Bonds Galore on the HP-12C

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Can we fit a "universal bond" program into the 12C? We want to reproduce the built-in YTM and PRICE - which do the standard "A/A SEMIANNUAL" bond. Also we should be able to do the 3 other types found on the 17BII: "30/360 SEMIANNUAL", "30/360 ANNUAL" and "A/A ANNUAL". Here 30/360 is 30(A)/360 (DatafileV25N2P9). Also Price and Yield to CALL should be easily accomplished, as on the 17BII (and 19BII, and probably on the 17BII+). Also we should be able to do zero-coupon bonds, and lastly we can even add special cases that use simple interest discounting - for example German Moosmüller bonds - this cannot be done on the 17BII. Finally of course we should be able to handle a monthly or quarterly coupon as well, and we don't want to be inputting the coupon dates (too easy). Can all this be done on the 12C? Well, yes, but only for British date format: D.MY. Using M.DY would add at least 20 lines - and make the program impossible to fit. A nice challenge would be to prove me wrong there :-)

The program sets up n, PMT (BEG mode) and FV and calculates the accrued interest (ACCRU). Once we have the output we just use TVM. You are the buyer. What you pay (-PRICE) is negative. PRICE+ACCRU=dirty price=dprice.

	Input	Comment		**Output**	Comment
R_3	#Coupons p.a.	1,2,3,4,6,12	n	term	n/R_3 years
R_4	Coupon p.a.	>=0	PMT	R_4/R_3	coupon payment
R_5	CALL	>0	FV	R_5+PMT	Final payment
R_6	day basis	0=30/360, 1=A/A	R_0	ACCRU	<=0.
R_7	SETT	DD.MMYYYY	R_1	LCD	DD.MMYYYY
R_8	MAT	DD.MMYYYY	R_2	NCD	DD.MMYYYY

SETT=Settlement date, MAT=Maturity Date, LCD(NCD)=Last (Next) Coupon Date. The general method is to set up the 6 inputs, $\boxed{g}$ $\boxed{\text{D.MY}}$ and $\boxed{\text{R/S}}$. Then, for a cum-div bond, set 'C' and:

YTM% $\boxed{\text{RCL}}$ $\boxed{3}$ $\boxed{\div}$ $\boxed{i}$ $\boxed{\text{PV}}$ →-dprice $\boxed{\text{RCL}}$ $\boxed{0}$ $\boxed{-}$ →-PRICE, or

PRICE $\boxed{\text{CHS}}$ $\boxed{\text{RCL}}$ $\boxed{0}$ $\boxed{+}$ →-dprice $\boxed{\text{PV}}$ $\boxed{i}$ $\boxed{\text{RCL}}$ $\boxed{3}$ $\boxed{\times}$ →YTM%

For an ex-div bond:

$\boxed{g}$ $\boxed{\text{END}}$ $\boxed{\text{RCL}}$ $\boxed{5}$ $\boxed{\text{FV}}$ $\boxed{\text{RCL}}$ $\boxed{\text{PMT}}$ $\boxed{\text{RCL}}$ $\boxed{0}$ $\boxed{+}$ $\boxed{\text{STO}}$ 0

Then proceed exactly as for a cum-div bond.

For *simple* interest discounting over FRACT(term) use $\boxed{\text{STO}}$ $\boxed{\text{EEX}}$ to *clear* 'C'.

If you get Error 8 while running the program, press $\boxed{f}$ and examine the date shown. It will be *either* invalid (e.g. 31.06YYYY) *or* valid. If it is valid then $\boxed{\text{R↓}}$ *will* show an invalid date. You must correct the invalid date (e.g. 1$\boxed{-}$) and resume the program. *Before* resuming do *one* $\boxed{g}$ $\boxed{\text{BST}}$ if no $\boxed{\text{R↓}}$ was required, otherwise do *two* $\boxed{g}$ $\boxed{\text{BST}}$, before pressing $\boxed{\text{R/S}}$.

Keystrokes	Display	Keystrokes	Display	Keystrokes	Display
f P/R		RCL n	27-45 11	RCL 1	55-45 1
f CLEAR PRGM	00-	RCL 3	28-45 3	CHS	56- 16
g BEG	01-43 7	÷	29- 10	g DATE	57-43 16
RCL 5	02-45 5	3	30- 3	g FRAC	58-43 24
RCL 4	03-45 4	6	31- 6	RCL 8	59-45 8
RCL 3	04-45 3	5	32- 5	g INTG	60-43 25
÷	05- 10	•	33- 48	+	61- 40
PMT	06- 14	2	34- 2	STO 1 *LCD*	62-44 1
+	07- 40	5	35- 5	RCL 2	63-45 2
FV	08- 15	X	36- 20	g ΔDYS	64-43 26
RCL 7	09-45 7	g INTG	37-43 25	RCL 6	65-45 6
RCL 8	10-45 8	CHS	38- 16	X	66- 20
g ΔDYS	11-43 26	g DATE	39-43 16	g x=0	67-43 35
R↓	12- 33	g FRAC	40-43 24	+	68- 40
3	13- 3	RCL 8	41-45 8	STO ÷ 0	69-44 10 0
6	14- 6	g INTG	42-43 25	RCL n	70-45 11
0	15- 0	+	43- 40	RCL 0	71-45 0
RCL 3	16-45 3	STO 2 *NCD*	44-44 2	+	72- 40
÷	17- 10	g ΔDYS	45-43 26	n *term*	73- 11
STO 1	18-44 1	RCL 6	46-45 6	RCL PMT	74-45 14
÷	19- 10	X	47- 20	g LSTx	75-43 36
g INTG	20-43 25	g x=0	48-43 35	1	76- 1
n *INT(term)*	21- 11	+	49- 40	−	77- 30
RCL 7	22-45 7	STO 0	50-44 0	X	78- 20
RCL 8	23-45 8	RCL 2	51-45 2	STO 0 *ACCRU*	79-44 0
g FRAC	24-43 24	g FRAC	52-43 24	g GTO 00	80-43,33 00
9	25- 9	9	53- 9	f P/R	
+	26- 40	+	54- 40		

Summary of common settings.

Bond Type	R₃	R₆
30(A)/360 ANNUAL	1	0
A/A ANNUAL	1	1
30(A)/360 SEMIANNUAL	2	0
A/A SEMIANNUAL	2	1

Example from the 12 C Manual, page 76/78.

g D.MY   2 STO 3   6.75 STO 4   100 STO 5   1 STO 6   28.041982 STO 7   4.061996 STO 8   R/S →-2.688874 (ACCRU).   STO EEX to set 'C'   8.25   RCL 3 ÷ →4.125   i PV →-90.31 (-dprice)   RCL 0 − →-87.62   (-PRICE).

Interesting info not provided in built-in YTM or PRICE: RCL 1→4.121981 (LCD),   RCL 2→4.061982 (NCD) and RCL n RCL 3 ÷ →14.101648 (term in years).

For PRICE=88.375 what is the YTM%? *No need to re-run* as inputs are unchanged, just: 88.375 CHS RCL 0 + →-91.06 (-dprice) PV i RCL 3 X →8.15 (YTM%).