FLUKE

7405A-4207T AC Divider Instruction Sheet

DESCRIPTION

The 7405A-4207T AC Divider is a precision 1000X attenuator. It attenuates input signals in the frequency range of dc to 50 kHz. The maximum input voltage is 20V ac. When a procedure calls for a system (7457-XXX Series) output of less than 20 mV ac, the system automatically prompts the user to install the AC Divider. The system then programs the required stimulus output to obtain the necessary signal after it has been divided by 1000. Figure 1 shows the AC Divider.

The AC Divider can be used with any instrument that has an input resistance of at least 1 MΩ and a capacitive load of 100 pF or less. Other instruments may be used, but at degraded specifications.

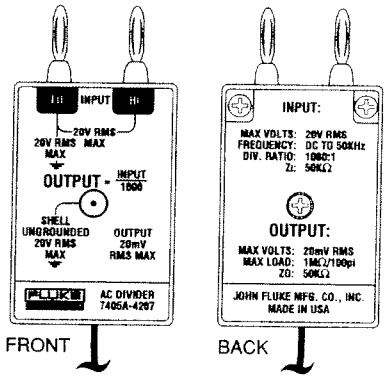


Figure 1. 7405A-4207T AC Divider

THEORY OF OPERATION

The AC Divider attenuates the input signal by 1000 using the precision divider R1 and R2. Diodes CR1 through CR4 prevent the input voltage to the divider from exceeding 39 volts. Figure 2 is a schematic of the AC Divider.

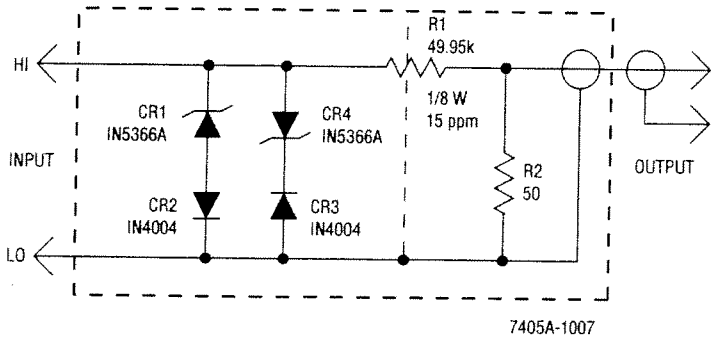


Figure 2. 7405A-4207T AC Divider Schematic

SPECIFICATIONS

Refer to Table 1 for 7405A-4207T AC Divider specifications.

Table 1. Specifications

INPUT RANGE	OUTPUT RANGE	RESOLUTION
100 mV to 200 mV 0.2V to 2V 2V to 20V	100 µV to 200 µV 0.2 mV to 2 mV 2 mV to 20 mV	1 nV 10 nV 100 nV

ACCURACY +/-(% of OUTPUT + FLOOR[1])	TEMPERATURE COEFFICIENT[2] ADD TO ACCURACY LIMITS +/-(PPM OF OUTPUT + FLOOR)°C	MAXIMUM LOAD
0.5% + floor[1], 50 Hz to 50 kHz 0.25% + floor[1], 50 HZ TO 10 kHz 0.3% + floor[1], 10 kHz to 50 kHz	50 ppm + .4 nV 50 ppm + 4 nV 50 ppm + 40 nV	1 MΩ, 100 pF (50Ω output impedance)

1: Floor can be less than 1 µV when proper means are taken to minimize ground current errors.

2: 10°C to 18°C and 28°C to 40°C.

Frequency Accuracy: +/- 3%

Frequency Resolution: 1 MSD

VERIFICATION

The following paragraphs describe the equipment required and the steps that are necessary to verify that the AC Divider meets specifications.

Division Ratio

(1000 to 1) 100 mV to 200 mV input level
Output Accuracy: ± (0.5% + floor), 50 Hz to 50 kHz

NOTE

The floor can be less than 1 µV when proper means are taken to minimize ground current errors.

0.2V to 20V input level
Output Accuracy: ± (0.25% + floor), 50 Hz to 10 kHz; ± (0.3% + floor), 10 kHz to 50 kHz)

Equipment Required

- Fluke 5700A Calibrator — 20V @ 50 Hz ± 0.03%
1 kHz ± 0.03%
10 kHz ± 0.03%
20 kHz ± 0.03%
50 kHz ± 0.04%
- Fluke FTE-1723 AC Divider or equivalent — 1000:1 division ratio
DC-10 kHz ±0.016%
10 kHz-20 kHz ±0.024%
20 kHz-50 kHz ±0.028%
- Fluke 931B-01 RMS Differential Voltmeter

Before Verification

NOTE

It is recommended that the following verification procedure is performed by a Fluke Service Center.

Before starting the verification process, read through the entire calibration procedure contained the following paragraphs.

CAUTION

Make sure that all test equipment voltage outputs are set to zero (0) or turned OFF. Make sure that all equipment switches are set to the proper position before making connections or applying power.

1. Connect the test equipment to the proper power source and allow the recommended warm-up time.

2. Allow the UUT to acclimatize to the verification temperature for a minimum of one hour before performing this procedure.

Verification Procedure

1. Connect the FTE-1723 OUTPUT to the 931B INPUT. (Make sure that the power cord is removed and that the 931B is operating on batteries.) Connect the OUTPUT of the 5700A to the FTE-1723 INPUT. Refer to Figure 3.

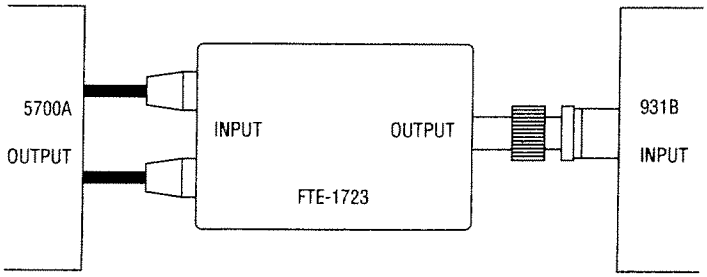


Figure 3. FTE-1723 Connection

2. Set the 931B RANGE to 100 mV, differential dials to 20.000, MODE to TVM.

3. Program the 5700A for an output of 20 volts, 50 Hz, OPERATE.

4. Rotate the MODE switch to the "NULL 10%." Adjust the differential dials for a null. Repeat for each successively smaller null range until a final null is reached on the .1% range. Record this value in the Test Record (Table 2) for future reference as "931B Characterized Value, 20 mV, 50 Hz." Return the 931B MODE switch to TVM.

5. Program the 5700A for an output of 20 volts, 1 kHz.

6. Repeat step 4, recording the value in Table 2 as "931B Characterize Value, 20 mV, 1 kHz."

7. Program the 5700A for an output of 20 volts, 10 kHz.

8. Repeat step 4, recording the value in Table 2 as "931B Characterized Value, 20 mV, 10 kHz."

9. Program the 5700A for an output of 20 volts, 20 kHz.

10. Repeat step 4, recording the value in Table 2 as "931B Characterized Value, 20 mV, 20 kHz."

11. Program the 5700A for an output of 20 volts, 50 kHz.

12. Repeat step 4, recording the value in Table 2 as "931B Characterized Value, 20 mV, 50 kHz."

13. Set the 5700A to STBY. Disconnect the FTE-1723 from the 5700A and the 931B. Connect the UUT INPUT to the 5700A OUTPUT, observing the polarity. Connect the UUT OUTPUT BNC to the 931B INPUT. Refer to Figure 4.

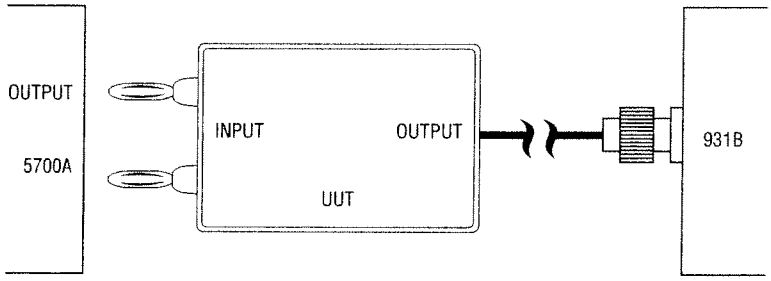


Figure 4. UUT Connection

14. Program the 5700A for an output of 20 volts, 50 Hz, OPERATE.

15. Set the 931B differential dials for the "931B Characterized Value, 20 mV, 50 Hz," shown in Table 2.

16. Reduce the 931B MODE switch until the largest on-scale meter indication is obtained. The meter must indicate 0 ± 0.25%. Record this value in Table 2 "Output Ratio Accuracy - 50 Hz." Return the 931B MODE switch to TVM.

17. Repeat steps 14 through 16 for frequencies of 1 kHz and 10 kHz.

18. Program the 5700A for an output of 20 volts, 20 kHz.

19. Set the 931B differential dials for the "931B Characterized Value, 20 mV, 20 kHz," in Table 2.

20. Reduce the 931B MODE switch until the largest on-scale meter indication is obtained. The meter must indicate 0 ± 0.3%. Record this value in Table 2 "Output Ratio Accuracy - 20 kHz." Return the 931B MODE switch to TVM.

21. Repeat steps 18 through 20 for a frequency of 50 kHz.

22. Set the 5700A to STBY.

23. Disconnect all equipment. This concludes the procedure.

Table 2. Performance Test Record

931B CHARACTERIZED VALUE (20 mV)	RECORDED VALUE
50 Hz 1 kHz 10 kHz 20 kHz 50 kHz	
OUTPUT RATIO ACCURACY	**RECORDED VALUE**
50 Hz 1 kHz 10 kHz 20 kHz 50 kHz	

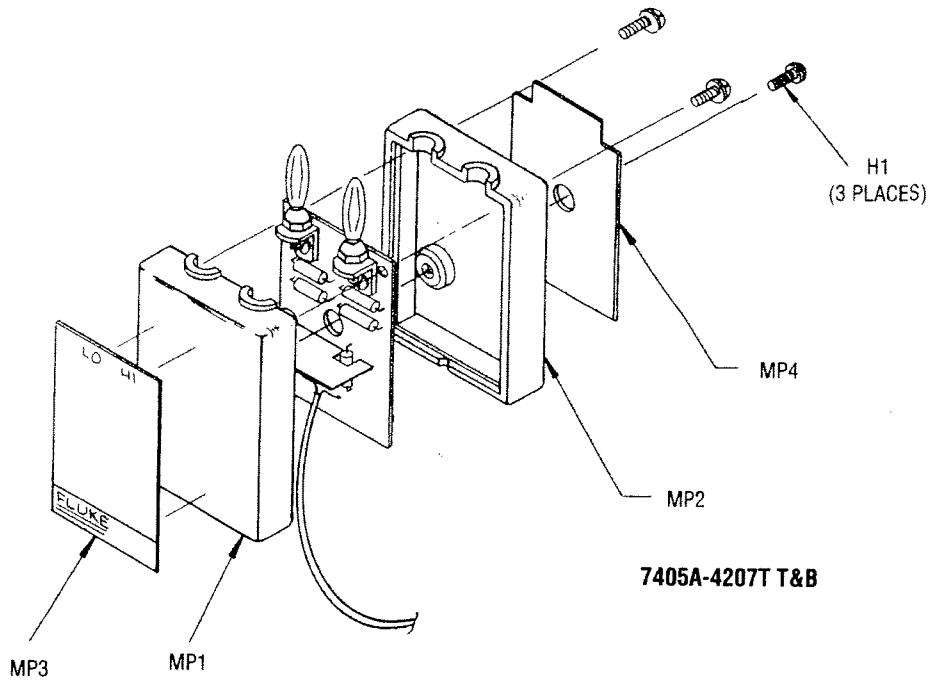
LIST OF REPLACEABLE PARTS

Table 3 is a list of the replaceable parts for the 7405A-4207T AC Divider. To order replaceable parts in USA, call 1-800-526-4731. To order outside the USA, contact the nearest Service Center. Figure 5 shows the location and reference designators of the parts in Table 3.

Table 3. List of Replaceable Parts
(See Figure 5.)

REF DES	DESCRIPTION	FLUKE STOCK NO	MFRS SPLY CODE	MANUFACTURERS PART NUMBER OR GENERIC TYPE	TOT QTY
CR1, 4	ϟ ZENER,UNCOMP,39.0V,10%,30.0MA,5.0W	536151	04713	1N5366B	2
CR2, 3	DIODE,SI,400 PIV,1.0 AMP	368738	04713	1N4004	2
E1, 2	TERM,UNINSUL,FEEDTHRU,HOLE,TURRET	179283	88245	2010B-5	2
H1	SCREW,PH,P,THD CUT,SS,4-24,.375	183574		COMMERCIAL	3
H2	RIVET,S-TUB,OVAL,STL,.118,.156	103424	12014	CUP-07826-014-0.146	2
H3	WASHER,LOCK,SPLIT,STL,.141,.266,.031	110692	86928	5850-6-3	2
MP1	HOUSING,TOP,MEDIUM PUTTY GRAY	527739	89536	527739	1
MP2	HOUSING,BOTTOM,MEDIUM PUTTY GRAY	527747	89536	527747	1
MP3	FRONT DECAL,AC DIVIDER	535948	89536	535948	1
MP4	REAR DECAL,AC DIVIDER	535955	89536	535955	1
MP5	BRACKET,RIGHT ANGLE,TAPPED,BRASS,6-32	404525	73734	36-510	2
MP6	BANANA PLUG,PANEL	352716	71002	400	2
MP7	SHIELD,AC DIVIDER	544759	89536	544759	1
MP8	CABLE ACCESS,TIE,4.00L,.10W,.75 DIA	172080	06383	SST-1M	1
R1	RES,MF,49.95K,+-0.05%,0.125W,15PPM	519371	91637	PTF-5649R95F T-10	1
R2	RES,MF,50,+-0.05%,0.125W,15PPM	500264	91637	PTF-56 50R F T-10	1
TM1	AC DIVIDER INSTRUCTION SHEET	881826	89536	881826	1
W1	CABLE ASSY, AC DIVIDER	544551	89536	544551	1

ϟ Indicates a static-sensitive part.



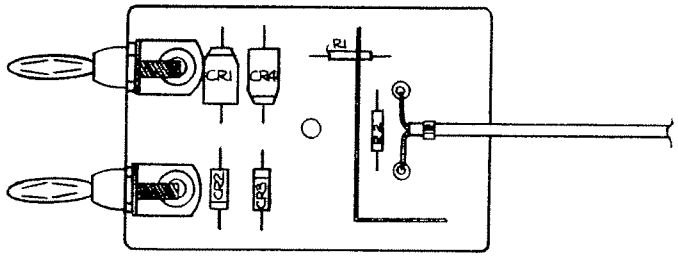


Figure 5. 7405A-4207T AC Divider Parts Location

DOMESTIC SERVICE CENTERS

John Fluke Mfg. Co.
Fremont, CA 94538
TEL: (415) 651-5112

John Fluke Mfg. Co.
Palatine, IL 60067
TEL: (312) 705-0500

John Fluke Mfg. Co.
Paramus, NJ 07652
TEL: (201) 599-9500

John Fluke Mfg. Co.
Everett, WA 98203
TEL: (206) 356-5560

PN 881826
FEBRUARY 1992

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From koeman Fri Jul 23 08:11:37 1993
Received: by boris.tc.fluke.COM (version 2.52)
        for scotty
        id AA24489; Fri, 23 Jul 93 08:11:35 PDT
Message-Id: <9307231511.AA24489@boris>
Date: Fri, 23 Jul 93 08:11:35 PDT
Return-Path: <koeman>
From: koeman (Henriecus Koeman)
To: nicholas, scotty
Subject: Cleaning up
Status: R


You might be interested in the following information. I am cleaning
up my metcal account ....

Specifications of the 7405A-4207 AC Divider, JF P/N 544510

The 7405A-4207 Specifications are as follows:

Divider ratio            :       1000:1
Input impedance          :       50 kOhms
Output impedance         :       50 Ohms
Maximum input voltage    :       20V
Frequency range          :       DC - 50kHz
Accuracy                 :       6 months, 23 +/- 5 C
                         :       0.07%           (AC only)
                         :       0.07% + 5 uV    (DC only)
Temperature Coefficient  :       25 ppm /C

Accuracy verification procedure.
        Accuracy verification occurs by applying 19V DC to the
        input of the 7405A-4207 AC Divider from the 5100B,
        enhanced by the 8506A and thereafter measuring the divided
        output with  the Fluke 8506A voltmeter. The following
        detailed steps should be followed to eliminate offset
        measurement errors:

        1. Short the input of the 8506A voltmeter and zero
           the offset to zero.
        2. Connect the input of the 7405A-4207 AC Divider
           to the Output of the 5100B and connect the output
           of the AC Divider to the 8506A Voltmeter.
        3. Apply 0 Volts from the 5100B and measure the
           voltage by the 8506A, the offset voltage should be
           below 5uV.
        4. Disconnect the 8506A voltmeter from the divider
           output and reconnect to the output of the 5100B
           for accuracy enhancement.
           Apply now 19V DC from the 5100B (so that the 8506A
           reads exactly 19V) to the input of the 7405A-4207
           AC Divider and measure the result again.
        5. Subtract the offset measured during step (2).
           Its result should be within 0.07% or 13.3uV of
           19mV, which is between 18.986.7 and 19.0133mV.
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