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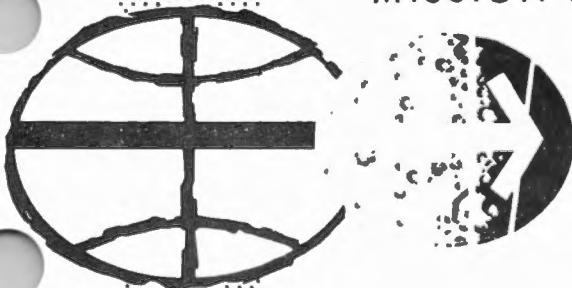
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May 6, 1971

APOLLO 15 (MISSION J-1) ALTERNATE RENDEZVOUS SIMULATOR DATA PACKAGE

Mission Planning Support Office

MISSION PLANNING AND ANALYSIS DIVISION



MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

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PROJECT APOLLO

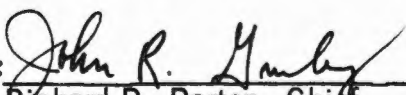
APOLLO 15 (MISSION J-1) ALTERNATE RENDEZVOUS
SIMULATOR DATA PACKAGE

By Data Management Group,
Mission Planning Support Office

May 6, 1971

MISSION PLANNING AND ANALYSIS DIVISION
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

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John P. Mayer, Chief
Mission Planning and Analysis Division

APOLLO 15 (MISSION J-1) ALTERNATE RENDEZVOUS

SIMULATOR DATA PACKAGE

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INTRODUCTION

This internal note provides supplementary rendezvous data to the Apollo 15 simulator data package (ref. 1). This data package is based on the nominal mission profile as it is defined in reference 2 and assumes a July 26, 1971, lift-off time of 13^h34^m00^s Greenwich mean time. The nominal rendezvous sequence for Apollo 15 is a lunar module (LM) active direct (M = 1) rendezvous. However, to facilitate crew and flight controller training for alternate rendezvous sequences, data other than that provided in the Apollo 15 simulator data package (ref. 1) are required.

The data contained in this document will be used to initialize the command module simulators (CMS) and the lunar module simulators (LMS) at the Manned Spacecraft Center and at Kennedy Space Center; the mission evaluator (ME) at North American Rockwell, Downey, California; the full mission engineering simulator (FMES) at Grumman Aircraft Engineering Corporation, Bethpage, New York; and Massachusetts Institute of Technology simulations at Cambridge, Massachusetts.

The data for tables I and II were generated or provided by R. H. Moore and A. L. Dupont (Orbital Mission Analysis Branch).

DATA DESCRIPTION

Reset vectors and rendezvous crew pads are provided for six alternate rendezvous sequences. These sequences are as follows.

1. Coelliptic sequence initiation - constant delta height (CSI-CDH) (M=2) rendezvous - LM active (no bailout, LM lift-off at nominal time for CSI-CDH sequence)

2. Direct (M=1) rendezvous - CSM active (no bailout)
3. CSI-CDH (M=2) rendezvous - LM active with LM bailout maneuver
4. CSI-CDH (M=2) rendezvous - CSM active with command and service module (CSM) bailout maneuver
5. CSI-CDH (M=2) rendezvous - LM active after an abort at powered descent initiation (PDI) plus 4 minutes
6. CSI-CDH (M=2) rendezvous - LM active after an abort at PDI plus 8 minutes

Table I contains the state vectors for the CSM and the LM in the mean Besselian coordinate system at specific times during each rendezvous sequence.

Table II contains the rendezvous crew pads for each maneuver of the various rendezvous sequences. For rendezvous sequences 1 through 4 (as previously described) an abort guidance system (AGS) reference time of 170 hours was assumed. For rendezvous sequences 5 and 6 an AGS reference time of 100 hours was assumed.

Tables VIII, IX, and X of reference 1 should be used for erasable load data, scale factors, propulsion data, mass properties data, and consumables data.

Any questions concerning this data package should be directed to Larry Davis of the Data Management Group, HU3-4091.

TABLE I.- STATE VECTORS

(a) CSI-CDH rendezvous - LM active - no bailout (lift-off at M = 2 time)

CSM-insertion + 1 minute

GET = 171 HR 48 MIN .00 SEC

	GEOCENTRIC	SELENOCENTRIC
X =	-0.27733002+09	0.31385407+07 FT
Y =	-0.10901922+10	0.29055609+07 FT
Z =	-0.57712871+09	0.42823150+07 FT
XDOT =	0.76880660+04	0.44065449+04 FT/SEC
YDOT =	-0.32542580+04	-0.26843930+04 FT/SEC
ZDOT =	-0.14586464+04	-0.14087745+04 FT/SEC
X =	-0.13253058+02	0.14998471+00 ER
Y =	-0.52098149+02	0.13885106+00 ER
Z =	-0.27579850+02	0.20464344+00 ER
XDOT =	0.13226314+01	0.75808851+00 ER/HR
YDOT =	-0.55985260+00	-0.46181478+00 ER/HR
ZDOT =	-0.25094108+00	-0.24236125+00 ER/HR
WT =	0.36156000+05 LBS	

TABLE I.- STATE VECTORS - Continued

(a) CSI-CDH rendezvous - LM active - no bailout (lift-off at M = 2 time) - Continued

LM-insertion + 1 minute

GET = 171 HR 48 MIN .00 SEC			
		GEOCENTRIC	SELENOCENTRIC
X	=	-.27893354+09	.15350191+07 FT
Y	=	-.10896376+10	.34601701+07 FT
Z	=	-.57707952+09	.43315104+07 FT
XDOT	=	.84723954+04	.51908743+04 FT/SEC
YDOT	=	-.24663241+04	-.18964591+04 FT/SEC
ZDOT	=	-.32074292+03	-.27087092+03 FT/SEC
X	=	-.13329687+02	.73355555-01 ER
Y	=	-.52071645+02	.16535475+00 ER
Z	=	-.27577499+02	.20699439+00 ER
XDOT	=	.14575650+01	.89302215+00 ER/HR
YDOT	=	-.42429886+00	-.32626103+00 ER/HR
ZDOT	=	-.55179632-01	-.46599805-01 ER/HR
		WT =	.59229000+04 LBS

TABLE I.- STATE VECTORS - Continued

(a) CSI-CDH rendezvous - LM active - no bailout (lift-off at M = 2 time) - Continued

LM-CSI + 1 minute

GCT = 172 HR 39 MIN .00 SEC

		GEOCENTRIC	SELENUCENTRIC
X	=	-.27020371+09	.21396907+06 FT
Y	=	-.10980545+10	-.40404802+07 FT
Z	=	-.58591326+09	-.43685749+07 FT
XDOT	=	-.19573497+04	-.52449496+04 FT/SEC
YDOT	=	.22890292+03	.77549691+03 FT/SEC
ZDOT	=	-.10124804+04	-.97499635+03 FT/SEC
X	=	-.12912506+02	.10225162+01 ER
Y	=	-.52512101+02	-.19346932+00 ER
Z	=	-.27999646+02	-.20876563+00 ER
XDOT	=	-.33673646+00	-.90232511+00 ER/HR
YDOT	=	.39379759+01	.13341412+00 ER/HR
ZDOT	=	-.17418403+00	-.16773539+00 ER/HR
		WT =	.58899370+04 LBS

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TABLE I.- STATE VECTORS - Continued

(a) CSI-CDH rendezvous - LM active - no bailout (lift-off M = 2 time) - Concluded

LM-TPI + 1 minute

GET = 174 HR 29 MIN .00 SEC

		GEOCENTRIC	SELENOCENTRIC
X	=	-.24667610+09	.20020081+07 FT
Y	=	-.11023004+10	-.41131907+07 FT
Z	=	-.58552566+09	-.38219254+07 FT
XDOT	=	-.16419417+04	-.49419521+04 FT/SEC
YDOT	=	-.90637110+03	-.41020586+03 FT/SEC
ZDOT	=	-.21781794+04	-.21674840+04 FT/SEC
X	=	-.11788167+02	.95672041-01 ER
Y	=	-.52679045+02	-.19656132+00 ER
Z	=	-.27981123+02	-.18264233+00 ER
XDOT	=	-.28247463+00	-.86019834+00 ER/HR
YDOT	=	-.15592931+00	-.70570562+01 ER/HR
ZDOT	=	-.37472732+00	-.37288733+00 ER/HR
		WT =	.58736620+04 LBS

TABLE I. - STATE VECTORS - Continued

(b) Direct rendezvous - CSM active

CSM-insertion + 1 minute

GET = 171 HR 46 MIN .00 SEC

		GEOCENTRIC	SELENOCENTRIC
X	=	-.27826931+09	.25931089+07 FT
Y	=	-.10698186+10	.32107662+07 FT
Z	=	-.57697802+09	.44269896+07 FT
XDOT	=	.79567425+04	.46754639+04 FT/SEC
YDOT	=	-.29683615+04	-.23975852+04 FT/SEC
ZDOT	=	-.10505620+04	-.10002046+04 FT/SEC
X	=	-.13297945+02	.12391959+00 ER
Y	=	-.52080293+02	.15343622+00 ER
Z	=	-.27572649+02	.21155717+00 ER
XDOT	=	.13688537+01	.80435253+00 ER/HR
YDOT	=	-.51066785+00	-.41247324+00 ER/HR
ZDOT	=	-.18073548+00	-.17207214+00 ER/HR
		WT = .36156000+05 LBS	

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TABLE I.- STATE VECTORS - Continued

(b) Direct rendezvous - CSM active - Continued

CSM-TPI + 1 minute

WET = 172 HR 34 MIN .00 SEC

		GEOCENTRIC	SELENOCENTRIC
X	=	-.27056948+09	.83450652+06 FT
Y	=	-.10988208+10	-.41791815+07 FT
Z	=	-.58582882+09	-.42955647+07 FT
XDOT	=	-.18029087+04	-.50899216+04 FT/SEC
YDOT	=	-.16114330+03	.38773552+03 FT/SEC
ZDOT	=	-.13856483+04	-.13469487+04 FT/SEC
X	=	-.12929985+02	.39879431-01 ER
Y	=	-.52510493+02	-.19971489+00 ER
Z	=	-.27995611+02	-.20527662+00 ER
XDOT	=	-.31016690+00	-.87565456+00 ER/HR
YDOT	=	-.27722601-01	.66704834-01 ER/HR
ZDOT	=	-.23838270+00	-.23172494+00 ER/HR
		WT =	.35871737+05 LBS

(A) —

TABLE I. - STATE VECTORS - Continued

(b) Direct rendezvous - CSM active - Concluded

LM-insertion + 1 minute

NET = 171 HR 46 MIN .00 SEC

	GEOCENTRIC	SELENUCENTRIC
X =	-.27914776+09	.17146517+07 FT
Y =	-.10896373+10	.33920142+07 FT
Z =	-.57708561+09	.43194069+07 FT
XDOT =	.84212406+04	.51399622+04 FT/SEC
YDOT =	-.25792661+04	-.20084898+04 FT/SEC
ZDOT =	-.46175714+03	-.41139967+03 FT/SEC
X =	-.13339924+02	.81939846+01 ER
Y =	-.52071631+02	.16209771+00 ER
Z =	-.27577790+02	.20641599+00 ER
XDOT =	.14487645+01	.88426338+00 ER/HR
YDOT =	-.44372906+00	-.34553444+00 ER/HR
ZDOT =	-.79439288-01	-.70775941-01 ER/HR
WT =	.59133000+04 LBS	

TABLE I.- STATE VECTORS - Continued
(c) CSI-CDH rendezvous - LM active - with LM bailout

CSM-insertion + 1 minute

GET = 171 HR 46 MIN .00 SEC

	GEOCENTRIC	SELENOCENTRIC
X =	-.27826885+09	.25935636+07 FT
Y =	-.10898193+10	.32099779+07 FT
Z =	-.57697911+09	.44258976+07 FT
XDOT =	.679567017+04	.46754232+04 FT/SEC
YDOT =	-.29691367+04	-.23983604+04 FT/SEC
ZDOT =	-.10520048+04	-.10016473+04 FT/SEC
X =	-.13297923+02	.12394132+00 ER
Y =	-.52080330+02	.15339455+00 ER
Z =	-.27572701+02	.21150497+00 ER
XDOT =	.13688466+01	.80434552+00 ER/HR
YDOT =	-.51080121+00	-.41260660+00 ER/HR
ZDOT =	-.18098369+00	-.17232034+00 ER/HR
WT =	.36156000+05 LBS	

TABLE I.- STATE VECTORS - Continued

(c) CSI-CDH rendezvous - LM active - with LM bailout - Continued

CSM-LM bailout + 1 minute

GET = 171 HR 51 MIN .00 SEC

	GEOCENTRIC	SELENOCENTRIC
X =	-.27598871+09	.38891106+07 FT
Y =	-.10908136+10	.23866877+07 FT
Z =	-.57744577+09	.39741689+07 FT
XDOT =	.71927639+04	.39108795+04 FT/SEC
YDOT =	-.36265304+04	-.30980324+04 FT/SEC
ZDOT =	-.20413420+04	-.19921982+04 FT/SEC
X =	-.13188960+02	.18585297+00 ER
Y =	-.52127841+02	.11409513+00 ER
Z =	-.27595002+02	.18991774+00 ER
XDOT =	.12374211+01	.67281576+00 ER/HR
YDOT =	-.62389720+00	-.52609455+00 ER/HR
ZDOT =	-.35118624+00	-.34273168+00 ER/HR
WT =	.36156000+05 LBS	

TABLE I.- STATE VECTORS - Continued
(c) CSI-CDH rendezvous - LM active - with LM bailout - Continued

LM-insertion + 1 minute

GET = 171 HR 46 MIN .00 SEC		
	GEOCENTRIC	SELENOCENTRIC
X =	-.27915342+09	.17089941+07 FT
Y =	-.10896353+10	.33939971+07 FT
Z =	-.57708445+09	.43205637+07 FT
XDOT =	.84228311+04	.51415526+04 FT/SEC
YDOT =	-.25760486+04	-.20052723+04 FT/SEC
ZDOT =	-.45636429+03	-.40600681+03 FT/SEC
X =	-.13340195+02	.81669481-01 ER
Y =	-.52071537+02	.16219247+00 ER
Z =	-.27577735+02	.20647127+00 ER
XDOT =	.14490381+01	.88453700+00 ER/HR
YDOT =	-.44317553+00	-.34498091+00 ER/HR
ZDOT =	-.78511517-01	-.69848171-01 ER/HR
WT = .59222910+04 LBS		

TABLE I.- STATE VECTORS - Continued

(c) CSI-CDH rendezvous - LM active - with LM bailout - Continued

LM-LM bailout + 1 minute

GET ■ 171 HR 51 MIN .00 SEC		
	GEOCENTRIC	SELENOCENTRIC
X ■	-.27671408+09	.31637453+07 FT
Y ■	-.10905386+10	.26616710+07 FT
Z ■	-.57739538+09	.40245553+07 FT
XDOT ■	.77924354+04	.45105510+04 FT/SEC
YDOT ■	-.34219324+04	-.28534344+04 FT/SEC
ZDOT ■	-.16067111+04	-.15575672+04 FT/SEC
X ■	-.13223624+02	.15118919+00 ER
Y ■	-.52114700+02	.12719604+00 ER
Z ■	-.27592594+02	.19232561+00 ER
XDOT ■	.13405868+01	.77598141+00 ER/HR
YDOT ■	-.58869880+00	-.49089614+00 ER/HR
ZDOT ■	-.27641366+00	-.26795910+00 ER/HR
WT ■	.58951930+04 LBS	

TABLE I.- STATE VECTORS - Continued

(c) CSI-CDH rendezvous - LM active - with LM bailout - Continued

LM-CSI + 1 minute

GET = 172 HR 40 MIN .00 SEC

GEOCENTRIC

SELENOCENTRIC

X	=	-.27083666+09	-.61619668+06 FT
Y	=	-.10988463+10	-.40075267+07 FT
Z	=	-.58616027+09	-.46133499+07 FT
XDOT	=	-.16172988+04	-.51050158+04 FT/SEC
YDOT	=	.69480864+03	.12409457+04 FT/SEC
ZDOT	=	-.45411386+03	-.41687289+03 FT/SEC
X	=	-.12942753+02	-.29446832-01 ER
Y	=	-.52511710+02	-.19151184+00 ER
Z	=	-.28011451+02	-.22046295+00 ER
XDOT	=	-.31264252+00	-.87825131+00 ER/HR
YDOT	=	.11953275+00	.21348851+00 ER/HR
ZDOT	=	-.78124361-01	-.71717539-01 ER/HR

WT = .58644550+04 LBS

TABLE I.- STATE VECTORS - Continued

(c) CSI-CDH rendezvous - LM active - with LM bailout - Continued

LM-CDH + 1 minute

GET = 173 HR 40 MIN .00 SEC		
	GEOCENTRIC	SELENOCENTRIC
X =	-.25760497+09	.76724597+06 FT
Y =	-.10429091+10	.38463554+07 FT
Z =	-.57716492+09	.44898084+07 FT
XDOT =	.84957847+04	.52011840+04 FY/SEC
YDOT =	-.18997509+04	-.13810825+04 FY/SEC
ZDOT =	.27057837+03	.29321832+03 FY/SEC
X =	-.12310436+02	.36665181-01 ER
Y =	-.52227983+02	.18380979+00 ER
Z =	-.27581580+02	.21455914+00 ER
XDOT =	.14615888+01	.89479579+00 ER/HR
YDOT =	-.32682733+00	-.23799721+00 ER/HR
ZDOT =	.46549477-01	.50444384+01 ER/HR
WT = .58361750+04 LBS		

TABLE I.- STATE VECTORS - Continued

(c) CSI-CDH rendezvous - LM active - with LM bailout - Concluded

LM-TPI + 1 minute

GET = 174 HR 29 MIN .00 SEC

GEOCENTRIC

SELENOCENTRIC

X	=	-.24668653+09	-.19915802+07 FT
Y	=	-.11023613+10	-.41140103+07 FT
Z	=	-.58552974+09	-.38260159+07 FT
XDOT	=	-.16456486+04	-.49456591+04 FT/SEC
YDOT	=	-.90010593+03	-.40394069+03 FT/SEC
ZDOT	=	-.21712721+04	-.21605768+04 FT/SEC
X	=	-.11788666+02	-.95173713+01 ER
Y	=	-.52679684+02	-.19660049+00 ER
Z	=	-.27981319+02	-.18283780+00 ER
XDOT	=	-.28311236+00	-.85083607+00 ER/HR
YDOT	=	-.15485147+00	-.69492722+01 ER/HR
ZDOT	=	-.37353902+00	-.37169904+00 ER/HR
WT	=	.58203500+04 LBS	

TABLE I.- STATE VECTORS - Continued

(d) CSI-CDH rendezvous - CSM active - with CSM bailout

CSM-insertion + 1 minute

GET = 171 HR 16 MIN .00 SEC		
	GEOCENTRIC	SELENOCENTRIC
X =	-.27826885+07	.25935636+07 FT
Y =	-.10893193+10	.32099779+07 FT
Z =	-.57677911+09	.44258976+07 FT
XDOT =	.79567017+04	.46754232+04 FT/SEC
YDOT =	-.29691367+04	-.23983604+04 FT/SEC
ZDOT =	-.10520048+04	-.10016473+04 FT/SEC
X =	-.13297923+02	.12394132+00 ER
Y =	-.52080330+02	.15339855+00 ER
Z =	-.27572701+02	.21150497+00 ER
XDOT =	.13688466+01	.90434552+00 ER/HR
YDOT =	-.51030121+00	-.41260660+00 ER/HR
ZDOT =	-.18098369+00	-.17232034+00 ER/HR
WT = .36156000+05 LBS		

TABLE I.- STATE VECTORS - Continued
(d) CSI-CDH rendezvous - CSM active - with CSM bailout - Continued

CSM-CSM bailout + 1 minute

GET	=	171 HR 58 MIN	.00 SEC
		GEOCENTRIC	SELENOCENTRIC
X	=	-.27327190+09	.52273229+07 FT
Y	=	-.10924667+10	.97165337+06 FT
Z	=	-.57855255+09	.28876691+07 FT
XDOT	=	.56546028+04	.23718736+04 FT/SEC
YDOT	=	-.91472296+04	-.35819221+04 FT/SEC
ZDOT	=	-.31517397+04	-.31042951+04 FT/SEC
X	=	-.13059128+02	.24980352+00 ER
Y	=	-.52206842+02	.46433410+00 ER
Z	=	-.27647893+02	.13799605+00 ER
XDOT	=	.97280059+00	.40804989+00 ER/HR
YDOT	=	-.71347670+00	-.61622293+00 ER/HR
ZDOT	=	-.54221566+00	-.53405344+00 ER/HR
WT	=	.35975474+05 LBS	

TABLE I. - STATE VECTORS - Continued

(d) CSI-CDH rendezvous - CSM active - with CSM bailout - Continued

CSM-CSI + 1 minute

GET = 172 HR 41 MIN .00 SEC		
	GEOCENTRIC	SELENOCENTRIC
X =	-.27155746+09	-.15342132+07 FT
Y =	-.10984065+10	-.35350448+07 FT
Z =	-.58596261+09	-.44134549+07 FT
XDOT =	-.17880372+04	-.50758713+04 FT/SEC
YDOT =	.13656186+04	.19112988+04 FT/SEC
ZDOT =	.29398397+03	.33098188+03 FT/SEC
X =	-.12977199+02	-.73317041-01 ER
Y =	-.52490695+02	-.16893286+00 ER
Z =	-.28002005+02	-.21091036+00 ER
XDOT =	-.30760846+00	-.87323738+00 ER/HR
YDOT =	.23493684+00	.32881400+00 ER/HR
ZDOT =	.50576104-01	.56941112-01 ER/HR
WT =	.35829676+05 LBS	

TABLE I.- STATE VECTORS - Continued

(d) CSI-CDH rendezvous - CSM active - with CSM bailout - Continued

CSM-CDH + 1 minute

GET = 173 HR 37 MIN .00 SEC		
	GEOCENTRIC	SELENOCENTRIC
X =	-.25724243+09	.17228227+07 FT
Y =	-.10932080+10	.34539467+07 FT
Z =	-.57726038+09	.43901968+07 FT
XDOT =	.83997078+04	.51054445+04 FT/SEC
YDOT =	-.24974709+04	-.19774266+04 FT/SEC
ZDOT =	-.42031800+03	-.39694729+03 FT/SEC
X =	-.12293111+02	.82330321-01 ER
Y =	-.52242268+02	.16505734+00 ER
Z =	-.27586143+02	.20979890+00 ER
XDOT =	.14450601+01	.87832506+00 ER/HR
YDOT =	-.42965725+00	-.34019043+00 ER/HR
ZDOT =	-.72310224-01	-.68289598-01 ER/HR
WT = .35618072+05 LBS		

TABLE I.- STATE VECTORS - Continued

(d) CSI-CDH rendezvous - CSM active - with CSM bailout - Continued

CSM-TPI + 1 minute

GET = 174 HR 29 MIN .00 SEC		
	GEOCENTRIC	SELENOCENTRIC
X =	-.24855784+09	.12026626+06 FT
Y =	-.11023458+10	-.40985265+07 FT
Z =	-.58616250+09	-.44587662+07 FT
XDOT =	-.18347908+04	-.51348012+04 FT/SEC
YDOT =	.33206194+03	.82822718+03 FT/SEC
ZDOT =	-.88390423+03	-.87320891+03 FT/SEC
X =	-.11878092+02	.57472886-02 ER
Y =	-.52678944+02	-.19586055+00 ER
Z =	-.28011557+02	-.21307570+00 ER
XDOT =	-.31565180+00	-.88337550+00 ER/HR
YDOT =	.57126921-01	.14248567+00 ER/HR
ZDOT =	-.15206418+00	-.15022419+00 ER/HR
WT = .35523651+05 LBS		

TABLE I.- STATE VECTORS - Continued

(d) CSI-CDH rendezvous - CSM active - with CSM bailout - Continued

LM-insertion + 1 minute

GET = 171 HR 46 MIN .00 SEC

	GEOCENTRIC	SELENOCENTRIC
X =	-.27915342+09	.17089941+07 FT
Y =	-.10896353+10	.33939971+07 FT
Z =	-.57708445+09	.43205637+07 FT
XDOT =	.84228311+04	.51415526+04 FT/SEC
YDOT =	-.25760486+04	-.20052723+04 FT/SEC
ZDOT =	-.45636429+03	-.40600681+03 FT/SEC
X =	-.13340195+02	.81669481-01 ER
Y =	-.52071537+02	.16219247+00 ER
Z =	-.27577735+02	.20647127+00 ER
XDOT =	.14490381+01	.88453700+00 ER/HR
YDOT =	-.44317553+00	-.34498091+00 ER/HR
ZDOT =	-.78511517-01	-.69848171-01 ER/HR
WT =	.57222210+04 LBS	

TABLE I.- STATE VECTORS - Continued

(d) CSI-CDH rendezvous - CSM active - with CSM bailout - Concluded

LM-CSM bailout + 1 minute

GET = 171 HR 58 MIN .00 SEC

	GEOCENTRIC	SELENOCENTRIC
X	-.27375409+09	.47451287+07 FT
Y	-.10921422+10	.12961351+07 FT
Z	-.57836230+09	.30779203+07 FT
XDOT	.62543040+04	.29715747+04 FT/SEC
YDOT	-.41527156+04	-.35874082+04 FT/SEC
ZDOT	-.29474882+04	-.29000436+04 FT/SEC
X	-.13082171+02	.22676040+00 ER
Y	-.52191335+02	.61939758-01 ER
Z	-.27638801+02	.14708778+00 ER
XDOT	.10759713+01	.51122063+00 ER/HR
YDOT	-.71442051+00	-.61716674+00 ER/HR
ZDOT	-.50707686+00	-.49891464+00 ER/HR
WT	.59222910+04 LBS	

TABLE I.- STATE VECTORS - Continued
(e) CSI-CDH rendezvous - LM active - after PDI + 4 abort

CSM-insertion + 1 minute

GET = 104 HR 37 MIN .00 SEC

	GEOCENTRIC	SELENOCENTRIC
X =	-.96677405+09	.22985738+07 FT
Y =	-.75279238+09	.36272079+07 FT
Z =	-.45531546+09	.42554044+07 FT
XDOT =	.70028344+04	.47568242+04 FT/SEC
YDOT =	-.44913323+04	-.23913251+04 FT/SEC
ZDOT =	-.14800454+04	-.56868202+03 FT/SEC
X =	-.46200237+02	.10984434+00 ER
Y =	-.35974473+02	.17333716+00 ER
Z =	-.21758633+02	.20335743+00 ER
XDOT =	.12047462+01	.81834950+00 ER/HR
YDOT =	-.77267507+00	-.41139626+00 ER/HR
ZDOT =	-.25462248+00	-.97834317+01 ER/HR
WT =	.37630000+05 LBS	

TABLE I.- STATE VECTORS - Continued

(e) CSI-CDH rendezvous - LM active - after PDI + 4 abort - Continued

LM-insertion + 1 minute

	GET	=	104 HR 37 MIN	.00 SEC	
			GEOCENTRIC		SELENOCENTRIC
X	=		-.96530775+09		.37648640+07 FT
Y	=		-.75401270+09		.24068898+07 FT
Z	=		-.45594899+09		.36218659+07 FT
XDOT	=		.63050914+04		.40590813+04 FT/SEC
YDOT	=		-.55820344+04		-.34820273+04 FT/SEC
ZDOT	=		-.27620150+04		-.18506516+04 FT/SEC
X	=		-.46130166+02		.17991547+00 ER
Y	=		-.36032789+02		.11502055+00 ER
Z	=		-.21788909+02		.17308187+00 ER
XDOT	=		.10847087+01		.69831195+00 ER/HR
YDOT	=		-.96031614+00		-.59903733+00 ER/HR
ZDOT	=		-.47516862+00		-.31838045+00 ER/HR
	WT	=	.23063768+05		LBS

TABLE I.- STATE VECTORS - Continued

(e) CSI-CDH rendezvous - LM active - after PDI + 4 abort - Continued

LM-boost + 1 minute

GET = 105 HR 37 MIN .00 SEC		
	GEOCENTRIC	SELENOCENTRIC
X =	-.96498908+09	-.40418944+07 FT
Y =	-.76688007+09	-.29316058+07 FT
Z =	-.46705038+09	-.42175252+07 FT
XDOT =	-.14389158+04	-.37069976+04 FT/SEC
YDOT =	.89954432+03	.29822248+04 FT/SEC
ZDOT =	.60475853+03	.15056035+04 FT/SEC
X =	-.46114937+02	-.19315421+00 ER
Y =	-.36647696+02	-.14009570+00 ER
Z =	-.22319422+02	-.20154726+00 ER
XDOT =	-.24754667+00	-.63774053+00 ER/HR
YDOT =	.15475485+00	.51305284+00 ER/HR
ZDOT =	.10404081+00	.25901942+00 ER/HR
WT = .23038263+05 LBS		

TABLE I.- STATE VECTORS - Continued

(e) CSI-CDH rendezvous - LM active - after PDI + 4 abort - Continued

LM-HAM + 1 minute

GET = 106 HR 37 MIN .00 SEC

	GEOCENTRIC	SELENOCENTRIC
X =	-.94932951+09	.34131219+07 FT
Y =	-.76868403+09	.27306238+07 FT
Z =	-.46225383+09	.38030122+07 FT
XDOT =	.66181976+04	.43282047+04 FT/SEC
YDOT =	-.53172080+04	-.32520411+04 FT/SEC
ZDOT =	-.24332920+04	-.15430495+04 FT/SEC
X =	-.45366597+02	.16310641+00 ER
Y =	-.36733903+02	.13049116+00 ER
Z =	-.22090204+02	.18173850+00 ER
XDOT =	.11385745+01	.74461111+00 ER/HR
YDOT =	-.91475622+00	-.55947120+00 ER/HR
ZDOT =	-.41861611+00	-.26546151+00 ER/HR
WT =	.23038262+05 LBS	

TABLE I.- STATE VECTORS - Continued
(e) CSI-CDH rendezvous - LM active - after PDI + 4 abort - Continued

LM-CSI + 1 minute

GET = 107 HR 37 MIN .00 SEC			211 -
	GEOCENTRIC	SELENOCENTRIC	
X =	-.94808477+09	-.36253166+07 FT	
Y =	-.78206153+09	-.32440684+07 FT	
Z =	-.47360796+09	-.43654608+07 FT	
XDOT =	-.16834995+04	-.39952413+04 FT/SEC	
YDOT =	.74213668+03	.27896040+04 FT/SEC	
ZDOT =	.34637310+03	.12259296+04 FT/SEC	
X =	-.45307113+02	-.17324677+00 ER	
Y =	-.37373188+02	-.15502767+00 ER	
Z =	-.22632796+02	-.20861682+00 ER	
XDOT =	-.28962411+00	-.68732910+00 ER/HR	
YDOT =	.12767493+00	.47991494+00 ER/HR	
ZDOT =	.59588969-01	.21090518+00 ER/HR	
WT =	.22954044+05 LBS		

TABLE I.- STATE VECTORS - Continued

(e) CSI-CDH rendezvous - LM active - after PDI + abort - Continued

LM-CDH + 1 minute

GET = 108 HR 39 MIN .00 SEC

		GEOCENTRIC	SELENOCENTRIC
X	=	-.93258835+09	.32299568+07 FT
Y	=	-.78339892+09	.30007487+07 FT
Z	=	-.46849954+09	.39942220+07 FT
XDOT	=	.66505975+04	.43165546+04 FT/SEC
YDOT	=	-.50053655+04	-.29763824+04 FT/SEC
ZDOT	=	-.21601827+04	-.12917555+04 FT/SEC
X	=	-.44566569+02	.15435330+00 ER
Y	=	-.37437099+02	.14339990+00 ER
Z	=	-.22388674+02	.19087604+00 ER
XDOT	=	.11441485+01	.74260686+00 ER/HR
YDOT	=	-.86110778+00	-.51204772+00 ER/HR
ZDOT	=	-.37163124+00	-.22222967+00 ER/HR
WT	=	.22668894+05 LBS	

TABLE I.- STATE VECTORS - Continued
(e) CSI-CDH rendezvous - LM active - after PDI + 4 abort - Concluded

LM-TPI + 1 minute

GET = 109 HR 20 MIN .00 SEC		
	GEOCENTRIC	SELENOCENTRIC
X =	-.92833902+09	.17194906+07 FT
Y =	-.79579466+09	-.44188432+07 FT
Z =	-.47820562+09	-.35846396+07 FT
XDOT =	-.26564234+04	-.50051166+04 FT/SEC
YDOT =	-.23311526+04	-.31450114+03 FT/SEC
ZDOT =	-.29341929+04	-.20731737+04 FT/SEC
X =	-.44363503+02	.82171083-01 ER
Y =	-.38029467+02	-.21116786+00 ER
Z =	-.22852509+02	-.17130290+00 ER
XDOT =	-.45700296+00	-.86106497+00 ER/HR
YDOT =	-.40104437+00	-.54105815-01 ER/HR
ZDOT =	-.50478958+00	-.35666247+00 ER/HR
WT = .10954405+05 LBS		

TABLE I.- STATE VECTORS - Continued
(f) CSI-CDH rendezvous - LM active - after an abort at PDI + 8

CSM-insertion + 1 minute

GET = 104 HR 44 MIN .00 SEC

	GEOCENTRIC	SELENOCENTRIC
X =	-.96403546+09	.40932795+07 FT
Y =	-.75490358+09	.23976049+07 FT
Z =	-.45622272+09	.37306664+07 FT
XDOT =	.59380433+04	.36894499+04 FT/SEC
YDOT =	-.54949859+04	-.33969906+04 FT/SEC
ZDOT =	-.28124492+04	-.19023087+04 FT/SEC
X =	-.46069365+02	.19560980+00 ER
Y =	-.36075362+02	.11457684+00 ER
Z =	-.21801989+02	.17828123+00 ER
XDOT =	.10215628+01	.63472168+00 ER/HR
YDOT =	-.94534058+00	-.58440788+00 ER/HR
ZDOT =	-.48384516+00	-.32726737+00 ER/HR
WT =	.37630000+05 LBS	

TABLE I.- STATE VECTORS - Continued

(f) CSI-CDH rendezvous - LM active - after an abort at PDI + 8 - Continued

LM-insertion + 1 minute

GET = 104 HR 44 MIN .00 SEC

		GEOCENTRIC	SELENOCENTRIC
X	=	-.96379606+09	.43326808+07 FT
Y	=	-.75543777+09	.18634203+07 FT
Z	=	-.45664402+09	.33093625+07 FT
XDOT	=	.57086653+04	.34688719+04 FT/SEC
YDOT	=	.58777676+04	.637797723+04 FT/SEC
ZDOT	=	-.32566859+04	.23465454+04 FT/SEC
X	=	-.46057924+02	.20705033+00 ER
Y	=	-.36100890+02	.89049202+01 ER
Z	=	.21822123+02	.15814795+00 ER
XDOT	=	.98210134+00	.59526020+00 ER/HR
YDOT	=	-.10111932+01	-.65026047+00 ER/HR
ZDOT	=	-.56027029+00	-.40369250+00 ER/HR
WT	=	.83372749+04 LBS	

TABLE I.- STATE VECTORS - Continued

(f) CSI-CDH rendezvous - LM active - after an abort at PDI + 8 - Continued

LM-CSI + 1 minute

GET = 105 HR 39 MIN .00 SEC		
	GEOCENTRIC	SELENOCENTRIC
X =	-.96436230+09	-.36872610+07 FT
Y =	-.76732403+09	-.31257300+07 FT
Z =	-.46721585+09	-.42749444+07 FT
XDOT =	-.17247712+04	-.39935858+04 FT/SEC
YDOT =	.77246408+03	.28545639+04 FT/SEC
ZDOT =	.38205663+03	.12825496+04 FT/SEC
X =	-.46084984+02	-.17620698+00 ER
Y =	-.36666911+02	-.14937251+00 ER
Z =	-.22327330+02	-.20429121+00 ER
XDOT =	-.29672436+00	-.68704429+00 ER/HR
YDOT =	.13289236+00	.49109045+00 ER/HR
ZDOT =	.65727854-01	.22064591+00 ER/HR
WT = .82992260+04 LBS		

TABLE I.- STATE VECTORS - Continued

(f) CSI-CDH rendezvous - LM active - after an abort at PDI + 8 - Continued

LM-CDH + 1 minute

GET = 106 HR 40 MIN .00 SEC

	GEOCENTRIC	SELENOCENTRIC
X	-.94923847+09	.30918450+07 FT
Y	-.76869121+09	.30951233+07 FT
Z	-.46218296+09	.40340791+07 FT
XDOT	.66886771+04	.43975927+04 FT/SEC
YDOT	-.49637300+04	-.28994438+04 FT/SEC
ZDOT	-.20737143+04	-.11840042+04 FT/SEC
X	-.45362246+02	.14775321+00 ER
Y	-.36734246+02	.14790988+00 ER
Z	-.22086818+02	.19278073+00 ER
XDOT	.11506996+01	.75654841+00 ER/HR
YDOT	-.85394495+00	-.49881144+00 ER/HR
ZDOT	-.35675547+00	-.20369245+00 ER/HR
WT	.81984700+04 LBS	

TABLE I.- STATE VECTORS - Concluded

(f) CSI-CDH rendezvous - LM active - after an abort at PDI + 8 - Concluded

LM-TPI + 1 minute

GET = 107 HR 21 MIN .00 SEC

		GEOCENTRIC	SELENOCENTRIC
X	=	-.94479758+09	.18783420+07 FT
Y	=	-.78125983+09	-.44101941+07 FT
Z	=	-.47191134+09	-.35145751+07 FT
XDOT	=	-.26500910+04	-.49560492+04 FT/SEC
YDOT	=	-.24819527+04	-.42974739+03 FT/SEC
ZDOT	=	-.30512978+04	-.21688836+04 FT/SEC
X	=	-.45150024+02	.89762281-01 ER
Y	=	-.37334876+02	-.21075453+00 ER
Z	=	-.22551718+02	-.16795466+00 ER
XDOT	=	-.45591356+00	-.85262355+00 ER/HR
YDOT	=	-.42698755+00	-.73932427-01 ER/HR
ZDOT	=	-.52493595+00	-.37312811+00 ER/HR
WT	=	.81762190+04 LBS	

TABLE II.- RENDEZVOUS CREW PADS

(a) CSI-CDH rendezvous - no bailout - LM active (nominal M = 2 lift-off time)

CSI CARD

+ 0 0				+ 0 0	1 7 2	HRS	N11
+ 0 0	0			+ 0 0	0 3 6	MIN	CSI
+ 0				+ 0	5 0 5 0	SEC	
R1(+00001), R2(+02660), R3(+13000)						N55	
+ 0 0				+ 0 0	1 7 4	HRS	N37
+ 0 0	0			+ 0 0	0 2 9	MIN	TPI
+ 0				+ 0	0 2 8 8	SEC	
+ 0				+ 0	0 5 0 4	ΔVX	N81
+ 0				+ 0	0 0 0 0	ΔVY	LV

410+1, 605+00777, 416+1, 623+0

+ 0				+ 0	1 5 6 9	373	
+ 0				+ 0	2 6 9 0	275	
+ 0				+ 0	0 5 0 4	ΔVX	N86
+ 0				+ 0	0 0 0 0	ΔVY	AGS
+ 0				+ 0	0 0 1 1	ΔVZ	

MAX N49			RESIDUALS					
			PGNS			AGS		
PGNS	AGS				ΔVX N85			ΔVX 500
		HA			ΔVY			ΔVY 501
		HP			ΔVZ			ΔVZ 502

PGNS	N75 CSI			N81 CSI			N82 CDH			PGNS
	ΔH	CSI/CDH	CDH/TPI	ΔVX	YDOT(N90)		ΔVX (+0.0)	ΔVY (+0.0)	ΔVZ (+0.0)	
	_____	_____	_____	_____	_____		_____	_____	_____	
	_____	_____	_____	_____	_____		_____	_____	_____	
	_____	_____	_____	_____	_____		_____	_____	_____	
AGS	402 ΔH			CSM SOLUTION (CHANGE SIGN)			263 YDOT CSI			AGS
	372 CSI/CDH	267/450 ΔVG (CSI)		ΔVX CSI	ΔVY CSI	BIAS ΔVX = -1.0	371 ΔV CDH			
	_____	_____	_____	_____	_____		_____	_____		
	_____	_____	_____	_____	_____		_____	_____		
	_____	_____	_____	_____	_____		_____	_____		

BURN RULES

CRITERIA IS $\dot{x}=3\text{fps}$
 PRIORITY OF SOLUTIONS-PGNS, AGS, CMC, CHARTS.

A. RR AGREES WITH VHF WHERE
 $\Delta R = \frac{R}{100} + 0.5\text{NM}$, ΔR IS ALWAYS $\geq 1\text{NM}$
 IF TWO OF THREE SOLUTIONS AGREE,
 BURN THE PRIORITY SOLUTION.

B. RR DOES NOT AGREE WITH VHF.
 MSFN ISOLATES FAILED SYSTEM.

C. $V90 < 5\text{fps}$ -NO BURN.

TABLE II.- RENDEZVOUS CREW PADS - Continued

(a) CSI-CDH rendezvous - no bailout - LM active (nominal M = 2 lift-off time) - Continued

CDH/PLANE CHANGE CARD

+	0	0				+	0	0	1	7	3	HRS	N13
+	0	0	0			+	0	0	0	3	5	MIN	CDH
+	0					+	0	0	8	5	0	SEC	
	0					+	0	0	0	0	0	ΔVX	N81
	0					+	0	0	0	0	0	ΔVY	LV
	0					+	0	0	0	0	0	ΔVZ	
X	X	X				X	X	X				PLM	FDAI
+						+	0	2	1	5	1	373	
	0					+	0	0	0	0	0	ΔVX	N86
	0					+	0	0	0	0	0	ΔVY	AGS
	0					+	0	0	0	0	0	ΔVZ	

PLANE CHANGE P30, V90, 410+5											
TIG	CDH										
TIG	PC										
YDOT											
CSM (N90)				PGNS (N90)				AGS (270)			
(-) .				(-) .				() .			
(-) .				(-) .				() .			

MAX N49				RESIDUALS							
				PGNS				AGS			
PGNS	AGS										
		HA									
		HP									

PGNS	N75 CDH			N81 CDH		
	ΔH	ΔT TPI/CDH	TPI SLIP	ΔVX (+0.0)	YDOT N90 (+0.0)	ΔVZ (+0.0)
AGS	402	450	452	CSM SOLUTION (CHANGE SIGN)		
	ΔH	ΔVX	ΔVZ	ΔVX	ΔVY	ΔVZ

CRITERIA IS $\dot{X}=2\text{fps}$, $\dot{Z}=6\text{fps}$	
PRIORITY OF SOLUTIONS-PGNS, AGS, CMC CHARTS.	
A. RR AGREES WITH VHF WHERE $\Delta R = \frac{R}{100} + 0.5\text{NM}$, ΔR IS ALWAYS ≥ 1	
IF TWO OF THREE SOLUTIONS AGREE, BURN THE PRIORITY SOLUTION.	
B. RR DOES NOT AGREE WITH VHF. MSFN ISOLATES FAILED SYSTEM.	
C. V90 < 5fps-NO BURN.	
263	270
ΔVY (CDH)	ΔVY (NOW)

TPI CARD

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TABLE II.- RENDEZVOUS CREW PADS - Continued
(c) CSI-CDH rendezvous - LM active - with LM bailout

LM BAILOUT

P30 CARD

P30 - RCS, 4 JETS													
+	0	0			+	0	0	1	7	1	HRS	N33	
+	0	0	0		+	0	0	0	4	9	MIN	TIG	
+	0				+	0		4	0	7	0	SEC	
					+	0	0	4	1	4	ΔVX	N81	
					+	0	0	0	0	0	ΔVY	LV	
					-	0	0	0	0	3	ΔVZ		
+					+	0	0	7	4	3	HA	N42	
					+	0	0	1	0	5	HP		
+					+	0	0	4	1	5	ΔVR		
X	X	X			X	X	X	0	1	9	BT	(RCS)	
X	X	X			X	X	X	NA			R	FDAI	
X	X	X			X	X	X	NA			P	INER	
					+	0	0	4	1	5	ΔVX	N86	
					+	0	0	0	0	0	ΔVY	AGS	
					+	0	0	0	0	0	ΔVZ		
X	X	X			X	X	X	NA			BSS		
X	X				X	X					SPA		
X	X	X			X	X	X				SXP		
RESIDUALS													
PGNS						AGS							
					ΔVX	N85					ΔVX	500	
					ΔVY						ΔVY	501	
					ΔVZ						ΔVZ	502	

BURN TIME IF > 1 SEC _____ :

P30												
+	0	0			+	0	0				HRS	N33
+	0	0	0		+	0	0	0			MIN	TIG
+	0				+	0					SEC	
											ΔVX	N81
											ΔVY	LV
											ΔVZ	
+					+						HA	N42
											HP	
+					+						ΔVR	
X	X	X			X	X	X				BT	
X	X	X			X	X	X				R	FDAI
X	X	X			X	X	X				P	INER
											ΔVX	N86
											ΔVY	AGS
											ΔVZ	
X	X	X			X	X	X				BSS	
X	X				X	X					SPA	
X	X	X			X	X	X				SXP	
RESIDUALS												
PGNS						AGS						
					ΔVX	N85					ΔVX	500
					ΔVY						ΔVY	501
					ΔVZ						ΔVZ	502

BURN TIME IF > 1 SEC _____ :

TABLE II. - RENDEZVOUS CREW PADS - Continued
(c) CSI-CDH rendezvous - LM active - with LM bailout - Continued

CSI CARD

+	0	0			+	0	0	1	7	2	HRS	N11
+	0	0	0		+	0	0	0	3	9	MIN	CSI
+	0				+	0	1	9	2	0	SEC	
R1(+00001), R2(+02660), R3(+13000)											N55	
+	0	0			+	0	0	1	7	4	HRS	N37
+	0	0	0		+	0	0	0	2	8	MIN	TPI
+	0				+	0	1	1	0	0	SEC	
+	0				+	0	0	4	7	3	ΔVX	N81
+	0				+	0	0	0	0	0	ΔVY	LV
410+1, 605+00777, 416+1, 623+0												
+					+	0	1	5	9	3	373	
+					+	0	2	6	8	2	275	
+	0				+	0	0	4	7	2	ΔVX	N86
+	0				+	0	0	0	0	0	ΔVY	AGS
+	0				+	0	0	0	0	8	ΔVZ	

BURN RULES

CRITERIA IS $\dot{X}=3\text{fps}$
PRIORITY OF SOLUTIONS-PGNS, AGS, CMC, CHARTS.

A. RR AGREES WITH VHF WHERE
 $\Delta R = R + 0.5\text{NM}$, ΔR IS ALWAYS $\geq 1\text{NM}$
100
IF TWO OF THREE SOLUTIONS AGREE,
BURN THE PRIORITY SOLUTION.

B. RR DOES NOT AGREE WITH VHF.
MSFN ISOLATES FAILED SYSTEM.

C. $V90 < 5\text{fps}$ -NO BURN.

MAX N49				RESIDUALS			
				PGNS		AGS	
PGNS	AGS	HA HP	ΔVX N85	ΔVX 500			
			ΔVY	ΔVY 501			
			ΔVZ	ΔVZ 502			

PGNS	N75 CSI			N81 CSI		N82 CDH			PGNS
	ΔH	CSI/CDH	CDH/TPI	ΔVX	YDOT(N90)	ΔVX (+0.0)	ΔVY (+0.0)	ΔVZ (+0.0)	
	_____	_____	_____	_____	_____	_____	_____	_____	
	_____	_____	_____	_____	_____	_____	_____	_____	
AGS	402 ΔH	372 CSI/CDH	267/450 AVG (CSI)	CSM SOLUTION (CHANGE SIGN)		263 YDOT CSI	371 ΔV CDH	AGS	
	_____	_____	_____	ΔVX CSI	ΔVY CSI	_____	_____		
	_____	_____	_____	_____	_____	_____	_____		
	_____	_____	_____	_____	_____	_____	_____		

BIAS
ΔVX = -1.0

42

42

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TABLE II - RENDEZVOUS CREW PADS - Continued
(c) CSI-CDH rendezvous - LM active - with LM bailout - Concluded

TPI CARD

+	0	0				+	0	0	1	7	4	HRS	N37
+	0	0	0			+	0	0	0	2	8	MIN	TPI
+	0					+	0	1	1	0	0	SEC	
R1(+00000), R2(+02660), R3(+13000)												N55	
+	0					+	0	0	2	1	8	ΔVX	N81
+	0					+	0	0	0	1	1	ΔVY	LV
-	0					-	0	0	1	0	9	ΔVZ	
+	0					+	0	3	7	8	5	R	N54
-	0					-	0	1	1	1	0	R	TIG-5
+	0					+	0	0	2	4	4	ΔVF ⁺ /A ⁻	N59
+	0					+	0	0	0	1	1	ΔVR ⁺ /L ⁻	LOS
-	0					-	0	0	0	0	0	ΔVD ⁺ /U ⁻	
X	X					X	X	0	0	2	2	BT	
307+043.00													

BURN RULES

CRITERIA IS $\dot{X}=2\text{fps}$, $\dot{Y}=5\text{fps}$, $\dot{Z}=6\text{fps}$
PRIORITY OF SOLUTIONS-PGNS, AGS, CMC, CHARTS.

A. RR AGREES WITH VHF WHERE
 $\Delta R = \frac{R}{100} + 0.5\text{NM}$, ΔR IS ALWAYS $\geq 1\text{NM}$
 IF TWO OF THREE SOLUTIONS AGREE,
 BURN THE PRIORITY SOLUTION.

B. RR DOES NOT AGREE WITH VHF.
 MSFN ISOLATES FAILED SYSTEM.

MAX N49			RESIDUALS					
PGNS		AGS	PGNS			AGS		
					ΔVX N85			ΔVX 500
					ΔVY			ΔVY 501
					ΔVZ			ΔVZ 502

PGNS	N37 TPI		N58 TPI			N81 TPI			N59 TPI			PGNS
	TIG		HP	ΔV	ΔV TPF	ΔVX	ΔVY	ΔVZ	ΔVF ⁺ /A ⁻	ΔVR ⁺ /L ⁻	ΔVD ⁺ /U ⁻	
AGS	373 TIG		267 ΔV 371 ΔV TPI+TPF			CSM SOLUTION (CHANGE SIGN)			CSM SOLUTION			AGS
						ΔVX	ΔVY	ΔVZ	ΔVX	-ΔVY	ΔVZ	

TABLE II.- RENDEZVOUS CREW PADS - Continued
 (d) CSI-CDH rendezvous - CSM active - with CSM bailout

P30 MANEUVER									
SET STARS		B A - 0 U T					PURPOSE		
		S P S G + N					PROP/GUID		
		+ 3 6 1 5 6					WT N47		
R ALIGN _____		- 0 0 0 9 0					P TRIM N48		
P ALIGN _____		+ 0 0 0 2 0					Y TRIM		
Y ALIGN _____		+ 0 0 1 7 1					HRS GETI		
		+ 0 0 0 5 6					MIN N33		
		+ 0 4 0 7 0					SEC		
ULLAGE _____		- 0 0 4 9 7					ΔV_X N81		
4 JET-13 SECS		+ 0 0 0 0 0					ΔV_Y		
		+ 0 0 0 0 0					ΔV_Z		
		X X X N A					R		
		X X X N A					P		
		X X X N A					Y		
		+ 0 0 5 9 3					H _A N44		
		+ 0 0 2 3 1					H _P		
		+ 0 0 4 9 7					ΔVT		
HORIZON/WINDOW _____		X X X 0 0 2					BT		
		X 0 0 3 7 6					ΔVC		
		X X X X N A					SXTS		
		+ 0					SFT		
		+ 0 0					TRN		
		X X X					BSS		
		X X					SPA		
		X X X					SXP		
OTHER _____		. 0					LAT N61		
							LONG		
		+					RTGO EMS		
		+					V10		
							GET 0.05G		

TABLE II.- RENDEZVOUS CREW PADS - Continued
 (d) CSI-CDH rendezvous - CSM active - with CSM bailout - Continued

P30 MANEUVER									
		C	S	I	PURPOSE				
SET STARS		S	P	S	G	+	N	PROP/GUID	
		+	3	5	9	7	5	WT N47	
R ALIGN	_____	-	0	0	0	9	0	P TRIM N48	
P ALIGN	_____	+	0	0	0	2	0	Y TRIM	
Y ALIGN	_____	+	0	0	1	7	2	HRS GETI	
		+	0	0	0	3	9	MIN N33	
		+	0	3	9	5	0	SEC	
ULLAGE	_____	-	0	0	4	0	2	ΔV_X N81	
4 JETS - 13 SECS	_____	+	0	0	0	0	0	ΔV_Y	
_____	_____	+	0	0	0	0	0	ΔV_Z	
_____	_____	X	X	X	NA			R	
_____	_____	X	X	X	NA			P	
_____	_____	X	X	X	NA			Y	
		+	0	0	3	9	8	H_A N44	
		+	0	0	1	3	7	H_P	
		+	0	0	4	0	2	ΔVT	
HORIZON/WINDOW	_____	X	X	X	0	0	2	BT	
_____	_____	X	0	0	2	8	0	ΔVC	
_____	_____	X	X	X	X	NA		SXTS	
_____	_____	+					0	SFT	
_____	_____	+					0 0	TRN	
		X	X	X				BSS	
		X	X					SPA	
		X	X	X				SXP	
OTHER	_____		0					LAT N61	
_____	_____							LONG	
_____	_____	+						RTGO EMS	
_____	_____	+						V10	
								GET 0.05G	

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TABLE II.- RENDEZVOUS CREW PADS - Continued
 (d) CSI-CDH rendezvous - CSM active - with CSM bailout - Concluded

P30 MANEUVER										PURPOSE	
SET STARS		T P I					PROP/GUID				
		S	P	S	G	T	N				
		+	3	5	6	1	8	WT	N47		
R ALIGN		-	0	0	0	9	0	P TRIM	N48		
P ALIGN		+	0	0	0	1	0	Y TRIM			
Y ALIGN		+	0	0	1	7	4	HRS	GETI		
		+	0	0	0	2	8	MIN	N33		
		+	0	1	0	1	0	SEC			
ULLAGE		-	0	0	2	3	5	ΔV_X	N81		
4 JETS - 13 SECS		-	0	0	0	0	7	ΔV_Y			
		+	0	0	1	1	0	ΔV_Z			
		X	X	X	NA			R			
		X	X	X	NA			P			
		X	X	X	NA			Y			
		+	0	0	6	0	6	H _A	N44		
		+	0	0	0	7	5	H _P			
		+	0	0	2	6	0	ΔVT			
HORIZON/WINDOW		X	X	X	0	0	1	BT			
		X	0	0	1	3	7	ΔVC			
		X	X	X	X	NA		SXTS			
		+					0	SFT			
		+				0	0	TRN			
		X	X	X				BSS			
		X	X					SPA			
		X	X	X				SXP			
OTHER			0					LAT	N61		
								LONG			
		+						RTGO	EMS		
		+						V10			
								GET	0.05G		

TABLE II.- RENDEZVOUS CREW PADS - Continued
(e) CSI-CDH rendezvous - LM active - after PDI + 4 minute abort

BOOST

P30 CARD

P30																			
+	0	0				+	0	0	1	0	5	HRS	N33						
+	0	0	0			+	0	0	0	3	5	MIN	TIG						
+	0					+	0		5	7	8	SEC							
						+	0	0	1	0	0	ΔVX	N81						
						+	0	0	0	0	0	ΔVY	LV						
						+	0	0	0	0	0	ΔVZ							
+						+	0	1	3	9	2	HA	N42						
						+	0	0	1	7	0	HP							
+						+	0	0	1	0	0	ΔVR							
X	X	X				X	X	X	0	3	6	BT	(RCS)						
X	X	X				X	X	X	NA			R	FDAI						
X	X	X				X	X	X	NA			P	INER						
						+	0	0	1	0	0	ΔVX	N86						
						+	0	0	0	0	0	ΔVY	AGS						
						+	0	0	0	0	1	ΔVZ							
X	X	X				X	X	X	NA			BSS							
X	X					X	X					SPA							
X	X	X				X	X	X				SXP							
RESIDUALS																			
PGNS						AGS													
												ΔVX	N85					ΔVX	500
												ΔVY						ΔVY	501
												ΔVZ						ΔVZ	502

BURN TIME IF > 1 SEC _____:

P30																			
+	0	0				+	0	0				HRS	N33						
+	0	0	0			+	0	0	0			MIN	TIG						
+	0					+	0					SEC							
												ΔVX	N81						
												ΔVY	LV						
												ΔVZ							
+						+						HA	N42						
												HP							
+						+						ΔVR							
X	X	X				X	X	X				BT							
X	X	X				X	X	X				R	FDAI						
X	X	X				X	X	X				P	INER						
												ΔVX	N86						
												ΔVY	AGS						
												ΔVZ							
X	X	X				X	X	X				BSS							
X	X					X	X					SPA							
X	X	X				X	X	X				SXP							
RESIDUALS																			
PGNS						AGS													
												ΔVX	N85					ΔVX	500
												ΔVY						ΔVY	501
												ΔVZ						ΔVZ	502

BURN TIME IF > 1 SEC _____:

TABLE II.- RENDEZVOUS CREW PADS - Continued

(e) CSI-CDH rendezvous - LM active - after PDI + 4 minute abort - Continued

HAM

P30 CARD

P30													
+	0	0				+	0	0	1	0	6	HRS	N33
+	0	0	0			+	0	0	0	3	6	MIN	TIG
+	0					+	0		1	5	50	SEC	
												ΔVX	N81
												ΔVY	LV
												ΔVZ	
+						+						HA	N42
												HP	
+						+				0	0	ΔVR	
X	X	X				X	X	X				BT	
X	X	X				X	X	X				R	FDAI
X	X	X				X	X	X				P	INER
												ΔVX	N86
												ΔVY	AGS
												ΔVZ	
X	X	X				X	X	X				BSS	
X	X					X	X					SPA	
X	X	X				X	X	X				SXP	
RESIDUALS													
PGNS						AGS							
												ΔVX	N85
												ΔVY	500
												ΔVZ	501
													502

BURN TIME IF > 1 SEC _____ :

P30													
+	0	0				+	0	0				HRS	N33
+	0	0	0			+	0	0	0			MIN	TIG
+	0					+	0					SEC	
												ΔVX	N81
												ΔVY	LV
												ΔVZ	
+						+						HA	N42
												HP	
+						+						ΔVR	
X	X	X				X	X	X				BT	
X	X	X				X	X	X				R	FDAI
X	X	X				X	X	X				P	INER
												ΔVX	N86
												ΔVY	AGS
												ΔVZ	
X	X	X				X	X	X				BSS	
X	X					X	X					SPA	
X	X	X				X	X	X				SXP	
RESIDUALS													
PGNS						AGS							
												ΔVX	N85
												ΔVY	500
												ΔVZ	501
													502

BURN TIME IF > 1 SEC _____ :

TABLE II.- RENDEZVOUS CREW PADS - Continued
(e) CSI-CDH rendezvous - LM active - after PDI + 4 minute abort - Continued

CSI CARD

+ 0 0				+ 0 0	1 0 7	HRS	N11
+ 0 0	0			+ 0 0	0 3 6	MIN	CSI
+ 0				+ 0	0 6 9 0	SEC	
R1(+00001), R2(+02660), R3(+13000)						N55	
+ 0 0				+ 0 0	1 0 9	HRS	N37
+ 0 0	0			+ 0 0	0 1 8	MIN	TPI
+ 0				+ 0	5 9 2 0	SEC	
+ 0				+ 0	0 3 4 7	ΔVX	N81
+ 0				+ 0	0 0 0 0	ΔVY	LV

410+1, 605+00777, 416+1, 623+0

+				+	4 5 6 1	373
+				+	5 5 9 0	275
+ 0				+ 0	0 3 4 8	ΔVX N86
+ 0				+ 0	0 0 0 0	ΔVY AGS
+ 0				+ 0	0 0 0 4	ΔVZ

BURN RULES	
CRITERIA IS $\dot{X}=3\text{fps}$	
PRIORITY OF SOLUTIONS-PGNS, AGS, CMC, CHARTS.	
A.	RR AGREES WITH VHF WHERE $\Delta R = \frac{R}{100} + 0.5\text{NM}$, ΔR IS ALWAYS $\geq 1\text{NM}$
	IF TWO OF THREE SOLUTIONS AGREE, BURN THE PRIORITY SOLUTION.
B.	RR DOES NOT AGREE WITH VHF. MSFN ISOLATES FAILED SYSTEM.
C.	V90<5fps-NO BURN.

MAX N49			RESIDUALS			
			PGNS		AGS	
PGNS	AGS			ΔVX N85		ΔVX 500
		HA		ΔVY		ΔVY 501
		HP		ΔVZ		ΔVZ 502

PGNS	N75 CSI			N81 CSI		N82 CDH			PGNS
	ΔH	CSI/CDH	CDH/TPI	ΔVX	YDOT(N90)	ΔVX (+0.0)	ΔVY (+0.0)	ΔVZ (+0.0)	
	_____	_____	_____	_____	_____	_____	_____	_____	
	_____	_____	_____	_____	_____	_____	_____	_____	
	_____	_____	_____	_____	_____	_____	_____	_____	
AGS	N75 CSI			N81 CSI		N82 CDH			AGS
	402 ΔH	372 CSI/CDH	267/450 ΔVG (CSI)	CSM SOLUTION (CHANGE SIGN)		263 YDOT CSI	371 ΔV CDH		
	_____	_____	_____	ΔVX CSI	ΔVY CSI	_____	_____		
	_____	_____	_____	_____	_____	_____	_____		
	_____	_____	_____	_____	_____	_____	_____		

BIAS
ΔVX = -1.0

(e) CSI-CDH rendezvous - LM active - after PDI + 4 minute abort - Continued

CDH/PLANE CHANGE CARD

CDH/PLANE CHANGE CARD									
+ 0 0			+ 0 0			HRS		N13	
+ 0 0 0			+ 0 0 0			MIN		CDH	
+ 0			+ 0			SEC			
0			- 0			ΔVX		N81	
0			+ 0			ΔVY		LV	
0			- 0			ΔVZ			
X X X			X X X			PLM		FDAI	
+			+			373			
0			- 0			ΔVX		N86	
0			+ 0			ΔVY		AGS	
0			- 0			ΔVZ			
MAX N49				RESIDUALS					
PGNS		AGS		PGNS		AGS			
		HA		ΔVX N85		ΔVX 500			
		HP		ΔVY		ΔVY 501			
				ΔVZ		ΔVZ 502			
N75 CDH				N81 CDH					
ΔH		ΔT TPI/CDH		TPI SLIP		ΔVX (+0.0)		ΔVZ (+0.0)	
.		.		.		.		.	
.		.		.		.		.	
.		.		.		.		.	
402 ΔH				450 ΔVX		452 ΔVZ			
.				.		.			
.				.		.			
.				.		.			
CSM SOLUTION (CHANGE SIGN)				ΔVX		ΔVY		ΔVZ	
.				.		.			
.				.		.			
.				.		.			
263 ΔVY (CDH)				270 ΔVY (NOW)					
PLANE CHANGE P30, V90, 410+5 TIG CDH TIG PC YDOT CSM (N90) PGNS (N90) AGS (270) RESIDUALS PGNS AGS									
CRITERIA IS $\dot{x}=2\text{fps}$, $\dot{z}=6\text{fps}$ PRIORITY OF SOLUTIONS-PGNS, AGS, CMC CHARTS. A. RR AGREES WITH VHF WHERE $\Delta R = R + 0.5\text{NM}$, ΔR IS ALWAYS ≥ 100 IF TWO OF THREE SOLUTIONS AGREE, BURN THE PRIORITY SOLUTION. B. RR DOES NOT AGREE WITH VHF. MSFN ISOLATES FAILED SYSTEM. C. V90<5fps-NO BURN.									

TABLE II.- RENDEZVOUS CREW PADS - Continued

(e) CSI-CDH rendezvous - LM active - after PDI + 4 minute abort - Concluded

TPI CARD

+	0	0			+	0	0	1	0	9	HRS	N37	BURN RULES CRITERIA IS $\dot{x}=2\text{fps}$, $\dot{y}=5\text{fps}$, $\dot{z}=6\text{fps}$ PRIORITY OF SOLUTIONS-PGNS, AGS, CMC, CHARTS. A. RR AGREES WITH VHF WHERE $\Delta R = \frac{R}{100} + 0.5\text{NM}$, ΔR IS ALWAYS $\geq 1\text{NM}$ IF TWO OF THREE SOLUTIONS AGREE, BURN THE PRIORITY SOLUTION. B. RR DOES NOT AGREE WITH VHF. MSFN ISOLATES FAILED SYSTEM.								
+	0	0	0		+	0	0	0	1	8	MIN	TPI									
+	0				+	0		5	9	2	SEC	0									
R1(+00000), R2(+02660), R3(+13000)											N55										
+	0				+	0		0	2	2	ΔV_X	N81									
+	0				+	0		0	0	1	ΔV_Y	LV									
-	0				-	0		0	1	1	ΔV_Z										
+	0				+	0		3	8	3	R	N54									
-	0				-	0		1	1	3	R	TIG-5									
+	0				+	0		0	2	4	$\Delta V_F^+/A^-$	N59		MAX N49 PGNS AGS HA HP	RESIDUALS						
+	0				+	0		0	0	1	$\Delta V_R^+/L^-$	LOS	PGNS		AGS						
-	0				+	0		0	0	0	$\Delta V_D^+/U^-$					ΔV_X	N85			ΔV_X	500
X	X				X	X		0	0	4	BT				ΔV_Y				ΔV_Y	501	
307+043.00															ΔV_Z				ΔV_Z	502	

PGNS	N37 TPI			N58 TPI			N81 TPI			N59 TPI			PGNS
	TIG			HP	ΔV	$\Delta V \cdot TPF$	ΔV_X	ΔV_Y	ΔV_Z	$\Delta V_F^+/A^-$	$\Delta V_R^+/L^-$	$\Delta V_D^+/U^-$	
	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	
	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	
AGS	373 TIG			267 371 $\Delta V \cdot \Delta V$ TPI+TPF			CSM SOLUTION (CHANGE SIGN)			CSM SOLUTION			AGS
							ΔV_X	ΔV_Y	ΔV_Z	ΔV_X	$-\Delta V_Y$	ΔV_Z	
	_____			_____			_____	_____	_____	_____	_____	_____	
	_____			_____			_____	_____	_____	_____	_____	_____	

TABLE II.- RENDEZVOUS CREW PADS - Continued
(f) CSI-CDH rendezvous - LM active - after PDI + 8 minute abort

CSI CARD

+	0	0			+	0	0	1	0	5	HRS	N11
+	0	0	0		+	0	0	0	3	7	MIN	CSI
+	0				+	0	5	0	0	0	SEC	
R1(+00001), R2(+02660), R3(+13000)											N55	
+	0	0			+	0	0	1	0	7	HRS	N37
+	0	0	0		+	0	0	0	2	0	MIN	TPI
+	0				+	0	2	6	6	0	SEC	
+	0				+	0	0	4	1	4	ΔVX	N81
+	0				+	0	0	0	0	0	ΔVY	LV
410+1, 605+00777, 416+1, 623+0												
+					+		3	3	7	8	373	
+					+		4	4	0	4	275	
+	0				+	0	0	4	1	3	ΔVX	N86
+	0				+	0	0	0	0	0	ΔVY	AGS
+	0				+	0	0	0	1	1	ΔVZ	

BURN RULES

CRITERIA IS $\dot{X}=3\text{fps}$
PRIORITY OF SOLUTIONS-PGNS, AGS, CMC, CHARTS.

A. RR AGREES WITH VHF WHERE
 $\Delta R = \frac{R}{100} + 0.5\text{NM}$, ΔR IS ALWAYS $\geq 1\text{NM}$
 IF TWO OF THREE SOLUTIONS AGREE,
 BURN THE PRIORITY SOLUTION.

B. RR DOES NOT AGREE WITH VHF.
 MSFN ISOLATES FAILED SYSTEM.

C. V90<5fps-NO BURN.

MAX N49				RESIDUALS			
PGNS		AGS		PGNS		AGS	
				ΔVX N85		ΔVX	500
				ΔVY		ΔVY	501
				ΔVZ		ΔVZ	502

P G N S	N75 CSI			N81 CSI		N82 CDH			P G N S
	ΔH	CSI/CDH	CDH/TPI	ΔVX	YDOT(N90)	ΔVX (+0.0)	ΔVY (+0.0)	ΔVZ (+0.0)	
	·	·	·	·	·	·	·	·	
	·	·	·	· (-)	·	·	·	·	
	·	·	·	· (-)	·	·	·	·	

A G S	N75 CSI			N81 CSI		N82 CDH		A G S
	402 ΔH	372 CSI/CDH	267/450 ΔVG (CSI)	CSM SOLUTION (CHANGE SIGN)	ΔVX CSI	ΔVY CSI	263 YDOT CSI	

BIAS
ΔVX = -1.0

TABLE II.- RENDEZVOUS CREW PADS - Continued

(f) CSI-CDH rendezvous - LM active - after PDI + 8 minute abort - Continued

CDH/PLANE CHANGE CARD

+ 0 0			+ 0 0			106			HRS	N13		
+ 0 0			+ 0 0			038			MIN	CDH		
+ 0			+ 0			17.20			SEC			
0			-			0101.5			ΔV_X	N81		
0			+			0000.0			ΔV_Y	LV		
0			-			0038.9			ΔV_Z			
X	X	X	X	X	X	NA			PLM	FDAI		
+			+			0398.3			373			
0			-			0097.9			ΔV_X	N86		
0			+			0000.0			ΔV_Y	AGS		
0			-			0047.2			ΔV_Z			
MAX N49						RESIDUALS						
						PGNS			AGS			
PGNS		AGS				ΔV_X N85		ΔV_X 500				
				HA		ΔV_Y		ΔV_Y 501				
				HP		ΔV_Z		ΔV_Z 502				
PGNS	N75 CDH						N81 CDH					
	ΔH		ΔT TPI/CDH		TPI SLIP		ΔV_X (+0.0)		ΔV_Y (+0.0)		ΔV_Z (+0.0)	
	.		.		.		.		.		.	
AGS	402 ΔH		450 ΔV_X		452 ΔV_Z		CSM SOLUTION (CHANGE SIGN)					
	.		.		.		ΔV_X		ΔV_Y		ΔV_Z	
	.		.		.		.		.		.	
PLANE CHANGE P30, V90, 410+5 TIG CDH _____ TIG PC _____ YDOT CSM (N90) PGNS (N90) AGS (270) (-) (-) (-) (-) (-) (-) RESIDUALS PGNS AGS ΔV_X N85 ΔV_X 500 ΔV_Y ΔV_Y 501 ΔV_Z ΔV_Z 502 CRITERIA IS $\dot{X}=2\text{fps}$, $\dot{Z}=6\text{fps}$ PRIORITY OF SOLUTIONS-PGNS, AGS, CMC CHARTS. A. RR AGREES WITH VHF WHERE $\Delta R = R + 0.5\text{NM}$, ΔR IS ALWAYS ≥ 100 IF TWO OF THREE SOLUTIONS AGREE, BURN THE PRIORITY SOLUTION. B. RR DOES NOT AGREE WITH VHF. MSFN ISOLATES FAILED SYSTEM. C. V90<5fps-NO BURN. 263 270 ΔV_Y (CDH) ΔV_Y (NOW)												

TABLE II.- RENDEZVOUS CREW PADS - Concluded
(f) CSI-CDH rendezvous - LM active - after PDI + 8 minute abort - Concluded

TPI CARD

+	0	0				+	0	0	1	0	7	HRS	N37
+	0	0	0			+	0	0	0	2	0	MIN	TPI
+	0					+	0	2	6	6	0	SEC	
R1(+00000), R2(+02660), R3(+13000)												N55	
+	0					+	0	0	2	1	8	ΔVX	N81
+	0					+	0	0	0	0	9	ΔVY	LV
-	0					-	0	0	1	0	5	ΔVZ	
+	0					+	0	3	7	9	5	R	N54
-	0					-	0	1	1	2	5	R	TIG-5
+	0					+	0	0	2	4	2	ΔVF ⁺ /A ⁻	N59
+	0					+	0	0	0	1	0	ΔVR ⁺ /L ⁻	LOS
-	0					+	0	0	0	0	4	ΔVD ⁺ /U ⁻	
X	X					X	X	0	0	4	1	BT	
307+043.00													

BURN RULES

CRITERIA IS $\dot{X}=2\text{fps}$, $\dot{Y}=5\text{fps}$, $\dot{Z}=6\text{fps}$
 PRIORITY OF SOLUTIONS-PGNS; AGS, CMC, CHARTS.

A. RR AGREES WITH VHF WHERE
 $\Delta R = \frac{R}{100} + 0.5\text{NM}$, ΔR IS ALWAYS $\geq 1\text{NM}$
 IF TWO OF THREE SOLUTIONS AGREE,
 BURN THE PRIORITY SOLUTION.

B. RR DOES NOT AGREE WITH VHF.
 MSFN ISOLATES FAILED SYSTEM.

MAX N49			RESIDUALS					
PGNS		AGS	PGNS			AGS		
						ΔVX N85		ΔVX 500
						ΔVY		ΔVY 501
						ΔVZ		ΔVZ 502

PGNS	N37 TPI		N58 TPI			N81 TPI			N59 TPI			PGNS
	TIG		HP	ΔV	ΔV.TPF	ΔVX	ΔVY	ΔVZ	ΔVF ⁺ /A ⁻	ΔVR ⁺ /L ⁻	ΔVD ⁺ /U ⁻	
AGS	373 TIG		267 371 ΔV ⁻ ΔV TPI+TPF			CSM SOLUTION (CHANGE SIGN)			CSM SOLUTION			AGS
						ΔVX	ΔVY	ΔVZ	ΔVX	-ΔVY	ΔVZ	

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