

Program Description I

Program Title BLACKJACK

Contributor's Name Michael W. FREEMAN

Address 25 Grant St., Apt. 1

City Cambridge State MA Zip Code 02138

Program Description, Equations, Variables The present program represents an improved version of the "GAME OF 21" (#00174D) in the HP-67/97 Games Pac I. The major differences involved are the following:

1. BETS can be placed only after each player has been dealt one card (otherwise, an "Error" display appears). The calculator has the option of "doubling" the initial bet placed by the user. This then can be "redoubled" by the user.
 2. A "natural" blackjack for the user pays twice the bet, instead of just 1 1/2 times.
 3. Various attempts at "cheating" are forestalled, e.g. attempting to "reshuffle" the deck after the first cards of a hand have been dealt, requesting the value of an ACE to be changed even though one has never been dealt an ace,* inputting values for BETS and SEEDS outside specified bounds, etc. These all lead to an "Error" display (cf. also (1) above), which can be cancelled by pressing "CLX" (or any other key) and then taking up where one left off (but without cheating this time!).
 4. The calculator automatically scores its own Aces to its best advantage, instead of always counting them as 1 (except for a blackjack) as in the original program.
 5. The user has the option of supplying a new SEED whenever the cards are reshuffled. Note that this does not lead to any greater predictability, since our card-generator is more random than the one in the original program: it takes into account whatever might be in any of the registers at a given point in the game.
 6. Because of space limitations (even after having expanded the program to two cards!), we have not included the "next card" option in our version. Nor have we provided for demarcative blank lines (SPACE) in the printed copy generated during play by the HP-97, or for the printing of values displayed in the X register when the program returns to user control: a user can always press the appropriate keys at that point for obtaining the desired printed copy. Note also that the "new player" option has been taken over by our "init" routine.
 7. The second card of the program may be positioned in the calculator during the initial deal, just after all bets have been placed; it will then be read in automatically at the right moment by the calculator. Otherwise, a repeatedly flashing "-6" supplies the prompt to load the second card.
- * Our version also eliminates a bug in the original program which allowed one to increment or decrement the same ACE an unlimited number of times--not that one would normally ever wish to do such a thing! It also refuses to set an ACE = 11 if this immediately yields a count > 21.

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.

NEITHER HP NOR THE CONTRIBUTOR MAKES ANY EXPRESS OR IMPLIED WARRANTY OF ANY KIND WITH REGARD TO THIS PROGRAM MATERIAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. NEITHER HP NOR THE CONTRIBUTOR SHALL BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH OR ARISING OUT OF THE FURNISHING, USE OR PERFORMANCE OF THIS PROGRAM MATERIAL.

Program Description I

Program Title	BLACKJACK		
Contributor's Name	Michael W. FREEMAN		
Address	25 Grant St., Apt. 1		
City	Cambridge	State	MA
		Zip Code	02138

Program Description, Equations, Variables (cont.)

8. Displays have hopefully been made easier to follow:

- i. HP's first card is displayed as "xx.00", whereas the user's first card is displayed simply as "xx." (i.e. with no zeroes after the decimal point);
- ii. the user's initial hand is given in the form of "xx.yy", where: xx = card 1, and yy = card 2;
- iii. after each hit, the new card is displayed, followed by the user's count at that point; if it is desired to see what the current bet is, then a "RCL B" has to be executed (followed by a "h R1" or "RCL 8" to get back to the user's count);
- iv. the end-game display consists of a "WHO WON" code (viz., "Oh*BLISS", if the calculator won, "I*LOSE", if the calculator lost, "0.000000000" for a blackjack tie (or "push"), "0.00" or "0." for any other type of push), followed by the final score in the form "xx.yy", where: xx = HP's count, and yy = user's count, followed by how much money is now in the user's account.

9. Current values can be retrieved as follows:

- i. RCL B = current BET,
- ii. RCL C = current SEED,
- iii. RCL 3 = user's account ("winnings"),
- iv. RCL 8 = user's initial hand: xx.yy (cf. (8ii) above),
- v. RCL 9 = user's count in current hand,
- vi. D (on card 1) = HP's card 1, then user's card 1,
- vii. C (on card 2) = HP's card 1, user's count,
- viii. A (on card 2) can be used not only to change the current score of an ACE, but also to determine if one holds an ACE: if one doesn't, then "Error" is displayed (cf. (3) above).

Operating Limits and Warnings

The program needs to be INITIALIZED (on card 1) just once, at the very beginning of a game. Any other action attempted before that will result in an "Error" display. As with other intended "Error" displays during the course of the game, the condition can be cleared by pressing any key and then proceeding in the requisite manner (cf. (3) above). If an "Error" display nevertheless continues to persist, then read in card 1 again (both sides), and start a new game.

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.

NEITHER HP NOR THE CONTRIBUTOR MAKES ANY EXPRESS OR IMPLIED WARRANTY OF ANY KIND WITH REGARD TO THIS PROGRAM MATERIAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. NEITHER HP NOR THE CONTRIBUTOR SHALL BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH OR ARISING OUT OF THE FURNISHING, USE OR PERFORMANCE OF THIS PROGRAM MATERIAL.

Program Description II

PROGRAM DESCRIPTION (cont.): Play is between the calculator and user, and proceeds as follows. Both sides of card 1 are read in. Initialization need be performed only the first time this is done, or when it is desired to clear the user's account, as for a "new player". If not performed in the beginning, however, any other action will lead to an "Error" display (cf. "Operating Limits and Warnings" above). The user then has the option of "shuffling" the cards (with or without supplying a new "SEED"). Otherwise, one has the calculator immediately make the first "deal": one card (face-up) to itself (displayed as "xx.00") and one to the user (displayed as "xx."). The user must then place a "bet", which the calculator may "double" (and the user "redouble"). Both sides of card 2 should be read in as soon as a flashing "-6" prompt appears: the user can then decide whether to be "hit" or not (i.e., dealt one or more cards). The goal is to finish with a hand whose total count is 21 or below, but closer to 21 than the dealer's. If one goes over 21, one is "busted" (i.e., loses).

When cards are dealt, the King is indicated by 13, the Queen by 12, and the Jack by 11, but all count just 10 points each. The other cards count their face value, except for the ACE, which counts 1 unless you change it to 11 by pressing A (on card 2). In the latter case, if a subsequent card you draw makes you score over 21, the calculator will automatically change your ACE back to 1. (You can also change it back to 1 by pressing A again. Normally, one decides on what value to assign an Ace just before "standing".) A "blackjack" is a 2-card hand totaling 21, i.e. a 10, Jack, Queen, or King plus an ACE (with a value of 11). Your best win is a blackjack, since you get twice your bet then. In the case of a tie (or "push"), nobody wins.

A user can request to be "hit" (by pressing D) as many times as desired, until "busted" (i.e., over 21) or "standing pat" (signaled by pressing E). The calculator will then show its hand. If 16 or less, it draws and continues to do so until it goes over 17. Since a "blackjack" consists of just a 2-card hand, this forestalls either player from being "hit" on that round: the calculator immediately goes to its end-game display at that point. The format of the end-game display is described in (8iv) above, as well as in step 12 of the directions below.

EXAMPLE:

Keystrokes:	Outputs:	Comments:
-------------	----------	-----------

Load CARD 1, sides 1 and 2.

A ----->	0.53	Default SEED & BET.
----------	------	---------------------

Shuffle (with your own seed):

.138562947 C	Display will not stabilize until R/S is pressed.
--------------	--

Wait 10 or 15 seconds:

R/S	Ignore output.
-----	----------------

To reproduce the example below, store ".7869501" in register C, either after the above steps or right after initialization.

Deal:

D ----->	3.00 ***	HP's 1st. card.
	3.	User's 1st. card.

Enter bet:

50 B ----->	50.00 ***	Bet not doubled.
	3.10 ***	User's initial hand, a 3 and a 10.
	-6.	Flashes as prompt to read in card 2.

Load CARD 2,

sides 1 & 2 ->	13.	User's count (= 3 + 10).
----------------	-----	--------------------------

Hit:

D ----->	3. ***	User's 3rd. card.
	16.	User's count.

*** Shown by PRINT on HP-97 and by PAUSE on HP-67.

Program Description II

EXAMPLE (cont.)

Keystrokes:	Outputs:	Comments:
Stand:		
E ----->	3.04 ***	HP's initial hand, a 3 and a 4.
	9. ***	HP's 3rd. card.
	5. ***	HP's 4th card.
	"Oh*BLISS" ***	Upside-down WHO WON code: HP won!
	21.16 ***	Final score: HP's count.user's count.
	-50.00	User's account.

Play another hand:

Load CARD 1,

sides 1 & 2 -> -50.00 User's account still in X register.

Try to enter "premature" bet:

100 B -----> Error

Recover, by pressing:

CLX -----> 100.00 Ignore.

Deal:

D -----> 11.00 *** HP's 1st. card.
6. User's 1st. card.

Bet:

50 B -----> 100.00 HP doubles.

Don't redouble:

B -----> 100.00 *** Final bet.
6.10 *** User's initial hand, a 6 and a 10.
-6. Flashes, as prompt to read in card 2.

Load CARD 2,

sides 1 & 2 -> 16. User's count (= 6 + 10).

Hit:

D -----> 10. *** User's 3rd. card.
"Oh*BLISS" *** User is bust.
20.26 *** Final score: HP's count.user's count
-150.00 User's account.

Play one more hand: load CARD 1,

sides 1 & 2 -> -150.00 User's account still in X register.

Deal:

D -----> 12.00 *** HP's 1st. card.
4. User's 1st. card.

Try to "reshuffle" at this point:

C -----> Error

Recover, by pressing:

CLX -----> 4. User's 1st. card still in X register.

Bet:

100 B -----> 200.00 HP doubles.

Redouble:

2 B -----> 400.00 *** Note that ANY number (including "0") can be pressed here: it simply means "redouble".

4.03 *** User's initial hand, a 4 and a 3.
-6. Flashes, as prompt to read in card 2.

Load CARD 2,

sides 1 & 2 -> 7. User's count (= 4 + 3).

Try to rescore an ACE you don't have:

A -----> Error

Recover, by pressing:

CLX -----> 7. User's count still in X register.

EXAMPLE (concluded):

Hit:

D -----> 9.00 ***
16.

User's 3rd. card.
User's count.

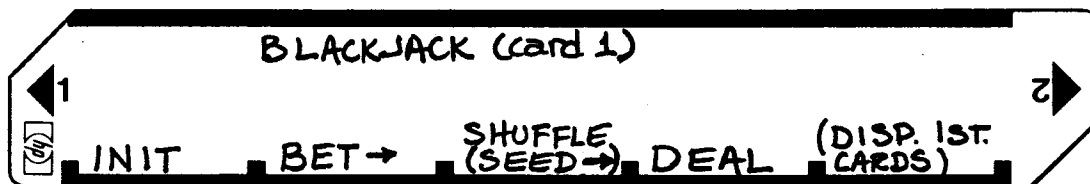
Stand:

E -----> 12.10 ***
"Oh BLISS" ***
20.16 ***
-550.00

HP's initial hand.
HP has won again!
Final score: HP's count.user's count.
User is \$550.00 in the hole!
Try your luck now
Remember: it doesn't pay to cheat!

To see the effect of current game values on the cards dealt, try the above example again from the beginning, after storing ".7869501" in register C, but without re-initializing (or with different values for the bets).

*** Shown by PRINT on HP-97 and by PAUSE on HP-67.



STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	READ in CARD 1, sides 1 and 2.		<input type="text"/> <input type="text"/>	0.00
2	INITIALIZE: just first time card 1 is read in*		<input type="text"/> <input type="text"/>	
	or when you wish to clear you account, as for		<input type="text"/> <input type="text"/>	
	a "new player":		A <input type="text"/>	0.53**
3	SHUFFLE: either with or without supplying		<input type="text"/> <input type="text"/>	
	your own "seed" (0 < seed < 1):***	(0.xxxxxxx)	C <input type="text"/>	
4	End shuffle (ignore output):		R/S <input type="text"/>	(ignore)
5	DEAL: HP's 1st. card blinked/printed,		D <input type="text"/>	xx.00
	followed by your 1st. card.		<input type="text"/> <input type="text"/>	xx.
6	BET: ⁺ (0 < bet < 10,000):***	(xxx)	B <input type="text"/>	xxx.xx
	-- if previous bet is to be kept, ⁺⁺ simply		<input type="text"/> <input type="text"/>	
	press B; otherwise, first key in new		<input type="text"/> <input type="text"/>	
	bet, then press B;		<input type="text"/> <input type="text"/>	
	-- if HP "doubles", then new value is dis-		<input type="text"/> <input type="text"/>	
	played and you may "redouble" by press-		<input type="text"/> <input type="text"/>	
	ing ANY number (including "0"), then B;		<input type="text"/> <input type="text"/>	
	if you do not want to redouble, simply		<input type="text"/> <input type="text"/>	
	press B;		<input type="text"/> <input type="text"/>	
	-- final bet is blinked/printed,		<input type="text"/> <input type="text"/>	
	followed by display of your initial hand		<input type="text"/> <input type="text"/>	
	"xx.yy" (where: xx = card 1, and		<input type="text"/> <input type="text"/>	xx.yy
	yy = card 2), followed by flashing "-6."		<input type="text"/> <input type="text"/>	-6.
	This is the prompt to read in CARD 2.		<input type="text"/> <input type="text"/>	
			<input type="text"/> <input type="text"/>	
	* If initialization is not performed at the start of a		<input type="text"/> <input type="text"/>	
	new game, then any other action will lead to an		<input type="text"/> <input type="text"/>	
	"Error" display. Press "CLX" and then "A" to correct.		<input type="text"/> <input type="text"/>	
			<input type="text"/> <input type="text"/>	
	** "0.53" represents both the default "bet",		<input type="text"/> <input type="text"/>	
	and the rounded off default "seed".		<input type="text"/> <input type="text"/>	
			<input type="text"/> <input type="text"/>	
	*** If stated bounds for BET or SEED are not observed,		<input type="text"/> <input type="text"/>	
	then "Error" is displayed. Press "CLX" and correct.		<input type="text"/> <input type="text"/>	
			<input type="text"/> <input type="text"/>	
	⁺ If a bet is entered before a deal, "Error" is dis-		<input type="text"/> <input type="text"/>	
	played: press "CLX" and then continue in the correct		<input type="text"/> <input type="text"/>	
	order. Similarly, if you attempt to "reshuffle" or		<input type="text"/> <input type="text"/>	
	"redeal" once a legitimate deal is in progress,		<input type="text"/> <input type="text"/>	
	"Error" will be displayed. Correct as above.		<input type="text"/> <input type="text"/>	
			<input type="text"/> <input type="text"/>	
	⁺⁺ Previous bet can be viewed by pressing "RCL B";		<input type="text"/> <input type="text"/>	
	to return to current display, press "h R↓".		<input type="text"/> <input type="text"/>	
			<input type="text"/> <input type="text"/>	
			<input type="text"/> <input type="text"/>	
			<input type="text"/> <input type="text"/>	

BLACKJACK (card 2)

1
2

ACE: 1 or 11
(HP (card 1).
USER COUNT)
HIT
STAND

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
7	READ in CARD 2, sides 1 and 2:		<input type="text"/>	
	-- if user doesn't have blackjack, then user's count is displayed;		<input type="text"/>	user's count
	otherwise, "I'LOSE" is blinked/printed, along with the rest of the display cycle in step 12.*		<input type="text"/>	
8	HIT: draw another card if desired:		D	xx. (= new card)
	--if not "busted", then your new count is displayed;		<input type="text"/>	user's count
	otherwise, "Oh'BLISS" is blinked/printed, along with the rest of the display cycle in step 12.		<input type="text"/>	
9	Repeat step 8 until you are "busted" or wish to "stand".		<input type="text"/>	
10	To RESCORE your ACE, either as 1 or 11:		A	user's count (updated)
	-- if you've not been dealt an ace, "Error" will be displayed: press "CLX" and continue;		<input type="text"/>	
	-- note that each successive pressing of "A" reverses the effect of the previous one.**		<input type="text"/>	
11	To review current deal:		C	HP's card. user's count
12	STAND: indicates you don't want any more cards:		E	HP's hand & hits
	-- "WHO WON" code blinked/printed ("Oh'BLISS", if calculator won,		<input type="text"/>	"WHO WON"
	"I'LOSE", if calculator lost,		<input type="text"/>	
	"0.000000000", if both have blackjack,		<input type="text"/>	
	"0.00" or "0." for other ties ("pushes"))		<input type="text"/>	
	-- final score: HP vs. user;		<input type="text"/>	HP's count. user's count
	-- your current account ("winnings").		<input type="text"/>	user's account
13	For a new game, go to step 1.		<input type="text"/>	
	* If both you and HP have blackjack, then no one wins, and "0.000000000" is blinked, along with the rest of the display cycle in step 12.		<input type="text"/>	
	** If you go "bust" (on a subsequent "hit") with an ACE scored at 11, the calculator will automatically reset it to 1. Similarly, if scoring an ACE as 11 immediately yields a count > 21, the calculator will refuse to do it.		<input type="text"/>	

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001 *	f LBL 1	31 25 01	SHUFFLE (card-generator) = 21 = 13 = previous cards, seed, bet, account etc. = user's account = bet		6TO (i)	22 24	INITIALIZATIONS
	RCL A	34 11		*	f LBL A	31 25 11	
	RCL 2	34 02			f CL REG	31 43	
	RCL (i)	34 24		060	5	05	
	f X=0	31 51			5	05	
	h R↓	35 53			1	01	
	x	71			7	07	
	RCL 3	34 03			8	08	
	RCL B	34 12			.	83	
010	h T	35 73			4	04	
	x	71			STO 0	33 00	"Oh 'BLISS" in R ₅₀ & R ₅₈
	+	61			STO 8	33 08	
	÷	81			3	03	
	h ABS	35 64		070	5	05	
	f LN	31 52			0	00	
	h ABS	35 64			7	07	
	9	09			.	83	
	9	09			1	01	
	7	07			STO 2	33 02	
020	+	61			STO 9	33 09	
	RCL C	34 13	= current seed		f P2S	31 42	"I LOSE" in R ₅₂ & R ₅₉
	x	71			f CL REG	31 43	
	g FRAC	32 83	= next seed		1	01	
	STO C	33 13		080	0	00	
	RCL 2	34 02	= 13		STO 0	33 00	
	x	71			1	01	
	f INT	31 83			2	02	
	1	01			STO 1	33 01	
	+	61			1	01	
030	f DSZ	31 33			3	03	
	GTO 1	22 01	- loop		STO 2	33 02	for indexing R ₅₀ & R ₅₂
	h RTN	35 22			2	02	
*	f LBL 2	31 25 02	J, Q, K ⇒ 10		1	01	
	RCL 0	34 00	= 10	090	STO A	33 11	
	h X≠y	35 52	- if 10 ≠ current card, return 10.		.	83	
	g X≠y	32 71			5	05	
	h RTN	35 22			2	02	
	h X≠y	35 52	- else, return current card		8	08	
	h RTN	35 22			4	04	
040 *	f LBL 3	31 25 03	ACE dealt?		1	01	
	1	01			6	06	- default seed stored in C.
	g X=y	32 51	- if so, clear ACE flag 1		3	03	
	h CF 1	35 61 01			STO C	33 13	
	h R↓	35 53		100	f RND	31 24	
	h RTN	35 22			STO B	33 12	
*	g LBL d	32 25 14	GET NEW CARD		h CF 1	35 61 01	
	0 1	01			h CF 2	35 61 02	
	h STI	35 33			h RTN	35 22	
	f GSB 1	31 22 01	→ card-generator	*	f LBL C	31 25 13	
050	h RTN	35 22			h F? 1	35 71 01	
	g MERGE	32 41			GTO 0	22 00	SHUFFLE (SEED →) - if deal is already in progress, then display "Error" - loop index
	h PAUSE	35 72			2	02	
*	g LBL e	32 25 15	MERGER prompt for CARD 2		5	05	
	0 6	06		110	h STI	35 33	
	CHS	42			h F? 3	35 71 03	
	h STI	35 33			h F? 3	35 71 03	

REGISTERS

0	10	1	12	2	13	3	user's account	4	HP card 1 (≤ 10)	5	HP card 2 (≤ 10)	6	HP init. hand: x.y.y	7	HP COUNT	8	user init. hand: x.y.y	9	USER COUNT
S0	"Oh 'BLISS"	S1		S2	"I LOSE"	S3		S4		S5		S6		S7		S8	"Oh 'BLISS"	S9	"I LOSE"
A	21	B	BET	C	SEED	D	user's card 1 (≤ 10)	E	user's card 2 (≤ 10)	I	index								

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
	GTO 1	22 01	-if user didn't input new seed, go to card-generator		STD B	33 12	
	h R↓	35 53		170 *	g LBL b	32 25 12	HP DOUBLES?
	1	01			h SF 0	35 51 00	- set "bet" flag 0
	GSB 4	31 22 04	→ else, check on new seed's bounds:		RCL 4	34 04	= HP's card 1
	STD 0	33 13	0 < y < 1		1	01	
	GTO 1	22 01	0 < y < x CHECK		g x=y	32 51	- if ACE or 10 point value, then HP doubles = 10
120	* f LBL 4	31 25 04			g GTO 5	22 05	
	g x < y	32 21			h R↓	35 53	
	g GTO 0	22 00	- if check fails, display "Error"		RCL 0	34 00	
	h R↓	35 53			g x > y	32 61	
	f x=0	31 51			g GTO 6	22 06	
	GTO 0	22 00		180 *	f LBL 5	31 25 05	(RE) DOUBLE BET
	f x < 0	31 21			RCL B	34 12	
	GTO 0	22 00			2	02	
	h RTN	35 22			x	21	
*	f LBL D	31 25 14	INITIAL DEAL		STD B	33 12	
	h F? 1	35 21 01	- if deal is already in progress, then display "Error"		h RTN	35 22	
130	GTO 0	22 00		*	g LBL c	32 25 13	USER REDOUBLES?
	h CF 0	35 61 00			h F? 3	35 21 03	
	h SF 1	35 51 01	- set "deal" flags		h F? 3	35 21 03	
	h SF 2	35 51 02			GTO 6	22 06	
	g GSB d	32 22 14	→ generate HP's card 1	190	f GSB 5	31 22 05	FINAL BET DISPLAY
	g STD 6	33 06	- blink/print	*	f LBL 6	31 25 06	- blink/print final bet
	f -X-	31 84	→ J, Q, K ⇒ 10		RCL B	34 12	
	f GSB 2	31 22 02			f -X-	31 84	
	STD 4	33 04			h CF 0	35 61 00	= user's card 1
	STD 7	33 07			RCL 8	34 08	→ J, Q, K ⇒ 10
140	g GSB d	32 22 14	→ generate HP's card 2		f GSB 2	31 22 02	
	STD 5	33 05			STD 9	33 09	
	EEX	43	- format & store HP's initial hand in 6: xx.yy		STD D	33 14	
	2	02	= HP's card 2		f GSB 3	31 22 03	→ ACE?
	÷	81	→ J, Q, K ⇒ 10	200	g GSB d	32 22 14	→ generate user's card 2
	STD + 6	33 61 06			STD E	33 15	
	RCL 5	34 05			EEX	43	- format & store user's initial hand in 8: xx.yy
	f GSB 2	31 22 02			2	02	
	STD 5	33 05			÷	81	
	STD + 7	33 61 07			STD + 8	33 61 08	
150	g GSB d	32 22 14	→ generate user's card 1		RCL 8	34 08	
	STD 8	33 08			DSP 2	23 02	
	DSP 0	23 00			f -X-	31 84	- blink/print = user's card 2
	R/S	84	- stop for bet		RCL E	34 15	→ J, Q, K ⇒ 10
*	f LBL B	31 25 12	BET →	210	f GSB 2	31 22 02	
	DSP 2	23 02			STD E	33 15	
	h F? 2	35 21 02	- if deal is not yet in progress, then display "Error"		STD + 9	33 61 09	
	h F? 2	35 21 02			f GSB 3	31 22 03	→ ACE?
	GTO 0	22 00	- reset "deal" flag 2		DSP 0	23 00	
	h SF 2	35 51 02	- if bet already in progress, then go to "redouble?"		GTO f e	22 31 15	→ MERGE card 2
160	h F? 0	35 21 00			h RTN	35 22	
	GTO f c	22 31 13		*	f LBL E	31 25 15	REDISPLAY 1st. CARDS
	h F? 3	35 21 03	- if no new bet input, then retain old one.		RCL 6	34 04	= HP's card 1
	h F? 3	35 21 03			f INT	31 83	
	GTO f b	22 31 12	- else, check bounds of new bet: 0 < y < 104		DSP 2	23 02	
	EEX	43		220	f -X-	31 84	
	4	04			RCL 8	34 08	= user's card 1
	f GSB 4	31 22 04			DSP 0	23 00	
	f END	31 24			h RTN	35 22	

LABELS				FLAGS		SET STATUS		
A INITIALIZE	B BET →	C SHUFFLE (SEED →)	D DEAL	E REDISPLAY 1st CARDS	0 bet placed	FLAGS	TRIG	DISP
a	b HP doubles	c user redoubles	d deal subr.	e MERGE	1 deal in progress	ON OFF	DEG <input checked="" type="checkbox"/>	FIX <input checked="" type="checkbox"/>
0 "Error"	1 card-generator	2 J, Q, K ⇒ 10	3 ACE dealt?	4 0 < y < x?	2 deal in progress	0 <input type="checkbox"/> <input checked="" type="checkbox"/>	GRAD <input type="checkbox"/>	SCI <input type="checkbox"/>
5 redouble	6 bet hand	7	8	9	3 numeric	1 <input type="checkbox"/> <input checked="" type="checkbox"/>	RAD <input type="checkbox"/>	ENG <input type="checkbox"/>
						2 <input type="checkbox"/> <input checked="" type="checkbox"/>		n 2
						3 <input type="checkbox"/> <input checked="" type="checkbox"/>		

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	RCL D	34 14	= user's card 1	*	f LBL 6	31 25 06	GAME OVER!
	RCL E	34 15	" card 2		RCL B	34 12	= bet
	X	71			h F? 0	35 71 00	
	RCL 9	34 09	= user's count	060	GTO 9	22 09	
	+	61		*	f LBL 8	31 25 08	HP WON
	RCL A	34 11	= 21		STO - 3	33 51 03	- decrement user's
	g X=Y	32 15	- user BJ		RCL 0	34 00	= 10 account
	GTO 5	22 05			h ST I	35 33	⇒ "OH BLISS"
	RCL 9	34 09	- else, display user's		DSP 2	23 02	
010	h RTN	35 22	count		GTO 7	22 07	
*	f LBL A	31 25 11	REScore ACE	*	f LBL 9	31 25 09	HP LOST
	h F? 1	35 71 01	- if no ACE held,		STO + 3	33 61 03	- increment user's
	GTO 0	22 00	display "Error"		RCL 1	34 01	= 12 account
	DSP 0	23 00		070	h ST I	35 33	⇒ "I'LOSE"
	9	09	- index who owns		DSP 1	23 01	
	h F? 0	35 71 00	ACE in I		GTO 7	22 07	
	7	07		*	f LBL 5	31 25 05	HP BJ or ACE?
	h ST I	35 33			RCL 4	34 04	= HP's card 1
	h F? 2	35 71 02	- if current score = 1,		f GSB 3	31 22 03	→ ACE?
020	GTO f 2	22 31 11	then change to 11.		RCL 5	34 05	= HP's card 2
	h SF 2	35 51 02	- else reset flag 2		f GSB 3	31 22 03	→ ACE?
	RCL 0	34 00	& rescore ACE as 1.		X	71	
	STO - (i)	33 51 24			RCL 7	34 07	= HP's count
	RCL (i)	34 24	- update count	080	+	61	
	h RTN	35 22			RCL A	34 11	= 21
*	g LBL 2	32 25 11	REScore ACE as 11		g X=Y	32 51	- if BJ, then check
	g RCL 0	34 00	= 10		GTO 8	22 08	if user also has BJ
	STO + (i)	33 61 24	- update count		h F? 0	35 71 00	- if user stood,
	RCL A	34 11	= 21		h RTN	35 22	return to HP-loop
030	RCL (i)	34 24	- if over 21,	*	f LBL 6	31 25 06	USER BJ!
	g X>Y	32 81	rescore as 1		RCL A	34 11	= 21
	GTO A	22 11			STO 9	33 09	
	h RTN	35 22			RCL B	34 12	= bet
*	f LBL C	31 25 13	HP (card 1). USER COUNT	090	2	02	- double
	DSP 2	23 02			X	71	
	RCL 9	34 09	= user count		STO + 3	33 61 03	- increment user's
	EEX	43			RCL 1	34 01	= 12 account
	2	02			h ST I	35 33	⇒ "I'LOSE"
	÷	81			DSP 1	23 01	
040	RCL 4	34 04	= HP's card 1	*	f LBL 7	31 25 07	END-GAME DISPLAY
	+	61			RCL (i)	34 24	- WHO WON blink/print
	h RTN	35 22			f -X-	31 84	
*	f LBL D	31 25 14	HIT		RCL 9	34 09	= user's count
	g GSB C	32 22 13		100	EEX	43	
	GTO + 9	33 61 09			2	02	
	RCL A	34 11	= 21		÷	81	
	RCL 9	34 09	= user's count		RCL 7	34 07	= HP's count
	g X=Y	32 71	- if not over 21,		+	61	
	h RTN	35 22	then display		DSP 2	23 02	- blink/print:
050	f LBL 4	31 25 04	GAME OVER?		f -X-	31 84	HP's count. user's count
	h F? 2	35 71 02	- if no ACE scored		RCL 3	34 03	= user's account
	GTO 6	22 06	as 11, then yes.		R/S	84	
	f GSB A	31 22 11	→ else, rescore ACE as 1	*	f LBL 8	31 25 08	HP BJ!
	h F? 0	35 71 00	- if owned by HP,		STO 7	33 07	= 21
	GTO f 6	22 31 12	return to its "hit"	110	RCL B	34 12	= bet
	h RTN	35 22	loop		h F? 0	35 71 00	= if user stood,
					GTO 8	22 08	then HP wins

0	1	2	3	4	5	6	7	8	9
10	12	13	user's account	HP card 1 (≤ 10)	HP card 2 (≤ 10)	HP initial hand: xx.yy	HP count	user init. hand: xx.yy	user count
S0 "OH BLISS"	S1	S2 "I'LOSE"	S3	S4	S5	S6	S7	S8 "OH BLISS"	S9 "I'LOSE"
A 21	B BET	C SEED	D user's card 1 (≤ 10)	E user's card 2 (≤ 10)	F	G	H	I index	

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
	RCL A	34 11	- else = tie ("push")	170	f GSB 2	31 22 02	→ J, Q, K → 10
	STD 9	33 09			f GSB 3	31 22 03	→ ACE?
	RCL 2	34 02	= 13		h RTN	35 22	
	h STI	35 33	⇒ "0.00000000"		R/S		
	DSP 9	23 09					
	GTO 7	22 07					
120 *	f LBL E	31 25 15	STAND				
	h SF 1	35 51 01	- reset ACE flags 1 & 2				
	h SF 2	35 51 02	= HP's initial hand				
	RCL 6	34 06					
	DSP 2	23 02					
	f -x-	31 84	- blink/print	180			
	h SF 0	35 51 00	- set "stand" flag 0				
	f GSB 5	31 22 05	→ HP BJ or ACE?				
*	g LBL e	32 25 15	REScore HP ACE?				
	h F? 1	35 71 01	- holds an ACE?				
130	GTO f b	22 31 12	- no: skip to b				
	h F? 2	35 71 02	- ACE scored as 11?				
	h F? 2	35 71 02					
	GTO f b	22 31 12	- no: skip to b				
	h SF 2	35 51 02	- else reset "11" flag				
	RCL 7	34 07	= HP's count	190			
	RCL 1	34 01	= 12				
	g X ≤ y	32 71	- if 7 ≤ HP count ≤ 11,				
	GTO f b	22 31 12	then rescore ACE				
	h R ↓	35 53	as 11.				
140	7	07					
	g X ≤ y	32 71					
	g GSB A	31 22 11					
*	g LBL b	32 25 12	HP HIT?				
	RCL 7	34 07	= HP's count				
	1	01		200			
	7	07					
	g X ≤ y	32 71	- if over 16,				
	GTO g	22 09	then stand				
	g GSB c	31 22 13	- else hit				
150	STD + 7	33 61 07	- increment HP's count				
	RCL A	34 11	= 21				
	RCL 7	34 07	= HP's count				
	g X > y	32 81	- if over 21, check				
	GTO 4	22 04	if game is over				
	GTO f e	22 31 15	- else loop	210			
*	f LBL g	31 25 09	COMPARE COUNTS				
	RCL 2	34 02	= 13				
	h ST I	35 33	⇒ "0.00" (for push)				
	RCL 9	34 09	= user's count				
160	RCL 7	34 07	= HP's count				
	g X = y	32 51	- PUSH?				
	GTO 7	22 07	→ END-GAME disp.				
	g X > y	32 81	- HP wins?				
	h CF 0	35 61 00	- yes				
	GTO 6	22 06	→ GAME OVER	220			
*	g LBL c	32 25 13	GET NEW CARD				
	g GSB d	32 22 14	→ generate card				
	J DSP 0	23 00					
	f -x-	31 84	- blink/print				

LABELS					FLAGS	SET STATUS		
A ACE → 1 or 11	B	C HP (card 1) user count	D HIT	E STAND	0 STAND	FLAGS	TRIG	DISP
a ACE → 11	b HP HIT?	c get new card	d deal subr.	e REScore HP ACE?	1 ACE dealt	ON OFF		
0 "Error"	1 card-generator	2 J, Q, K → 10	3 ACE dealt?	4 game over?	2 ACE = 11	0 <input type="checkbox"/> <input checked="" type="checkbox"/>	DEG <input checked="" type="checkbox"/>	FIX <input checked="" type="checkbox"/>
5 HP BJ or ACE?	6 game over! / user BJ	7 end-game disp.	8 HP won (or BJ)	9 HP lost / compare counts	3	1 <input type="checkbox"/> <input checked="" type="checkbox"/>	GRAD <input type="checkbox"/>	SCI <input type="checkbox"/>
						2 <input checked="" type="checkbox"/> <input type="checkbox"/>	RAD <input type="checkbox"/>	ENG <input type="checkbox"/>
						3 <input type="checkbox"/> <input checked="" type="checkbox"/>		n 0