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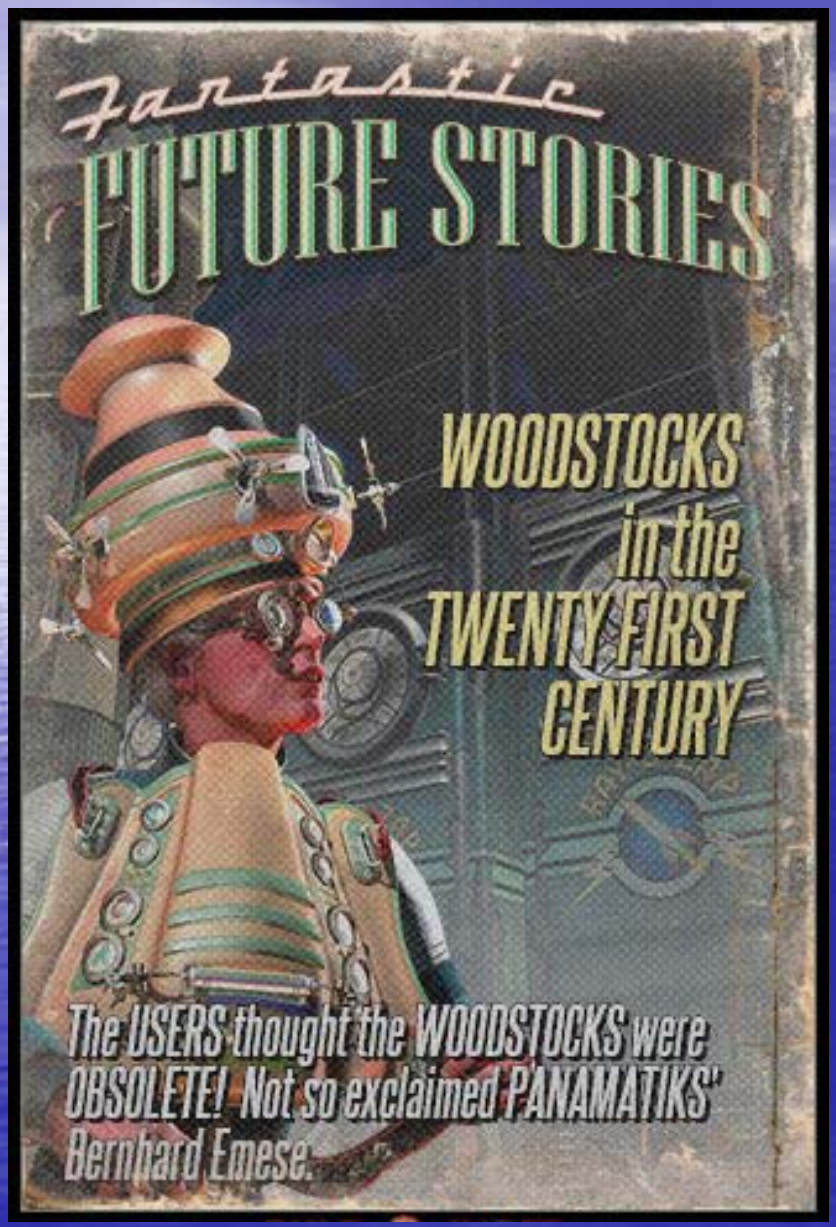
HP PROJECTS NOT BY HP!



OR

"WOW YOUR CO-WORKERS IN THE OFFICE WITH THE MAGIC OF LEDs and TECHNOLOGY FROM THE TWENTIETH CENTURY"

Geoff Quickfall

HHC 2015

THE ORIGINAL SIX:

TOP ROW:

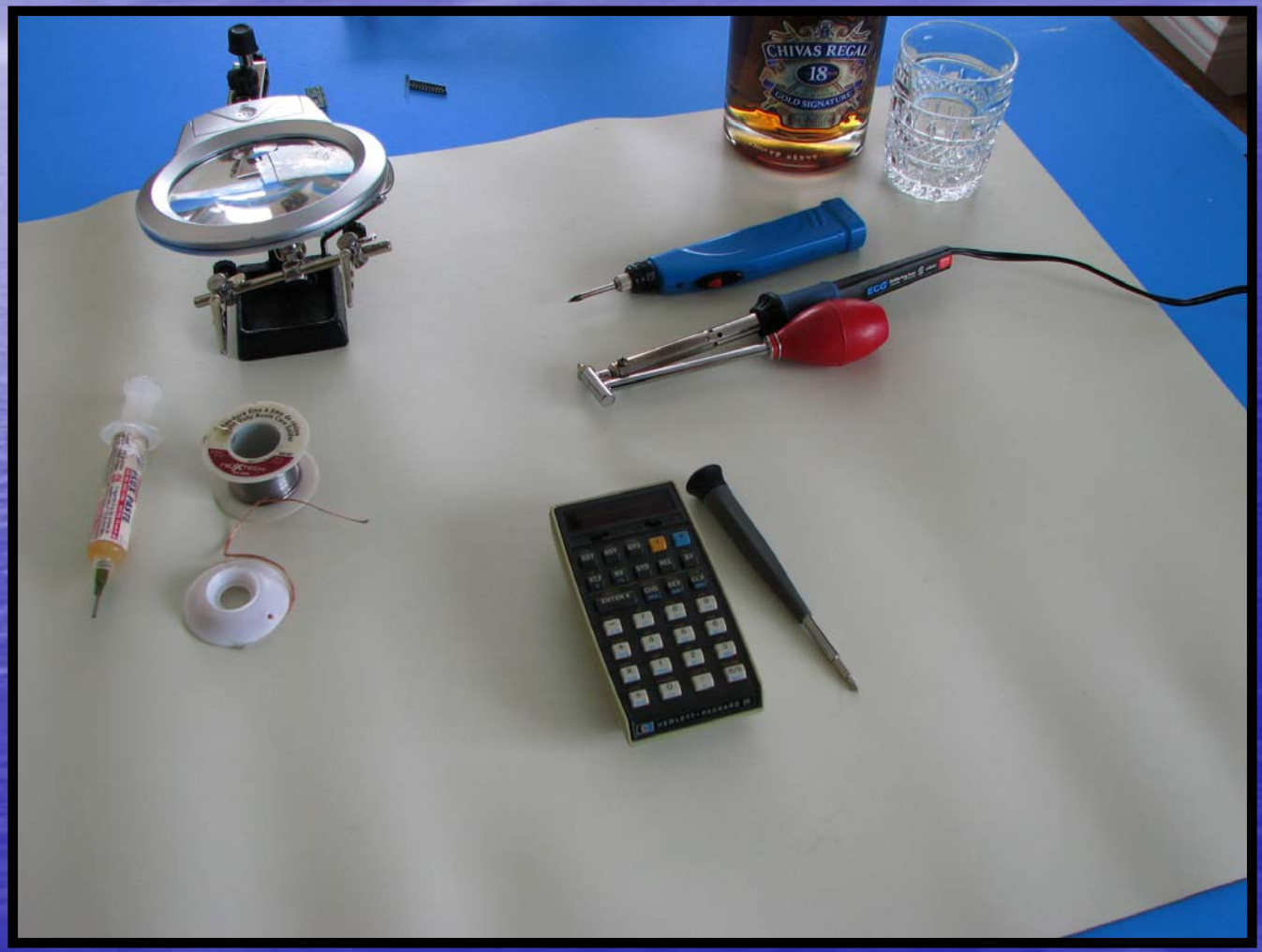
25C, 27, 22

BOTTOM ROW:

21, 29C, 25

SPOT THE ODD ONE, BUT DON'T SHOUT IT OUT!

SO HOW DO YOU GET FROM THIS …



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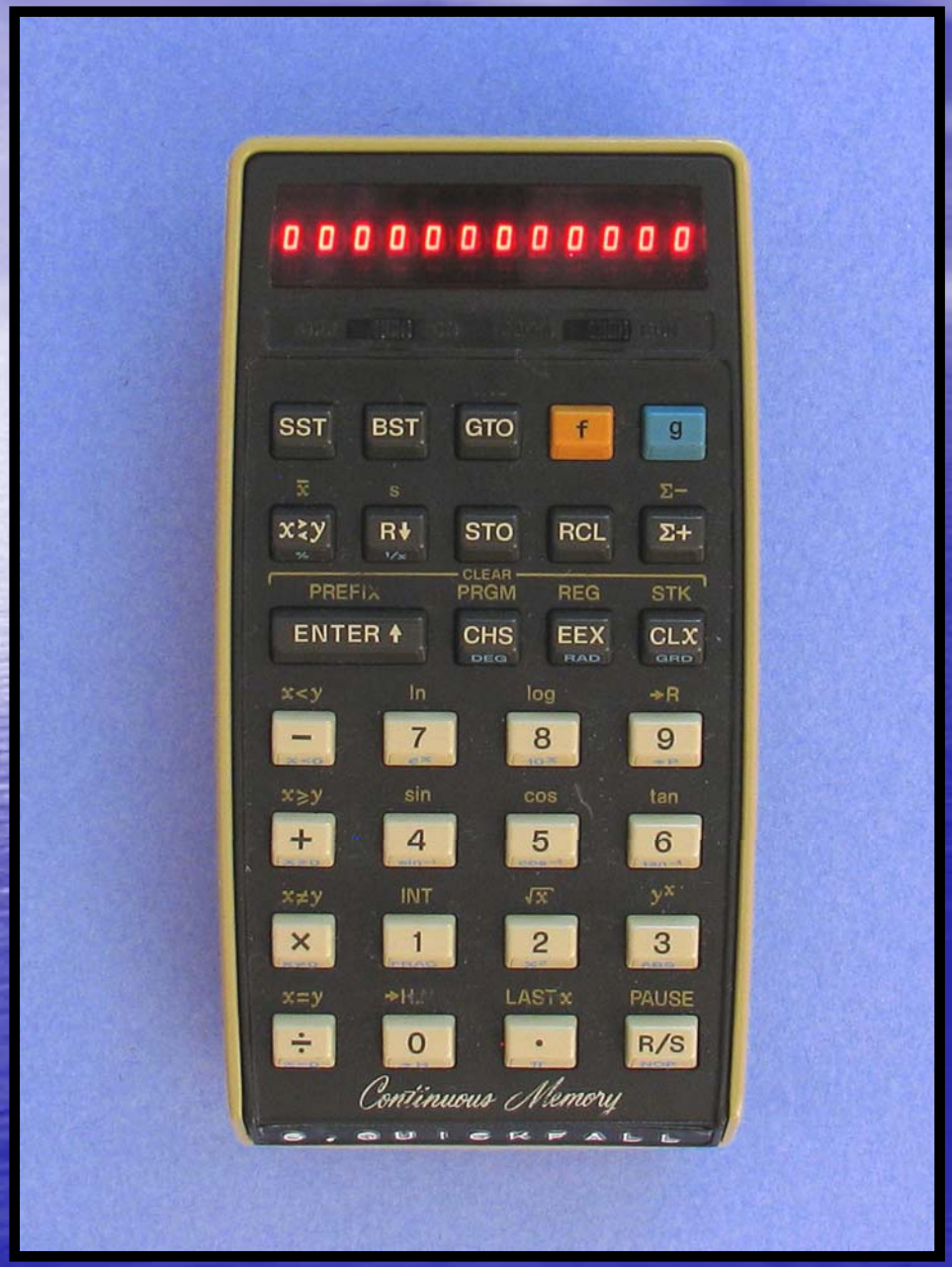
TO THIS?



SPOTTING A BAD ACT:

- COMPLETE SET OF ZEROS.
- A SINGLE DIGIT "0".
- NO DISPLAY.
- FLICKERING DISPLAY.

SPOTTING A BAD ROM

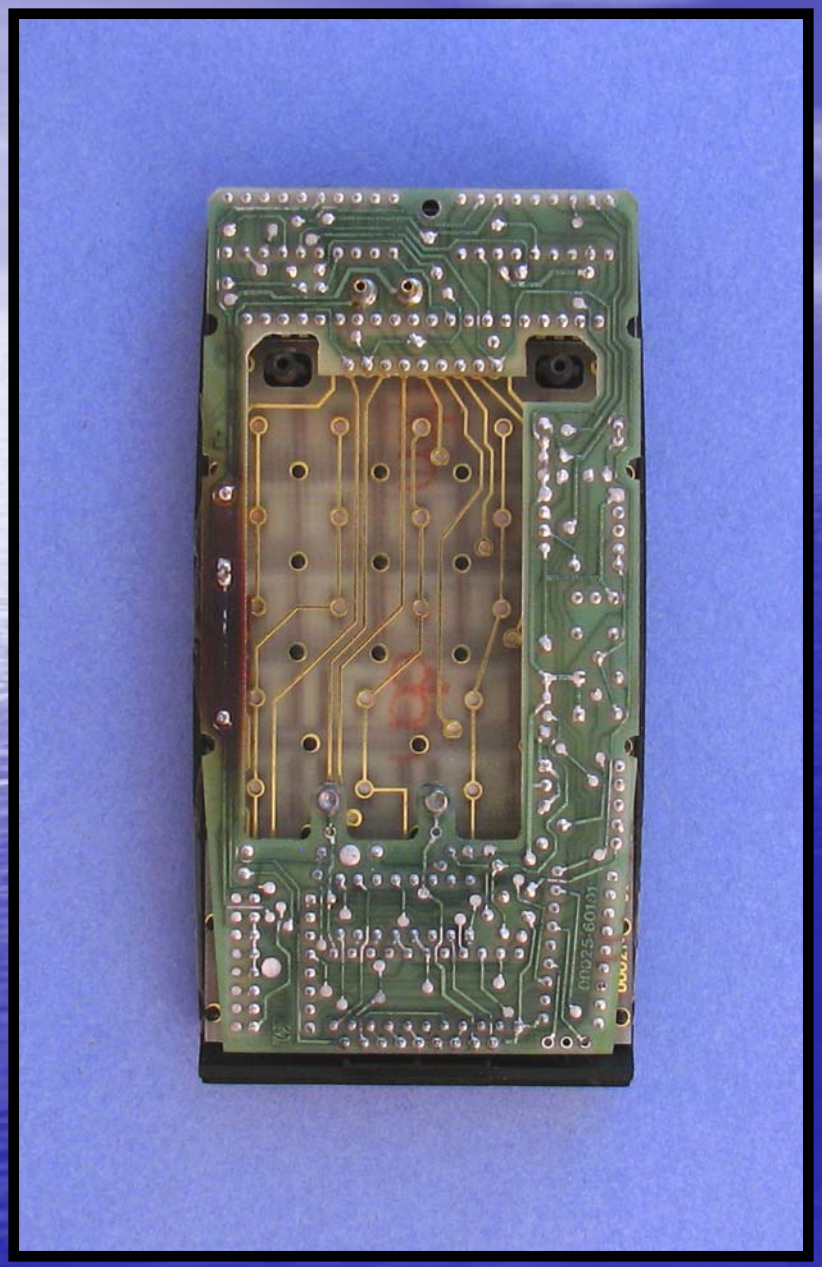
- NON FUNCTIONING KEYS.
- "CIGO".
- ERROR MESSAGES.

SPOTTING A BAD RAM

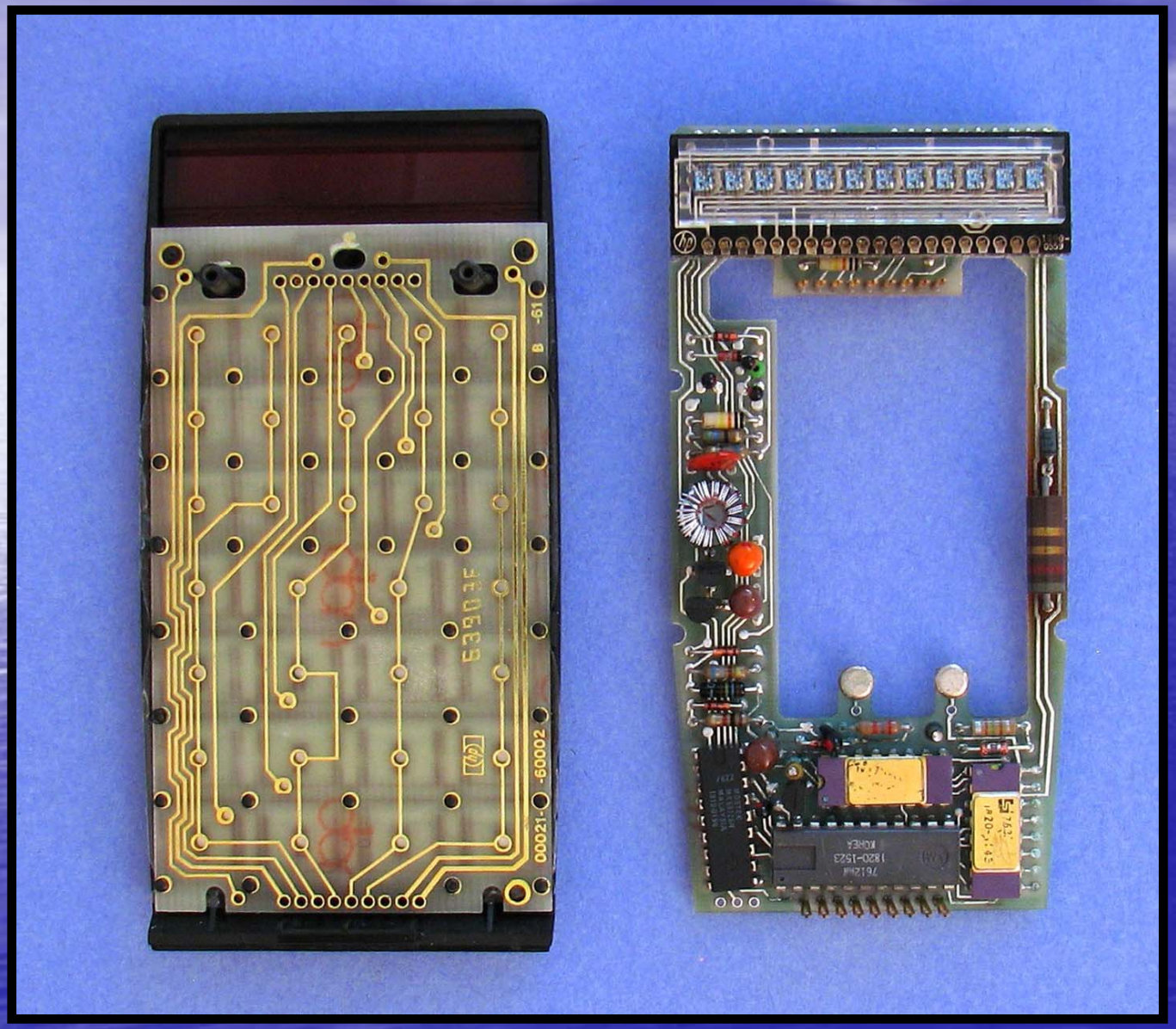
- NON FUNCTIONING DATA. REGISTERS.
- NON FUNCTIONING PROGRAM REGISTERS.

HOW DID THIS HAPPEN?

- CHARGER (WALL WART) IN USE WITH THE FOLLOWING CONDITIONS:
  - BATTERIES NOT IN CALCULATOR CONTRARY TO MANUALS INSTRUCTION.
  - BATTERIES DECOMPOSED AND OFFERING INFINITE RESISTANCE.

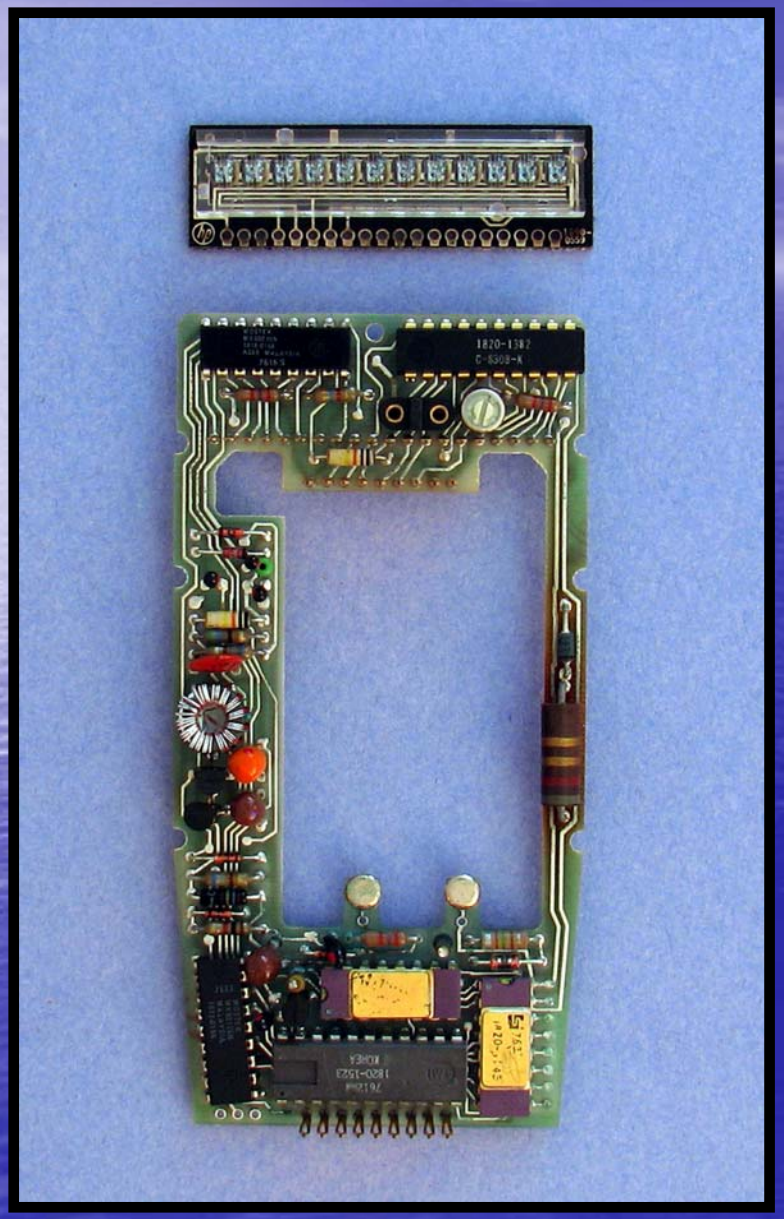


- *THE BACK SHELL IS REMOVED EXPOSING THE PCA TRACE SIDE.*
- *NOTE THE 'BURNT' SECTION TO THE LEFT OF THE BOARD.*



SEPARATE THE TWO SECTIONS.

- THIS EXPOSES THE CHIPS AND LED PANEL ON THE RIGHT.
- THE KEYBOARD ON THE LEFT.



REMOVE THE LED PANEL.

- *LED DRIVERS*
- *ROM*
- *RAM*
- *ACT*
- *POWER CONVERTOR*

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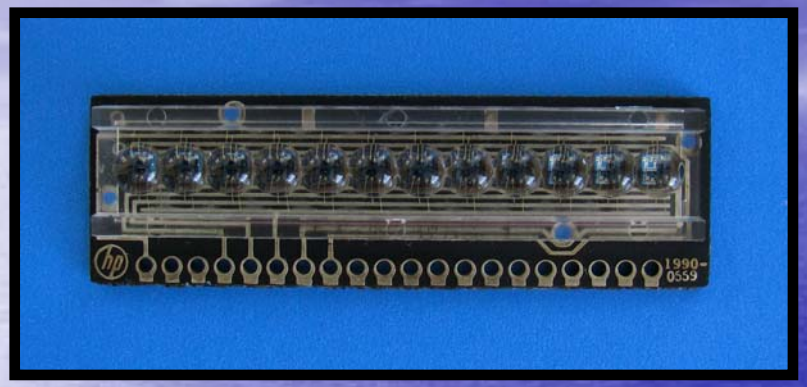
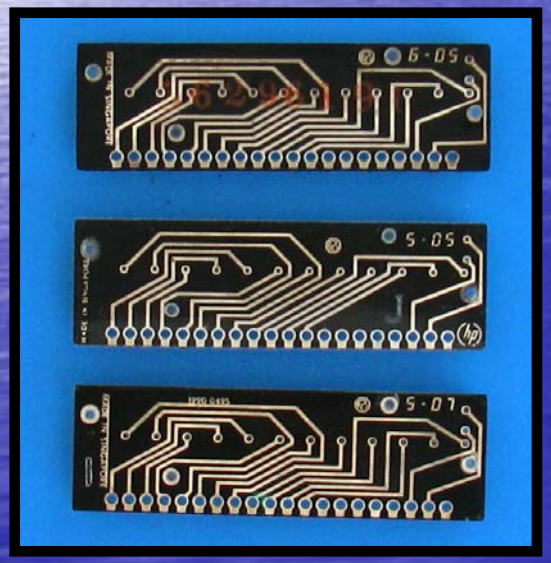
OBVERSE



REVERSE

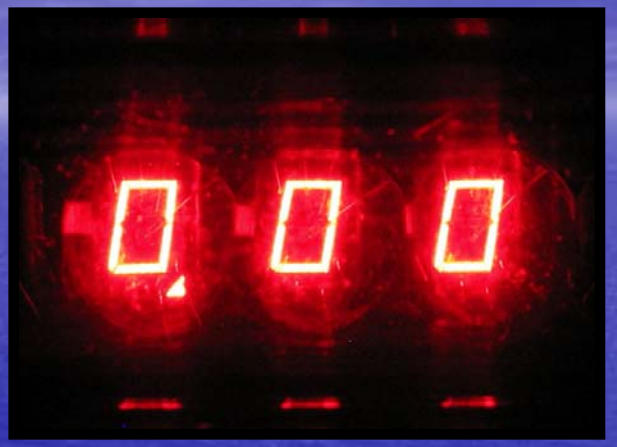


6.05 DOT

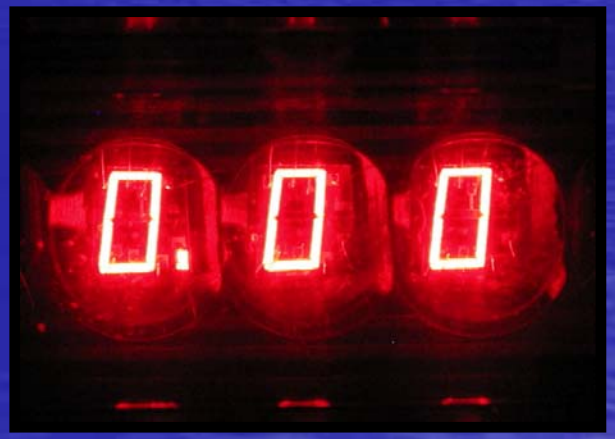
5.05 COMMA

5.07 DOT

RADIX COMMA



RADIX DOT



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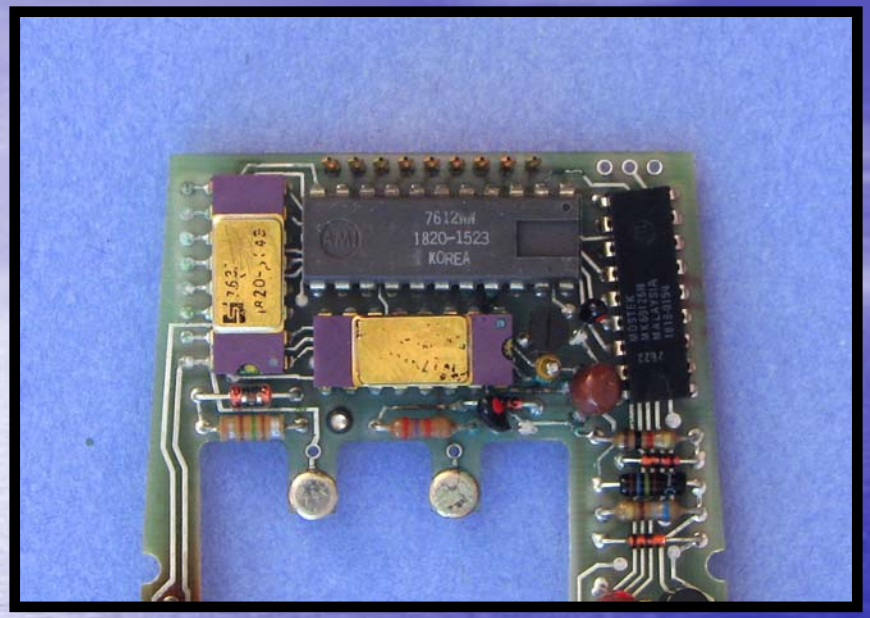
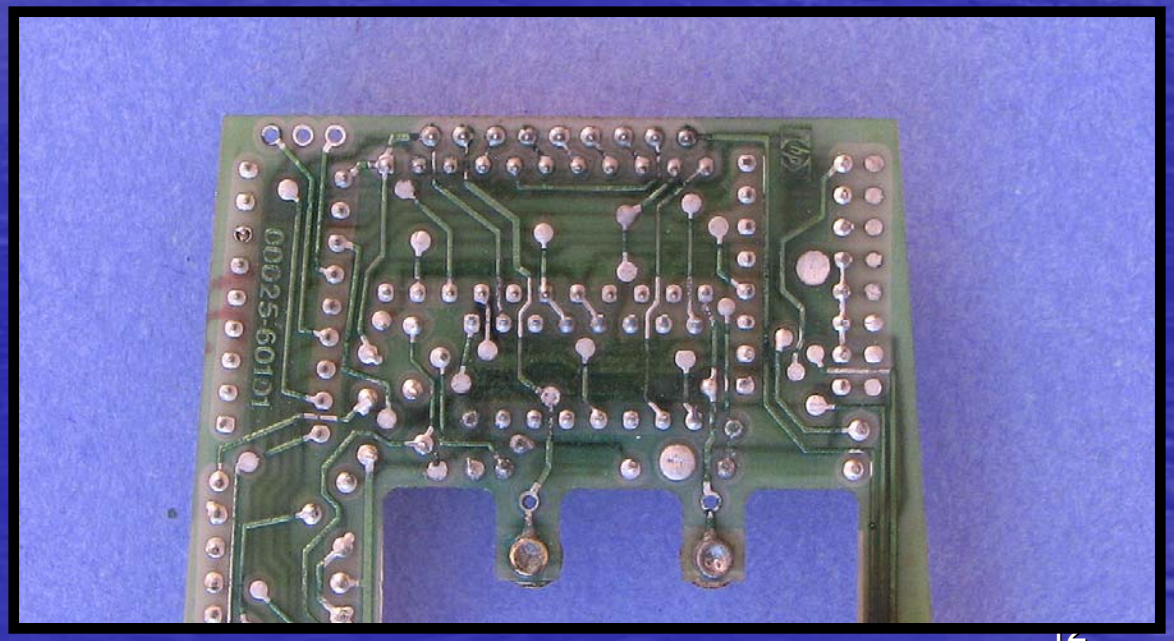


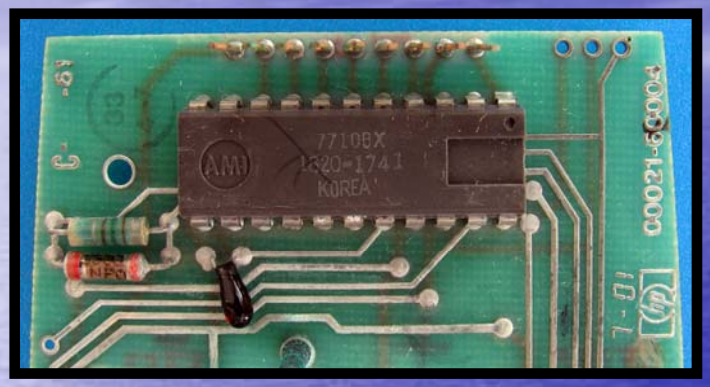
CLOSE UP OF THE "BAD" HP 25 ACT WHICH WILL BE REPLACED WTH A PANAMATIK ACT.

THE SOLDER POINTS ON THE BAD ACT.

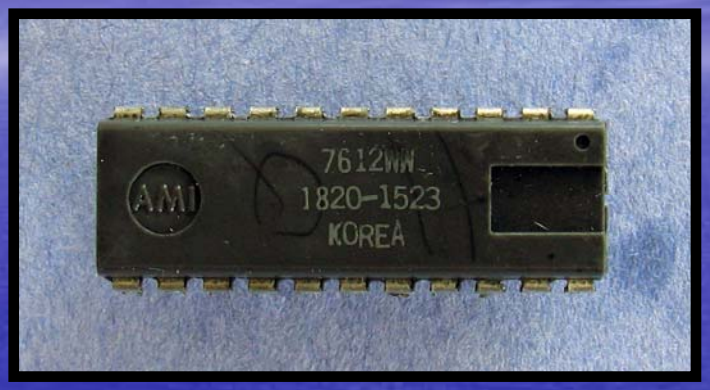


HHC 2015

VARIOUS WOODSTOCK ACTS

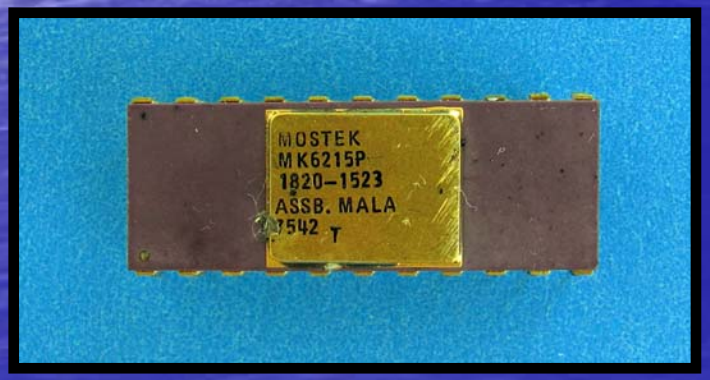


AMI HP 21 ACT 1220-1741

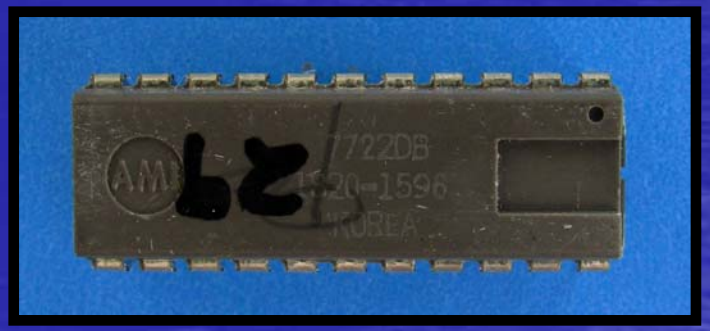


AMI HP 25 ACT 1820-1523

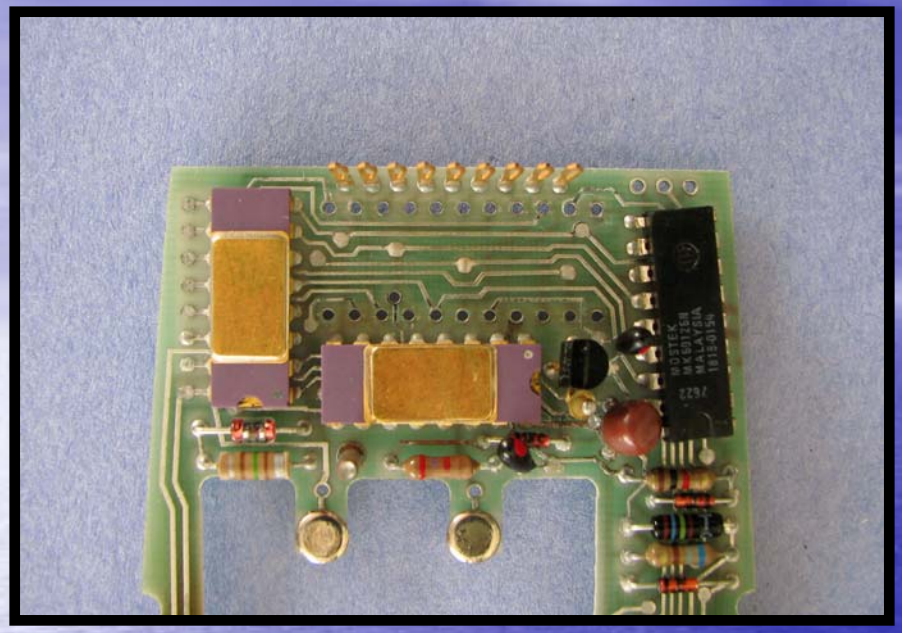
MOSTEK HP 25 ACT 1820-1523



AMI HP 29 ACT 1820-1596

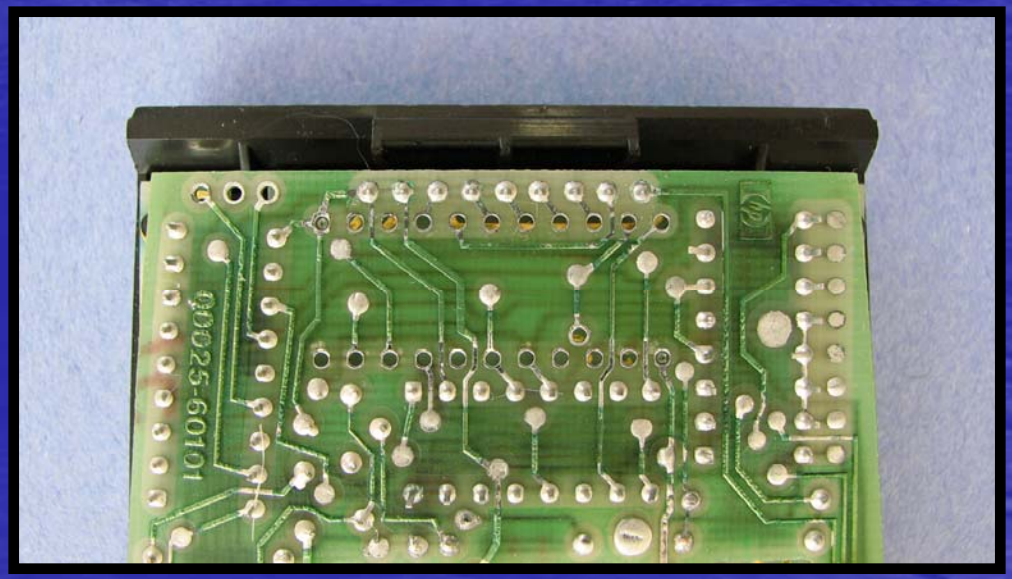


HHC 2015

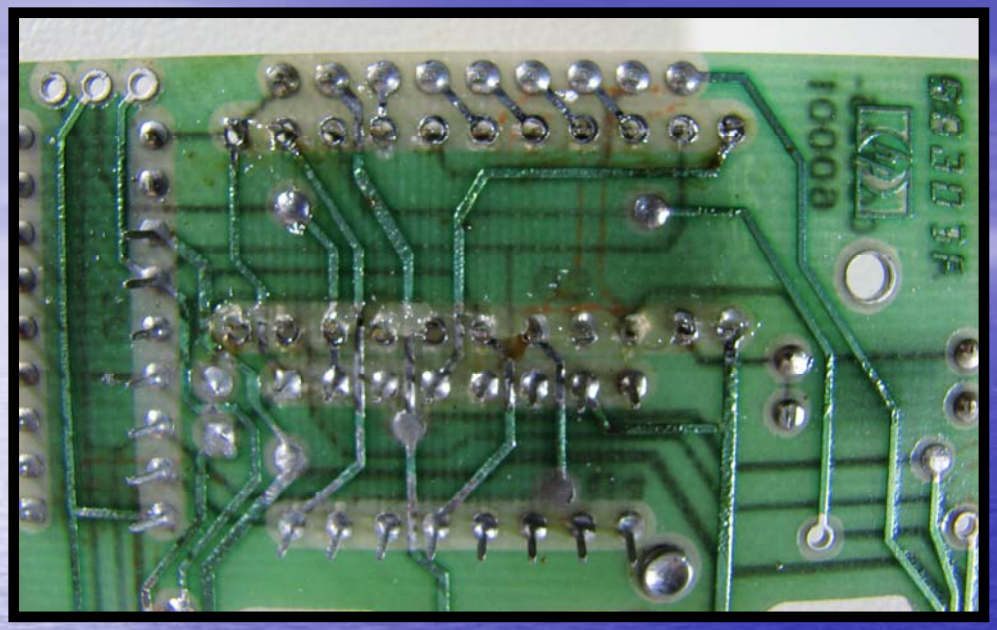


CLOSE UP OF THE PCA WITH THE "BAD ACT" REMOVED.

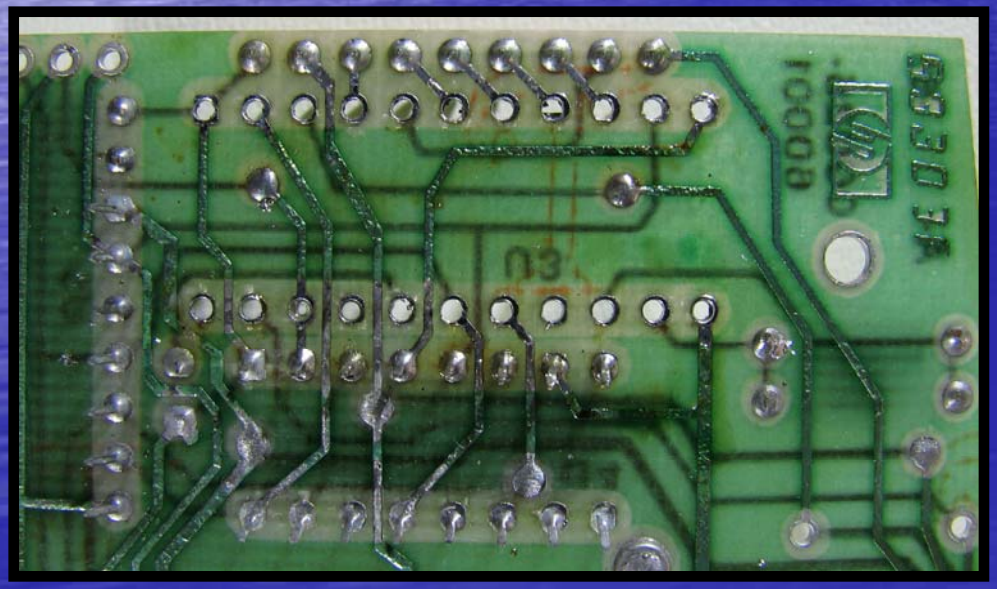
THE REVERSE SIDE: NOTE HOW CLEAN THE HOLES ARE OF SOLDER.



Solder pronounced (/ˈsoʊldə/, /ˈsɒldə/ or in North America /ˈsɒdər/)



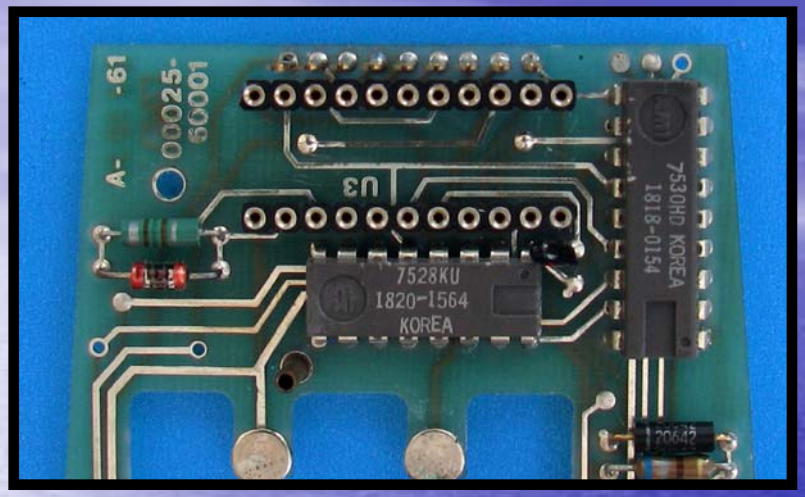
AFTER ACT REMOVED WITH COMBINED DESOLDER IRON AND BULB.



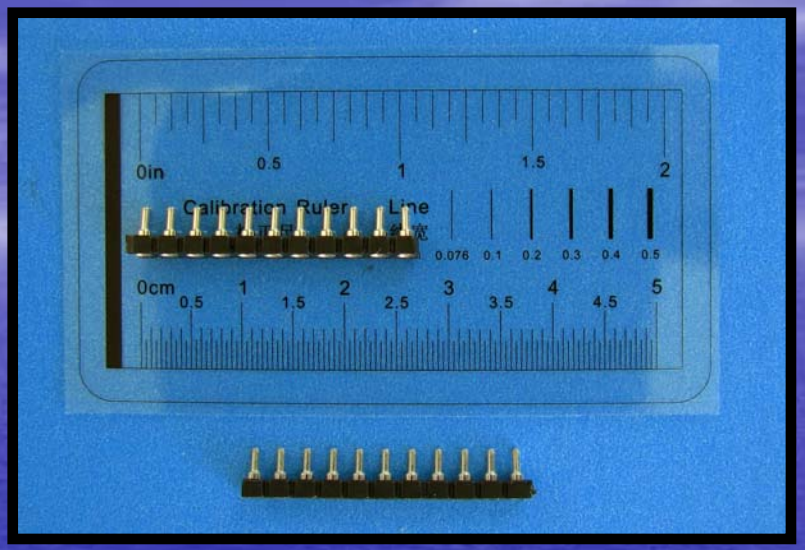
AFTER CLEANUP WITH DESOLDER BRAID.

HHC 2015

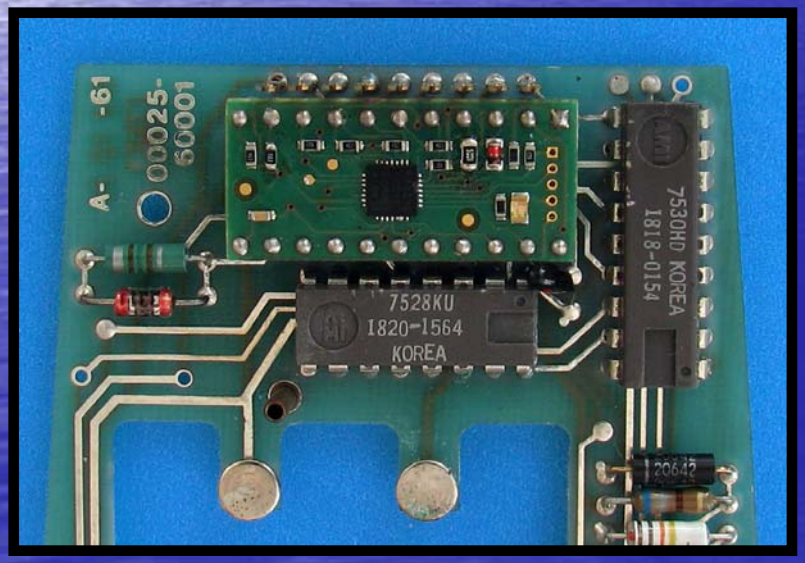
LOW PROFILE SOCKETS INSTALLED



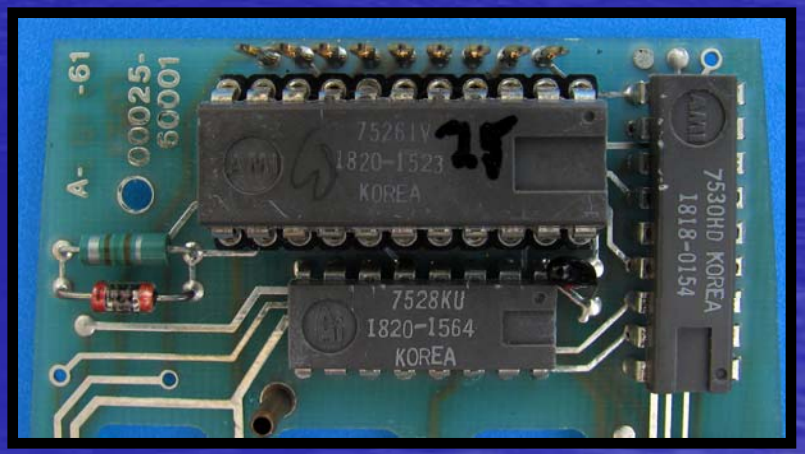
LOW PROFILE SOCKETS



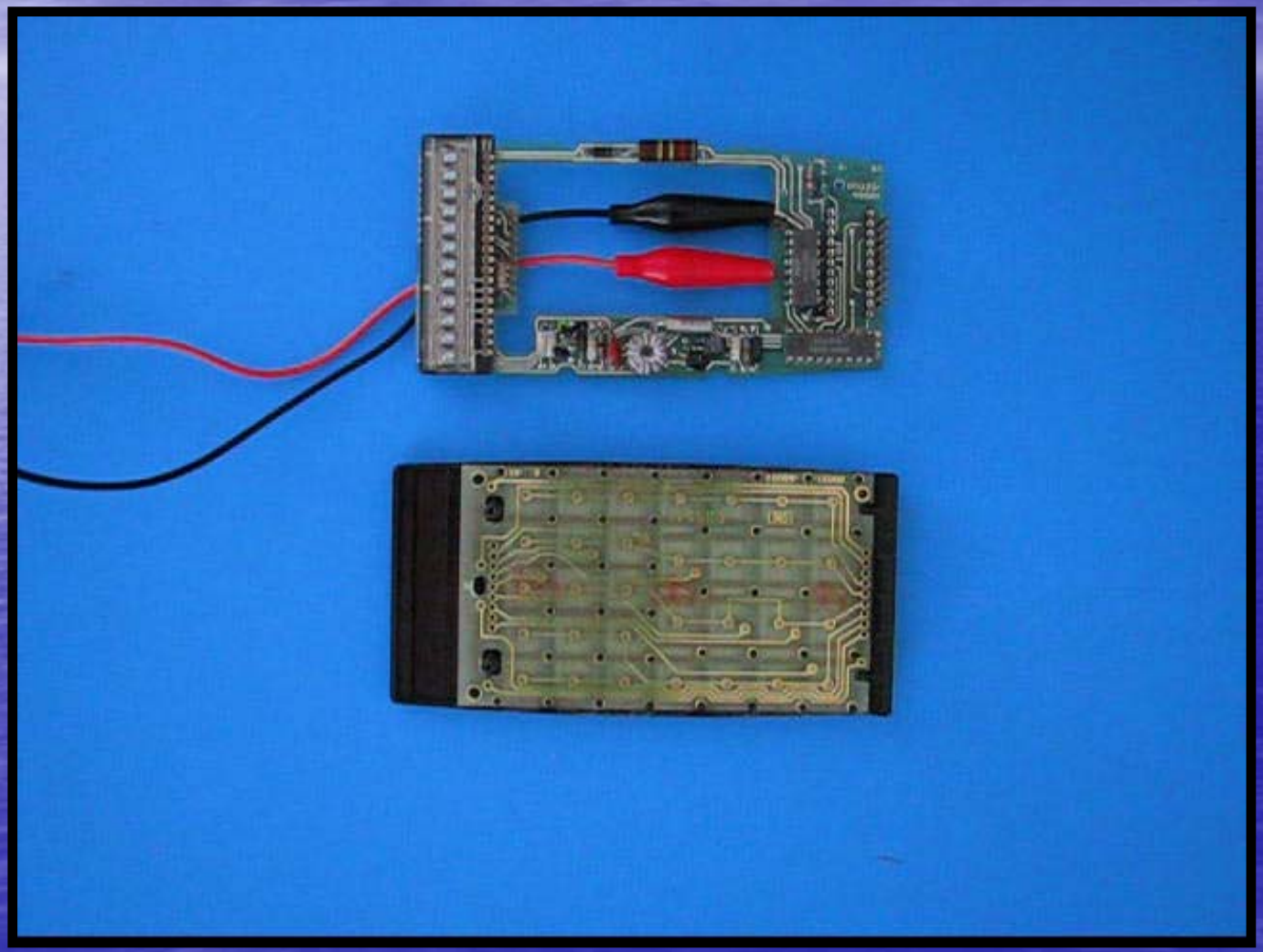
PANAMATIK ACT INSTALLED



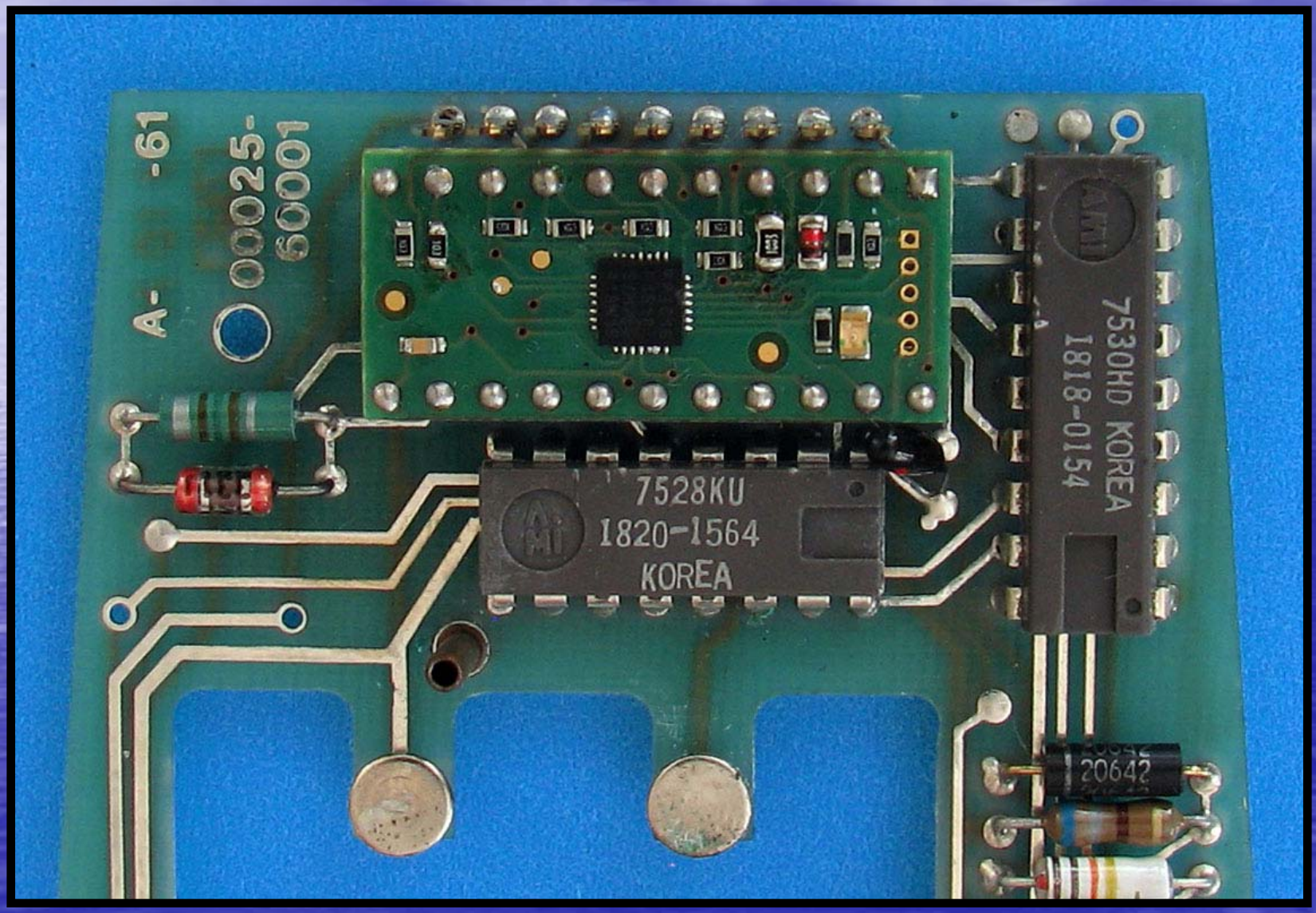
USING THE LOW PROFILE SOCKETS FOR TESTING ACTS.

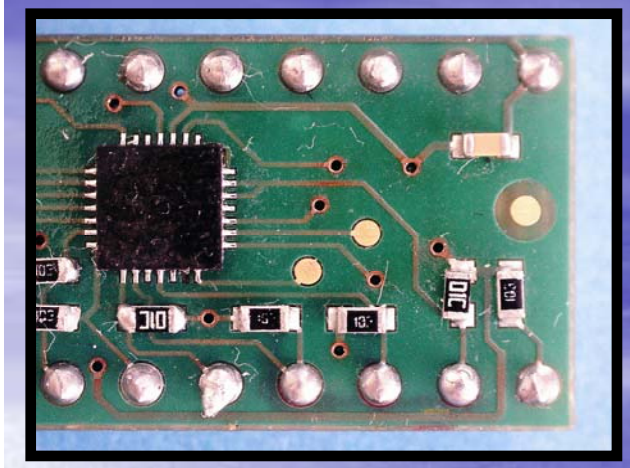


TESTING AN ACT USING THE LOW PROFILE SOCKETS

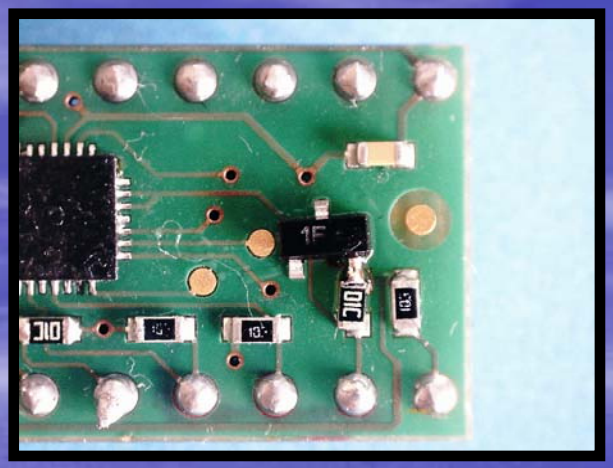


LETS ADD A PRINTER CIRCUIT TO THE ACT

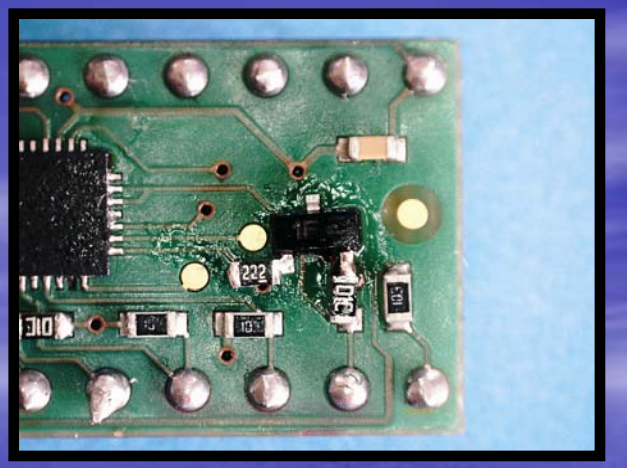




BARE BONES ACT

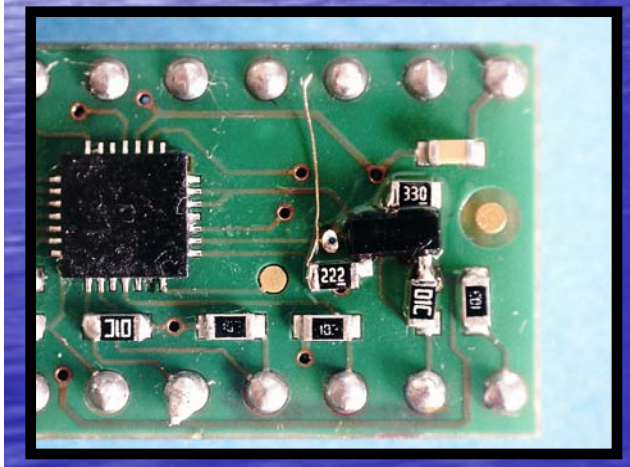


BC847 TRANSISTOR



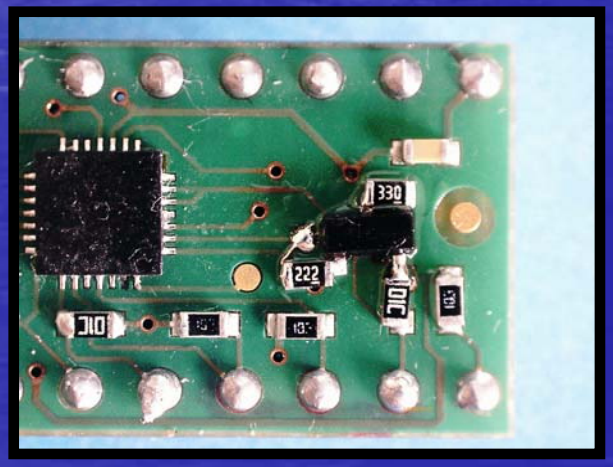
2.2 kΩ RESISTOR

WIRE TO 2.2K



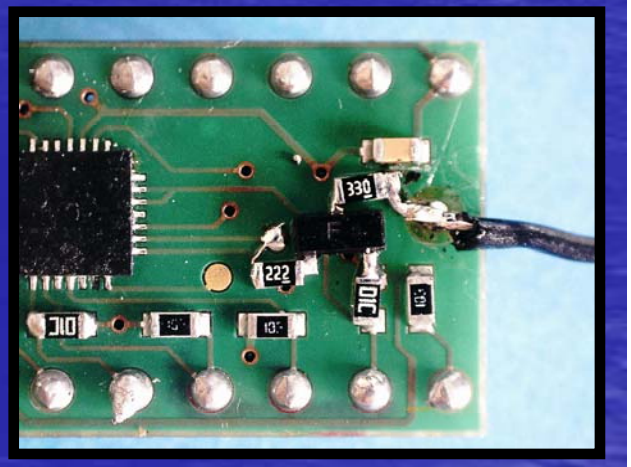
WIRE TO PAD,

33 Ω RESISTOR



WIRE TO

IR CATHODE



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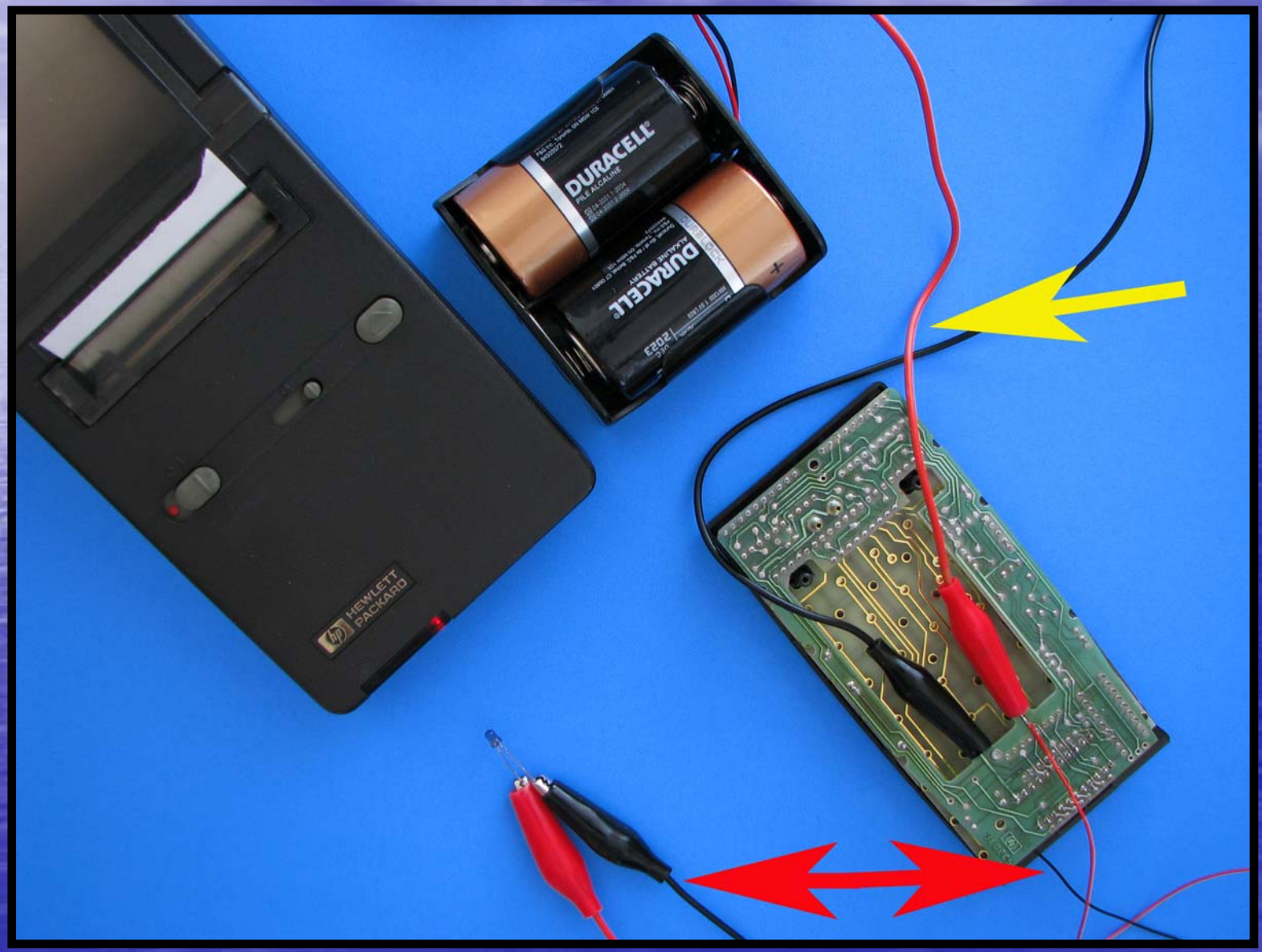
POWER SUPPLY WIRES: YELLOW ARROW
IR WIRES: RED ARROW



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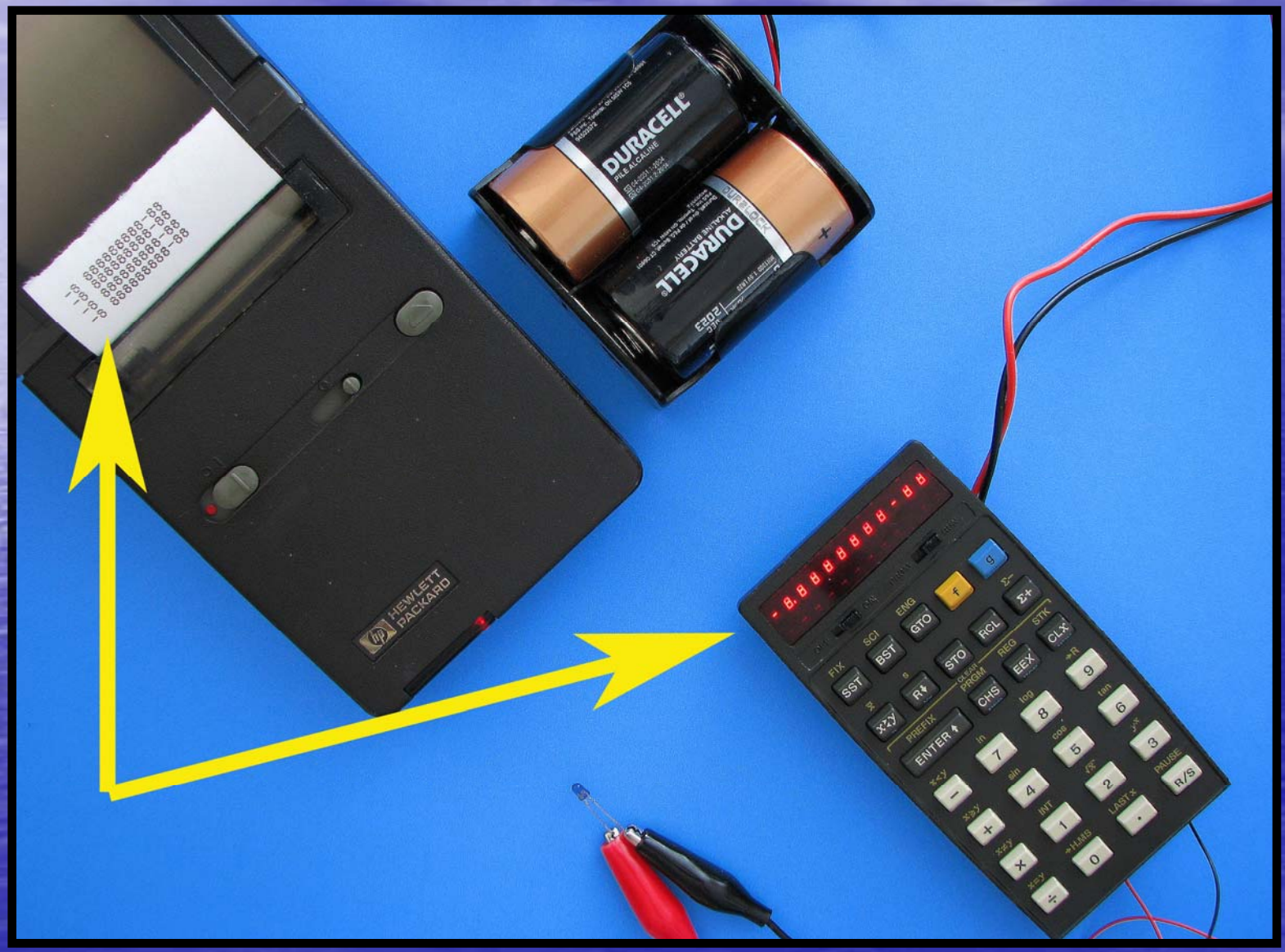
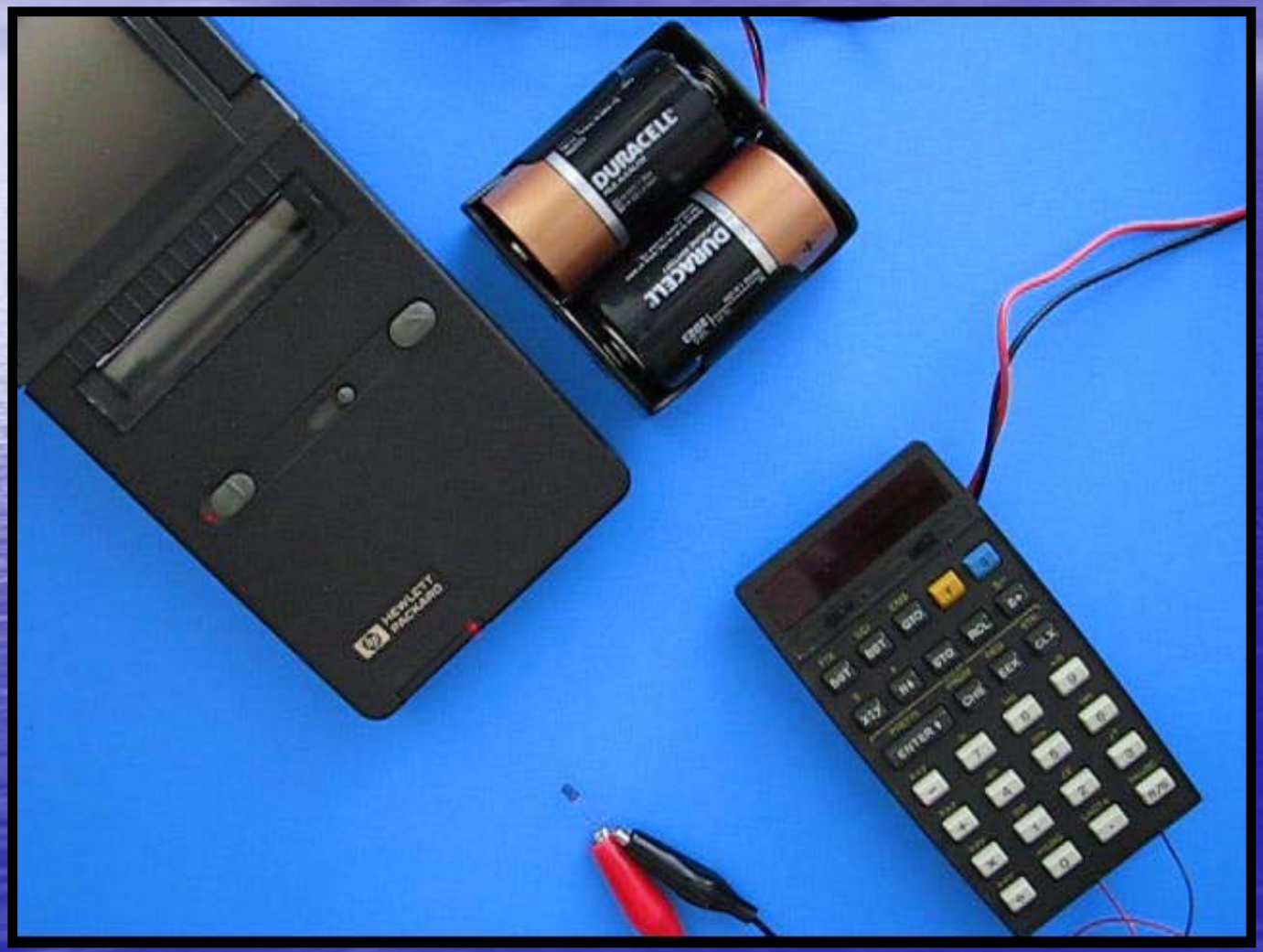
IR PRINT RESULT: SUCCESS!



VIDEO

HP 67E Ir

Have some faith!

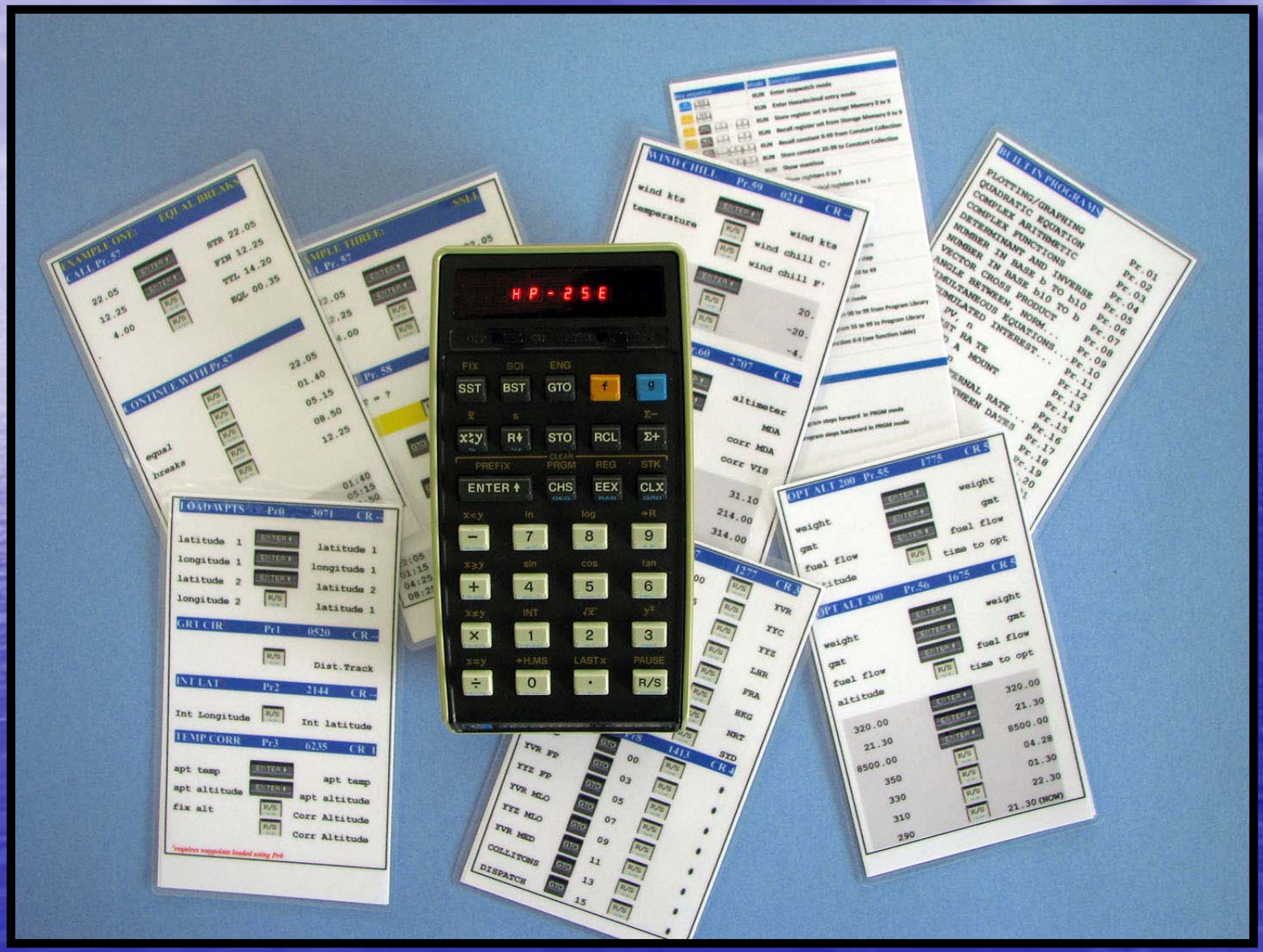


TESTING THE STACK PRINT COMMAND OF THE HP 67 FROM THE KEYBOARD BEFORE ASSEMBLY.

WHAT THE ACT DOES

HP 25E Ir

HP 25E Ir


HP-25E
SST
BST
GTO
STO
RCL
ENTER
CHS
EEX
CLX
R/S
BUILT IN PROGRAMS
WIND CHILL
OPT ALT 200
OPT ALT 300
LOAD WPTS
GRT CIR
INT LAT
TEMP CORR

HHC 2015

HP 25E Ir

HP 25E Ir

REVISION & SERIAL NUMBER

SHOW FLAGS

HP LOGO

ROM CODE

HHC 2015

HP 25E Ir

CHECKSUM & REPROGRAM

PROGRAM & CHECK SUM

AVAILABLE MEMORY

OPERATING & BATTERY TIME

HHC 2015

HP 25E Ir

FLASH WRITE CYCLES

DISPLAY TEST

WELCOME SCREEN

SYMBOLIC PI

HHC 2015

HP 25E Ir

SYMBOLIC EULER

DEGREE MODE

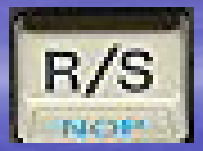
RAD MODE

GRAD MODE

HHC 2015

HP 25E Ir

BASE TEN



HEXADECIMAL

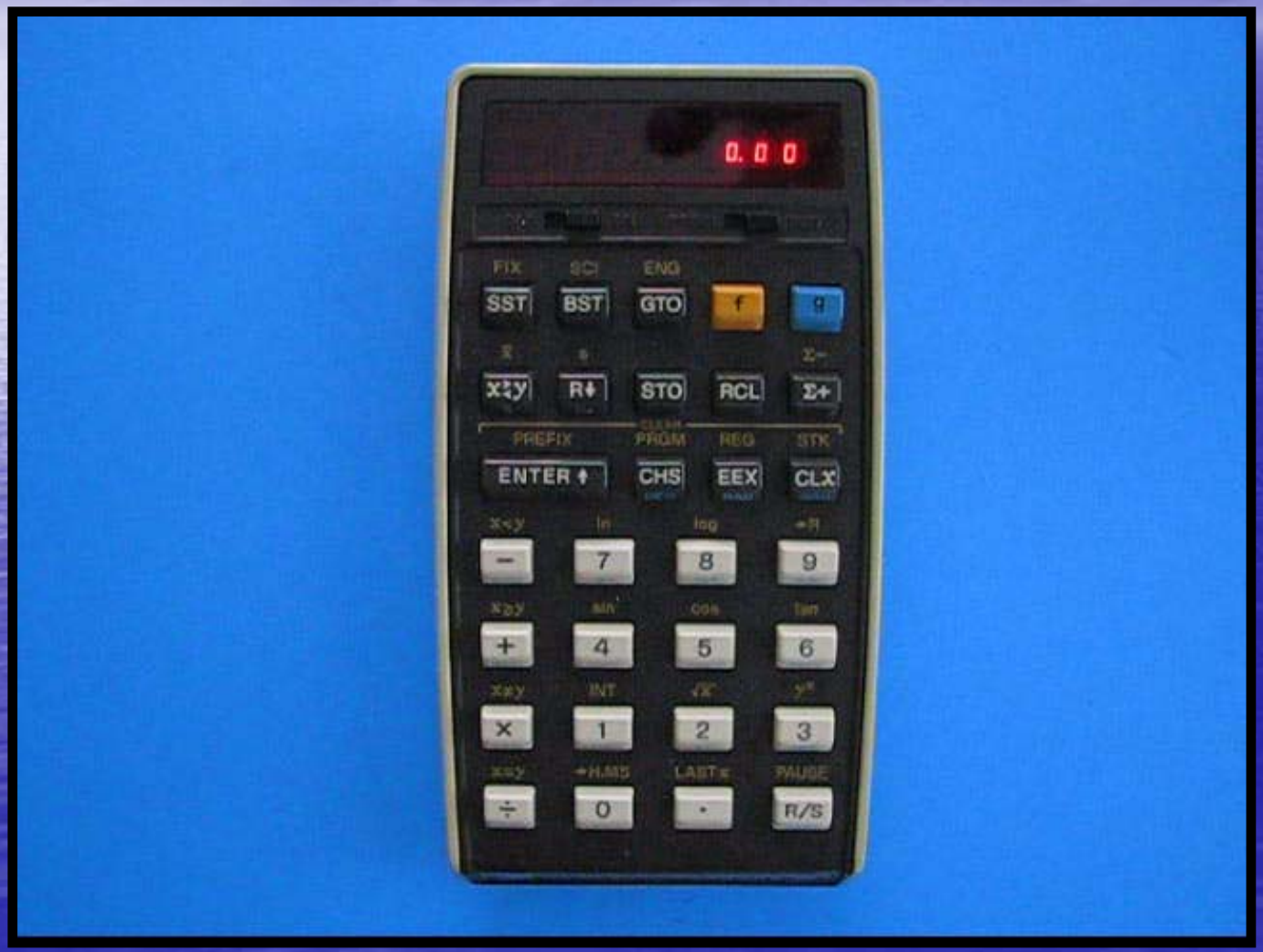
OCTAL

HHC 2015

WAS THIS THE ONE YOU PICKED?

HP 25E Ir

VIDEO



SLEEP (1 MIN.)

PI

EULER

STOPWATCH 1

STOPWATCH 2

FLAGS

- REMOVE RIGHT JUSTIFIED.

HHC 2015

VIDEO

HP 25E Ir

I know where the keys are!

FAST SPEED

RCL 0 IN PRGM MODE
- LOAD WAYPOINTS

RCL 1 IN PRGM MODE
- LOAD GREAT CIRCLE

RCL 2 IN PRGM MODE
- INTERMEDIATE LATITUDE

LOAD WAYPOINTS.

GREAT CIRCLE.

INTERMEDIIATE LATITUDE.

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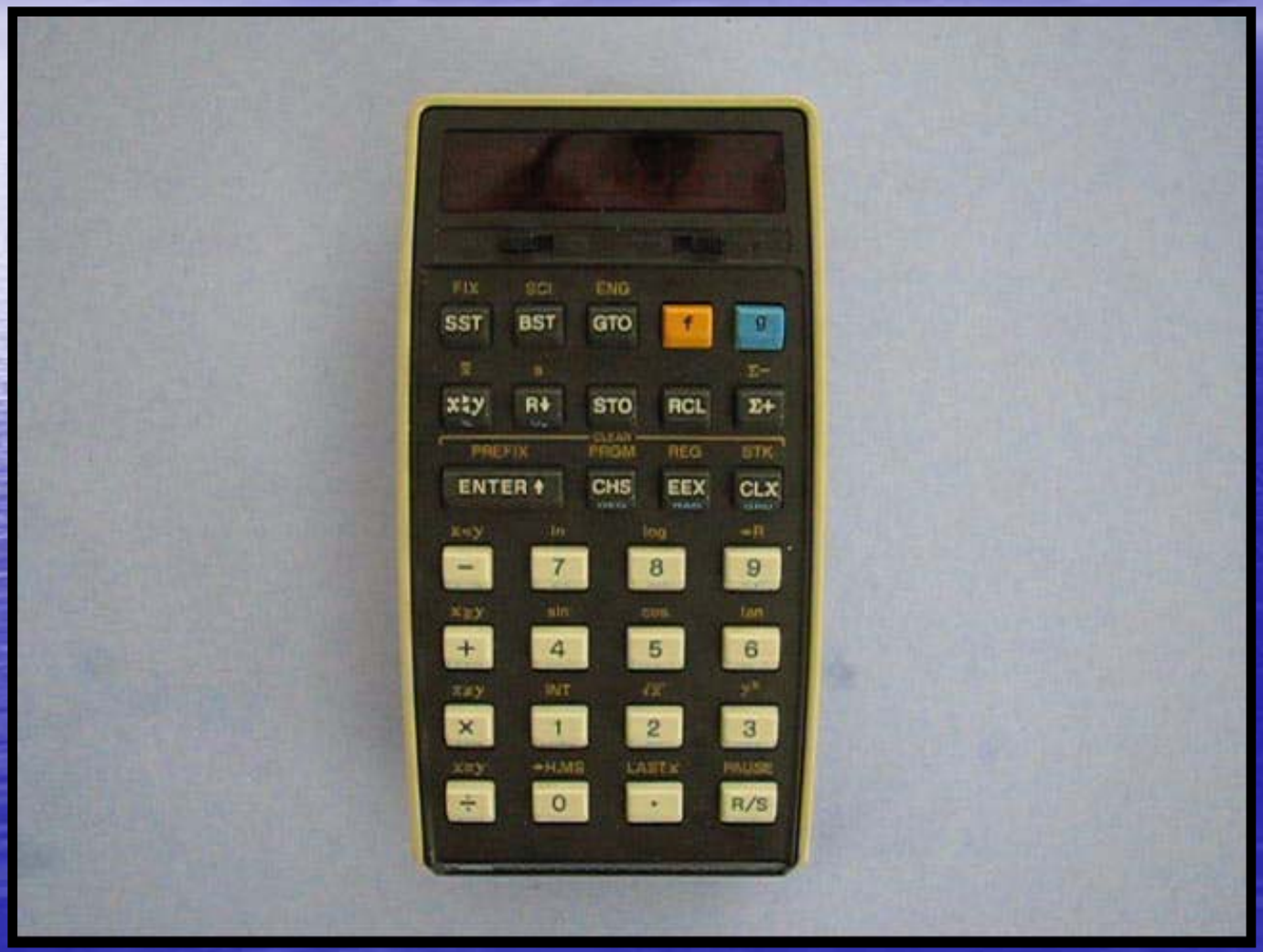
VIDEO

HP 25E Ir

Where is that key?

SLOW SPEED



LOAD WAYPOINTS.

GREAT CIRCLE.

INTERMEDIIATE LATITUDE.

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HP 25E Ir

VIDEO

OPTIMUM ALTITUDE:

f RCL .56	PROGRAM
f RCL 5	CONSTANTS
WEIGHT	320,000 KGs
TIME	21:30 GMT
FUEL FLOW	8500 KG/HR
FLIGHT LEVEL	350…05:17
	330…02:23
	310…23:19
	290…21:30

LOAD OPTIMUM ALTITUDE PROGRAM

LOAD CONSTANTS FOR THE ABOVE SUBROUTINE.

WHAT THE ACT DOES

HP 29E Ir

HHC 2015

HP 29E Ir

HHC 2015

HP 29E Ir

VIDEO *

```
49.0000
123.0000
53.0000
0.0000

33.
4031.

60.0000
68.5645
```

LOAD WAYPOINTS.

GREAT CIRCLE.

INTERMEDIIATE LATITUDE.

MANUAL PRINTING.

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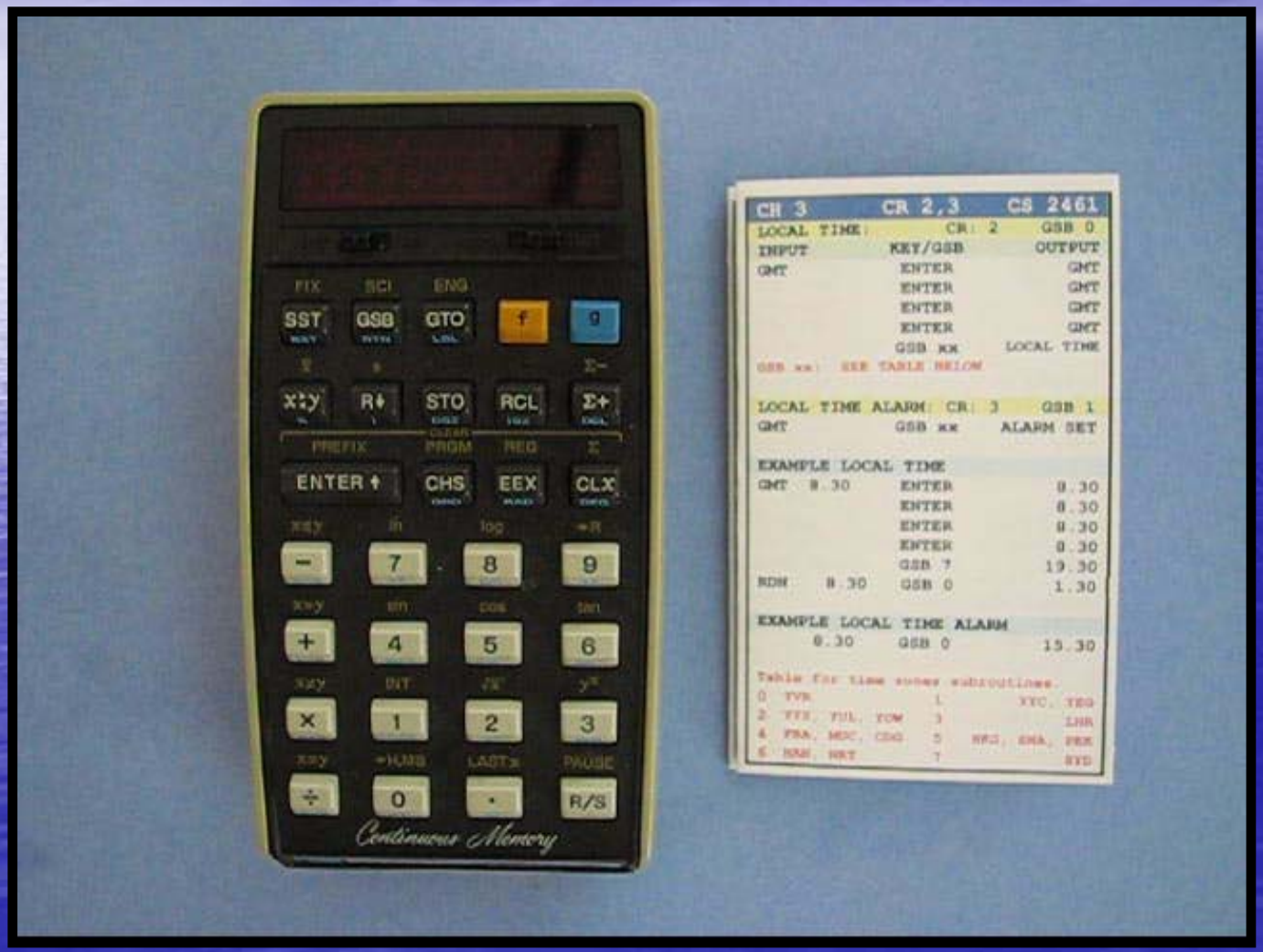
HP 29E Ir

VIDEO



STOPWATCH.

LOAD "LOCAL TIME FROM UST" ROUTINE.

LOAD DAYLIGHT SAVINGS TIME DATA.

LOCAL TIME SYD.
LOCAL TIME YVR

STOPWATCH FOR TIME IT TOOK.

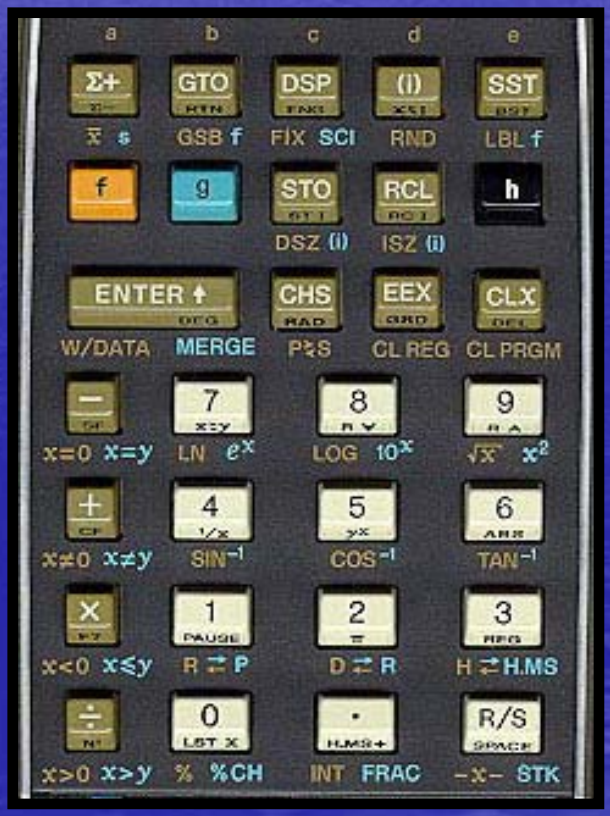
WHAT THE ACT DOES

HP 67E Ir

HP 67E Ir

Keyboard overlay

HP 25 KEYBOARD



HP 67 KEYBOARD

HHC 2015

HP 67E Ir

From the "IDBI" FILES.

VIDEO *

```
10000000.00
100000.00
1000.00
10.00
10 00
1000 00
100000 00
10000000 00
```

EXECUTING THE PRINT -X- COMMAND AND THE PRINT -STACK- COMMAND FROM A ROUTINE.

HHC 2015

HP 67E Ir

From the "YKM" FILES.

VIDEO *

```
001    33 00 STO 0
002       84 R/S
003    33 01 STO 1
004       84 R/S
005    33 02 STO 2
006       84 R/S
007    33 03 STO 3
008       84 R/S
009    34 03 RCL 3
010    31 84 -X-
011    34 02 RCL 2
012    31 84 -X-
013    34 01 RCL 1
014    31 84 -X-
015    34 00 RCL 0
016    31 84 -X-
017    34 00 RCL 0
018    34 01 RCL 1
019    34 02 RCL 2
020    34 03 RCL 3
021    32 84 STK
022       84 R/S
```

EXECUTING THE PRINT PROGRAM COMMAND OF THE PREVIOUS ROUTINE.

HHC 2015

Some more bad ACTS?

NEWS FLASH

THE HP 67E CAN NOW BE FOUND IN THE HP 67

Photo by Bernhard Emese, creator of the ACT replacement chip.

The ACT residing on the original 67 PCA.

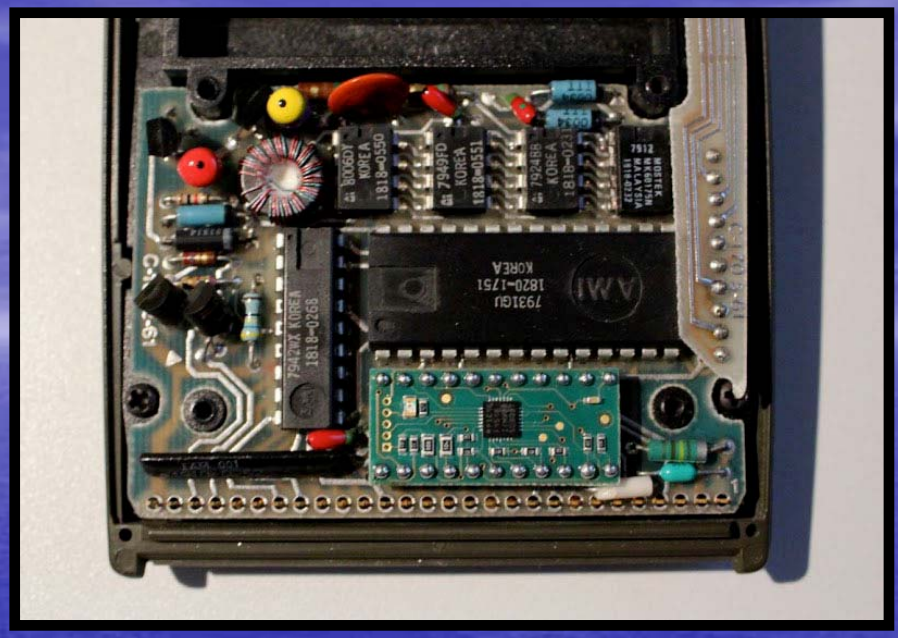
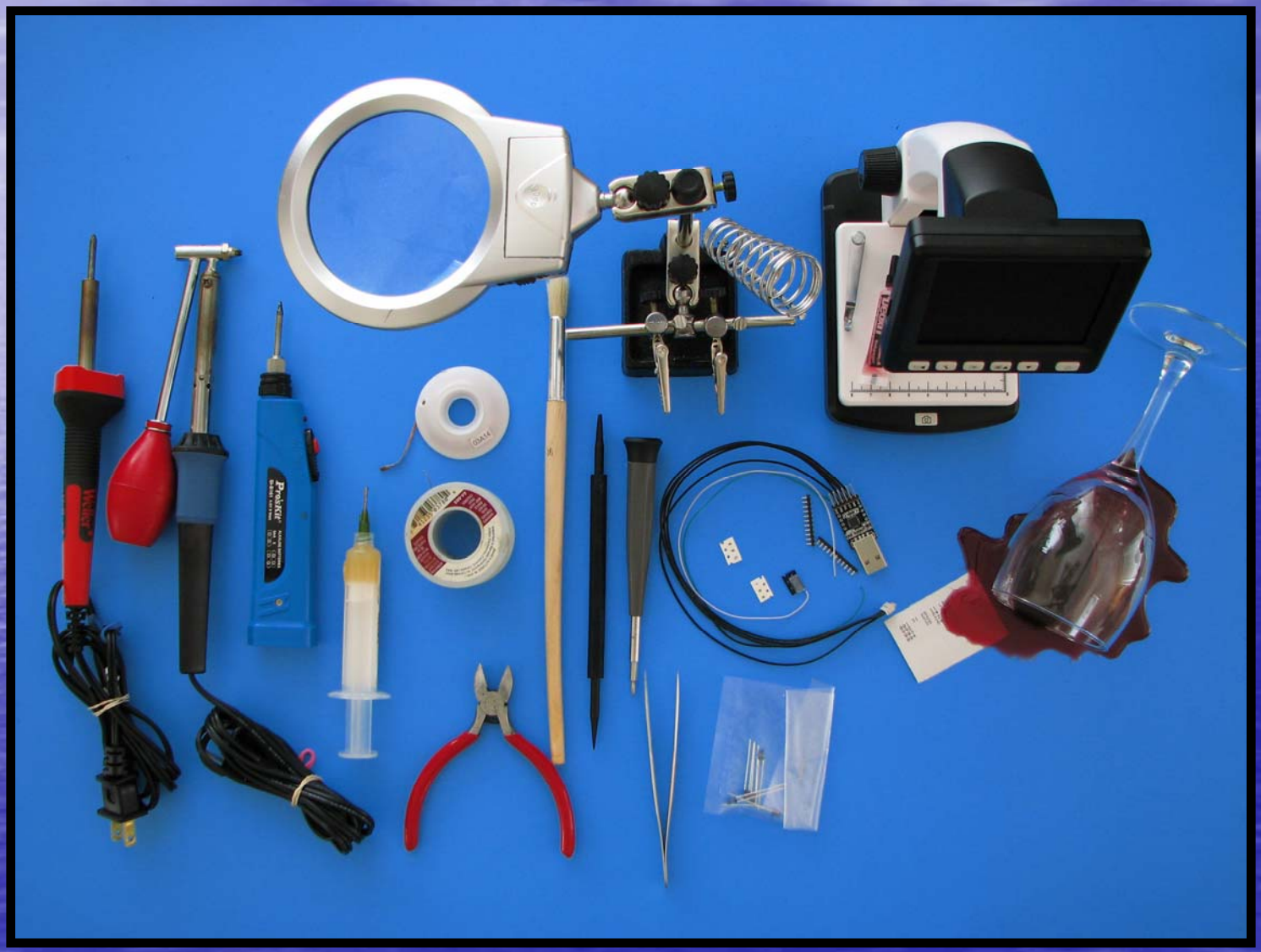


Photo by Bernhard Emese, creator of the ACT replacement chip.

The ACT in its new home

TOOLS USED FOR THIS ADVENTURE



HHC 2015

HP 25E PROGRAM SHEET EXAMPLES

PROGRAM NAME: LOAD WAYPOINTS FOR G/C AND I/LAT PRGM LABEL: Pr0

CONSTANT LIBRARY: CR - CHECK SUM: 3071

Step	Key	Code	Explanation	
01	HR	15 00		USED IN CONJUNCTION WITH Pr.1 AND Pr.2;
	STO 3	23 03	DEC LON TWO	GREAT CIRCLE TRUE TRACK AND INTERMEDIATE
	RDN	22		LATITUDE GIVEN INTERMEDIATE LONGITUDE
	HR	15 00		
05	STO 2	23 02	DEC LAT TWO	LAT 1 ENTER LAT 1
	RDN	22		LON 1 ENTER LON 1
	HR	15 00		LAT 2 ENTER LAT 2
	STO 1	23 01	DEC LON ONE	LON 2 R/S LAT 1
	RDN	22		
10	HR	15 00		EX)
	STO 0	23 00	DEC LAT ONE	YVR: N49W123
				LHR: N53W000
				N49 ENTER N49
15				W123 ENTER W123
				N53 ENTER N53
				W000 R/S N49
20				INPUT SOUTH AS -VE AND EAST AS -VE
				• NORTH +VE SOUTH -VE
				• WEST +VE EAST -VE
25				
30				
35				
40				Degrees | Radians | Grads
				constants library
				0 LAT 1
				1 LON 1
				2 LAT 2
45				3 LON 2
				4
				5
				6
49				7

PROGRAM NAME: GREAT CIRCLE: DISTANCE.TRACK PRGM LABEL: Pr1

CONSTANT LIBRARY: CR - CHECK SUM: 0520

Step	Key	Code	Explanation	
01	FIX 3	14 11 03		USES DATA INPUT FROM Pr.0
	RCL 0	24 00		
	RCL 2	24 02		CALL Pr.0; LOAD WAYPOINTS
	1	01		
05	RECT	14 09		R/S GREAT CIRCLE.TRUE TRACK
	RCL 1	24 01		
	RCL 3	24 03		EX)
	-	41		CALL Pr.0 AND INPUT FOLLOWING DATA
	X<>Y	21		
10	RECT	14 09		• YVR: N49W123
	X<>Y	21		• LHR: N53W000
	ENTER	31		
	RDN	22		CALL Pr.1
	RDN	22		
15	POLAR	15 09		R/S 4031.033
	X<>Y	21		
	RCL 0	24 00		GREAT CIRCLE = 4031
	-	41		TRUE TRACK = 033'
	X<>Y	21		
20	RECT	14 09		
	RDN	22		
	X<>Y	21		
	RDN	22		
	POLAR	15 09		
25	X<>Y	21		
	X<0?	15 41		
	GTO 43	13 43		
	STO 5	23 05		
	RDN	22		
30	X<>Y	21		
	POLAR	15 09		
	X<>Y	21		
	6	06		
	0	00		
35	X	61		
	INT	14 01		
	RCL 5	24 05		
	EEX	33		
	3	03		
40	/	71		Degrees | Radians | Grads
	+	51		constants library
	GTO 00	13 00		0 LAT 1
	3	03		1 LON 1
	6	06		2 LAT 2
45	0	00		3 LON 2
	+	51		4
	GTO 28	13 28		5 TRUE TRACK
				6
49				7

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HP 29E PROGRAM SHEET EXAMPLES

Hewlett Packard 29C

PROGRAM NAME: LOAD WAYPOINTS; GREAT CIRCLE; INT. LAT.

PROGRAM LABEL: 0 CONSTANTS REGISTER: CHECK SUM: 6266

Step	Key	Code	Explanation	Comments
01 *	LBL 0	15 13 00	LOAD DATA	LOAD DATA FOR GREAT CIRCLE AND
	FIX 0	14 11 00		INTERMEDIATE LATITUDE ROUTINES.
	HR	15 72		
	STO 3	23 03	LON 2	LAT 1 ENTER LAT 1
05	RDN	22		LON 1 ENTER LON 1
	HR	15 72		LAT 2 ENTER LAT 2
	STO 2	23 02	LAT 2	LON 2 GSB 0 LAT 1
	RDN	22		
	HR	15 72		ENTER SOUTH AS -VE
10	STO 1	23 01	LON 1	ENTER EAST AS -VE
	RDN	22		USE LOAD DATA FOR BOTH ROUTINES.
	HR	15 72		
	STO 0	23 00	LAT 1	
	RTN	15 12		
15 *	LBL 1	15 13 01	GREAT CIRCLE	EXAMPLE: GREAT CIRCLE TRACK & DIST
	FIX 0	14 11 00		
	RCL 2	24 02		YVR: N49W123
	1	01		LHR: N53W000
	REC	14 44		
20	RCL 1	24 01		49 ENTER 49
	RCL 3	24 03		123 ENTER 123
	-	41		53 ENTER 53
	X<>Y	21		000 GSB 0 49
	REC	14 44		
25	X<>Y	21		GSB 1 33
	ENTER	31		R/S 4031
	RDN	22		
	RDN	22		
	POL	15 44		
30	X<>Y	21		
	RCL 0	24 00		
	-	41		
	X<>Y	21		
	REC	14 44		
35	RDN	22		
	X<>Y	21		
	RDN	22		
	POL	15 44		
	X<>Y	21	TEST FOR -VE	
40	X<0?	15 41	SIGN	
	GSB 9	12 09		
	R/S	74	TRUE TRACK	
	RDN	22		
	X<>Y	21		
45	POL	15 44		
	X<>Y	21		
	6	06	NM	CHANGE THIS CONSTANT FOR SM OR KM.
	0	00		
49	X	61		

Hewlett Packard 29C

Step	Key	Code	Explanation	Comments
50	R/S	74	DISTANCE	
	LBL 9	15 13 09	INVERT HDG	THIS ROUTINE CORRECTS FOR
	3	03		DIRECTION OF TRAVEL.
	6	06		
	0	00		
55	+	51		
	RTN	15 12		
*	LBL 2	15 13 02	INT LAT	EXAMPLE: INTERMEDIATE LATITUDE
	FIX 4	14 11 04		
	HR	15 72	INT LON	YVR: N49W123
60	STO 5	23 05		LHR: N53W000
	RCL 3	24 03		
	-	41		W060 GSB 2 68.5645
	SIN	14 52		
	RCL 2	24 02		
65	COS	14 53		
	X	61		
	RCL 0	24 00		
	SIN	14 52		
	X	61		
70	RCL 5	24 05		
	RCL 1	24 01		
	-	41		
	SIN	14 52		
	RCL 0	24 00		
75	COS	14 53		
	X	61		
	RCL 2	24 02		
	SIN	14 52		
	X	61		
80	-	41		
	RCL 1	24 01		
	RCL 3	24 03		
	-	41		
	SIN	14 52		
85	RCL 2	24 02		
	COS	14 53		
	X	61		
	RCL 0	24 00		
	COS	14 53		
90	X	61		
	/	71		
	TAN -1	15 54		
	HMS	14 72	INTERMEDIATE	
	RTN	15 12	LATITUDE	
95				
98				

SUB	TITLE
0	LOAD WAYPOINTS
1	GREAT CIRCLE TRK & DIS
2	LOAD INT LON; SOLVE INT LAT
3	
4	
5	
6	
7	
8	
9	-VE TRK CORRECTION

DEG	RAD	GRAD
REG	CR:	CR:
0	LAT 1	
1	LON 1	
2	LAT 2	
3	LON 2	
4	INT LON	
5		
6		
7		
8		
9	`	

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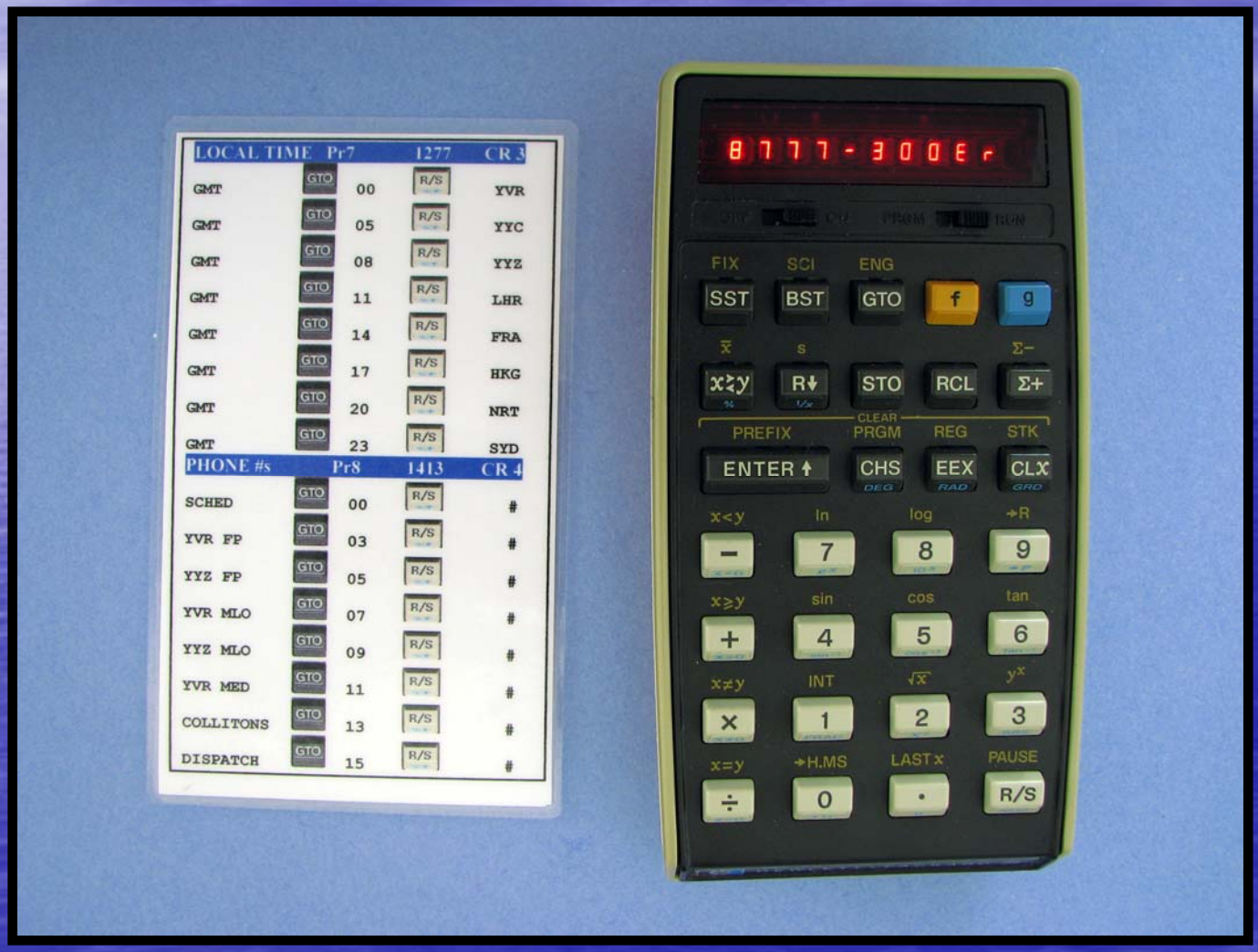
PROGRAM CARD EXAMPLES



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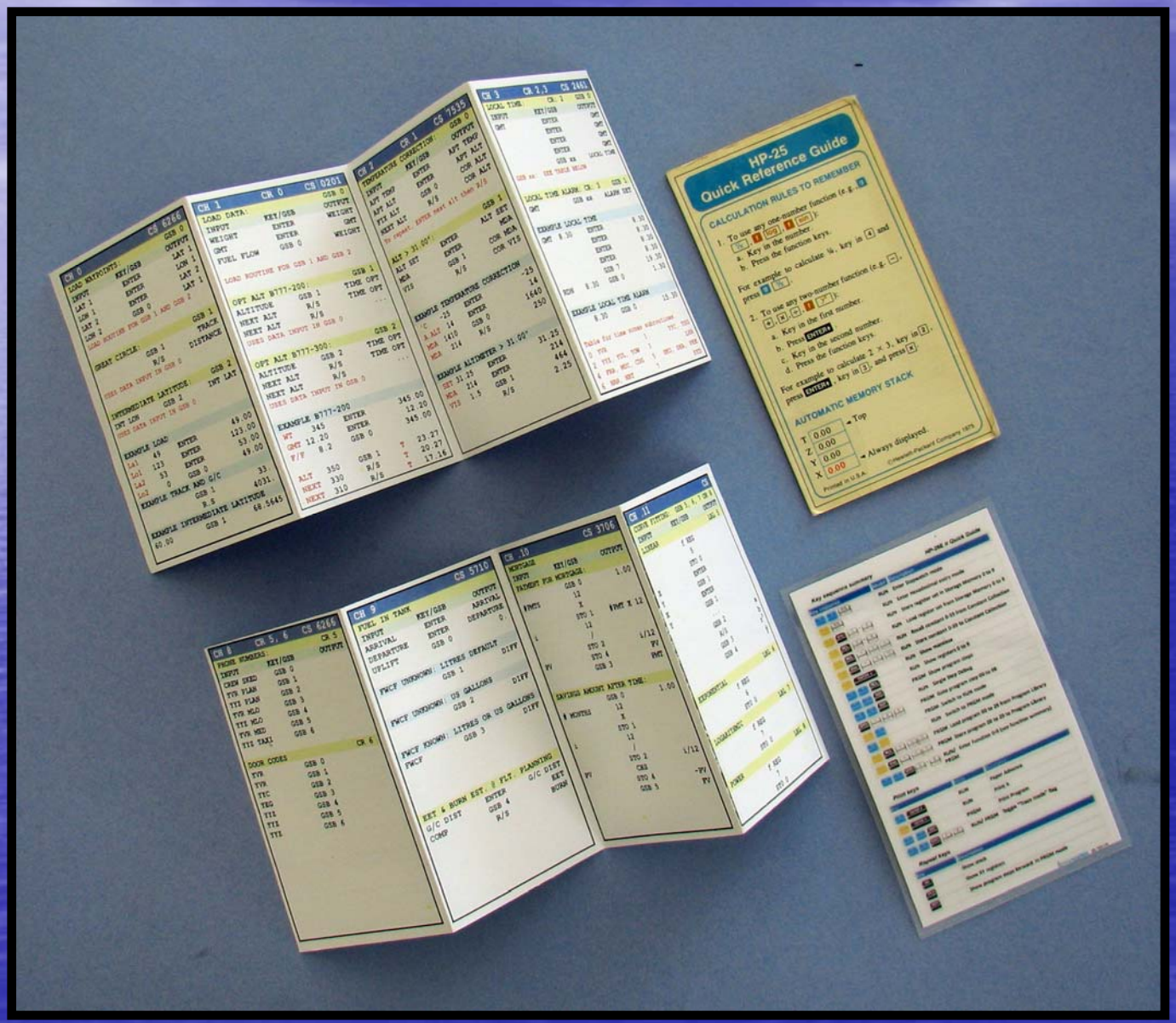
PROGRAM CARD EXAMPLES



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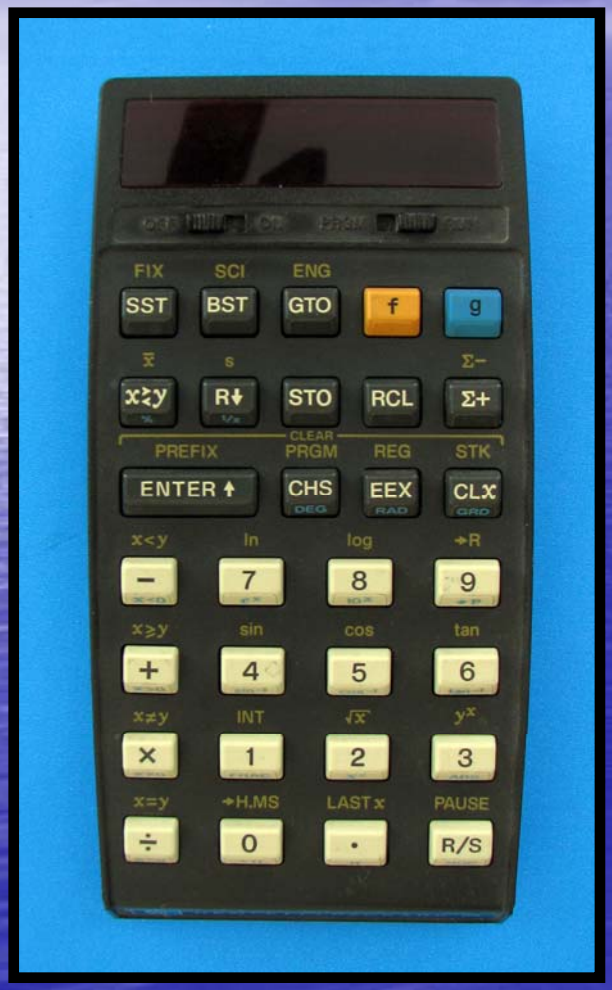
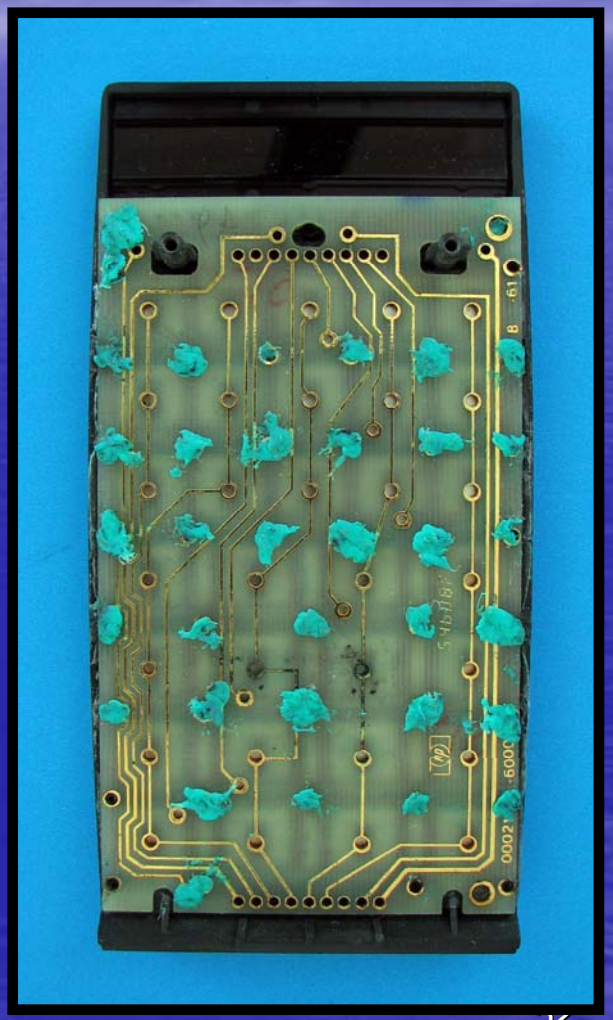
"YOU DON'T ALWAYS GET WHAT YOU WANT"

THR ROLLING STONES



"NON WORKING, IN EXCELENT COSMETIC CONDITION. NO CORROSION ON BATTERY TERMINALS".



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SO GET OUT YOUR OLD MANUALS…

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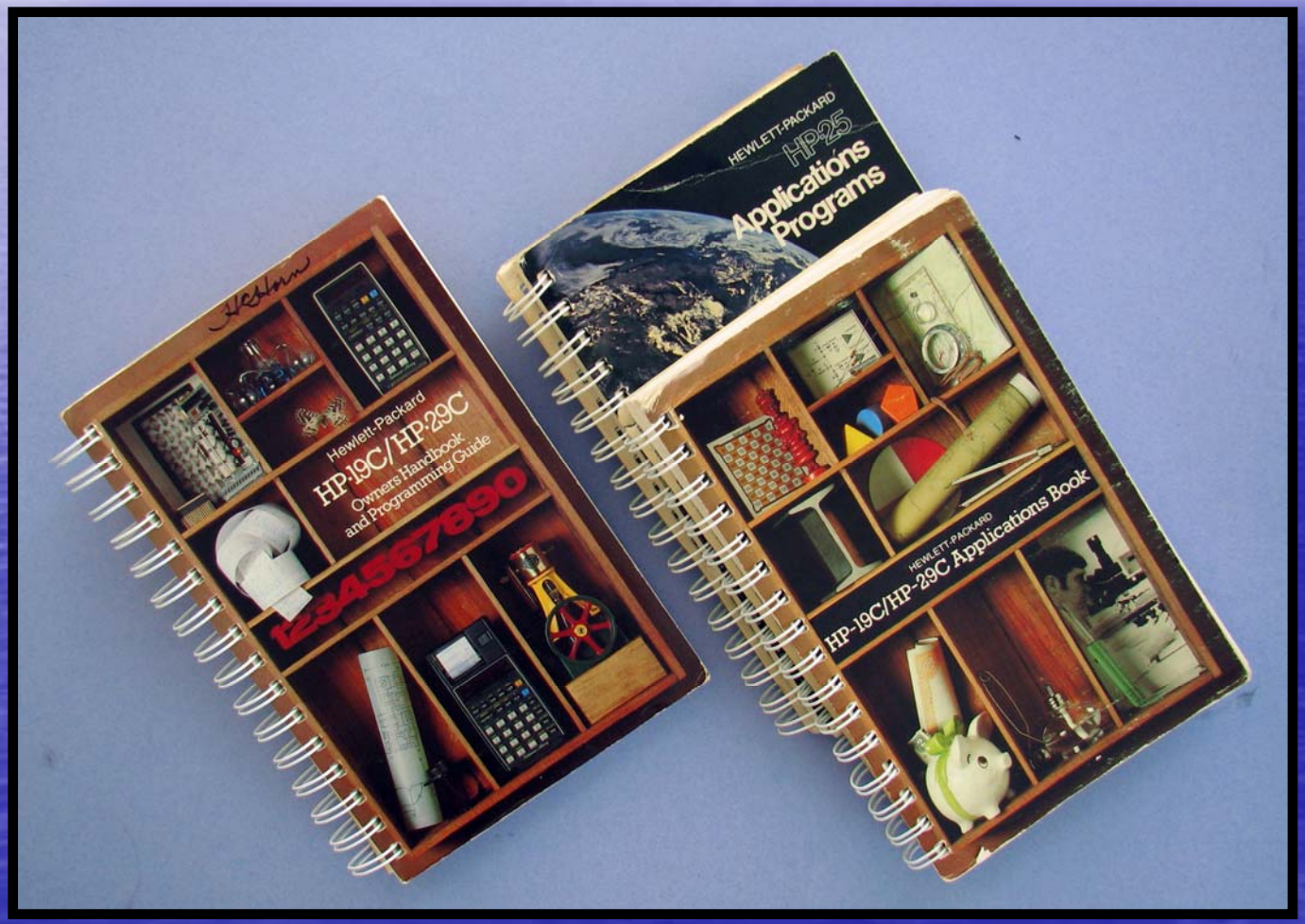
YOUR OLD APPLICATION BOOKS…



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AND YOUR ACCESSORIES BECAUSE YOUR WORK HAS JUST BEGUN!

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CREDITS:

- Bernhard Emese:
  - See attached presentation document “inside the ACT” especially prepared by Bernhard for this power point presentation.
  - All manuals, QRC and technical details can be found at Bernhards’ website:
    - panamatik.de
- Eric Smith:
  - Creater of nonpareil on which the Panamatik ACT is based.
- Jim Johnson
  - RESTORATION of an HP 29C CALCULATOR HHC203
- Wlodek Mier Jedrzejowicz:
  - Information, information and more information…
- HPMuseum members:
  - Information, information and more information…