

EFFICIENT SERVICE

Friden

A FRIDEN PRODUCT

ELECTRONIC CALCULATOR 130

SERVICE LETTER

NO.

1

7-21-64

TO ALL FRIDEN OFFICES

SUBJECT: Plug-in Circuit Card Jacks

REFERENCE: Serial numbers 1040-1090 (approximately)

ACTION: Report to San Leandro immediately any troubles related to plug-in card jacks. Include machine serial number in report.

REASON: Cracked jacks and intermittent contacts may occur in referenced serial numbers. Indications can be: card not seating firmly, intermittent trouble when vibrating or slightly rocking plug-in card, or any intermittent trouble not otherwise identified.

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San Leandro General Service Department

EFFICIENT SERVICE

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ELECTRONIC CALCULATOR 130 SERVICE LETTER

NO.

2A

8-5-64

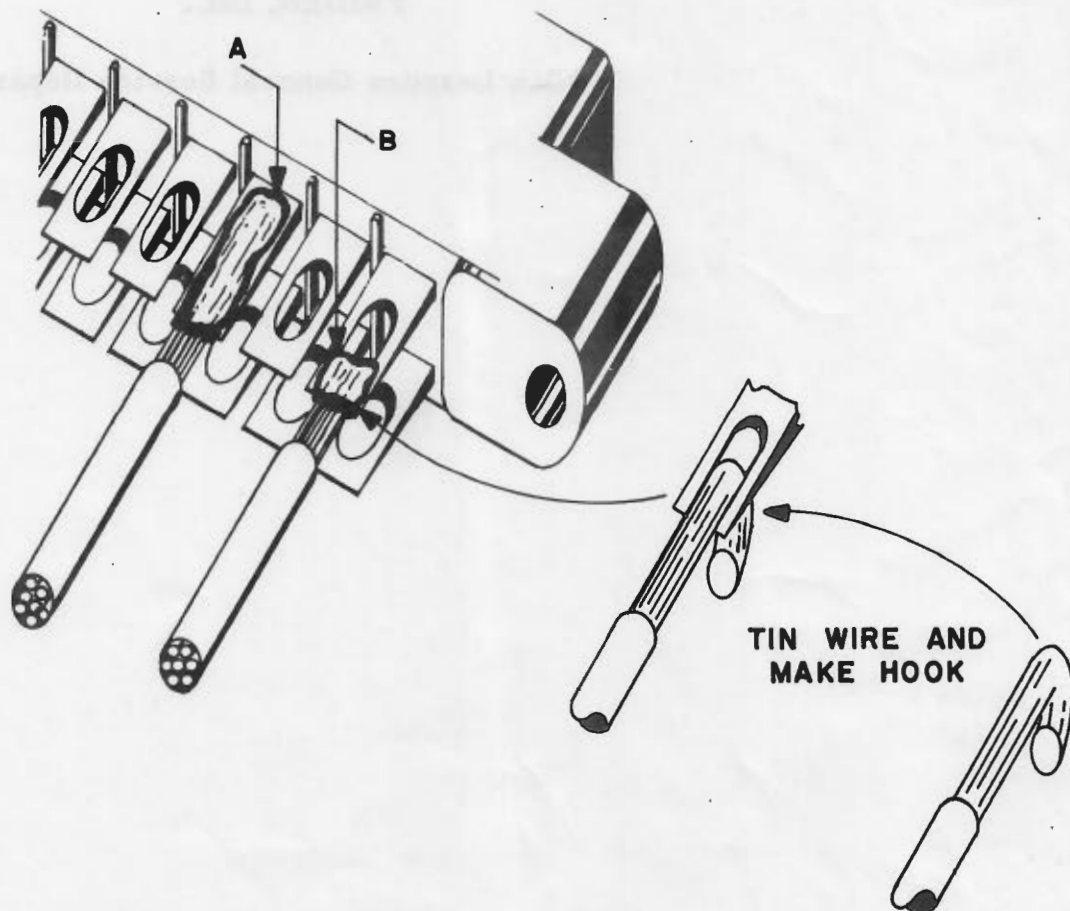
TO ALL EC-130 SERVICE DEPOTS

SUBJECT: Plug-in Circuit Card Jacks (Friden No. 803206)

REFERENCE: EC-130 Service Letter No. 1

NOTE: This letter supersedes Service Letter No. 2.

REASON: Intermittent troubles have been traced to bad plug-in card jacks on some machines in the group serialized 1040-1090 (approximately).



INSTRUCTIONS: Replace jacks if intermittent operation results when pressing on a plug-in card or if servicing indicates trouble in jacks.

Point A illustrates soldering technique that is causing trouble. Point B illustrates method to be used when replacing a plug-in card jack.

When replacing a jack, the new jack should be placed alongside bad jack and leads transferred one by one to corresponding terminals. Otherwise, each lead will have to be tagged since these wires have no number coding.

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ELECTRONIC CALCULATOR 130

SERVICE LETTER

NO.

3

9-3-64

TO ALL EC-130 FIELD SERVICE OFFICES

SUBJECT: Plug-in Circuit Card Retaining Plates (Friden # 801574)

REFERENCE: Production Line Change.

REASON: Present installation of only one card retaining plate is unsatisfactory.

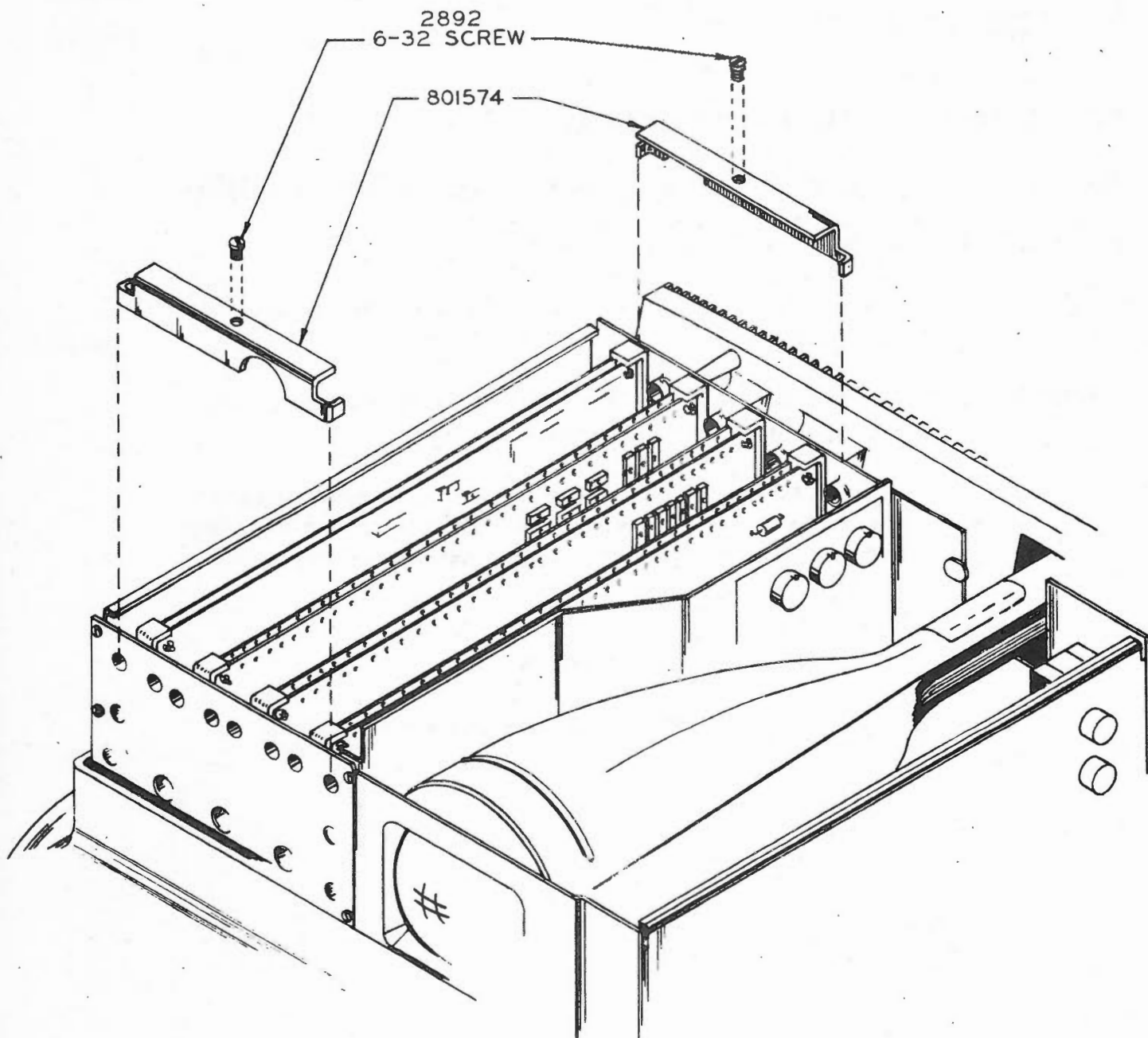
INSTRUCTIONS: Remove present retaining plate and replace with double retaining plates as per sketch.

NOTE: In cases of extreme difference in card heights, it may be necessary to cut a slit(s) in the lip of the plate and form the lip up or down for a particular card, or cards.

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San Leandro General Service Department

(Over)



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ELECTRONIC CALCULATOR 130

SERVICE LETTER

NO.

4

TO ALL EC-130 FIELD SERVICE OFFICES

SUBJECT: Spacers in Plug-in Card Shipping Box.

REFERENCE: Friden #8462.

REASON: Boxes #8462 are 1/2" too long. Plug-in cards can move excessively during shipment.

ACTION: When packing plug-in cards for shipment, make spacers out of cardboard and fit between rubber packing blocks (#8463/64) and the boxes. Ensure that enough spacer material is used so that plug-in cards are held firmly in rubber packing blocks with no end play.

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ELECTRONIC CALCULATOR 130
SERVICE LETTER

NO.
5

9-11-64

TO ALL EC-130 FIELD SERVICE OFFICES

SUBJECT: Simplified Keyboard Tester, Authorization to Build.

REFERENCE: None.

REASON: Experience has shown that a small portable keyboard tester would be advantageous for common service problems relating to keyboards.

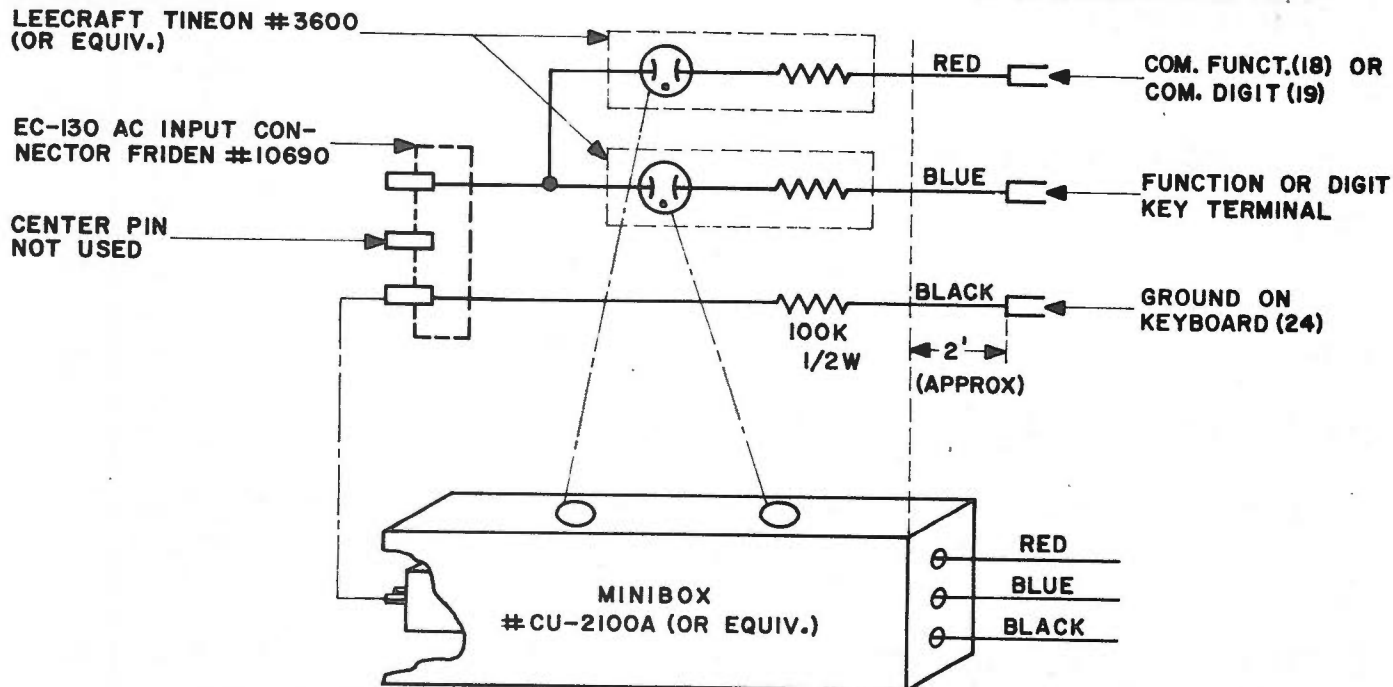
ACTION: All Field Service Offices are authorized to build a small keyboard tester as shown on the schematic and parts list on page 2. Note that AC input plug is same as the EC-130. When using tester, use EC-130 power cord for AC input as keyboard tests and adjustments are made with no power to EC-130 thus enabling EC-130 cord to be available for tester.

To use tester, simply connect to keyboard connections associated with suspected malfunctioning key. Reference drawing EC-130-8-T for keyboard connections. Refer to Keyboard Adjustment Section (3) of EC-130 Field Service Manual for information as to proper keyboard action.

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(Over)



LIST OF PARTS

2	Leecraft Tineon #3600 (or equivalent) (125V neon with 100K built-in resistor)	
1	100K, 1/2W, $\pm 10\%$ resistor	
2 ft.	20 gauge red wire	
2 ft.	20 gauge black wire	Flexible Test Lead type wire is recommended
2 ft.	20 gauge blue wire	
1	AC Input Plug, Friden #10690.	
3	Taper Pin Connectors, Friden #223434	
1	Mini Box #CU-2100A (or equivalent)	
As required	Hook-up wire	

NOTE: Local purchase of items other than Friden.
Friden Numbers order from San Leandro.

EFFICIENT SERVICE

Friden

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ELECTRONIC CALCULATOR 130

SERVICE LETTER

NO.

5A

4-14-65

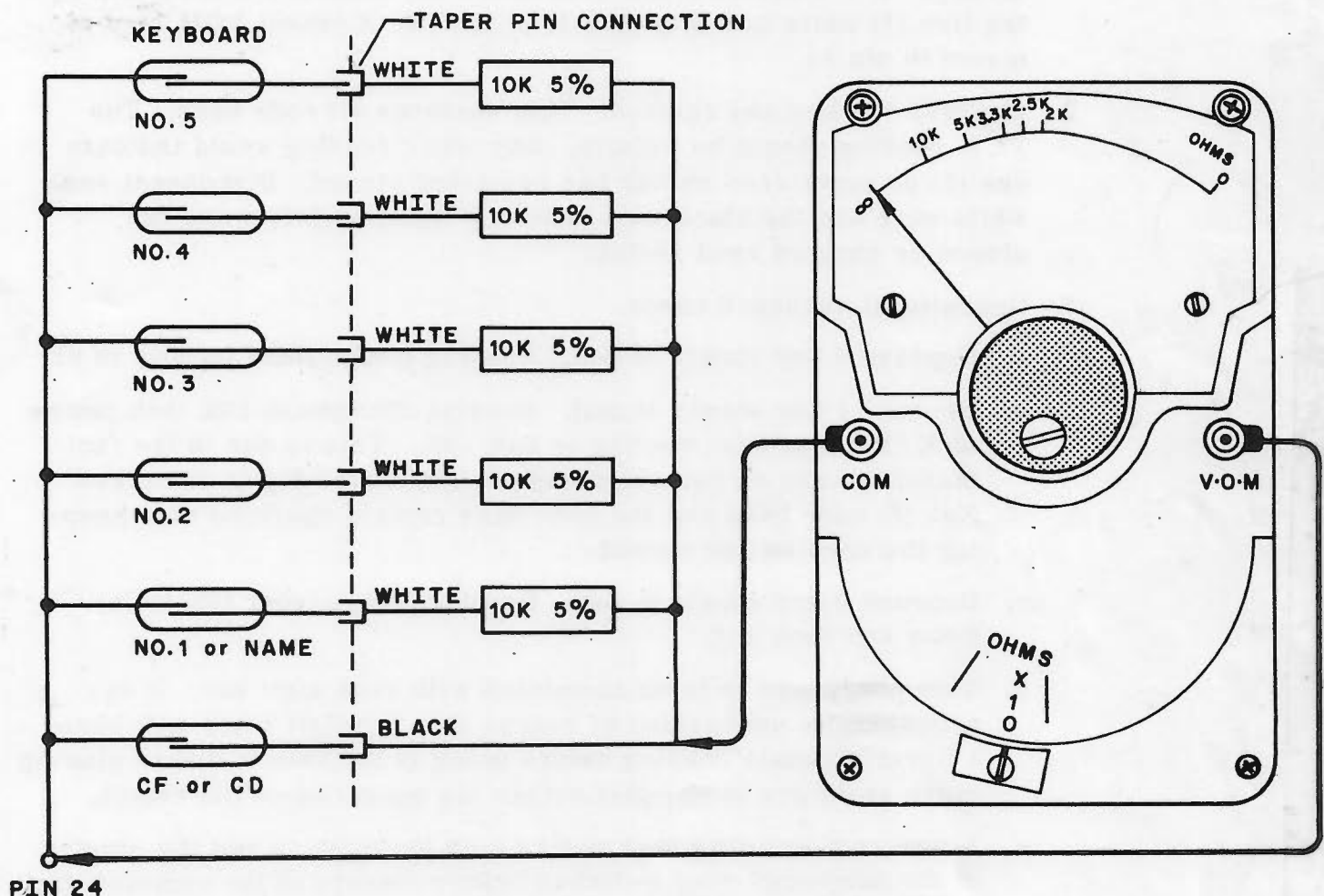
This cancels Service Letter No. 5 & 6. Retain Schematic Drawings for point to point wiring reference.

TO ALL FRIDEN OFFICES

SUBJECT: Simplified Keyboard Tester

REASON: Experience has shown that a simplified keyboard tester capable of testing all digit and function keys using the VOM meter would be advantageous.

INSTRUCTIONS:



TEST PROCEDURES

This inexpensive adapter to the volt ohm meter allows the technician to positively determine the correct sequence of operation for any digit or function key.

The circuit consists of five (5) resistors connected in parallel with a common input to the ohm meter. The CD (Common Digit) or CF (Common Function) output is through a wire with no resistor in series. This allows for easy detection of early closing of the CD switch in relation to the digit code being set or CF early closing in relation to function key switch, such as plus or minus keys.

CHECKING SEQUENCE:

The volt ohm meter is zeroed in on the X10 scale and connected in series with the test circuit.

1. To check common digit in relationship to closure of digits "0" through "9": Connect black wire to the CD switch, pin 19. Connect the five (5) white wires to pins 1, 2, 3, 4, 5. Connect VOM lead of meter to pin 24.
2. Depress "0" key and release. This restores all code bars. The VOM reading should be infinity. Any other reading would indicate one (1) or more reed switch has remained closed. Disconnect each white wire and the black wire, one at a time, to determine the closed or shorted reed switch.
3. Operational sequence check.
 - a. Depress 0 key slowly to pad. Reading jumps from infinity to 0.
 - b. Depress 1 key slowly to pad. Reading changes to 10K then jumps to 0. Release key, reading is now 10K. This is due to the fact that there are no return springs on any of the digits one (1) to five (5) code bars and the code bars remain operated thus keeping the reed switch closed.
 - c. Depress 0 key slowly to pad. Reading jumps from 10K to infinity and then to 0.
 - d. This procedure is to be completed with each digit key. It is necessary to understand of course that the digit 5 key will have a lower ultimate reading before going to 0. This is due to placing more resistors in parallel before the operation of CD switch.
 - e. A program to follow that checks both the opening and the closing of the numbered reed switches before closure of the common digit switch is as follows: Press, check, and release each key as shown.
0 - 1 - 0 - 2 - 0 - 3 - 0 - 4 - 0 - 5 - 0 - 6 - 0 - 7 - 0 - 8 - 0 - 9 - 0.

This test will check that each code bar reed switch is operated prior to the common digit switch. The ohm meter reading must

reach its ultimate value, as listed in the accompanying chart, prior to the closing of common digit and will probably, but not necessarily, reach this value in incremental steps as the individual switches are opened or closed.

Another test would be to press, check, and release each key in the following manner: 5 - 0 - 5 - 1 - 5 - 2 - 5 - 3 - 5 - 4 - 5 - 6 - 5 - 7 - 5 - 8 - 5 - 9 - 0. This will check the ability of the code bar reed switches to open prior to the operation of the common digit reed switch.

- f. Function keys must operate the code bars, for interlocking requirements, and this may be checked by installing the black lead on the CF switch, pin 18. The ultimate value listed in the chart should be reached prior to closure of the CF switch. Operation of the 0 key before the function key will restore the meter to infinity for easier checking.
- g. Operation of the function reed switches, in relation to the Common Function switch, may be checked by removing all white wires from the numbered reed switch and connecting one (1) of these wires to the function reed switch to be checked. This will then show a meter movement from infinity to 10K ohms and then to zero (0) ohms, as the switch is operated, and from zero (0) ohms to 10K ohms to infinity, as the switch is released.

PARTS REQUIRED:

- 5 ea. 223257 - Resistor 10K, 5%
- 7 ea. 223434 - Taper Pin Connectors
- 5 ft. - White Wire (24 gauge hook-up patch wire)
- 1 ft. - Black or Colored Wire (24 gauge hook-up patch wire)

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San Leandro General Service Department

KEYBOARD KEYS									K OHMS BEFORE CF-CD		OUT LINE
0	⊗								∞		
1	⊗		⊗						10.0		
2	⊗		⊗	⊗					5.0		
3	⊗		⊗	⊗	⊗				3.3		
4	⊗		⊗	⊗	⊗	⊗			2.5		
5	⊗		⊗	⊗	⊗	⊗	⊗		2.0		
6	⊗			⊗	⊗	⊗	⊗		2.5		
7	⊗				⊗	⊗	⊗		3.3		
8	⊗					⊗	⊗		5.0		
9	⊗						⊗		10.0		
DECIMAL POINT				⊗					10.0		6
CLEAR ENTRY									∞		8
CLEAR ALL									∞		7
OVERFLOW LOCK									∞		16
ENTER		⊗			⊗		⊗		5.0		
REPEAT		⊗		⊗		⊗			5.0		9
STORE		⊗		⊗			⊗		5.0		14
RECALL		⊗		⊗	⊗				5.0		15
CHANGE SIGN		⊗	⊗				⊗		5.0		17
+		⊗				⊗			10.0		13
-		⊗			⊗	⊗			5.0		12
X		⊗			⊗				10.0		10
÷		⊗	⊗		⊗				5.0		11
COM DIG		COM FUN	1	2	3	4	5				
19		18	1	2	3	4	5				
CODE BAR AND CODE BAR											
OUTPUT LINES											

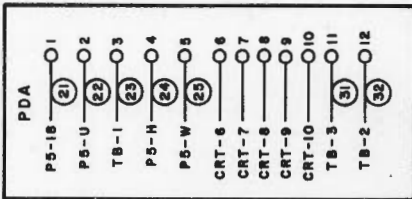
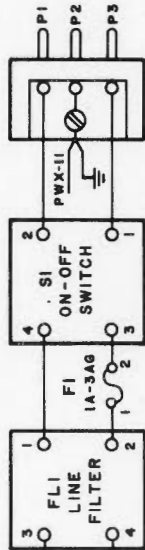
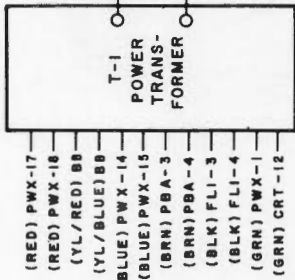
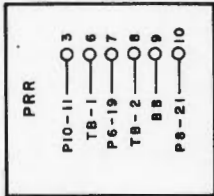
The top diagram shows the control circuitry for the 'J' CARD, including a common function switch (COM. FUNCT.), a common digit switch (COM. DIGIT), a decimal point switch (DEC. PT.), an interlock coil, and a keyboard. It features two 2N1805 transistors, a 31446 diode, and various resistors and capacitors connected to a -80V supply and other voltage sources like +6V and -12V.

The middle diagram shows the digit control circuitry, including a multi-switch (MULT.), digit switches (DIGITS 1-5, 2-6, 3-7, 4-8, 5-9), and a flow lock switch (O'FLOW LOCK). It includes a 150Ω resistor and various resistors and capacitors connected to a -80V supply.

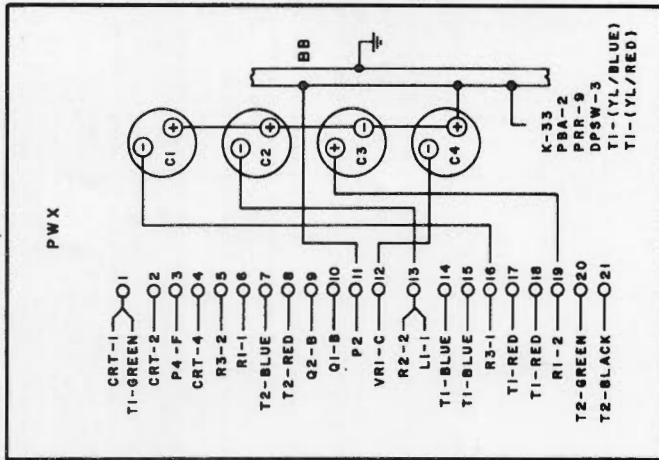
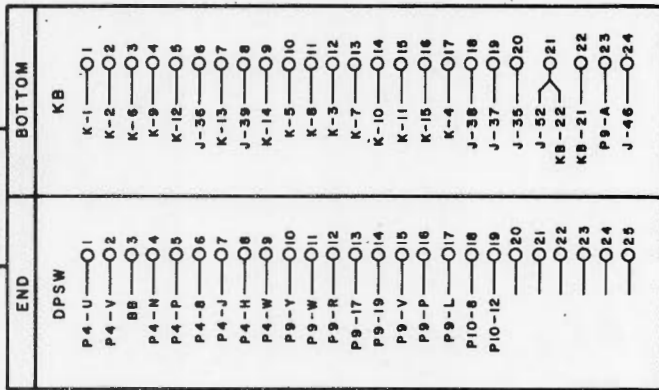
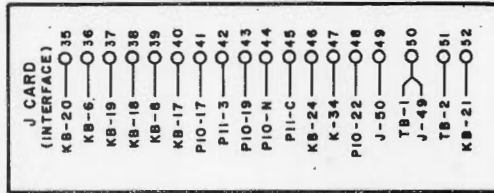
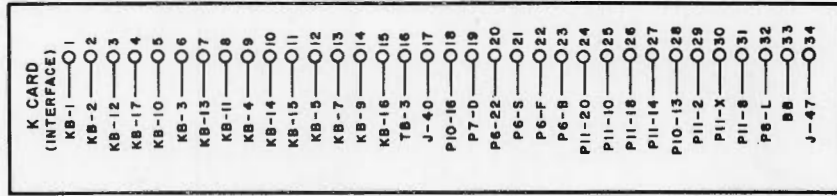
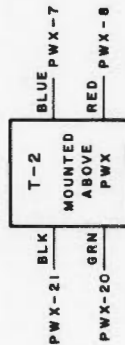
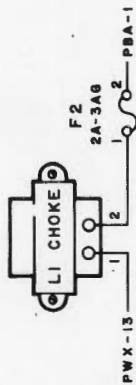
The bottom diagram shows the function control circuitry, including a clear all switch (CLEAR ALL), a subtract switch (SUB.), an add switch (ADD), a store switch (STORE), a sign switch (CH. SIGN), a repeat switch (REPEAT), a recall switch (RECALL), and a divide switch (DIV.). It includes a 150Ω resistor and various resistors and capacitors connected to a -80V supply.

NOTES:

SERVICE DEPARTMENT, FRIDEN, INC. CALIFORNIA, U.S.A.			
DRAWN BY TSH	CHECKED BY HCY	DATE 7-23-64	
REVISION			
DRAWING NO.		EC-130-8-T	



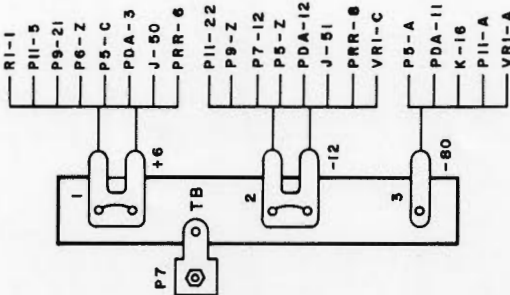
NOTE:
INDICATES CABLE
NUMBER CODING
AT THIS POINT



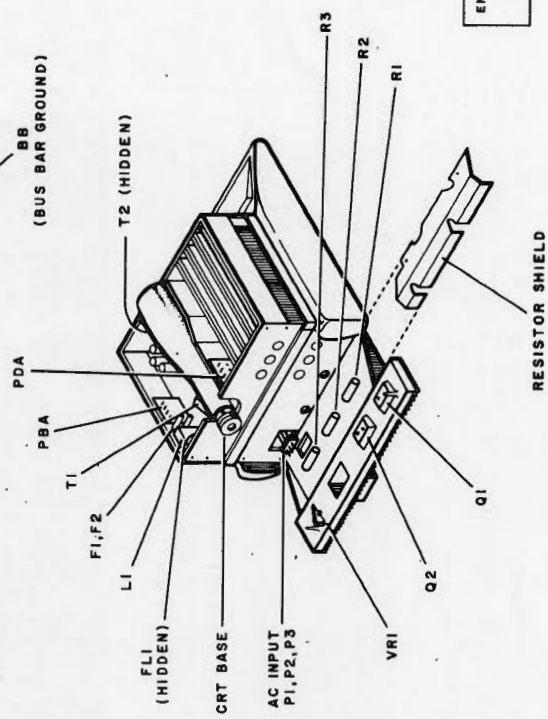
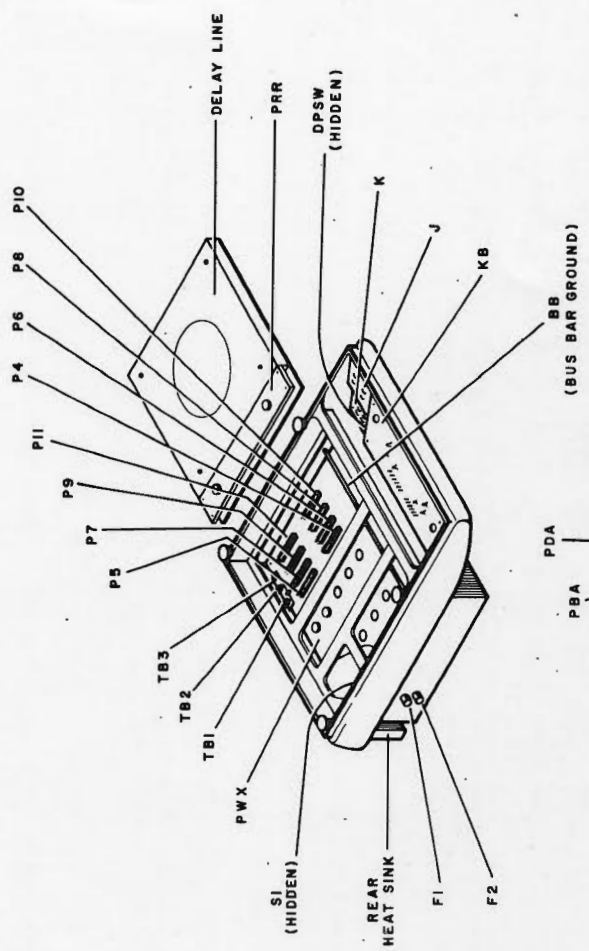
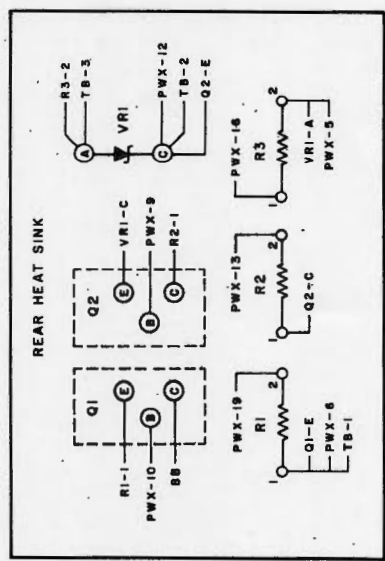
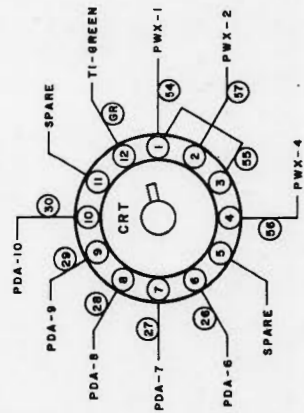
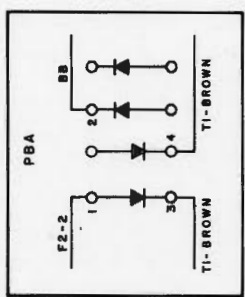
D-130-72W

EC-130 WIRING DIAGRAM (SHEET 1 OF 3)

ENG. REF.
NO. 803502
NO. 803503

[illegible]

ENG. REF.
NO. 803502
NO. 803503



ENG. REF.
NO. 803502
NO. 803503

EC-130 WIRING DIAGRAM (SHEET 3 OF 3)

EFFICIENT SERVICE



A FRIDEN PRODUCT

ELECTRONIC CALCULATOR 130

SERVICE LETTER

NO.
6

9-25-64

TO ALL EC-130 FIELD SERVICE OFFICES

SUBJECT: How To Use Simplified Keyboard Tester.

REFERENCE: Service Letter #5.

ACTION: Service Letter #5 authorized a simplified keyboard tester. The following are basic instructions on use of the simplified tester.

- a. Isolate malfunction to a specific key on keyboard.
- b. Remove EC-130 bottom cover plate.
- c. Refer to Friden drawing #130-8-T which was furnished with Service Letter #5.
- d. Determine from drawing the keyboard terminal associated with that key.
- e. Remove taper pin connection from that terminal and replace with "key" lead from keyboard tester.
- f. For a digit key, remove taper pin from terminal #19 and replace with "CF/CD" lead from tester. For a function key, use terminal #18.
- g. Remove taper pin connection from terminal #24 and replace with "ground" lead from tester.
- h. Connect tester to AC with EC-130 power cord.
- i. Refer to Section 3 of the EC-130 Field Service Manual for information as to operational sequence of the key involved.
- j. Upon completion of test, replace all keyboard taper pin connections, carefully observing wire number to taper pin coding.
- k. Replace EC-130 bottom cover plate.
- l. Re-connect EC-130 power cord.

NOTE: In all cases of digit key or function key testing, the basic requirement is that the "key light" comes on before the "CF/CD" light with depression of the key. Also that the "CF/CD" light goes off before the "key" light with release of the key.

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ELECTRONIC CALCULATOR 130

SERVICE LETTER

NO.

7

11-20-64

TO ALL FRIDEN OFFICES

SUBJECT: Resistor Change.

MODIFY: All EC-130 Calculators below approximate serial #1560,
at time D card is serviced.

REASON: The change is being done because excess lead length both on the card and the back wiring, in addition to narrow width printed circuit wires, results in excess inductance. This inductance causes HOME pulse to over-shoot by 1V to 2V at gate 1308 on the 'E' card.

This problem shows up in the multiplication of 2 nines by 2 nines in the 13th decimal place. $.99 \times .99 = 9801$ The answer in error is .8901. The error occurs in the first 9 additions when the digit 9 in the sum 891 is in the most significant position of R1 and is shifted left to the least significant position of R2.

The over-shoot from the 1308 gate resets the D5 flip-flop and a zero is placed into the LSD of R2 instead of a 9. Then the second 9 additions, added to the digit 1 that was left in R1, result in the answer 8901.

REFERENCE: Page .016.00AB Construction File Element AA 0109.005.0.
Absolute co-ordinate location D078-090. Visual co-ordinate approximately D0926R. 6.8K resistor changed to 2.2K.

INSTRUCTIONS: Since the above starting serial number is approximate, when the D card is serviced, check to see whether a 6.8K resistor is present at D0926R. If it is, change to a 2.2K, 1/2W, 5% resistor, Friden #223253.

PARTS REQUIRED:

(1) 223253 Resistor - 2.2K, 1/2 W, 5%.

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ELECTRONIC CALCULATOR 130

SERVICE LETTER

NO.

8

3-12-65

TO ALL FRIDEN OFFICES

SUBJECT: Grounding of Power Transformer 804002.

MODIFY: All EC-130 Calculators below approximate serial number 1800.

REASON: Should the case of the power transformer not be properly grounded the minute leakage from the windings to the case may cause a charge to build up on the case. When the charge builds high enough, it jumps from the transformer to the calculator frame (through the paint on the transformer case). This discharge causes a voltage spike on all power supplies and may cause the data to change at random, or a flash on the CRT. The repetition rate may be from several minutes to seconds.

INSTRUCTIONS: Remove the screw, lockwasher and flatwasher diagonally opposite power switch; discard flatwasher and lockwasher. (Note: This screw, screws into the frame.) Scrape paint from transformer under washer. Replace screw and use Star Lockwasher, Part #4688. Be sure lockwasher makes good contact to transformer.

PARTS REQUIRED:

1 - 4688 Star Lockwasher.

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ELECTRONIC CALCULATOR 130

SERVICE LETTER

NO.

8A

3-12-65

Revised Date

4-8-65

This Letter supersedes EC-130 SL #8

DESTROY EC-130 SL #8

TO ALL FRIDEN OFFICES

SUBJECT: Grounding of Power Transformer 804002.

MODIFY: All EC-130 Calculators below approximate serial number 1800.

REASON: Should the case of the power transformer not be properly grounded the minute leakage from the windings to the case may cause a charge to build up on the case. When the charge builds high enough, it jumps from the transformer to the calculator frame (through the paint on the transformer case). This discharge causes a voltage spike on all power supplies and may cause the data to change at random, or a flash on the CRT. The repetition rate may be from several minutes to seconds.

INSTRUCTIONS: Remove the screw, lockwasher and flatwasher diagonally opposite power switch; discard flatwasher and lockwasher. (Note: This screw, screws into the frame.) Scrape paint from transformer under washer. Replace screw and use Star Lockwasher, Part #4559. Be sure lockwasher makes good contact to transformer.

PARTS REQUIRED:

→ 1 - 4559 Star Lockwasher.

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gill
ELECTRONIC CALCULATOR 130**SERVICE LETTER**

NO.

9

4-1-65

TO ALL FRIDEN OFFICES

SUBJECT: Decimal Switch, Position 0-2-5-9-13.

MODIFY: Any EC-130 as required for customer application.

REASON: Due to customer's application, a "9" position decimal setting may be required.

INSTRUCTIONS:

1. Remove keyboard.
2. Remove printed circuit board.
3. Loosen the two (2) allen head screws and remove the gear from the decimal switch shaft.
4. Remove screws holding pin plug assembly.
5. Remove nut holding switch assembly and remove switch assembly.
6. Install new switch assembly, reversing procedure of Steps 3, 4, 5. The decimal switch should be in position "0" or "13" when reassembling.
7. Replace decimal switch indicator with new indicator.
8. Install printed circuit board.
9. Install keyboard and reconnect wiring. Check the position of the decimal switch indicator before final tightening up.

PARTS REQUIRED: 1 - 803560 Decimal Switch Assembly - Positions 0-2-5-9-13.
1 - 802582 Decimal Switch Indicator - Positions 0-2-5-9-13.

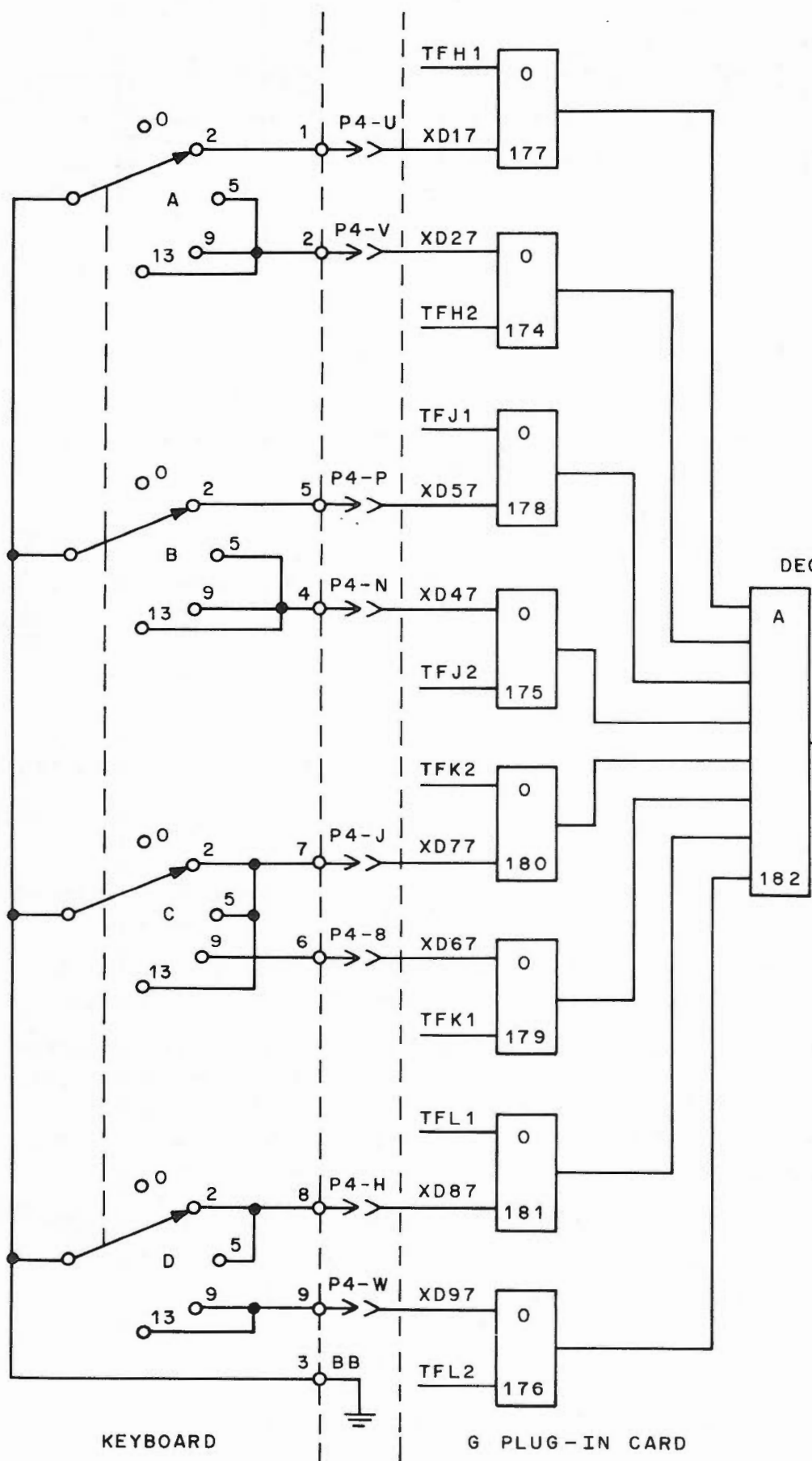
CHARGES: This special switch is to be installed in branch or agency office for a charge of \$45.00, plus pick-up and delivery charges. This is a Service Department item and is to be billed as normal Service Department billing. No credit will be given for the old decimal switch or indicator.

NOTE: This is the only special decimal position which is authorized.

REFERENCE: Sales Department Calculator Release #0024, dated 11/20/64.

FRIDEN, INC.

San Leandro General Service Department



TRUTH TABLE

DPS POS.	H	J	K	L	
	0	0	0	0	C0
	1	0	0	0	C1
0	0	1	0	0	C2
	1	1	0	0	C3
2	0	0	1	0	C4
	1	0	1	0	C5
	0	1	1	0	C6
5	1	1	1	0	C7
	0	0	0	1	C8
(7)	1	0	0	1	C9
	0	1	0	1	C10
9	1	1	0	1	C11
	0	0	1	1	C12
	1	0	1	1	C13
	0	1	1	1	C14
13	1	1	1	1	C15

DECIMAL POSITION COUNTER

KEYBOARD

G PLUG-IN CARD

EFFICIENT SERVICE

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A FRIDEN PRODUCT

ELECTRONIC CALCULATOR 130**SERVICE LETTER**

NO.

10

4-28-65

TO ALL FRIDEN OFFICES

SUBJECT: Vertical Register Spacing.

MODIFY: Any EC-130 Calculator when necessary.

REASON: To allow sufficient tolerance for proper adjustment of the display. In the present circuit it is sometimes impossible, even with the Vertical Character Spacing (VCS) potentiometer set to maximum, to adjust the display to the proper height of 1" while maintaining the proper character height.

INSTRUCTIONS:

1. Replace the 9.31K ohm resistor at co-ordinates G0818R with a 4.64K ohm resistor.
2. Replace the 4.64K ohm resistor at co-ordinates G0518R with a 2.32K ohm resistor.
3. Insert appropriate notes in the MDD construction file for element 3012 at lines 3012.005.0 and 3012.008.0.

PARTS REQUIRED:

- 1 - 804024 Resistor, 2.32K ohm, 1%, 1/2W.
- 1 - 804026 Resistor, 4.64K ohm, 1%, 1/2W.

REFERENCE: MCA 281

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A FRIDEN PRODUCT

ELECTRONIC CALCULATOR 130

SERVICE LETTER

NO.
10A

7-16-65

NOTE: This Service Letter Supercedes Service Letter #10.

TO ALL FRIDEN OFFICES

SUBJECT: Vertical Register Spacing.

MODIFY: All EC-130 Calculators previously modified per Service Letter 10 when the G-H card is serviced, and any other EC-130 Calculator as required.

REASON: To allow sufficient tolerance for proper adjustment of the display to the proper height of 1" while maintaining the proper character height. This modification provides better adjustment characteristics than the modification of Service Letter 10 which introduced too much character slant on some machines.

INSTRUCTIONS:

1. If there is a 4.64K ohm resistor at co-ordinate G0818R, replace this with a 9.31K ohm resistor.
2. If there is a 2.32K ohm resistor at co-ordinate G0518R, replace this with a 4.64K ohm resistor.
3. Replace the 1K ohm vertical character spacing potentiometer with a 2K ohm potentiometer at co-ordinates G0702R*.
4. Insert appropriate notes in the MDD construction file for element 3012 at lines 3012.005.0, 3012.008.0, and 3012.013.0.

PARTS REQUIRED:

- 1 - 804026 Resistor, 4.64K ohm 1%, 1/2W.
- 1 - 804028 Resistor, 9.31K ohm 1%, 1/2W.
- 1 - 804213 Potentiometer, 2K ohm 20% 1/4W.

REFERENCE: CA-601-3C

FRIDEN, INC.

San Leandro General Service Department

EFFICIENT SERVICE

Friden

A FRIDEN PRODUCT

ELECTRONIC CALCULATOR 130
SERVICE LETTER

NO.

11

5-5-65

Page 1 of 3

TO ALL FRIDEN OFFICES

SUBJECT: Keyboard Wiring Harness Color Code.

REFERENCE: Production Line Change.

REASON: Effective with serial number EC130-4000, the Production Department changed wire designations from numbered wire markers on each wire to individual color coded wires.

INSTRUCTIONS:

Retain the attached list for use while servicing the keyboard area. Colors are duplicated within some cables but due to the cable harness spacing, incorrect connections should not be possible.

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KEYBOARD WIRING HARNESS COLOR CODE

J CARD

PIN NO.	COLOR	PIN NO.	COLOR
35	White - Black - Blue	44	White - Red - Red
36	White - Black - Violet	45	White - Red - Orange
37	White - Red - Brown	46	Red (Unnumbered)
38	White - Red - Red	47	Red (Unnumbered)
39	White - Red - Orange	48	White
40	Green (Unnumbered, connected to K card #17)	49	(Blank)
41	White - Black - Blue	50	Green (Numbered)
42	White - Black - Violet	51	Green (Numbered)
43	White - Red - Brown	52	Green (Unnumbered)

K CARD

PIN NO.	COLOR	PIN NO.	COLOR
1	White	18	White
2	White - Black	19	White - Black
3	White - Brown	20	White - Brown
4	White - Red	21	White - Red
5	White - Orange	22	White - Orange
6	White - Yellow	23	White - Yellow
7	White - Green	24	White - Green
8	White - Blue	25	White - Blue
9	White - Violet	26	White - Violet
10	White - Gray	27	White - Gray
11	White - Black - Black	28	White - Black - Black
12	White - Black - Brown	29	White - Black - Brown
13	White - Black - Red	30	White - Black - Red
14	White - Black - Orange	31	White - Black - Orange
15	White - Black - Green	32	White - Black - Green
16	Green (Numbered)	33	Red (Unnumbered)
17	Green (Unnumbered)	34	Red (Unnumbered)

KEYBOARD WIRING HARNESS COLOR CODE

KB CARD

PIN NO.	COLOR	PIN NO.	COLOR
1	White	13	White - Green
2	White - Black	14	White - Gray
3	White - Yellow	15	White - Black - Black
4	White - Violet	16	White - Black - Green
5	White - Black - Brown	17	White - Red
6	White - Black - Violet	18	White - Red - Red
7	White - Black - Red	19	White - Red - Brown
8	White - Red - Orange	20	White - Black - Blue
9	White - Black - Orange	21	Green
10	White - Orange	22	Green
11	White - Blue	23	White
12	White - Brown	24	Red

DECIMAL POINT SWITCH PLUG

PIN NO.	COLOR	PIN NO.	COLOR
1	White	11	White - Gray
2	White - Black	12	White - Black - Black
3	Red	13	White - Black - Brown
4	White - Brown	14	White - Black - Red
5	White - Red	15	White - Black - Orange
6	White - Orange	16	White - Black - Green
7	White - Yellow	17	White - Black - Blue
8	White - Green	18	White - Black - Violet
9	White - Blue	19	White - Red - Brown
10	White - Violet		

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ELECTRONIC CALCULATOR 130

SERVICE LETTER

NO.

12

5-20-65

TO ALL FRIDEN OFFICES

SUBJECT: EC-130 Logic Card Carrying Case.

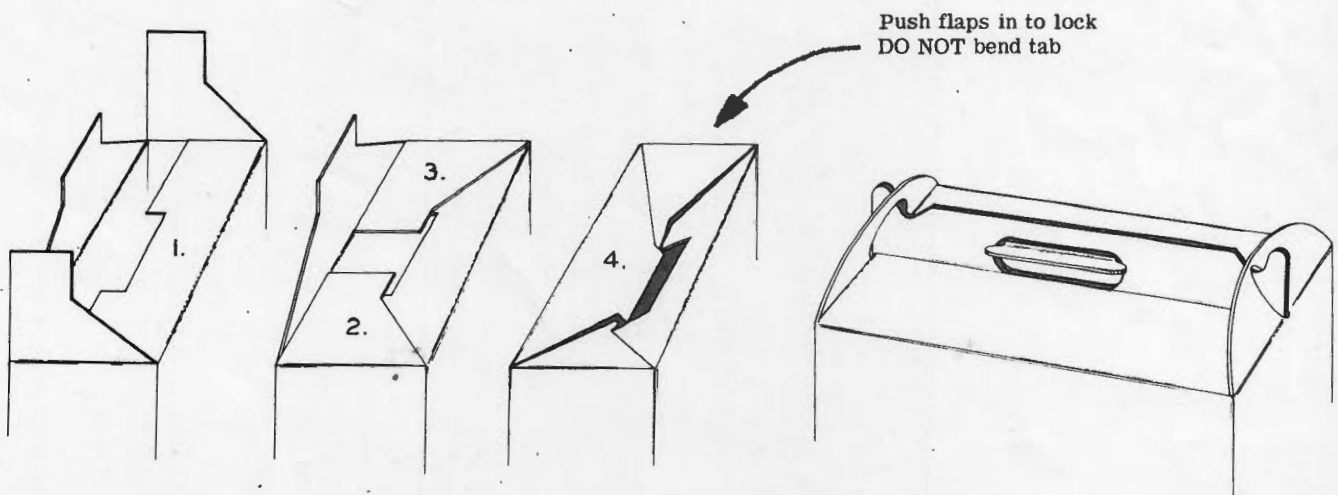
REASON: Experience has shown that a simple inexpensive carton would be advisable to hand-carry EC-130 logic cards to the customer's office.

INSTRUCTIONS:

EC-130 logic card carrying cartons will be shipped knocked down. Each package will contain four (4) outer cartons, two (2) plastic liners, and two (2) pads. The price of the outer carton is such that it can be thrown away when it becomes damaged. Retain the inside liner for use with extra outer carton.

DO NOT USE THIS CARTON TO SHIP CARDS!

The cartons are assembled as shown below.



PARTS REQUIRED:

800200 - Package of carrying cases. Contains: 4 cartons, 2 plastic liners, and 2 pads.

FRIDEN, INC.

San Leandro General Service Department

EFFICIENT SERVICE

Page 1 of 2

Friden

A FRIDEN PRODUCT

ELECTRONIC CALCULATOR 130**SERVICE LETTER**

NO.

13

7-1-65

TO ALL FRIDEN OFFICES

SUBJECT: EC-130 High Voltage Troubleshooting.

REASON: Service records indicate that excessive difficulty is being experienced when problems occur in the high voltage section.

INSTRUCTIONS:

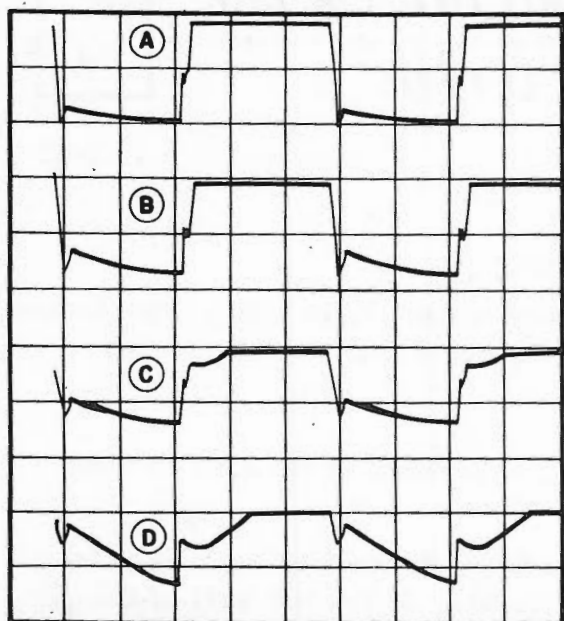
Troubleshooting procedure will vary, according to the malfunction encountered.

A "dim display" complaint should be first checked by reducing the intensity until the display is barely visible. If the left half of the display is dimmer than the right, the DC restore diode is probably leaky. If the beginning of each segment is brighter than the last half or if there is a dot at the beginning of each segment with the last half of the segment dimmer, then the DC restore diode is open. In either case, replace the DC restore diode regardless of any resistance measurement you may make across the diode.

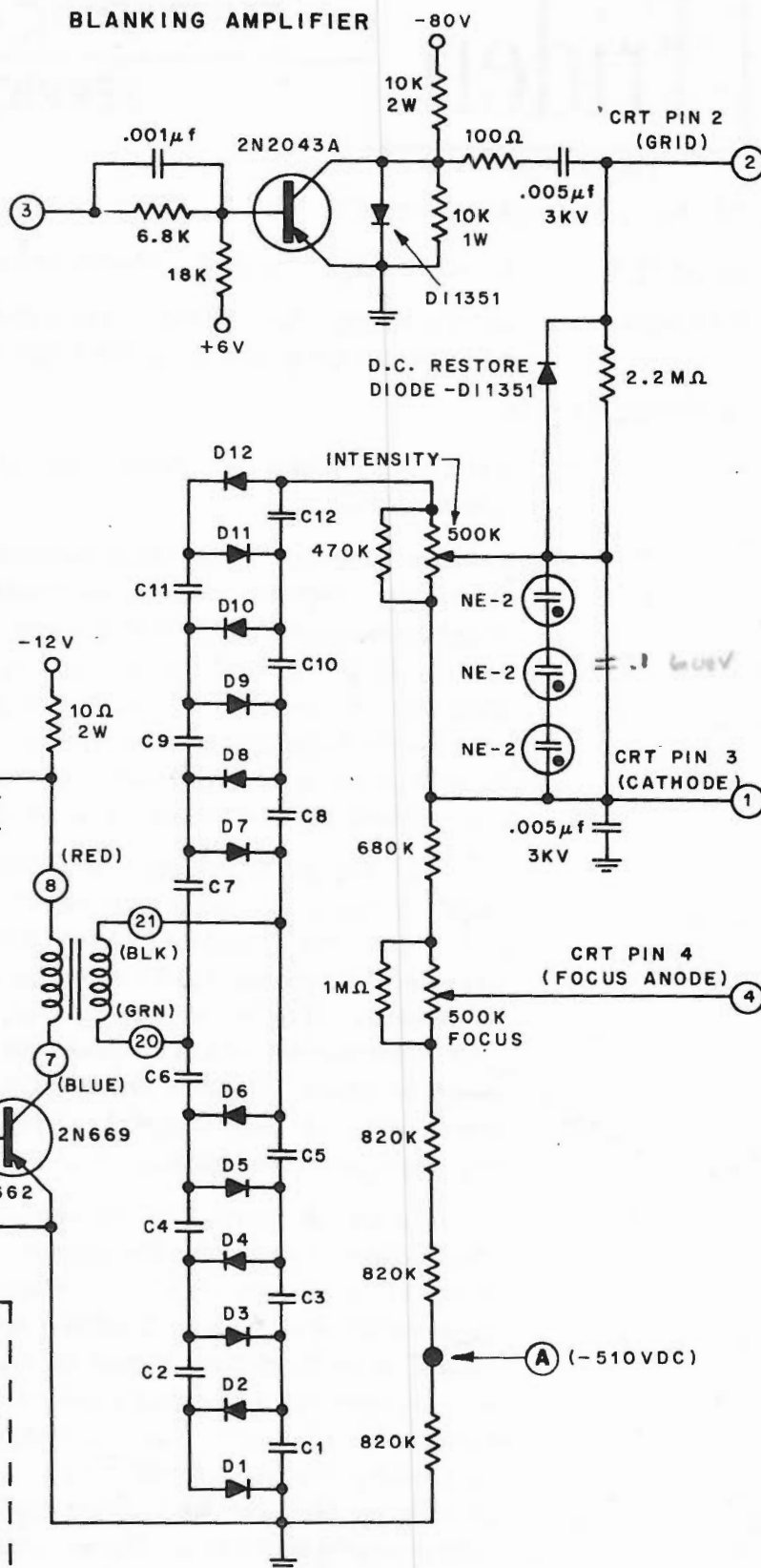
Another frequent reason for insufficient brightness is insufficient high voltage. This may be checked by measuring the DC voltage at point A of the attached schematic. A reading of -510V should be secured providing resistors are at or close to zero (0) percent tolerance. If this voltage is low, check the output of the a-stable. The A stable waveform should be a 2KC (500us) symmetrical waveform of about 10 volts amplitude. A defective a-stable output, not oscillating or unsymmetrical oscillation, is one of the most common reasons for overheating of the 10 ohm 2W resistor.

If the a-stable output is correct, check the output of the driver transistor at pin 7 on the power supply board. Waveform A is the correct output for this connection. Although any malfunction of the high voltage supply will cause distortion of this waveform, the most common defects are shown in waveforms B, C and D. Waveform B was caused by a leaking even-numbered diode, waveform C was caused by a leaking odd-numbered diode, and waveform D was caused by a shorted odd or even-numbered diode. The defective diode should be isolated by taking resistance measurements of the components involved. When looking at DC voltages over 600V, always connect a .005 mfd 3KV capacitor (#804098) in series with the oscilloscope probe to protect the probe and oscilloscope circuitry.

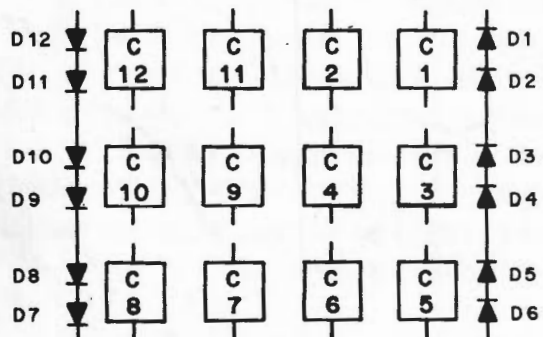
(Over)



BLANKING AMPLIFIER



COMPONENT LAYOUT



(FRONT OF MACHINE)

EFFICIENT SERVICE

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**ELECTRONIC CALCULATOR 130
SERVICE LETTER**NO.
14

7-16-65

TO ALL FRIDEN OFFICES

SUBJECT: Soldering of Friden Etched Circuit Boards.

REASON: Experience has shown that an explanation of soldering technique is advisable.

INSTRUCTIONS:

Soldering is an alloying process between two metals. In its molten state, solder chemically dissolves some of the metal with which it comes into contact. However, the metals to be soldered, are, more often than not, covered with a thin film of oxide that the solder cannot dissolve. A flux must be used to remove this oxide film from the area to be soldered. The solder used in most electronic work contains this flux as a center core which has a lower melting point than solder itself. The flux in its molten state cleans the metal and holds the oxides suspended in solution. The molten solder can then make contact with the cleaned metal and the solvent action of solder on metal can take place.

The soldering process then is the following:

1. The cored flux melts first and removes the oxide film on the metal to be soldered.
2. The solder melts, floating the lighter flux and the impurities suspended in it to the surface.
3. The solder dissolves some of the metal in the connection.
4. The solder cools and fuses with the metal.

To do a proper soldering job the following must be done:

1. The connection itself must become hot enough for the rosin to melt and clean the metal.
2. The cored solder must be applied directly to the heated connection so that the flux, which melts at a lower temperature than the solder, will melt first and clean the connection by the time the solder has melted. (If the solder is applied to the soldering-iron tip, the flux, being lighter, will float on top of the solder. It will be unable to reach the connection and clean it.)

3. A good easy flow of heat from the soldering-iron tip to the connection must be obtained by a clean, well-tinned soldering-iron tip. A thin film of molten solder will transfer heat rapidly.

In soldering techniques for etched circuit boards, the basic principles for soldering prevail. We are now interested in the difference in the soldering of etched circuit boards and normal soldering.

The first consideration of soldering to etched circuit boards is the limitations of the substrate of the boards. The Friden etched circuit boards have a substrate of fiber-glass epoxy which has a temperature limitation of 600° F for not more than 7 seconds. Hotter temperatures reduce the time in inverse relationship; the hotter the temperature, the less time the boards will stand it before damage. (As an indication of damage, white flakes will first appear in the surface of the board. These white flakes indicate a decomposition of the fiber-glass epoxy substrate.)

A second consideration is the soldering-iron-tip temperature, which is determined by the type of soldering iron and soldering-iron tip used. The wattage of the soldering iron and the configuration of the soldering-iron tip combined with the speed of soldering will determine the ultimate tip temperature as well as the working-tip temperature. Since we are here primarily concerned with the working tip temperature, the soldering iron and tip should be chosen so that the working tip temperature will at no time exceed the limitations of heat set forth above. An Oryx soldering iron, Model 115-15W, is recommended. (Friden Tool #T18702 with Tip #T18703.)

A third consideration in soldering of etched circuit boards is the type of solder used. The best type for use on the Friden etched circuit boards is a "eutectic"-type cored-wire solder of size #20 AWG, composed of 60% tin and 40% lead with a central core of activated rosin flux. (Friden Tool # T18704.)

The fourth consideration is the technique of repair - repair in this case consisting of replacement of components. Carelessness in reheating the solder connections for the removal and replacement of components is the only difficulty to be guarded against here. Caution must be taken not to overheat the substrate and this can best be accomplished with deft hands and by small applications of heat.

If the removal or replacement is not accomplished in the first few seconds of heat application, avoid transferring too much heat to the substrate by going to another connection or waiting a few minutes before reheating the connection. Giving the connection these few minutes to cool will allow the heat to dissipate and help to avoid overheating the substrate. Heat dissipates quite slowly from some of the smaller connections and too long an application of the soldering iron will result in the overheating of the substrate and subsequent "peeling" off of the actual printed circuit trace due to the smaller bond area available.

There are two areas on an etched circuit board which might require different soldering techniques. One is the large copper area used as a common connection in contrast to the smaller spot connections. The larger areas will absorb heat much more rapidly than the smaller spot connection. This may necessitate a hotter iron and a larger tip for these areas than the smaller spot connections.

With these cautions and recommendations in mind you should encounter no trouble when soldering Friden etched circuit boards.

PARTS REQUIRED:

- 1 - T18702 Oryx Soldering Iron, model 115-15W
- 1 - T18703 Oryx Soldering Iron Tip
- 1 - T18704 Solder

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A FRIDEN PRODUCT

ELECTRONIC CALCULATOR**SERVICE LETTER**

NO.

15

8-16-65

TO ALL FRIDEN OFFICES

SUBJECT: High Voltage Resistor Change

MODIFY: EC-130/132 Calculators with high voltage exceeding 2500V.

REASON: The high voltage supply, common to both models, is dependent on several factors; -12V supply, decoupling network, oscillator frequency, and symmetry, leakage in the multiplier sections, and tolerances within the resistor bleeder chain. Each of these can be within its own tolerance, but collectively they can cause the high voltage to exceed -2500V. The nominal voltage ranges from -2200V to -2400V.

High voltage above -2500V may cause arcing within the CRT. This, as you know, can cause destruction of the associated transistor circuitry.

REFERENCE: Circuit schematic - Figure 1.

INSTRUCTION: Using a Triplet Model 310 volt meter set on the 1200 VDC scale measure across the bottom resistor in the high voltage bleeder chain. This resistor 820K-2W (gray, red, yellow, and gold) is the one closest to the power transformer. The resistor lead nearer the transformer is ground and must have the positive lead of the meter. The negative lead connects to the other end of the same resistor.

If the measured voltage is above -560 volts but below -580 volts, replace the 10 ohm, 2W, 5% resistor (located in the primary circuit of the high voltage transformer) with a 12 ohm, 2W, 5% resistor. If voltage is above -580 volts, replace the 10 ohm resistor with a 15 ohm, 2W, 5% resistor.

NOTE: (Voltage at test point) $560V \times 4.5 = 2520V$ (high voltage).

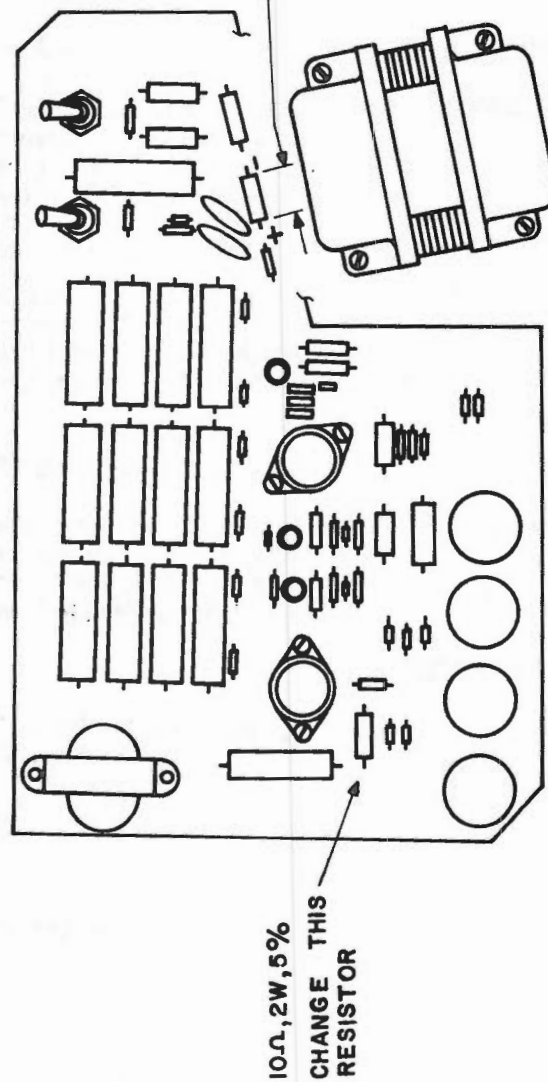
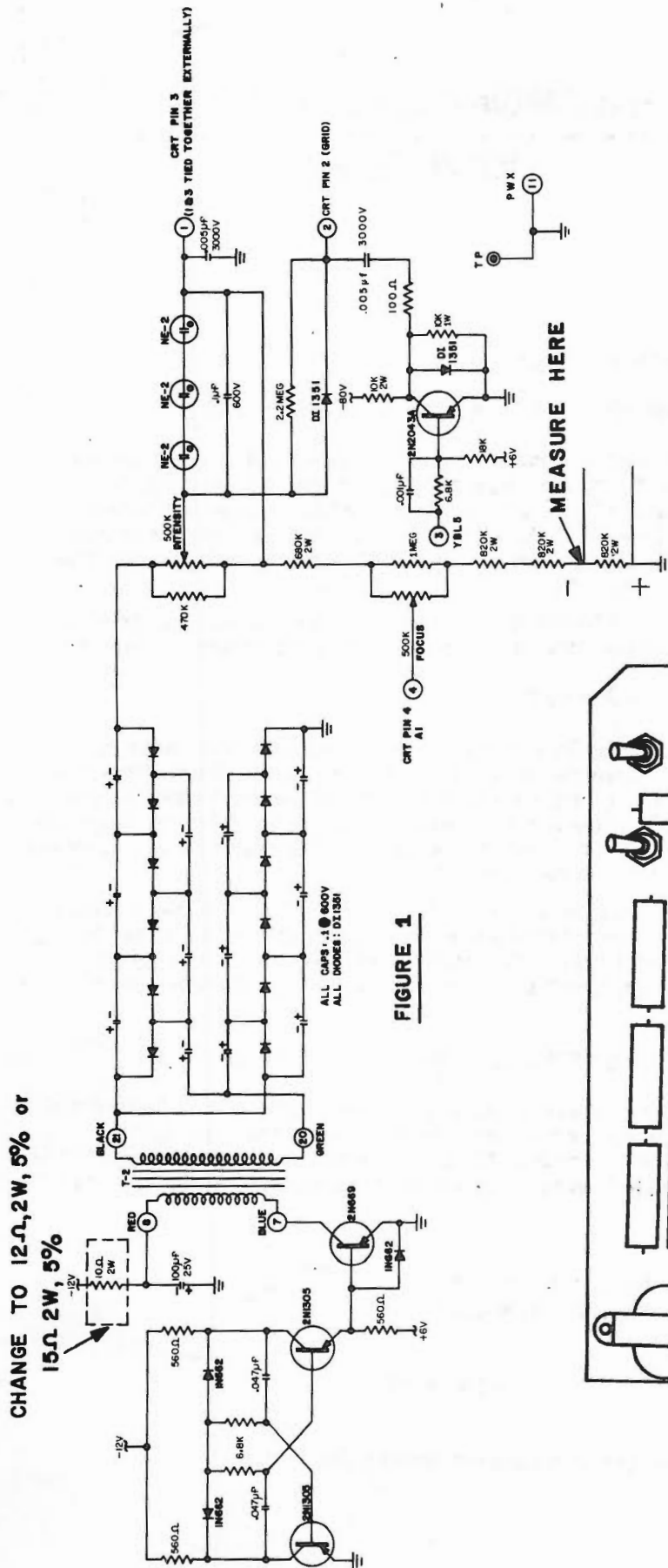
CAUTION: You will be working with an uncommonly HIGH VOLTAGE; 1500 volts if you get across the wrong resistor. Observe that there are three identical 820K, 2W resistors. The one across which the measurement is to be taken is located nearest the power transformer. Refer to Figure 2.

PARTS REQUIRED:

- (1) Resistor 12 ohm 2W, 5%, 804176
Or (2) Resistor 15 ohm 2W, 5%, 804177

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**ELECTRONIC CALCULATOR
SERVICE LETTER**

NO.

16

8-27-65

TO ALL FRIDEN OFFICES

SUBJECT: EC-130 and EC-132 "Wavering Display".

MODIFY: Any EC-130 or EC-132 when necessary.

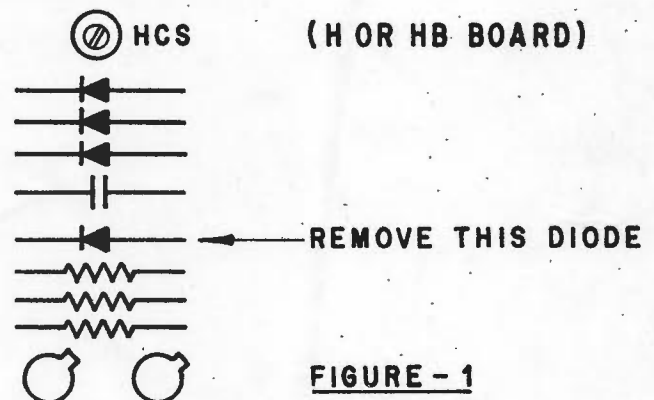
REASON: To eliminate "wavering display" by changing the data writing rate and bringing voltage within tolerance.

INSTRUCTIONS:

Remove the diode indicated in Figure 1. This is referenced in the EC-130 construction file under 1580.020.0 and in the EC-132 construction file under 1600.021.0. Removal of this diode will eliminate one writing pass of R1 so that R1 will be of the same intensity as R2, R3, and R4. Readjustment of the intensity control may be required. If "wavering" still persists, replace old style power transformer with new style transformer. The old style transformer has the part number (804002) stamped into the side, while the new transformer has the number on the top. The new transformer must be installed in the same position as the present one with the laminations approximately parallel to the side frame, or additional "waving" may be created.

PARTS REQUIRED:

1 - 804002 Power transformer



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San Leandro General Service Department

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**ELECTRONIC CALCULATOR
SERVICE LETTER**

NO.

17

3-17-66

TO ALL FRIDEN OFFICES

SUBJECT: CORNELL-DUBILIER CAPACITORS - 804088 (.0015uf)
804091 (.0047uf)

MODIFY: All EC-130/132 Calculators when machine or GH Card is serviced.

REASON: The Cornell-Dubilier capacitors (yellow mylar) of the above values have been shown to have a very high defective rate.

1. When one of these defective components (804088) is used in the Master Oscillator Circuit (at location H0319C) the oscillator frequency may go up as high as 1000 to 1200 kilocycles, or oscillations may cease entirely. Excessively high frequency may result in segments too short and "tailing" on certain segments. If there is an abrupt frequency change, digits may change randomly.
2. If one of these capacitors (804091) is installed in the Segment Generator (G1411C) the segments may be too short. This also may be an intermittent condition.
3. If one of these defective capacitors (804088) is installed in the Horizontal Staircase Generator (at location G1210C), there may be insufficient Horizontal Character Spacing control, or the display width may jump in and out occasionally.

INSTRUCTIONS:

If a Cornell-Dubilier capacitor (yellow mylar) is installed in any of the above locations, replace it with a Sprague "Pacer" (orange) capacitor of the same value.

PARTS REQUIRED:

- (1) 804088 (.0015uf) Sprague Pacer Capacitor
- (1) 804091 (.0047uf) Sprague Pacer Capacitor

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San Leandro General Service Department

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**ELECTRONIC CALCULATOR
SERVICE LETTER**

NO.
18

- 4-11-66

SUBJECT: EC-130 Circuit Board identification above serial #8500.

MODIFY: No modification required.

REASON: New identification:

All EC-130 Electronic Calculators above serial #8500
will have the printed circuit boards identified in two ways:

1. White plastic end guides.
2. All circuit boards will be designated as Revision "C".

BC - 810014
CC-DC - 810016
EC-FC - 810017
GC-HC - 810018

INSTRUCTIONS: Revision 1 circuit boards used on machines below serial #8500 are identified as B, CD, EF and GH boards. Machines below serial # 8500 will be known as the four counter machine.

Revision "C" Boards (Referrred to as Revision 2 in Service Flier #206). Revision "C" Circuit Board will be known as the three counter machine.

NOTE: DO NOT ATTEMPT TO INTERCHANGE REVISION 1 AND REVISION C CIRCUIT BOARDS AS BOARDS AND MACHINE WILL BE DAMAGED.

DO NOT INSTALL REVISION 1 CIRCUIT BOARDS IN MACHINES ABOVE SERIAL #8500.

DO NOT INSTALL REVISION C CIRCUIT BOARDS IN MACHINES BELOW SERIAL #8500.

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ELECTRONIC CALCULATOR SERVICE LETTER

NO.
19

6-14-66

TO ALL FRIDEN OFFICES

SUBJECT: Oscillations in the EC-130 and EC-132 -12 volt power supply.

MODIFY: Any EC-130 or EC-132 as required.

REASON: If the -12 volt power supply oscillates (usually at 25KC to 50KC with a peak-to-peak amplitude of over 50 millivolts), the display is distorted so that EACH segment appears as an elongated "S".

REFERENCE: Figure 1.

INSTRUCTIONS: Replace the .1 μ f 200V capacitor (804096) on the power supply board with a 25 μ f 25V capacitor (804102). The new capacitor must be installed with the positive (+) end to the front of the machine.

PARTS REQUIRED: 1 - 804102, 25 μ f 25V capacitor.

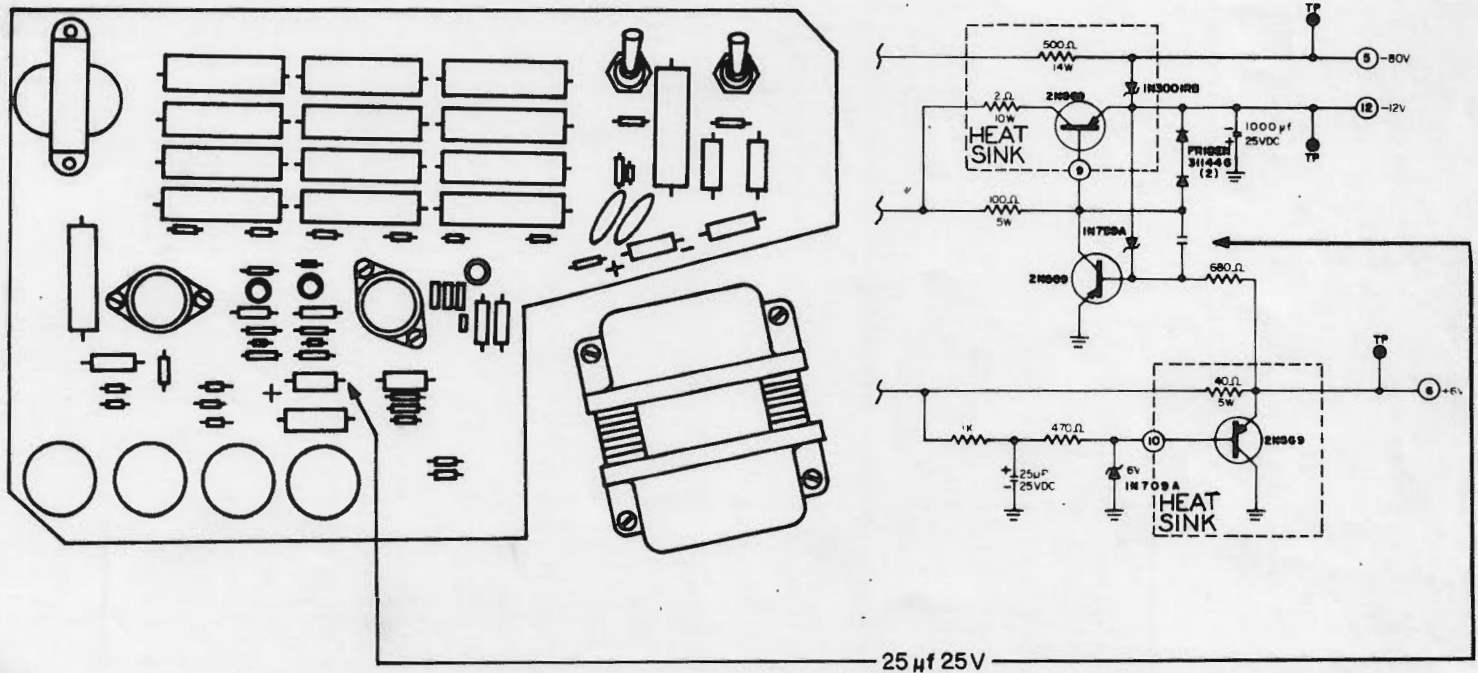


FIGURE 1

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ELECTRONIC CALCULATOR 130

SERVICE LETTER

NO.

20

6-29-66

TO ALL FRIDEN OFFICES

SUBJECT: Polaroid Filter for Electronic Calculators.

MODIFY: Any EC-130/132 Electronic Calculator as required.

REASON: To improve the character readability on the CRT in areas of high glare or light incidence.

INSTRUCTIONS: Replace the blue plastic shield with a blue Polaroid filter (801539).

CAUTION: Polaroid filters conduct light the best in one direction so be sure to install the new filter in accordance to the instructions contained.

PARTS REQUIRED: 1 - 801539 - Blue Polaroid Filter C ^{6.63}~~\$5.00~~.

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A FRIDEN PRODUCT

ELECTRONIC CALCULATOR SERVICE LETTER

NO.
207

8-18-66

TO ALL FRIDEN OFFICES

SUBJECT: EC-130 and EC-132 POWER SUPPLY BOARDS

MODIFY: None required, for information only.

REASON: Improved operation:

Sometimes a residue of rosin flux is left on the top and/or bottom of the power supply board when the board is first soldered. This residue becomes a highly resistive intermittent current path due to humidity at certain ambient temperatures. This results in sagging the high voltage down and causes "sudden blooming", the display "jumping in and out", and the display "rapidly changing size". This condition is often temperature dependent.

INSTRUCTIONS: Clean the rosin residue off both sides of the power supply board with isopropyl alcohol (available at your local druggist). Be sure to thoroughly clean in the area of the D.C. restore diode. The alcohol should be applied with an applicator such as a "Q-Tip".

NOTE: TURN MACHINE OFF BEFORE CLEANING HIGH VOLTAGE SUPPLY.

ES

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**ELECTRONIC CALCULATOR
SERVICE LETTER**

NO.

22

9-8-66

TO ALL FRIDEN OFFICES

SUBJECT: Transistor Heat Sink Grease.

MODIFY: No modification required.

REASON: Availability of Heat Sink grease from the factory in 1 ounce tubes.

INSTRUCTIONS: Apply to all transistors which use heat sinks before installing as this aids in heat transference between the transistor case and the heat sink.

PARTS REQUIRED: Heat Sink Grease, 1 ounce T-18729.

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**ELECTRONIC CALCULATOR
SERVICE LETTER**

NO.
23

9-8-66

TO ALL FRIDEN OFFICES

SUBJECT: Numbers changing at random.

MODIFY: Any EC-130 or EC-132 as required.

REASON: A static charge of several hundred volts builds up on the frame of the high voltage transformer. This charge then arcs between the long transformer mounting screws and the ground bus.

INSTRUCTIONS: Remove the high voltage transformer mounting screws and re-install them with the head of the screw on the bottom of the power supply board.

PARTS REQUIRED: None.

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**ELECTRONIC CALCULATOR
SERVICE LETTER**

NO.

24

9-8-66

TO ALL FRIDEN OFFICES

SUBJECT: New Keyboard Reed Switches.

MODIFY: No modification required.

REASON: A new reed switch, with improved magnetic characteristics, is being installed in both digit and function positions. The new switch is physically smaller than the old style and does not have the dot painted on one end.

INSTRUCTIONS: When installing these switches, particular attention must be paid that the long formed lead of the new reed switch is placed in the same end position that the long formed lead of the old reed switch was.

NOTE: The new switch may not be used in the "Overflow Lock", "Clear Display", or "Clear All" positions.

PARTS REQUIRED: None. For information only, the new reed switch carries part number 810044.

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A FRIDEN PRODUCT

ELECTRONIC CALCULATOR

SERVICE LETTER

NO.

24 A

7-25-67

TO ALL FRIDEN OFFICES

SUBJECT: New Keyboard Reed Switches.

MODIFY: No modification required.

REASON: A new reed switch, with improved magnetic characteristics, is being installed in all but two of the function positions. The new switch is physically smaller than the old style and does not have a dot painted on one end.

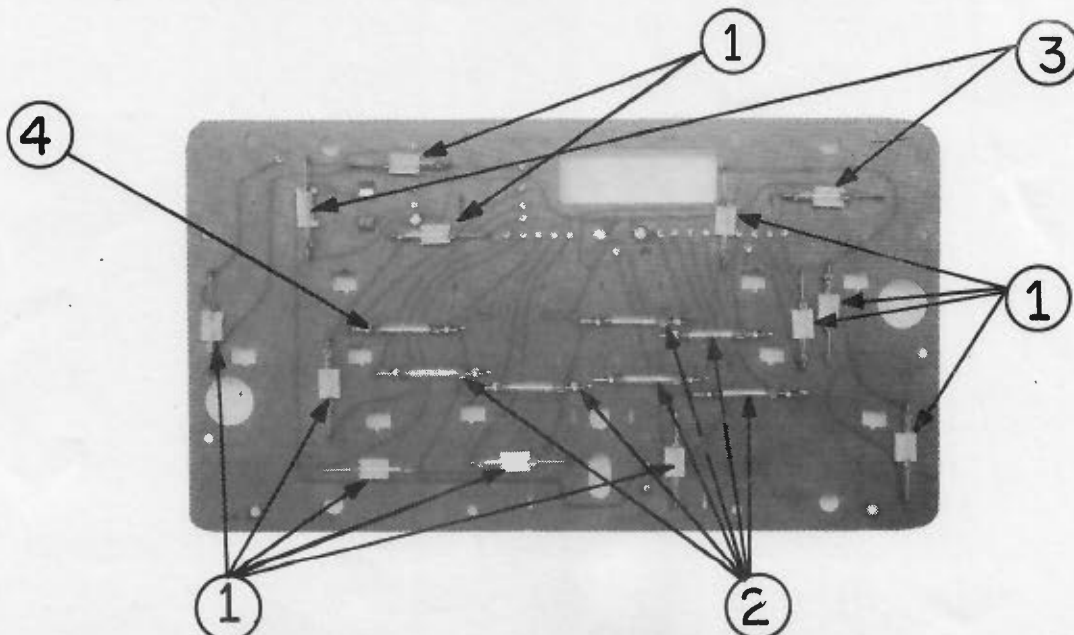
INSTRUCTIONS: When installing these new switches, particular attention must be paid so that the long formed lead of the new switch is placed in the same position as the long formed lead of the old switch.

New switch part #810044 used in positions 6-8-9-10-11-12-13-14-15-17-25. Shown as #1 in photo.

Green dot part #804131 used in positions 1-2-3-5-CD, and CF. Shown as #2 in photo.

Red dot part #804132 used in positions 7 and 16. Shown as #3 in photo.

Yellow dot part #804134 used in position 4. Shown as #4 in photo.



PARTS REQUIRED: None.

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**ELECTRONIC CALCULATOR
SERVICE LETTER**

NO.

25

11-28-66

TO ALL FRIDEN OFFICES

SUBJECT: Electronic Calculator Display Size

MODIFY: No modification required.

REASON: Change in Specification for Display Size:

The character display Electronic Calculators have been increased to the following maximum size:

Display Width approx. 2-1/2"

Display Height approx. 1-1/8"

Character Width approx. 1/8"

Character Height approx. 1/4"

These are the maximum allowable size for a good display.

PARTS REQUIRED: None.

*CG
E.P.*

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ELECTRONIC CALCULATOR SERVICE LETTER

NO.
#26

3-27-67

TO ALL FRIDEN OFFICES

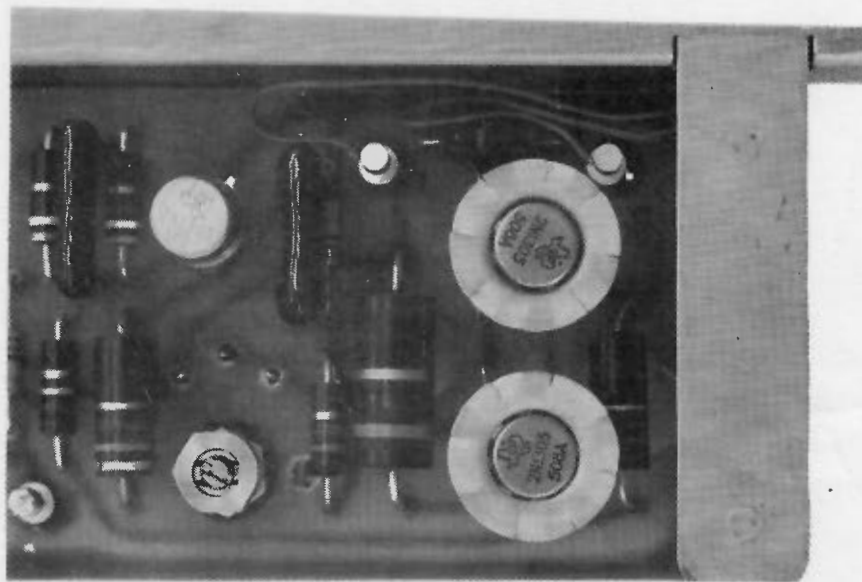
SUBJECT: Write Amplifier

MODIFY: None required

REASON: Field reports indicate a rise in open write coil problems. This is frequently caused by the transistor heat-sinks touching each other, or the write coil terminals.

INSTRUCTIONS: Make sure that the transistor heat-sinks do not come in contact with each other, or adjacent terminals. Care should be taken when replacing transistors so that they will not touch the bottom cover.

PARTS REQUIRED: None



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A FRIDEN PRODUCT

ELECTRONIC CALCULATOR SERVICE LETTER

NO.
27

6-1-67

TO ALL FRIDEN OFFICES

SUBJECT: In Guarantee Credit Tag, Form 721-61

MODIFY: None Required.

REASON: In order to determine if there are troublesome areas in the EC-130/132, we would like to make a computer analysis using the information contained on In Guarantee Credit Tags. To do this successfully, we require more information on the defective component.

INSTRUCTIONS: Fill in the remarks area with the following information:

1. The logic number from the block diagram such as the Or-gate, And-gate, Inverter or Flip-Flop number.
2. The signal name when replacing diodes.
3. Card coordinates.

(Example)	Remarks
	O-97
	M1L4
	D0429DA

PARTS REQUIRED: None.

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ELECTRONIC CALCULATOR SERVICE LETTER

NO.

28

6-12-67

TO: ALL FRIDEN OFFICES

SUBJECT: EC-130 INTERCHANGEABILITY OF KEYBOARDS

MODIFY: AS REQUIRED

REASON: To provide interchangeability of EC-130 keyboards for machines serial #1016 to 4904, from 4905 to 8500 and 8500 and up. (Note three different keyboards.)

1. Keyboard 1016 - 4904, basic keyboard, see Figure 1.
2. Keyboard printed circuit board was changed at serial #4905 see Figure 2.
3. Decimal point switch was changed at serial #8500, and still used printed circuit board as shown in Figure 2.

INSTRUCTIONS:

1. Check the decimal point switch to determine the serial number series of the keyboard. The decimal point switch for machines below serial #8500 will show continuity between pins 19 and 14 with decimal point switch set on 5.

2. Identify the keyboard to be installed, reference to the pictures below, and install pin connections according to instructions A or B as shown on the chart.

A. Instruction (A).

1. Install a bus from KB pin 21 to KB pin 22 on the printed circuit. Solder to the PC, not to the pins.
2. Install the dark green wire, formerly on KB pin 21 to KB pin 22.
3. Install the light green wire, formerly on KB spade lug 22 to KB pin 24. This can be accomplished by slightly closing one side of the spade connector, and then insulating the connector so that it will not touch adjacent points.
4. The red jumper wire is not required, so insulate each end of this wire to prevent any unwanted circuits.
5. Connect all other wires point to point.

B. Instruction (B).

1. Connect wire 22 to KB pin 21.
2. Install a bus between KB spade lugs 22 and 26. Solder to PC, not to the lugs.
3. Insulate the connector on wire 21 as this wire is not required.
4. Connect all other wires point to point.

PARTS REQUIRED:

None

KEYBOARD		CHANGE	REQUIRED
FROM	TO	PC CONNECTIONS	DECIMAL SWITCH
1016	4904	X(A)	
	8500	X(A)	X
4904	1016	X(B)	
	8500		X
8500	1016	X(B)	X
	4904		X

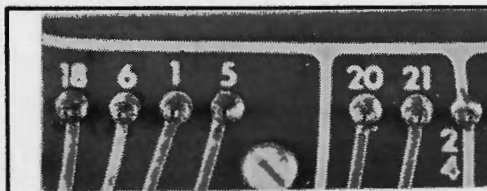


FIGURE 1
PIN CONNECTIONS
EARLY KBD
1016 thru 4903



FIGURE 2
LUG CONNECTIONS
LATE KBD
4904 and ABOVE
Decimal Point Switch
Changed at 8500.

EFFICIENT SERVICE

Friden

A FRIDEN PRODUCT

**ELECTRONIC CALCULATOR
SERVICE LETTER**

NO.

29

7-28-67

TO ALL FRIDEN OFFICES

SUBJECT: EC-132 Square Root Error.

MODIFY: As required or when in shop.

REASON: Intermittent errors in square root after warm up.
Example: With the decimal switch on 5, extract the square root of .9. The answer should be .94868, but during a malfunction it is .9. This problem is basically caused by the slow transition time of I-180 in the carry circuitry.

INSTRUCTIONS: Replace the 2N1305 in inverter 180 located at EB0302 with a 2N2635.

PARTS REQUIRED: 1 - 804111 2N2635.

CA-601-23

EFFICIENT SERVICE

Friden

A FRIDEN PRODUCT

**ELECTRONIC CALCULATOR
SERVICE LETTER**NO.
30

8-30-67

TO ALL FRIDEN OFFICES

SUBJECT: Repairing Keyboard Magnet Assembly.

MODIFY: None Required.

REASON: Field reports indicate problems with keyboard magnets breaking their adhesive bond.

INSTRUCTIONS:

To repair dislocated magnets use Special Adhesive, tool #T-18761.
Proceed as follows:

1. Remove circuit from keyboard.
2. Clean off old adhesive from bracket and magnet with small knife, or sharp edge instrument.
3. Apply a single drop of adhesive to each surface to be joined.
4. Join parts immediately, sliding magnet back and forth with a slight pressure, to distribute adhesive evenly.
5. Align magnet in correct position, with long nose pliers crimp in sides of mounting flange to secure magnet. (On older models with flat bracket, disregard.)
6. Using a clean 33 watt soldering iron with the tip bent at 45 degrees, place tip under the flange, supporting the magnet for three minutes. If a smaller iron is used, a slightly longer curing time will be required.
7. Wipe off excessive adhesive when the assembly is cool. Check for a proper bond by pulling slightly on the magnet. The keyboard is now ready for assembly and use.

PARTS REQUIRED:

1 - T18761 Special Adhesive \$1.97

EFFICIENT SERVICE

Friden

A FRIDEN PRODUCT

**ELECTRONIC CALCULATOR
SERVICE LETTER**

NO.

31

10-18-67

TO ALL FRIDEN OFFICES

SUBJECT: EC 130/132 Register Display.

MODIFY: Any Electronic Calculator, EC 130/132 as requested.

REASON: To display only an enlarged R1 and R2.

INSTRUCTIONS:

1. All EC 132's and EC 130's below serial number 8500 -
A. Remove diode at location H 1705 to H 1805.
2. EC 130's above serial number 8500 -
A. Remove diode at location H 0709 to H 0809.
3. Adjust overall display size to 2-3/8" wide by 11/16" high
with 3/32" spacing between registers.

NOTE: To achieve this larger character display it may be necessary to replace the VCS potentiometer from a 1K to a 2K (Part #804213). Check the high voltage power supply in accordance with the instructions in Electronic Calculator Service Letter #15.

*SEE S.L. #10A
INSTRUCTIONS-3.*

This feature is to be accomplished only in the Friden office in the following procedure: The machine will be brought into the shop and a loaner supplied to the customer. Upon completion of the modification, it will be thoroughly checked out and then returned to the customer. The customer price is \$50.00 and is billable by the Service Department.

If this feature is requested by the Sales Department on a stock machine in the branch office, they are to be billed \$6.00.

PARTS REQUIRED:

None

Handwritten signature and initials:
J.H.P.
C.R.
V.J.R.
J.P.S.

EFFICIENT SERVICE

Friden

A FRIDEN PRODUCT

ELECTRONIC CALCULATOR**SERVICE LETTER**

NO.

31 A

(This Letter cancels Service Letter #31)

10-18-67

Rev. 11-28-67

TO ALL FRIDEN OFFICES

SUBJECT: EC-130/132 Register Display. *shop*

MODIFY: Any Electronic Calculator, EC-130/132 as requested.

REASON: To display only an enlarged R1 and R2.

INSTRUCTIONS: A. For EC-130's below 8500.

1. Remove diode at location H1705 to H1805.
2. Remove 4.64K Resistor at location G0518 to G0~~8~~⁶18.
3. Remove 9.31K Resistor at location G0718 to G0818.
4. Install 6.8K 5% Resistor at location G0718 to G0818.

B. For EC-130's above 8500.

1. Remove diode at location HC0709 to HC0809.
2. Remove 4.64K Resistor at location GC0120 to GC0220.
3. Remove 9.31K Resistor at location GC0119 to GC0219.
4. Install 6.8K 5% Resistor at location GC0119 to GC0219.

C. For all EC-132's.

1. Remove diode at location HB1705 to HB1805.
2. Remove 4.64K Resistor at location GB0518 to GB0618.
3. Remove 9.31K Resistor at location GB0718 to GB0818.
4. Install 6.8K 5% Resistor at location GB0718 to GB0818.

D. All models: Adjust the overall display size to 2-3/8" wide by 11/16" high with 3/32" spacing between registers.

This feature is to be accomplished only in the Friden office in the following procedure: The machine will be brought into the shop and a loaner supplied to the customer. Upon completion of the modification, it will be thoroughly checked out and then returned to the customer. The customer price is \$50.00 and is billable by the Service Department.

If this feature is requested by the Sales Department on a stock machine in the branch office, they are to be billed \$6.00.

PARTS REQUIRED:

1 - 223403 Resistor 6.8K 1/2W 5%.

LEB epr

EFFICIENT SERVICE

Friden

A FRIDEN PRODUCT

ELECTRONIC CALCULATOR SERVICE LETTER

NO.
32

11-9-67

TO ALL FRIDEN OFFICES

SUBJECT: Electrical shock on Electronic Calculators.

MODIFY: All EC 130's above serial #5204 and all EC 132's above serial #804. This modification should be made during INSPECTION or ROUTINE SERVICE CALLS.

REASON: To prevent the possibility of electrical shock between earth ground and the main frame.

INSTRUCTIONS: Remove the cover. Remove the two screws securing the heat sink and swing the heat sink down. Remove the left mounting screw which presently secures the green ground wire and remove the green wire (see Figure A).

Re-install the green wire under the center mounting screw (see Figure B).

CAUTION: All Electronic Calculators must have a three wire AC Cord.

PARTS REQUIRED: None.

FIGURE A

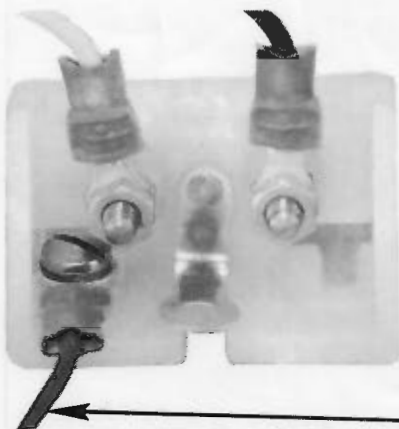
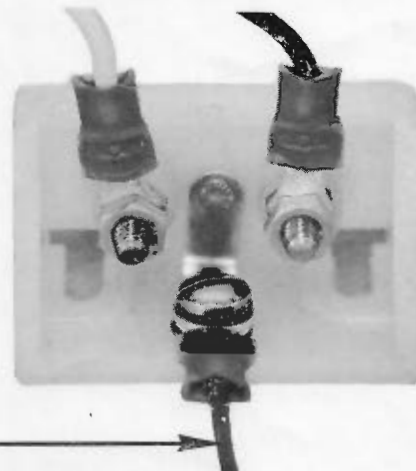


FIGURE B



GREEN
WIRE

4-25-68

TO ALL FRIDEN OFFICES

SUBJECT: EC-130/132 Keyboard

MODIFY: As required if you are having keyboard noise and adjustment problems.

REASON: To reduce keyboard noise and prevent the loss of keyboard adjustment.

INSTRUCTIONS: Two new types of code bar stop screws are now available to replace part #2997. To correct a noise problem, order part #7001352. This part has the addition of a rubber tip to absorb the noise by cushioning the impact. This part is used only in the common function and common digit position; two (2) are required for each keyboard. Part #7001351 is used for the remainder of the code bars, ten (10) are required per keyboard. Both new parts have incorporated into them a nylon insert which is imbedded into the threads to prevent the screw from backing out during operation. Please refer to this Service Letter when ordering these parts.

PARTS REQUIRED: 7001351
7001352

(These two parts replace part #2997.)

5-2-68

URGENT!

SUBJECT: Delay Lines - EC-130 and EC-132

PERFORM: Immediately! During unpacking and routine inspections.

REASON: Reports from the field indicate an increase in open launch-coils in the write amplifier on EC-130 and EC-132 Delay Lines.
(Refer to Service Letter No. 26)

INSTRUCTIONS: To prevent this problem in the field, perform the following check before the machine is turned on after unpacking. Remove the bottom cover. Inspect the write amplifier output transistor (mounted nearest the launch-coil terminals) and insure that the heat sink does not touch the launch-coil terminals. A small piece of electrician's tape may be used if necessary.

Note: Do not allow the tape to interfere with the heat dissipation capability of this transistor.

PARTS REQUIRED: None.

6-3-68

SUBJECT: EC-130/132 Delay Lines.

INSTRUCTIONS: Do not return delay line assembly for rebuild unless it is certain that the read-write amplifiers are ok.

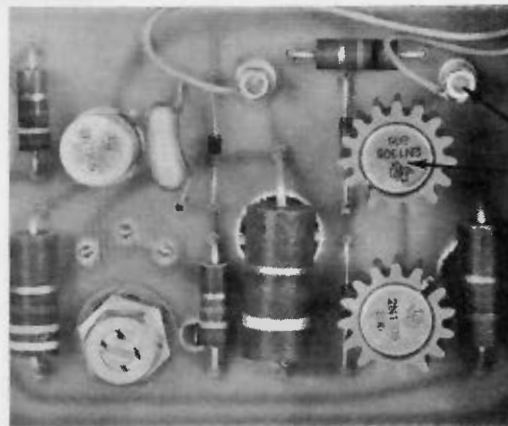
COMPLY: Immediately when applicable.

REASON: A recent survey shows that 48% of all delay lines received in San Leandro for rebuild have defective read- or write-amplifier circuits. Since the amplifier circuitry is taught in the training schools, the technician should be able to recognize and locate amplifier troubles. It is suggested that more time be spent to determine the actual trouble.

Because nearly half of the delay-line troubles can be remedied in the local office, your cooperation will decrease the lead time in supplying this part to you when the delay line itself is really at fault.

IMPORTANT!

Special care must be exercised when troubleshooting the write-amplifier circuitry to prevent shorting the coil terminal to the nearby transistor as illustrated! Even a momentary short will open the launch coil.



PROBLEM AREA

Note: Credit will not be given on delay lines returned with the read-write amplifier removed.

ear