



60 1 2 3 Program Description I

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Program Title NEW AND FULL MOON DATE

→ 104 → Ref.

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Program Description, Equations, Variables

This program finds the date of New Moon and of Full Moon for any month m and any year y between 0 and 2100. Just key in $mm.yyyy$ and use A or B respectively. The material used was taken from a USA program by F.A.LUMMUS, who states to follow an empirical algorithm from a recent issue of SKY and TELESCOPE, made by O.L.HARVEY. Dates should be correct in about $2/3$ of the cases and be one day off in the other cases. Highly exceptionally an error of 2 days may be possible. Personal work consisted in clearing the program mentioned from some disturbing mistakes and in reducing the number of steps, at the same time incorporating a two-side data-card into the program. The algorithm now works without the use of any tables!

Operating Limits and Warnings

This program has been verified only with respect to the numerical example given in *Program Description II*. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

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1 NEW AND FULL MOON DAY

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Program Listing I

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STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBLB				GT01	.	
	SF1		mm. yyyy		*LBL2		
	1		Full Moon Flag		RCL2		
	GT00			060	4		
	*LBLA				7		
	CF1		mm. yyyy		1		
	0				2		
	*LBLO				+		
	DSPO				7		
010	PAUSE				6		
	X==Y		0 or 1		:		
	DSP4				INT		
	ST00				STO4		$a = \left[\frac{y+4712}{76} \right]$
	PAUSE		mm. yyyy	070	LSTX		
	INT		m		FRAC		
	STO1				7		
	LSTX				6		
	FRAC				x		
	EX				RND		
020	4				4		
	x				:		
	STO2		y		INT		
	2				STO5		$x = \left[\frac{b}{4} \right]$
	RCL1				LSTX		
	x>y?		m>2	080	FRAC		
	GT00				4		
	1		if not, then y → y-1		x		
	STO-2				STO6		$z = b \bmod 4$
	*LBLO				RCL4		
030	0				4		
	STO3		d=0 as a start		:		
	1				INT		
	5				STO-3		$d \rightarrow d - \left[\frac{d}{4} \right]$
	8				RCL5		
	2				1		
	RCL2				0		
	x<y?		y ≤ 1582?		:		
	GT02				INT		
	1		if not, ...		RCL5		
040	3				+		
	STO3		d=13		3		
	1				x		
	9				1		
	0			100	+		
	0				4		
	STO4		1900 = Y		:		
	*LBL1				INT		
	RCL2				9		
	RCL4				+		
050	x<y?		Y ≤ y		RCL5		
	GT02				1		
	EX		if not, ...		5		
	2				x		
	STO-4		Y → Y-100	110	+		
	1		and		3		
	STO-3		d → d-1		0		

REGISTERS

0 mm. yyyy	1 m	2 y	3 d	4 1900 = Y, a	5 x, y	6 z, L	7 k	8	9 M
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9
A	B	C	D	E	I				

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
	E				2		
	STO5				-		
	1		$y = \left[\frac{3(x + \lceil \frac{x}{10} \rceil) + 1}{4} \right] + 15x + 9$	170	x>0?		t = k-2
	0		modulo 30		GTOO		t > 0?
	:				1		if not, then t → t+12
	INT				2		
	LSTX				+		
120	FRAC				*LBLO		
	1				6		
	0				x===y		
	x		l = y mod 10		x>y?		t > 6?
	STO-6		z → z-l	180	GTOO		if not, then t → 2[$\frac{t}{2}$]
	x===y				2		
	1				:		
	1				INT		
	x				2		
	9				x		
130	+				*LBLO		
	RCL5				STO-3		d → d-t
	-				1		
	3				5		
	E		k = 11[$\frac{t}{10}$] + 9 - y mod 3	190	F?1		if Full Moon wanted,
	STO7				STO+3		then d → d+15
	RCL6				3		
	XHS				0		
	STO6		L = l-k		STO+3		make d > 0
	x>0?		L > 0?		RCL3		
140	GTOO		L = 0?		3		
	x=0?		if not, ...		0		
	GTOO		L → L+10		E		d → d mod 30
	1		and		RCLO		
	0		if k=2	200	EX		
	STO+6		then k → 0		2		
	2				:		
	RCL7				+		
	x=y?				DSP6		
	0				RS		Find dd.mm.yyyy
150	STO7				RCLO		
	*LBLO				F?1		if Full M. was found,
	RCL6				GTOA		find New-Moon -
	RCL7				GTOB		otherwise find Full Moon
	+			210	*LBLE		finds a number
	3		f = k+L mod 3		STO9		modulo M
	E				:		
	1				FRAC		
	0				RCL9		
	x				x		
160	RCL6				RND		
	+				RTN		
	3						
	0						
	x===y						
	x=0?			220			
	+						
	STO+3						
	RCL1						

LABELS			
A New Moon	B Full Moon	C	D
a	b	c	d
0 ✓	1 ✓	2 ✓	3
5	6	7	8

FLAGS		SET STATUS	
e ✓		DISP	
1 ✓	2	FIX	✓
3	3	SCI	✓
		ENG	✓
		n	4