

**067-1180-99**

**SETTLING TIME FIXTURE**

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## DESCRIPTION

The 067-1180-99 is an electronic switching circuit that can be used in conjunction with a 50M10, 50M50, and an FG 5010 to produce a digital sampling system. An external power supply is also needed.

It contains a solid state relay to provide a step function to the unit under test. When the SLEWED TRIGGER is applied equal to the REF IN, a trigger is applied to the 50M10 ESC and delayed by the pulse width of the SLEWED TRIGGER, up to 500  $\mu$ s delay can be developed. Jumpers are provided to allow many configurations.

The following configurations are for the testing of the 50M10 and the amplifier modules of the 50M41 with the M41A1 through M41A8.

## 50M10 Settling Time

Addresses: MI 5010=23, 50M10=slot 1, 50M50=slot 3, FG 5010=24.

a. Connect the pins marked TO 50M50 (16a—25A and 25B COM) to the like numbered pins of the 50M50.

b. Connect the power supply to the appropriate pins marked -15, +5, COM, and +15.



*Wrong connections will damage the IC's.*

c. Connect the FG 5010 OUTPUT to the pins marked SLEWED TRIGGER and the COM just below it.

d. Connect DATA PRECISION Voltage Calibrator output to the REF IN pin and the COM just below it.

e. Set ESC jumper to H (or to match ESC jumper in the 50M10).

f. Set A/D jumper to center (A/D) position.

g. Jumper pin F to COM next to it.

h. Set ATN jumper to  $\div 1$ .

i. Connect 067-1180-00 to 50M10 and run 50M10 Settling Time Program.

### M41A1 through 8 Module Settling Time

Addresses: MI 5010=23, 50M41=slot 1, 50M10=slot 2, 50M50=slot 3, FG 5010=24.

a. Connect the pins marked TO 50M50 (16a—25A and 25B COM) to the like numbered pins of the 50M50.

b. Connect the power supply to the appropriate pins marked -15, +5, COM, and +15.



*Wrong connections will damage the IC's.*

c. Connect the FG 5010 OUTPUT to the pins marked SLEWED TRIGGER and the COM just below it.

d. Connect the DATA PRECISION Voltage Calibrator output to the REF IN pin and the COM just below it.

e. Connect output of M41—module to pin E.

f. Connect input of M41—module to pins P and COM next to it.

g. Set ESC jumper to H (or to match ESC jumper in the 50M10).

h. Jumper upper 2 pins of A/D together and jumper lower 2 pins of A/D together.

i. Jumper pin F to COM next to it.

j. Set ATN jumper to  $\div 1$ .

k. Connect 067-1180-00 to 50M10 and run M41A1—8 Settling Time Program.

a. Connect a PS 502 or equivalent power supply to the -15, +5, COM (gnd), and +15 pins as indicated on the PCB.

**CAUTION**

*Wrong connections will damage the IC's.*

b. Connect the FG 5010 output to the SLEWED TRIGGER and COM pins indicated on the PCB.

c. Set Jumpers as follows:

|     |    |             |
|-----|----|-------------|
| ATN |    | ÷ 1 (Index) |
| FSC |    | H (Index)   |
| F   | to | COM         |
| A/D | to | U (lower)   |

d. Apply power to the PS 502 and FG 5010.

e. Set PS 502 VOLTS to 15 and press OUTPUT ON. (COMMON and gnd connected).

f. Set FG 5010 for:

|            |             |
|------------|-------------|
| AMPLITUDE  | 5 V         |
| OFFSET     | +2.5 V      |
| FUNCTION   | SQUARE      |
| MODE       | CONT        |
| FREQ       | 1.000 +3 Hz |
| INCR SIZE  | 100 Hz      |
| COMPLEMENT | OFF         |
| OUTPUT     | ON          |

g. Use an oscilloscope to monitor the ESC pin (lower right part of PCB) for a 5 V, 1 KHz square wave with a positive duration of about 1.1  $\mu$ s.

h. Adjust ESC WIDTH ADJ for 1.1  $\mu$ s positive duration.

i. Set ESC jumper to L and check for a negative duration of 1.1  $\mu$ s.

j. Connect +5 V to REF IN pin.

k. Connect scope to pin 1 or 10 of U1000.

l. Use the oscilloscope to check for a +5 V square wave with a positive duration of approximately 600  $\mu$ s (must be  $>500 \mu$ s).

m. Push FG 5010 INC until square wave changes to +5 V DC on scope display. Check that the FG 5010 FREQ is less than 1.900 +3 Hz.

Calibration and check out is finished.



# SETTLING TIME VERIFICATION PROGRAM 4041

```

100 Rem 3-1-83, Revised 10-27-83
110 Rem -----SETTLING TIME VERIFICATION FOR THE 50M10
120 Rem MI5010 ADDR=23,FG5010 ADDR=24
130 Print "ADDRESSES --- MI5010=23, FG5010=24"
140 Init all
150 On sra then gosub 970
160 Dim v(500),v1(500)
170 V=0
180 V1=0
190 A=0
200 A1=-100
210 E=50.9
220 S=0.1
230 Print "TURN ON TMS006 WITH JUMPERS SET FOR RANGE TO BE TESTED. ";
240 Print "SET REFERENCE VOLTAGE FOR VOLTAGE OF RANGE BEING CHECKED ";
250 Print " (FOR 10X ATTN SET RANGE FOR 100 & INPUT FOR 1 V AND ATTN)";
260 Print " [RET] TO CONTINUE"
270 Input a$
280 Print #23:"SEL 3;ABORT;PURGE;CR M10,1000"
290 Print #24:"FUNC SQ;AMPL 5;OFFS 2.5;MODE TRIG;OUT ON"
300 Print #23:"SEL 1;RANGE?"
310 Input #23:z
320 If z<>100 and z<>10 then goto 340
330 Goto 390
340 If z<>1 then goto 360
350 Goto 390
360 E=200.9
370 S=0.4
380 If a>0 then goto 420
390 If a>0 then goto 420
400 Print "50M10 IS SETUP FOR ";z;" VOLTS. [RET] TO CONTINUE"
410 Input a$
420 Print #23:"SEL 3;ATTACH M10,1,ADC"
430 Print #23:"START"
440 Print #23:"SEL 1"
450 Print #23:"EXT ON"
460 Rem GET DATA
470 For i=1 to e step s
480 X=1/(2*i)*10^6
490 F=int(x*10^(3-int(1st(abs(x))))+0.5)*10^(3-int(1st(abs(x))))
500 Print #24:"FREQ ";f
510 Wait 0.01
520 Print #24:"MTRIG"
530 Next i
540 If a>0 then goto 590
550 Print "TURN REFERENCE VOLTAGE OFF, REVERSE POLARITY, AND"
560 Print " TURN REFERENCE VOLTAGE BACK ON FOR A NEGITIVE OUTPUT"
570 Print " [RET] TO CONTINUE"

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# SETTLING TIME VERIFICATION PROGRAM 4041

```

580      Input a$
590      Wait 1
600      Print #23:"EXT OFF"
610      Print #23:"SEL 3"
620      If a<>1 then goto 640
630      V1=v
640      Print #23:"SEND M10,BIN16"
650      Input #23:v
660      Gosub 770
670      Rem                                CHECK FOR COMPLETED TEST
680      If a=2 then goto 710
690      Rem                                REPEAT TEST FOR NEGATIVE INPUT
700      Goto 390
710      If z=100 then goto 750
720      Wait 10
730      Print z;" VOLT RANGE"
740      Goto the_end
750      Print "10X ATTN AND 1 VOLT RANGE      10V INPUT"
760      Goto the_end
770      Gosub 810
780      A=a+1
790      Return
800      Rem                                DETERMINE SETTLING TIME
810      For i=500 to 1 step -1
820          If v(i)<(v(500)-2 or v(i)>(v(500)+2 then gosub 860
830      Next i
840      Return
850      Rem                                check for settled condition
860      If i<490 then gosub 910 else print "50M10 DID NOT SETTLE PROPERLY."
870      A1=20
880      I=1
890      Return
900      Rem                                PRINT SETTLING TIME
910      If a=1 then goto 940
920      Print "POSITIVE SETTLING TIME IS ";i*s+1-s;" uS."
930      Return
940      Print "NEGATIVE SETTLING TIME IS ";i*s+1-s;" uS."
950      Return
960      Rem                                SRQ HANDLER
970      Poll x,y;24;23
980      If y=65 or y=98 then goto 1000
990      Print x,y
1000     Return
1010     Goto the_end
1020 The_end:      end

```

# SETTLING TIME VERIFICATION PROGRAM 4041

```

1      Gosub init_r
2      Rem                               M41A(X) SETTLING TIME                DF   6-2-83
4      Key_1:  ! page
5      Goto 100
100     Init all
110     Enable keys
120     On sra then gosub 10000
125     Enable sra
130     E=0
140     Dim t(1000)
150     T=0
160     Print "TURN ON TEST SYSTEM AND WAIT FOR POWER UP SELF TESTS TO BE ";
170     Print "COMPLETED."
180     Print "SET VOLTAGE CALIBRATOR OUTPUT VOLTAGE TO GIVE A FULL SCALE ";
190     Print "OUTPUT FROM THEM41A1-8 FOR THE GAIN (1 TO 100) AND ";
200     Print "COMPLIANCE (1 VOLT OR 10 VOLTS) SETBY THE INTERNAL JUMPERS.";
210     Print "  A 1000X ATTENUATOR CAN BE USEFUL."
220     Print "          PRESS [RETURN] TO CONTINUE."
230     Input a$
240     Rem      INIT SETUP FG5010          ADDRESS #24
250     Print #24:"INIT;FREQ 2E3;AMPL 5;OFFSET 2.5;SYM 50;NBURST 1000"
260     Print #24:"FUNC SQ"
270     Rem      INIT SETUP MI5010  ADD #23  50M41#1 50M10#2 50M50#3
280     Print #23:"INIT;CLO 1;OUT AMP;FILT ON"
290     Print #23:"SEL 3;ABORT;PURGE;CRE TIME,2000;"
300     Wait 1
310     Print #24:"MODE BURST;OUT ON"
320     Wait 1
330     Print #23:"ATT TIME,1,ADC;START;SEL 2;EXT ON"
340     Wait 1
350     Print #24:"MTRIG"
360     F1=0
370     Gosub 390
380     Goto 610
390     If e<>200 then goto 390
400     E=0
410     Print #23:"SEL 2;EXT OFF;SEL 3;SEND TIME,BIN16"
420     Input #23:t
430     L=0
440     For i=991 to 1000 step 1
450         L=L+t(i)
460     Next i
470     L=int(L/10+0.5)
490     For i=1000 to 1 step -1
500         If t(i)<1+20 and t(i)>1-20 then goto 560
510         If f1=1 then goto 540
520         Print "SETTLING TIME FILTER ON IS ";int(i*0.5+0.6)*1.4;" mS."
530         Goto 550
540         Print "SETTLING TIME FILTER OFF IS ";1.4*(i*0.2+0.8);" uS."
550         I=0

```

# SETTLING TIME VERIFICATION PROGRAM 4041

```

560     Next i
590     Return
610     Print " PRESS [RET] FOR TIME WITHOUT FILTER"
620     Input a$
630     Rem                               TIME WITHOUT FILTER
640     T=0
650     F1=1
660     Print #24:"MODE TRIG"
670     Print #23:"SEL 1;FILT OFF;SEL 2;EXT ON;SEL 3;ATT TIME,1,ADC;START"
680     For i=1 to 201 step 0.2
690         Z=1/(2*i)*10^6
700         F=int(z*10^(3-int(1st(abs(z))))+0.5)*10^-(3-int(1st(abs(z))))
710         Print #24:"FREQ ";f
720         Wait 0.01
730         Print #24:"MTRIG"
740         Next i
750         Wait 1
760         Gosub 390
780         If I<2048 then goto 810
790         Print "REPEAT TEST WITH NEGATIVE VOLTAGE INPUT."
800         Goto 990
810         Print "UNLESS ALREADY TESTED REPEAT TEST WITH POSITIVE VOLTAGE INPUT."
990         Goto the_end
10000    Rem                               SRQ ROUTINE
10010    E=0
10020    Poll y,x
10030    If y=65 or y=81 then goto 10150
10050    If x=24 then goto 10120
10060    Print #23:"ERR?"
10070    Input #23:a$
10080    E=val(a$)
10090    If e=200 then goto 10150
10100    Print "MI5010 REPORTS ";a$
10110    Goto 10150
10120    Print #24:"ERR?"
10130    Input #24:a$
10140    Print "FG5010 REPORTS ";a$
10150    Resume
10170    Print "input address to talk to (23 or 24). ";
10180    Input a
10190    Print "input message when > is seen."
10200    On sra then gosub 10000
10210    Enable sra
10220    Print "> ";
10230    Input s$
10240    P=pos(s$,"?",1)
10250    P1=pos(s$,"SEND",1)

```

# SETTLING TIME VERIFICATION PROGRAM 4041

```
10260      Print #a:s$
10270      If p=0 and p1=0 then goto 10220
10280      Input #a:a$
10290      Print "@    ";a$
10300      Goto 10220
10302 Init_r:  ! first code executed
10303      On key(1) then gosub key_1
10318      Return
10319 The_end:      end
```



## Replaceable Parts

## CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

| Mfr. Code | Manufacturer                                                                      | Address                          | City, State, Zip           |
|-----------|-----------------------------------------------------------------------------------|----------------------------------|----------------------------|
| 00779     | AMP, INC.                                                                         | P.O. BOX 3608                    | HARRISBURG, PA 17105       |
| 04713     | MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.                                          | 5005 E MCDOWELL RD, PO BOX 20923 | PHOENIX, AZ 85036          |
| 05574     | VIKING INDUSTRIES, INC.                                                           | 21001 NORDHOFF STREET            | CHATSWORTH, CA 91311       |
| 15238     | ITT SEMICONDUCTORS, A DIVISION OF INTER<br>NATIONAL TELEPHONE AND TELEGRAPH CORP. | P.O. BOX 168, 500 BROADWAY       | LAWRENCE, MA 01841         |
| 17856     | SILICONIX, INC.                                                                   | 2201 LAURELWOOD DRIVE            | SANTA CLARA, CA 95054      |
| 22526     | BERG ELECTRONICS, INC.                                                            | YOUK EXPRESSWAY                  | NEW CUMBERLAND, PA 17070   |
| 32997     | BOURNS, INC., TRIMPOT PRODUCTS DIV.                                               | 1200 COLUMBIA AVE.               | RIVERSIDE, CA 92507        |
| 56289     | SPRAGUE ELECTRIC CO.                                                              | 87 MARSHALL ST.                  | NORTH ADAMS, MA 01247      |
| 59660     | TUSONIX INC.                                                                      | 2155 N FORBES BLVD               | TUCSON, AZ 85705           |
| 79136     | WALDES, KOHINOOR, INC.                                                            | 47-16 AUSTEL PLACE               | LONG ISLAND CITY, NY 11101 |
| 80009     | TEKTRONIX, INC.                                                                   | P O BOX 500                      | BEAVERTON, OR 97077        |
| 83385     | CENTRAL SCREW CO.                                                                 | 2530 CRESCENT DR.                | BROADVIEW, IL 60153        |
| 91637     | DALE ELECTRONICS, INC.                                                            | P. O. BOX 609                    | COLUMBUS, NE 68601         |

## Replaceable Electrical Parts

| Ckt No. | Tektronix<br>Part No. | Serial/Model No.<br>Eff      Dscont | Name & Description                        | Mfr<br>Code | Mfr Part Number  |
|---------|-----------------------|-------------------------------------|-------------------------------------------|-------------|------------------|
|         | 670-8548-00           |                                     | CKT BOARD ASSY:SETTLING TIME              | 80009       | 670-8548-00      |
| C1000   | 283-0111-00           |                                     | CAP.,FXD,CER DI:0.1UF,20%,50V             | 56289       | 273C11           |
| C1001   | 283-0111-00           |                                     | CAP.,FXD,CER DI:0.1UF,20%,50V             | 56289       | 273C11           |
| C1002   | 283-0111-00           |                                     | CAP.,FXD,CER DI:0.1UF,20%,50V             | 56289       | 273C11           |
| C1010   | 283-0111-00           |                                     | CAP.,FXD,CER DI:0.1UF,20%,50V             | 56289       | 273C11           |
| C1020   | 283-0054-00           |                                     | CAP.,FXD,CER DI:150PF,5%,200V             | 59660       | 855-535U2J0 151J |
| P1020   | 131-0993-00           |                                     | BUS,CONDUCTOR:2 WIRE BLACK                | 00779       | 850100-01        |
| P1040   | 131-0993-00           |                                     | BUS,CONDUCTOR:2 WIRE BLACK                | 00779       | 850100-01        |
| P1050   | 131-0993-00           |                                     | BUS,CONDUCTOR:2 WIRE BLACK                | 00779       | 850100-01        |
| P1060   | 131-0993-00           |                                     | BUS,CONDUCTOR:2 WIRE BLACK                | 00779       | 850100-01        |
| R1020   | 321-0313-00           |                                     | RES.,FXD,FILM:17.8K OHM,1%,0.125W         | 91637       | MFF1816G17801F   |
| R1030   | 321-0631-00           |                                     | RES.,FXD,FILM:12.5K OHM,1%,0.125W         | 91637       | MFF1816G12501F   |
| R1040   | 311-1227-00           |                                     | RES.,VAR,NONWIR:5K OHM,20%,0.50W          | 32997       | 3386F-T04-502    |
| U1000   | 156-1236-00           |                                     | MICROCKT,INTFC:DUAL SPST ANALOG SWITCH    | 17856       | SDG18138         |
| U1010   | 156-2023-00           |                                     | MICROCKT,DI:DUAL MONOSTABLE RETRIGGERABLE |             |                  |
| VR1000  | 152-0520-00           |                                     | SEMICONV DEVICE:ZENER,1W,12V,5%           | 15238       | Z6033            |
| VR1010  | 152-0520-00           |                                     | SEMICONV DEVICE:ZENER,1W,12V,5%           | 15238       | Z6033            |
| VR1020  | 152-0772-00           |                                     | SEMICONV DEVICE:ZENER,SI,5.6V,5%,1.0W     | 04713       | 1N4734A          |

# Replaceable Mechanical Parts

| Fig. &<br>Index<br>No. | Tektronix<br>Part No. | Serial/Model No.<br>Eff | Dscont | Qty | 1 | 2 | 3 | 4 | 5 | Name & Description                        | Mfr<br>Code | Mfr Part Number |
|------------------------|-----------------------|-------------------------|--------|-----|---|---|---|---|---|-------------------------------------------|-------------|-----------------|
|                        | 129-0647-00           |                         |        | 2   |   |   |   |   |   | SPACER,POST:0.205 L,W/4-40 THRU THD,BRS   | 80009       | 129-0647-00     |
|                        | 131-0608-00           |                         |        | 46  |   |   |   |   |   | TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD  | 22526       | 47357           |
|                        | 131-3082-00           |                         |        | 1   |   |   |   |   |   | CONN,RCPT,ELEC:EDGE CARD                  | 05574       | ORD BY DESCR    |
|                        | 200-2882-00           |                         |        | 1   |   |   |   |   |   | COVER,BOTTOM:                             | 80009       | 200-2882-00     |
|                        | 200-2883-00           |                         |        | 1   |   |   |   |   |   | COVER,TOP:                                | 80009       | 200-2883-00     |
|                        | 200-2900-00           |                         |        | 1   |   |   |   |   |   | COVER,FRONT:                              | 80009       | 200-2900-00     |
|                        | 211-0008-00           |                         |        | 10  |   |   |   |   |   | SCREW,MACHINE:4-40 X 0.250,PNH,STL,POZ    | 83385       | ORD BY DESCR    |
|                        | 211-0105-00           |                         |        | 2   |   |   |   |   |   | SCREW,MACHINE:4-40 X 0.188,100 DEG,FLH ST | 83385       | ORD BY DESCR    |
|                        | 214-3493-00           |                         |        | 1   |   |   |   |   |   | THUMBSCREW:4-40 X 3.96,0.25 OD            | 80009       | 214-3493-00     |
|                        | 342-0658-00           |                         |        | 1   |   |   |   |   |   | INSUL,BOT COVER:                          |             |                 |
|                        | 354-0324-00           |                         |        | 1   |   |   |   |   |   | RING,RETAINING:E SHAPE,0.102 ID X 0.270   | 79136       | 5133-14-MD      |
|                        | 386-5071-00           |                         |        | 1   |   |   |   |   |   | PLATE,FRONT:                              | 80009       | 386-5071-00     |
|                        | 386-5107-00           |                         |        | 1   |   |   |   |   |   | PLATE,REAR:                               | 80009       | 386-5107-00     |
|                        |                       |                         |        |     |   |   |   |   |   | STANDARD ACCESSORIES                      |             |                 |
|                        | 061-2922-00           |                         |        | 1   |   |   |   |   |   | MANUAL,TECH:INSTR                         | 80009       | 061-2922-00     |
|                        | 062-7125-00           |                         |        | 1   |   |   |   |   |   | TAPE,PROGRAMMED                           | 80009       | 062-7125-00     |



