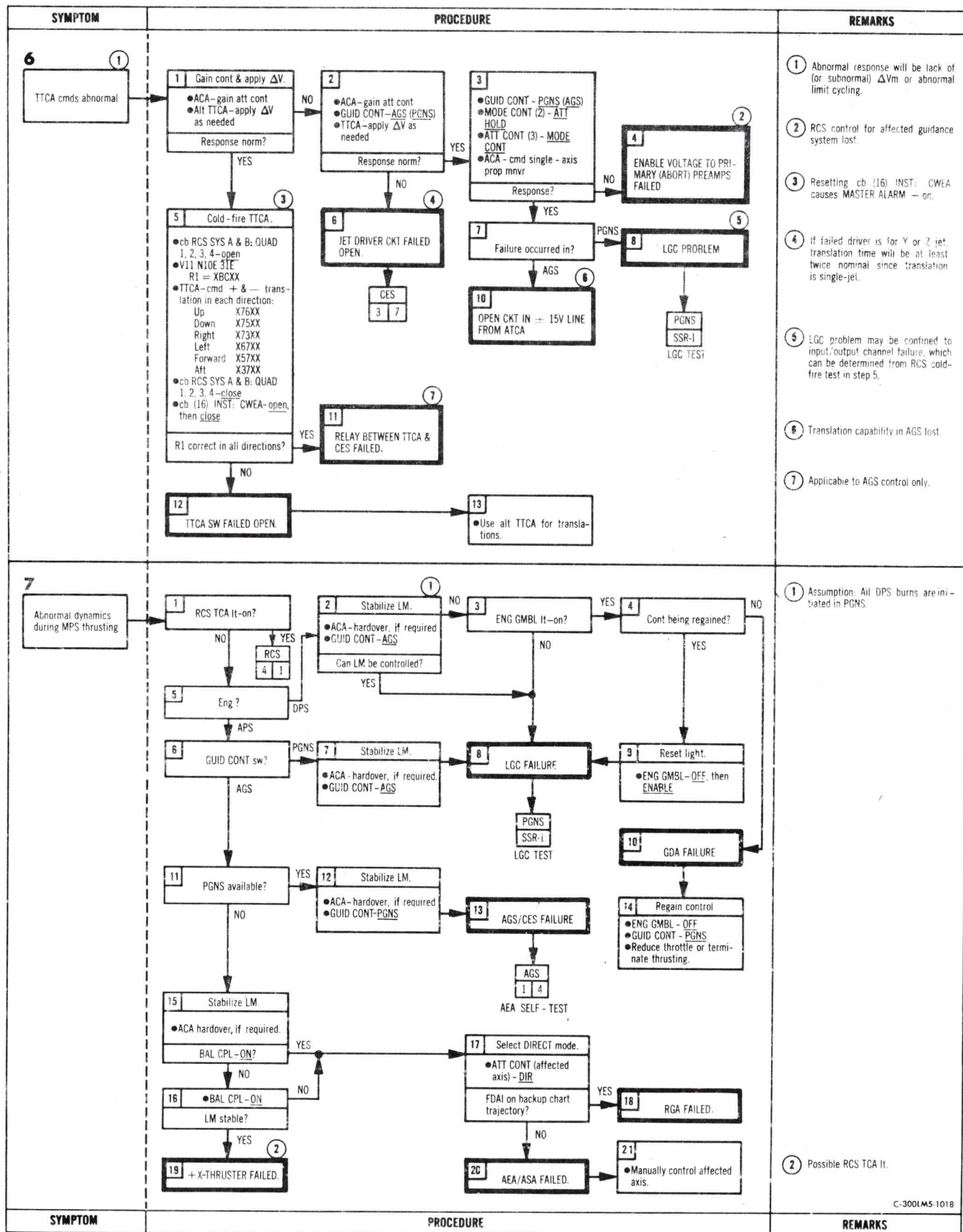
8
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B-300LM5-1020

4
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5

SYMPTOM	PROCEDURE	REMARKS
4 AGS pulse or direct cmds abnormal	1 Excessive or uncommanded rates? NO → 9 Alt ACA - cmd mnvr Response norm? YES → 2 Symptom occurred in? 2 YES → 3 Prop mnvr • ATT CONT (3) - MODE CONT • ACA - cmd mnvr Response norm? 2 NO → 4 ATCA FAILURE (1) 3 YES → 6 ACA 2.5° SW FAILED CLOSED. • ATT CONT (affected axis) - MODE CONT 3 NO → 5 • ATT CONT (3) - PULSE Symptom remains? 5 YES → 11 • ATT CONT (3) - PULSE • Orig ACA - cmd mnvr Response norm? 5 NO → 7 ACA 2.5° SW FAILED CLOSED. 11 YES → 12 ACA 2.5° SW FAILED OPEN. (4) 11 NO → 13 ACA 2.5° SW FAILED OPEN. (5) 9 NO → 14 Symptom occurred in? 14 DIR → 17 JET FAILED OFF (SEC). 14 PULSE → 15 Prop mnvr • ATT CONT (3) - MODE CONT • DEADBAND - MAX • ACA - cmd mnvr Response norm? 15 YES → 16 PULSE MODE ENABLE RELAY FAILED (TYP K19). (6) 15 NO → 18 JET DRIVER/PREAMP FAILED OFF. (1)	(1) Affected axis may be available in PGNS (if preamp failed). (2) Yaw contact failure causes loss of Yaw minimum impulse. Pitch or roll contact failure causes loss of LPD commands and both pitch and roll minimum impulse. (3) Switch contact used for direct only. (4) One-half of DIRECT authority lost in one direction for affected ACA. (5) LGC minimum impulse, LPD, AGS PULSE, and one-half of DIRECT authority lost in one direction for affected ACA. (6) AGS PULSE mode lost for affected axis.
5 Prop cmds abnormal	1 • ACA - hardover, if required • ACA PROP - DISABLE • Alt ACA - cmd prop mnvr Response norm? YES → 2 Orig symptom no mnvr? 2 YES → 3 ACA PROP CONT FAILED. (1) (2) 2 NO → 4 PROP CONT TRANSDUCER HUNG UP OUT OF NEUTRAL. (3) 1 NO → 5 Cross coupled motion? 5 YES → 6 • GUID CONT - AGS (PGNS) • ACA - cmd + & - in affected axis Response norm? 6 YES → 7 PGNS - RCS (CES - RCS) INTERFACE FAILURE. (3) 6 NO → 8 JET DRIVER FAILED OFF. (10) 5 NO → 9 GUID CONT sw? 9 PGNS → 10 S & C CONT ASSYS RELAY FAILED OPEN OR LGC PROP INPUT PROBLEM OR OPEN CIRCUIT IN ONE ACA. (2) (4) (5) (6) 9 AGS → 11 Excessive rates? 11 YES → 12 • GUID CONT - PGNS • Perform rate gyro test. Successful? 12 YES → 13 SUMMING AMPLIFIER SHORTED. (2) (7) 12 NO → 14 S & C CONT ASSYS RELAY OR SUMMING AMPLIFIER FAILED OPEN OR OPEN CIRCUIT IN ONE ACA. (2) (5) (6) (8) 12 NO → 15 RGA FAILED. (9)	(1) Prop control lost for affected ACA. (2) Failure may be single or multiaxis. (3) Failure could be open LGC output channel, summing amplifier, pulse rate module, or preamplifier. (4) Prop control lost for affected guidance system. DIRECT and PULSE control unaffected. (5) If symptom is present in both guidance modes, malfunction may be open circuit in one ACA. (6) To remove ACA and replace with shorting plug: • cb (11) S/C: ATT DIR CONT - open ATCA (PGNS) - open • cb (16) S/C: ATCA (AGS) - open • cb (11) COMM: CDR - open (for CDR ACA) or • cb (16) COMM: SE - open (for LMP ACA) • ACA PROP (2) - DISABLE • AUDIO CONT (2) - NORM On suspected ACA: • P & J 709 - disconnect • P & J 708 - disconnect • Install jumper plug on J 709. • Install dust cap on J 708. • Close above cb's & reconfigure switches. Since vehicle attitude control is lost during switch over, use of this procedure during controlled flight is not recommended. (7) PGNS and DIRECT control unaffected. PULSE control may be available in AGS. (8) DIRECT control unaffected. Prop control may be OK in alternative guidance system. (9) FDAI rate displays lost. (10) If PGNS guidance desired, inhibit jet per CES 3, step 7. C-300LMS-1012
SYMPTOM	PROCEDURE	REMARKS

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THRU
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C-300LM5-1018