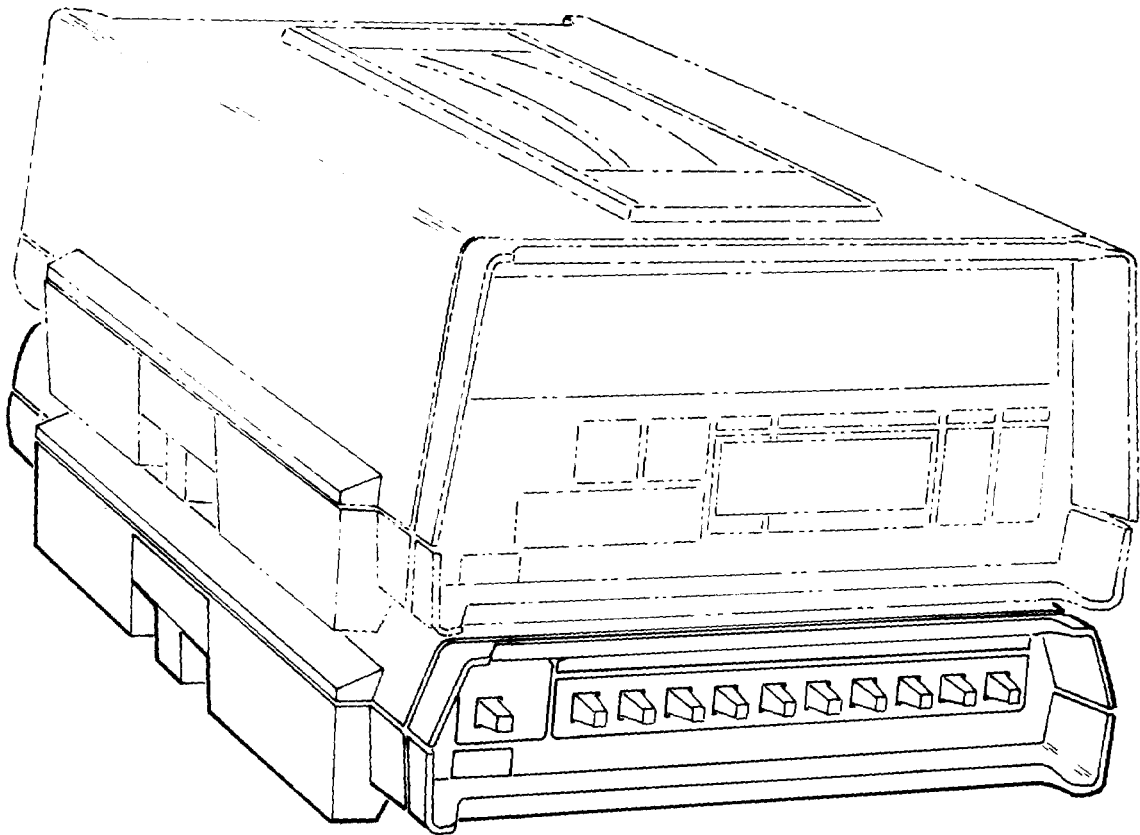


Y2001



# Instruction Manual

## Model Y2001 Thermocouple Multipoint Selector



P/N 489245

June 1978

# LIMITED WARRANTY

The JOHN FLUKE MFG. CO., INC., warrants each instrument it manufactures to be free from defects in material and workmanship under normal use and service for the period of one year from date of purchase. This warranty extends only to the original purchaser. This warranty shall not apply to fuses, disposable batteries (rechargeable type batteries are warranted for 90 days), or any product or parts which have been subject to misuse, neglect, accident or abnormal conditions of operations.

In the event of failure of a product covered by this warranty, John Fluke Mfg. Co., Inc., will repair and calibrate an instrument returned to an authorized Service Facility within one year of the original purchase; provided the warrantor's examination discloses to its satisfaction that the product was defective. The warrantor may, at its option, replace the product in lieu of repair. With regard to any instrument returned within one year of the original purchase, said repairs or replacement will be made without charge. If the fault has been caused by misuse, neglect, accident or abnormal conditions of operations, repairs will be billed at a nominal cost. In such case, an estimate will be submitted before work is started, if requested.

ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS SHALL BE LIMITED TO A PERIOD OF TWELVE MONTHS FROM THE DATE OF PURCHASE. THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS OR ADEQUACY FOR ANY PARTICULAR PURPOSE OR USE. JOHN FLUKE MFG. CO., INC. SHALL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, WHETHER IN CONTRACT, TORT OR OTHERWISE.

NOTE: Some states do not allow limitations on how long an implied warranty lasts, or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

**If any fault develops, the following steps should be taken:**

1. Notify the John Fluke Mfg. Co., Inc. or nearest Service facility, giving full details of the difficulty, and include the Model number, type number, and serial number. On receipt of this information, service data or shipping instructions will be forwarded to you.
2. On receipt of the shipping instructions, forward the instrument, transportation prepaid. Repairs will be made at the Service Facility and the instrument returned, transportation prepaid.

## **SHIPPING TO MANUFACTURER FOR REPAIR OR ADJUSTMENT**

All shipments of John Fluke Mfg. Co., Inc., instruments should be made via United Parcel Service or "Best Way" prepaid. The instrument should be shipped in the original packing carton; or if it is not available, use any suitable container that is rigid and of adequate size. If a substitute container is used, the instrument should be wrapped in paper and surrounded with at least four inches of excelsior or similar shock-absorbing material.

## **CLAIM FOR DAMAGE IN SHIPMENT TO ORIGINAL PURCHASER**

The instrument should be thoroughly inspected immediately upon original delivery to purchaser. All material in the container should be checked against the enclosed packing list. The manufacturer will not be responsible for shortages against the packing sheet unless notified immediately. If the instrument is damaged in any way, a claim should be filed with the carrier immediately. (To obtain a quotation to repair shipment damage, contact the nearest Fluke Technical Center.) Final claim and negotiations with the carrier must be completed by the customer.

The John Fluke Mfg. Co., Inc. will be happy to answer all application or use questions, which will enhance your use of this instrument. Please address your requests or correspondence to: JOHN FLUKE MFG. CO., INC., P.O. Box 43210, MOUNTLAKE TERRACE, WASHINGTON 98043, Atten: Sales Dept. For European Customers: FLUKE (Nederland) B.V., Zevenheuvelenweg 53, Tilburg, The Netherlands.

\* For European customers, Air Freight prepaid.

**John Fluke Mfg. Co., Inc. • P.O. Box 43210 • Mountlake Terrace, Washington 98043**

## INTRODUCTION

The Model Y2001 Thermocouple Multipoint Selector is a manually switched scanner that allows selection of one of ten thermocouple inputs to be displayed by the 2190A Digital Thermometer. The Y2001 inputs are divided into two groups of five each so that two different types of thermocouple probes may be monitored. Two or more Model Y2001's can be stacked in a serial configuration when requirements for more than ten thermocouple probes exist.

## SPECIFICATIONS

Specifications for the Y2001 Thermocouple Multipoint Selector are as follows:

The Y2001 does not deteriorate the accuracy or other characteristics of the 2190A. Each channel read will be identified by number when a digital printer is used with the 2190A with Option 21X0-002.

**Number of Channels:** Ten, up to 100 with more than one Y2001.

**Thermocouple Types Accommodated:** Seven, five per 2190A. See 2190A accuracy table.

**Thermocouple Types Selectable:** Two, five channels per type.

**Maximum Voltage Between Channels:** 125V ac rms.  
**Power:** 25 mW, supplied by 2190A.

**TempPak Bus:** Rear panel receptacle plus 46 cm cable with connector.

**Size and Weight:** Style A case, 1.6 kg (3 lbs. 7 oz.), typical.

## INSTALLATION

The Y2001 is installed by attaching it to the Accessory Bus and Thermocouple Input connections, using the permanently attached cables for the accessory bus and the thermocouple. If the unit is being used in series with another multipoint selector or alarms accessory the permanently attached cables are connected to the previous unit in the series.

### NOTE

*If the Y2002 Accessory is used it must be connected between the 2190A Thermometer and the Y2001 Multipoint Selector accessory.*

If two or more multipoint selectors are used in a system with an Output Unit, Option 21X0-002, Channel MSD

assignment must be made to differentiate between the channels of subsequent units in the output message. This is done by removing the applicable diodes (CR1 through CR4) to assign an address in a BCD code. CR4 is removed for a count of 1X, CR3 for 2X, CR2 for 4X, and CR1 for 8X. Remove the applicable diodes for the channel number desired. Use the following procedure to install the multipoint selector:

1. On the bottom of the instrument remove the screws that attach the top cover to the case bottom and then lift the top cover away for access to the interior of the instrument.
2. If required, remove the applicable channel selection diodes.
3. Attach the input thermocouples to the input connectors and insure the wires exit through the access port.

### NOTE

*Only two types of thermocouples may be connected to any multipoint selector and all points within a group, i.e., 0 through 4 and 5 through 9, must be of the same type.*

4. Set the thermocouple type select switches to the number on the table beside the switches corresponding to the thermocouple type installed on the applicable bank.
5. Replace the top cover and reattach it to the bottom with the screws.
6. Connect the permanently attached accessory bus cable and thermocouple wires to the 2190A inputs, or, if installed, the Y2002 or previously installed Y2001.

## OPERATING FEATURES

The controls on the Y2001 front panel, as shown in Figure 1, consist of ten individual channel selectors (0 through 9) and an EXTENSION switch. EXTENSION is selected when a channel in another Y2001 in the chain is selected. The CHANNEL switches select the thermocouple probe to input temperature data to the thermometer and no more than one can be selected at any time.

## OPERATING NOTES

The following subparagraphs describe conditions that should be considered before operating the Y2001 Multipoint Selector.

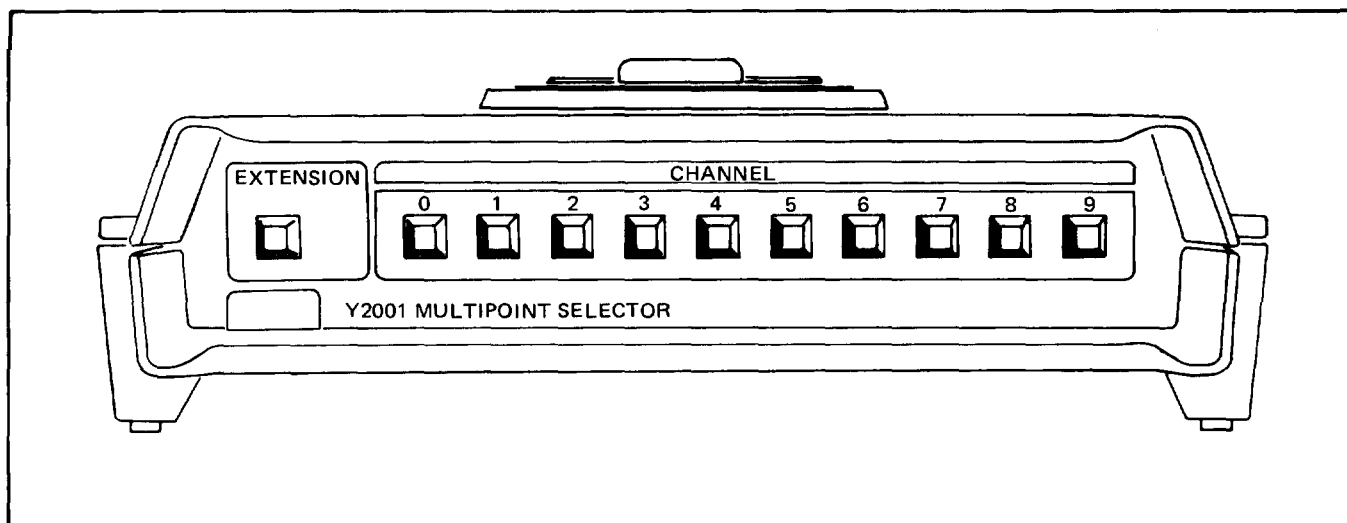


Figure 1. Front Panel

## Input/Output Connections

### WARNING

**THE INTERIOR OF Y2001 SHOULD BE ACCESSED ONLY BY QUALIFIED PERSONNEL. LETHAL VOLTAGE MAY EXIST ON EXPOSED INPUT/OUTPUT TERMINALS DUE TO COMMON-MODE PROBE VOLTAGES.**

Thermocouple inputs to the unit are on screw type terminals, two per input. They are accessible when the top cover is removed. Each pair (positive and negative) are marked with polarity and channel number (LSD if two or more units are used). The pairs are divided into two groups of five, each with a thermocouple type select switch. All inputs within a group must be of the same thermocouple type.

Two additional terminals are provided adjacent to the rear panel for the inputs from succeeding units. The accessory bus input from succeeding units is a 25-pin connector located at the center of the rear panel.

Outputs from the unit are on wires and a cable that are permanently attached to the unit pcb. Two wires are available for thermocouple inputs to the thermometer or any previous instrument in a series. The accessory bus is on a 25-wire flat cable with a standard 25-pin connector attached for connection to the thermometer or a previous instrument in the series.

### Guard Circuit

Each of the input/output circuits in the instrument are guarded to prevent errors from interchannel leakage

currents. The currents result from common-mode voltages at the input terminals, and are absorbed by the guard. To comply with IEC land spacing specifications the voltage differential between pairs of channels should not exceed 184V dc and 125V ac (rms).

## OPERATION

Operate the multipoint selector accessory using the following procedure:

1. Verify the Y2001 has been properly connected into the system using the procedure previously described.
2. Energize the 2190A Digital Thermometer.
3. Install the thermocouple probes into their operating environment.

### NOTE

*If more than one Y2001 is installed in series, verify the EXTENSION switch is depressed in all units except the unit to which the desired test thermocouple is attached. If more than one EXTENSION switch is extended (switch out) the selected channel on the first Y2001 in the series is the channel read and displayed.*

4. Select the channel corresponding to the desired thermocouple.
5. Monitor the thermocouple output on the 2190A Digital Thermometer.

## THEORY OF OPERATION

Circuitry for the multipoint selector consists of an analog and a digital section. Each of these sections is covered in separate subparagraphs below.

### Analog Section

The analog section consists of the ten manual CHANNEL selection switches, the EXTENSION switch and the reference junction compensation (isothermal block) circuit. Closing one of the six pole, double throw CHANNEL switches automatically cancels any switch previously closed and connects the applicable channel terminals to the J8 Output Terminals. At the same time, a ground is applied from the closed CHANNEL switch to the digital section. The EXTENSION switch completes the circuit for the isothermal block transistor when open (out) and connects the input terminals to the output terminals when closed (in).

The thermometer uses the multipoint selectors isothermal block circuit when it is selected instead of its own. This allows the Y2001 to be connected to the thermometer with copper wire and eliminates the possibility of temperature gradient errors between the selected terminal block and the reference compensation circuit.

The guard circuit eliminates the possibility of inter-channel leakage to insure the integrity of the individual thermocouple voltage levels that pass through the unit. This leakage could otherwise result from the presence of common-mode voltages between the channels.

### Digital Section

Before the thermometer can communicate with the multipoint selector it must address it on the accessory bus. When the  $\overline{\text{WRTADR}}$  line is low it enables U8-4 so

that the repetitive  $\overline{\text{DCLK}}$  pulses can clock the address on the  $\overline{\text{DATA}}$  line into the shift register U7. If the decoder four bit address at U10-13 is low it enables U11-2 on the output gate in preparation of outputting data to the bus from the multipoint selector.

After the accessory has been addressed both  $\overline{\text{WRTADR}}$  and  $\overline{\text{WRT}}$  go high for a low at U10-1 to enable U8-1 and U11-1. U8-3 now toggles with  $\overline{\text{DCLK}}$  and moves the data in the shift registers U3 and U4 onto the  $\overline{\text{DATA}}$  line for transfer to the thermometer. U4 is loaded with the BCD channel number LSD at pin 4 (MSD), 5, 6, and 7, and the BCD channel number MSD at pins 1 (MSD), 15, 14, and 13. The channel number is decoded at the inputs to U11-10 to make that point go low for channels five through nine and remain high for channels zero through four. This is decoded by the settings of S1 and S2 to load the thermocouple type, as selected by the switches, into U3, Pins 5, 6, and 7.

## CALIBRATION

The Y2001 Multipoint Selector should be calibrated concurrently with the 2190A Digital Thermometer, i.e., either quarterly, annually, or when repairs have taken place. The procedure following assumes that the 2190A used has just completed calibration and is properly connected to the multipoint selector. The equipment required is listed in Table 1.

1. Remove the cover from the Y2001 Multipoint Selector.
2. Attach either a "J" or "K" type thermocouple to any channel on the multipoint selector and select the applicable switch setting.
3. Replace the cover on the Y2001.

Table 1. Calibration Equipment

| DEVICE                   | SPECIFICATIONS                            | MODEL                                        |
|--------------------------|-------------------------------------------|----------------------------------------------|
| J or K Type Thermocouple | Meets ANS Standard MC96.1                 | Fluke P20J or Fluke P20K                     |
| Dewar Flask/Cap          | 1 pint capacity                           | Thermos                                      |
| Mercury Thermometer      | 0.05°F Resolution or<br>0.02°C Resolution | Princo Model ASTM56F<br>Princo Model ASTM56C |
| Decade Resistor          | Accuracy: 1%<br>Ranges: 1k, 10k and 100k  | General Radio 1434                           |

Table 3. Troubleshooting (cont)

| STEP NO. | ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Go to the step number given for correct response |    |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|----|
|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | YES                                              | NO |
| 25       | <p>Rotate the Y2001 Thermocouple type select switch for bank 1 (channels 0-4) through its range. The 2190A display should read the ambient temperature for the thermocouple type connected, be blank for types not included in the program, and a different figure for each of the other four types selectable.</p> <p><b>NOTE</b></p> <p><i>The above step is testing switch operation only. The display for thermocouple types other than the one installed will be only approximations.</i></p> |                                                  |    |
| 26       | Connect the thermocouple to a channel in bank 2 (channels 5-9), select that channel and rotate the thermocouple type select switch through the thermocouple types, observing the display.                                                                                                                                                                                                                                                                                                          |                                                  |    |
| 27       | Is the display as stated through the range of both thermocouple type select switches?                                                                                                                                                                                                                                                                                                                                                                                                              | 32                                               | 28 |
| 28       | Check that U11-10 changes states when channel selection changes from one bank to the other. Check that U11-6 is of the opposite polarity and changes states at the same time.                                                                                                                                                                                                                                                                                                                      |                                                  |    |
| 29       | Are the signals correct at U11-10 and U11-6?                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 31                                               | 30 |
| 30       | Check U11, U8, U9, U6 and its inputs from the channel selection switches, and their associated components. Repair as required then resume at Step 24.                                                                                                                                                                                                                                                                                                                                              |                                                  |    |
| 31       | Check U1 and the thermocouple type select switches S1 and S2. Repair as required and resume at Step 24.                                                                                                                                                                                                                                                                                                                                                                                            |                                                  |    |
| 32       | Is the 2190A equipped with an Output Option -002?                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 33                                               | 36 |
| 33       | Obtain a printed output from the 2190A with channel selected in the Y2001.                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                  |    |
| 34       | Is the channel number printed correctly?                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 36                                               | 35 |
| 35       | If the channel LSD is incorrect check U4 and U6 including its inputs from the channel selector switches. If MSD is incorrect check U4 and the diode array (CR1, CR2, CR3, CR4). Repair as required then resume at Step 33.                                                                                                                                                                                                                                                                         |                                                  |    |
| 36       | Troubleshooting of the Y2001 Multi-point selector is complete.                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                  |    |

Table 4. Final Assembly

| ITEM NO. | DESCRIPTION                              | FLUKE STOCK NO. | MFG SPLY CODE | MFG PART NO. OR TYPE | TOT QTY | REC QTY | USE CDE |
|----------|------------------------------------------|-----------------|---------------|----------------------|---------|---------|---------|
| A1       | TC MULTIPOINT SELECTOR PCB ASSY          | 469411          | 89536         | 469411               | 1       |         |         |
| H1       | SCREW,FHP,6-32X5/8(FASTEN TOP TO BOTTOM) | 114876          | 89536         | 114876               | 4       |         |         |
| H2       | SCREW, FHP, 82 DEGREES COUNTERSUNK       | 484790          | 89536         | 484790               | 2       |         |         |
| H3       | SCREW                                    | 174391          | 89536         | 174391               | 1       |         |         |
| HB1      | INSTRUCTION MANUAL                       | 489245          | 89536         | 489245               | 1       |         |         |
| MP1      | DECAL, RETAINER                          | 473645          | 89536         | 473645               | 2       |         |         |
| MP2      | HANDLE                                   | 454751          | 89536         | 454751               | 1       |         |         |
| MP3      | RETAINER, HANDLE                         | 467563          | 89536         | 467563               | 2       |         |         |
| MP4      | GUARD, COVER A SIZE                      | 464198          | 89536         | 464198               | 1       |         |         |
| MP5      | COVER, A SIZE                            | 454710          | 89536         | 454710               | 1       |         |         |
| MP6      | INSULATOR, GUARD COVER                   | 488387          | 89536         | 488387               | 1       |         |         |
| MP7      | BASE, STANDARD                           | 454702          | 89536         | 454702               | 1       |         |         |
| MP8      | GUARD, BASE                              | 464404          | 89536         | 464404               | 1       |         |         |
| MP9      | REAR PANEL                               | 464446          | 89536         | 464446               | 1       |         |         |
| MP12     | LATCH                                    | 467548          | 89536         | 467548               | 2       |         |         |
| MP13     | BAIL                                     | 467555          | 89536         | 467555               | 1       |         |         |
| MP14     | FOOT, NONSKID                            | 467571          | 89536         | 467571               | 4       |         |         |
| MP16     | FRONT PANEL                              | 475293          | 89536         | 475293               | 1       |         |         |
| MP17     | FRONT PANEL DECAL                        | 454694          | 89536         | 454694               | 1       |         |         |
| MP18     | DECAL, BOTTOM                            | 473934          | 89536         | 473934               | 1       |         |         |
| MP19     | DECAL, BASE SIDES                        | 473652          | 89536         | 473652               | 2       |         |         |
| MP20     | GROMMET, BLACK, RUBBER                   | 380782          | 77969         | 68                   | 2       |         |         |

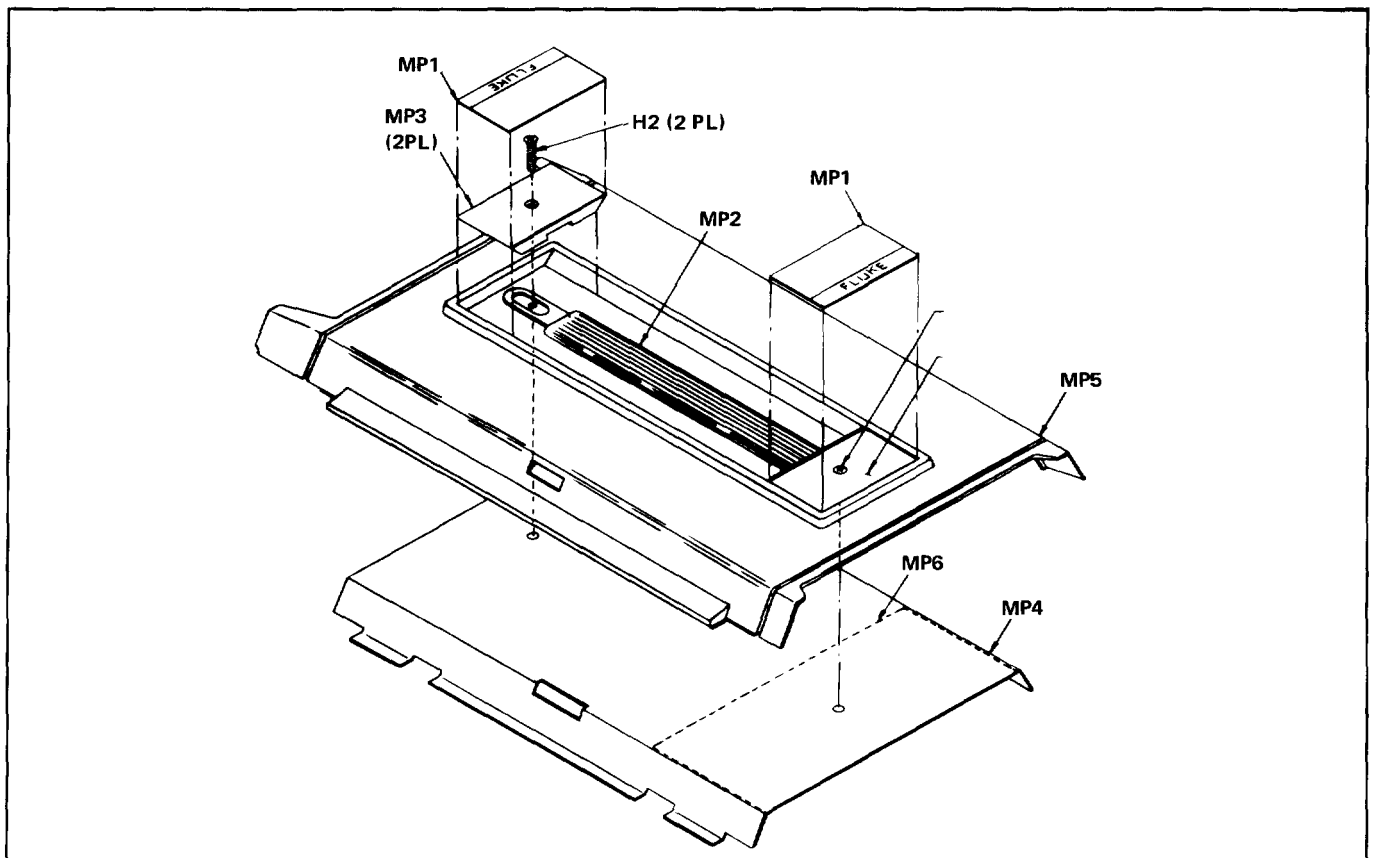


Figure 2. Final Assembly

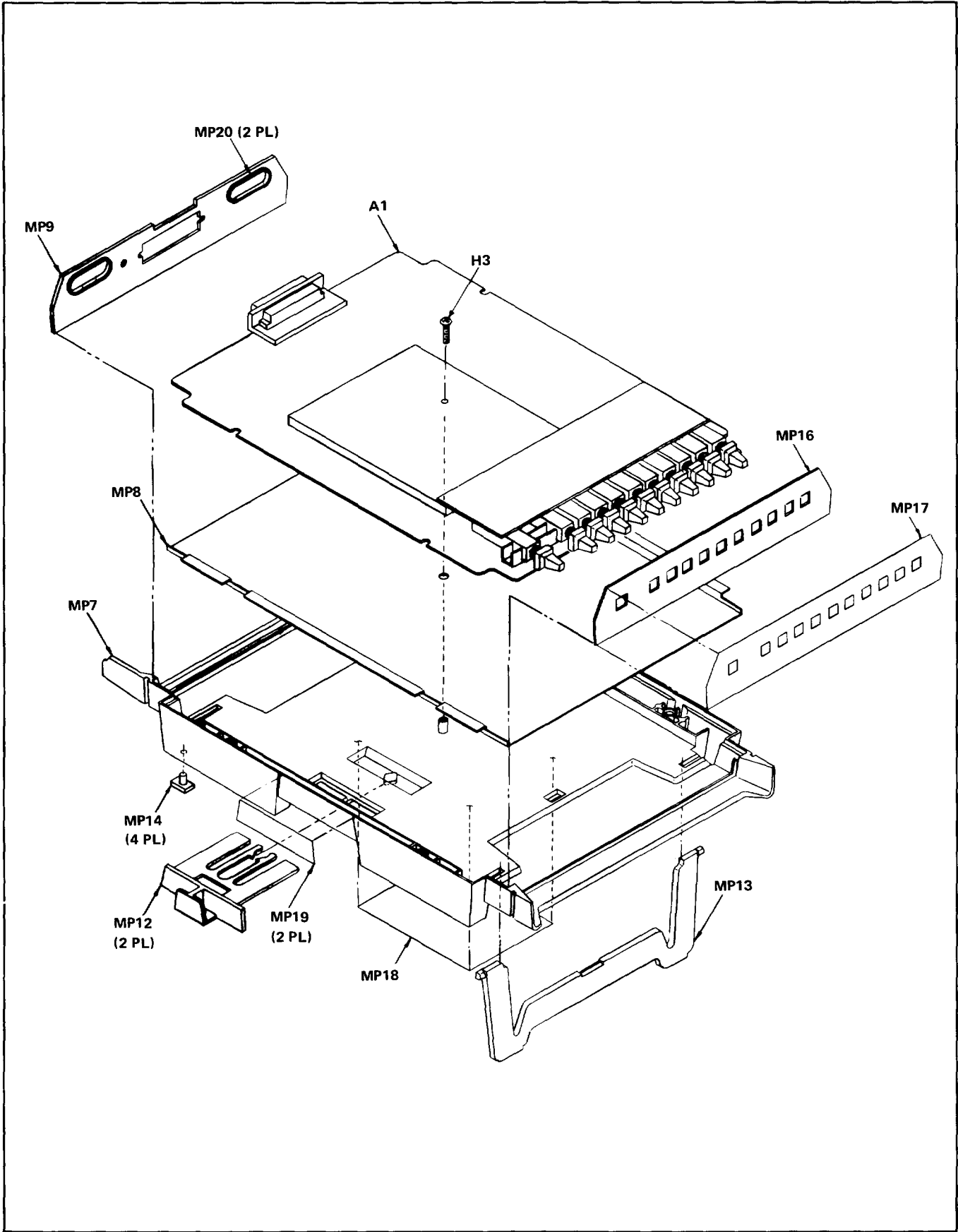
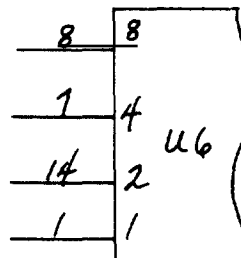


Figure 2. Final Assembly (cont)

## ERRATA #1

On page 13, Figure 5, Thermocouple Multipoint Selector Schematic, make the following changes:

IC U6 has incorrect BCD numbers, change as shown below:



On page 5, Table 3, Troubleshooting, step 10, make the following changes:

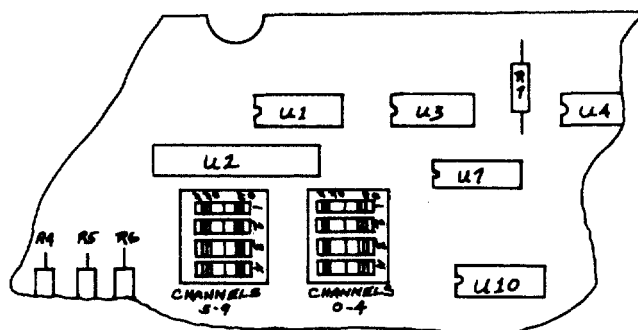
Is +5V present between pins 14 and 7 (Low) of U8, U9, U10 and U11; between pins 16 and 8 (Low) of U3, U4 and U7; and from digital common to U2-1?

On page 1, under INSTALLATION, replace step 4 with the following:

Referring to the Figure and the Table shown below, set switches S1 and S2 to the appropriate positions corresponding to the thermocouple type installed on the applicable channel or channels.

**Thermocouple Input Switch Settings**

| SELECTION<br>CODE | SWITCH<br>POSITIONS |     |     |     | T/C TYPE or<br>OPERATION |
|-------------------|---------------------|-----|-----|-----|--------------------------|
|                   | 1                   | 2   | 4   | 8   |                          |
| 0                 | OFF                 | OFF | OFF | OFF | J                        |
| 1                 | ON                  | OFF | OFF | OFF | K                        |
| 2                 | OFF                 | ON  | OFF | OFF | T                        |
| 3                 | ON                  | ON  | OFF | OFF | E                        |
| 4                 | OFF                 | OFF | ON  | OFF | C                        |
| 5                 | ON                  | OFF | ON  | OFF | S                        |
| 6                 | OFF                 | ON  | ON  | OFF | R                        |
| 7                 | ON                  | ON  | ON  | OFF | Display Blanked          |
| 8                 | OFF                 | OFF | OFF | ON  | Calibration              |
| 9                 | ON                  | OFF | OFF | ON  | Calibration              |



**A1 Thermocouple Multipoint Selector PCB Assembly**

**NOTE**

Positions 8 and 9 on the 2190A's input module are for calibration use only.  
The selection of these positions will override the normal operation of the Y2001.

## Change/Errata Information

**Issue No:** 1 10/78

This change/errata contains information necessary to ensure the accuracy of the following manual.  
Enter the corrections in the manual if either one of the following conditions exist:

1. The instrument's PCB revision letter is lower than that which is indicated at the beginning of the change/errata.
2. No revision letter is indicated at the beginning of the change/errata.

### MANUAL

**Title:** MODEL Y2001, THERMOCOUPLE MULTIPOINT SELECTOR  
**Print Date:** JUNE 1978  
**Rev and Date:** - - -

#### C/E PAGE EFFECTIVITY

| Page No. | Print Date |
|----------|------------|
| 1        | 10/78      |

Table 5. A1 TC Multipoint Selector PCB Assembly

| ITEM NO. | DESCRIPTION                             | FLUKE STOCK NO. | MFG SPLY CODE | MFG PART NO. OR TYPE | TOT QTY | REC QTY | USE CDE |
|----------|-----------------------------------------|-----------------|---------------|----------------------|---------|---------|---------|
| A1       | TC MULTIPOINT SEL PCB ASSY (2190A-4130) | 469411          | 89536         | 469411               | REF     |         |         |
| A1A1     | SWITCH ASSY                             | 476176          | 89536         | 476176               | 1       |         |         |
| CR1      | DIODE, SI, HI-SPEED SWITCHING           | 203323          | 07910         | 1N4448               | 4       | 1       |         |
| CR2      | DIODE, SI, HI-SPEED SWITCHING           | 203323          | 07910         | 1N4448               | REF     |         |         |
| CR3      | DIODE, SI, HI-SPEED SWITCHING           | 203323          | 07910         | 1N4448               | REF     |         |         |
| CR4      | DIODE, SI, HI-SPEED SWITCHING           | 203323          | 07910         | 1N4448               | REF     |         |         |
| H1       | SPACER, PCB STANDOFF                    | 28533           | 71590         | J64284               | 5       |         |         |
| H2       | PRESS-NUT                               | 380196          | 24347         | KF2-440              | 7       |         |         |
| H3       | SCREW, PHP, 6-32 X 3/8                  | 334458          | 89536         | 334458               | 22      |         |         |
| H4       | LOCKWASHER                              | 110395          | 89536         | 110395               |         |         |         |
| H5       | SCREW, SEMS, 4-40 X 3/8                 | 281196          | 89536         | 281196               | 7       |         |         |
| H6       | SCREW, PHP, 4-40 X 3/8                  | 152124          | 73734         | 19024                | 2       |         |         |
| H7       | WASHER, FLAT                            | 147728          | 73734         | 1402                 | 2       | H8      |         |
| J5       | CONNECTOR                               | 461996          | 00779         | 206584-1             | 1       |         |         |
| MP1      | ISOTHERMALBLOCK                         | 472308          | 89536         | 472308               | 1       |         |         |
| MP2      | INSULATOR                               | 472480          | 89536         | 472480               | 1       |         |         |
| MP3      | CABLE TIE                               | 172080          | 06383         | SST-1M               | 1       |         |         |
| P5       | CABLE ASSY                              | 473479          | 89536         | 473439               | 1       | P8      |         |
| P8       | CABLE                                   | 481788          | 89536         | 481788               | 1       |         |         |
| Q1       | XSTR, SI, NPN                           | 218396          | 89536         | 218396               | 1       | 1       |         |
| Q2       | XSTR, SI, PNP                           | 195974          | 89536         | 195974               | 1       | 1       |         |
| Q3       | XSTR, SI, NPN                           | 329698          | 89536         | 329698               | 1       | 1       |         |
| R1       | RES, VAR, 50K +/-10%, 1/2W              | 330688          | 75378         | 190PC503B            | 1       |         |         |
| R2       | RES, SELECTED - SEE PROCEDURE           |                 |               |                      |         |         |         |
| R3       | RES, MTL FILM, 187K +/-1%, 1/8W         | 291641          | 91637         | OMF551873F           | 1       |         |         |
| R4       | RES, DEP CAR, 10K +/-5%, 1/4W           | 348839          | 80031         | CR251-4-5P10KT       | 5       |         |         |
| R5       | RES, DEP CAR, 10K +/-5%, 1/4W           | 348839          | 80031         | CR251-4-5P10KT       | REF     |         |         |
| R6       | RES, DEP CAR, 10K +/-5%, 1/4W           | 348839          | 80031         | CR251-4-5P10KT       | REF     |         |         |
| R7       | RES, DEP CAR, 10K +/-5%, 1/4W           | 348839          | 80031         | CR251-4-5P10KT       | REF     |         |         |
| R8       | RES, DEP CAR, 100K +/-5%, 1/4W          | 348920          | 80031         | CR251-4-5P100KT      | 1       |         |         |
| R9       | RES, DEP CAR, 10K +/-5%, 1/4W           | 348839          | 80031         | CR251-4-5P10KT       | REF     |         |         |
| S1       | SWITCH MODULE                           | 408559          | 00779         | 435166-2             | 2       |         |         |
| S2       | SWITCH MODULE                           | 408559          | 00779         | 435166-2             | REF     |         |         |
| S3       | BUTTON (GOES WITH A1A1 ASSY)            | 426759          | 89536         | 426759               | 10      |         |         |
| S4       | BUTTON (GOES WITH A1A1 ASSY)            | 426759          | 89536         | 426759               | REF     |         |         |
| S5       | BUTTON (GOES WITH A1A1 ASSY)            | 426759          | 89536         | 426759               | REF     |         |         |
| S6       | BUTTON (GOES WITH A1A1 ASSY)            | 426759          | 89536         | 426759               | REF     |         |         |
| S7       | BUTTON (GOES WITH A1A1 ASSY)            | 426759          | 89536         | 426759               | REF     |         |         |
| S8       | BUTTON (GOES WITH A1A1 ASSY)            | 426759          | 89536         | 426759               | REF     |         |         |
| S9       | BUTTON (GOES WITH A1A1 ASSY)            | 426759          | 89536         | 426759               | REF     |         |         |
| S10      | BUTTON (GOES WITH A1A1 ASSY)            | 426759          | 89536         | 426759               | REF     |         |         |
| S11      | BUTTON (GOES WITH A1A1 ASSY)            | 426759          | 89536         | 426759               | REF     |         |         |
| S12      | BUTTON (GOES WITH A1A1 ASSY)            | 426759          | 89536         | 426759               | REF     |         |         |
| S13      | BUTTON (GOES WITH A1A1 ASSY)            | 425900          | 89536         | 425900               | 1       |         |         |
| U1       | IC, CMOS, QUAD 2-IN NAND GATE           | 355198          | 04713         | MC14011CP            | 1       | 1       |         |
| U2       | RES, NETWORK, 100K                      | 412908          | 89536         | 412908               | 1       |         |         |
| U3       | IC, CMOS, 8-STAGE STATIC SHIFT REGSTR   | 380766          | 12040         | MM5621AN             | 2       | 1       |         |
| U4       | IC, CMOS, 8-STAGE STATIC SHIFT REGSTR   | 380766          | 12040         | MM5621AN             | REF     |         |         |
| U5       | RES, NETWORK, 100K                      | 380618          | 89536         | 380618               | 1       | 1       |         |
| U6       | IC, DIODE MATRIX, PROGRAMMED            | 370676          | 89536         | 370676               | 1       | 1       |         |

Table 5. A1 TC Multipoint Selector PCB Assembly (cont)

| ITEM NO. | DESCRIPTION                          | FLUKE STOCK NO. | MFG SPLY CODE | MFG PART NO. OR TYPE | TOT QTY | REC QTY | USE CDE |
|----------|--------------------------------------|-----------------|---------------|----------------------|---------|---------|---------|
| U7       | IC, CMOS, DUAL 4-BIT STATIC SHIFTREG | 340125          | 04713         | MC14015BCP           | 1       | 1       |         |
| U8       | IC, CMOS, QUAD 2-IN NOR GATE         | 355172          | 04713         | MC14001CP            | 1       | 1       |         |
| U9       | IC, CMOS, HEX INV                    | 404681          | 04713         | MC1406BCP            | 1       | 1       |         |
| U10      | IC, CMOS, DUAL 4-IN, POS NAND GATE   | 355206          | 04713         | MC14012CP            | 1       | 1       |         |
| U11      | IC, CMOS, 3-IN NOR GATE              | 355180          | 04713         | MC14025CP            | 1       | 1       |         |

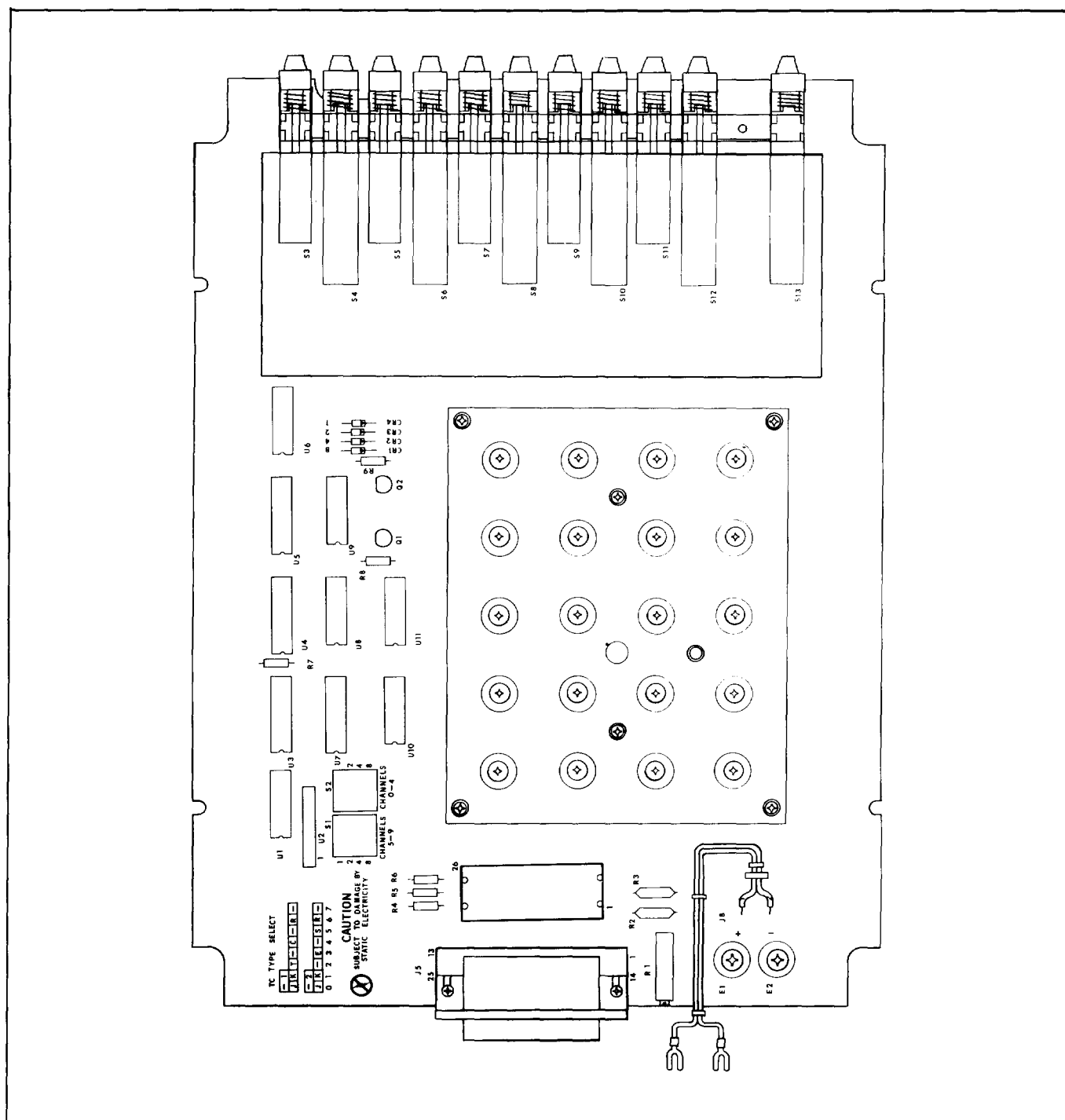


Figure 3. A1 TC Multipoint Selector PCB Assembly

Table 6. A1A1 Switch Assembly

| ITEM NO. | DESCRIPTION                   | FLUKE STOCK NO. | MFG SPLY CODE | MFG PART NO. OR TYPE | TOT QTY | REC QTY | USE CDE |
|----------|-------------------------------|-----------------|---------------|----------------------|---------|---------|---------|
| A1A1     | SWITCH ASSY                   | 476176          | 89536         | 476176               | REF     |         |         |
| MP1      | SPACER                        | 285353          | 71590         | J64284               | 4       |         |         |
| R1       | RES, DEP CAR, 470 +/-5%, 1/4W | 343434          | 80031         | CR251-4-5P470ET      | 20      |         |         |
| R2       | RES, DEP CAR, 470 +/-5%, 1/4W | 343434          | 80031         | CR251-4-5P470ET      | REF     |         |         |
| R3       | RES, DEP CAR, 470 +/-5%, 1/4W | 343434          | 80031         | CR251-4-5P470ET      | REF     |         |         |
| R4       | RES, DEP CAR, 470 +/-5%, 1/4W | 343434          | 80031         | CR251-4-5P470ET      | REF     |         |         |
| R5       | RES, DEP CAR, 470 +/-5%, 1/4W | 343434          | 80031         | CR251-4-5P470ET      | REF     |         |         |
| R6       | RES, DEP CAR, 470 +/-5%, 1/4W | 343434          | 80031         | CR251-4-5P470ET      | REF     |         |         |
| R7       | RES, DEP CAR, 470 +/-5%, 1/4W | 343434          | 80031         | CR251-4-5P470ET      | REF     |         |         |
| R8       | RES, DEP CAR, 470 +/-5%, 1/4W | 343434          | 80031         | CR251-4-5P470ET      | REF     |         |         |
| R9       | RES, DEP CAR, 470 +/-5%, 1/4W | 343434          | 80031         | CR251-4-5P470ET      | REF     |         |         |
| R10      | RES, DEP CAR, 470 +/-5%, 1/4W | 343434          | 80031         | CR251-4-5P470ET      | REF     |         |         |
| R11      | RES, DEP CAR, 470 +/-5%, 1/4W | 343434          | 80031         | CR251-4-5P470ET      | REF     |         |         |
| R12      | RES, DEP CAR, 470 +/-5%, 1/4W | 343434          | 80031         | CR251-4-5P470ET      | REF     |         |         |
| R13      | RES, DEP CAR, 470 +/-5%, 1/4W | 343434          | 80031         | CR251-4-5P470ET      | REF     |         |         |
| R14      | RES, DEP CAR, 470 +/-5%, 1/4W | 343434          | 80031         | CR251-4-5P470ET      | REF     |         |         |
| R15      | RES, DEP CAR, 470 +/-5%, 1/4W | 343434          | 80031         | CR251-4-5P470ET      | REF     |         |         |
| R16      | RES, DEP CAR, 470 +/-5%, 1/4W | 343434          | 80031         | CR251-4-5P470ET      | REF     |         |         |
| R17      | RES, DEP CAR, 470 +/-5%, 1/4W | 343434          | 80031         | CR251-4-5P470ET      | REF     |         |         |
| R18      | RES, DEP CAR, 470 +/-5%, 1/4W | 343434          | 80031         | CR251-4-5P470ET      | REF     |         |         |
| R19      | RES, DEP CAR, 470 +/-5%, 1/4W | 343434          | 80031         | CR251-4-5P470ET      | REF     |         |         |
| R20      | RES, DEP CAR, 470 +/-5%, 1/4W | 343434          | 80031         | CR251-4-5P470ET      | REF     |         |         |

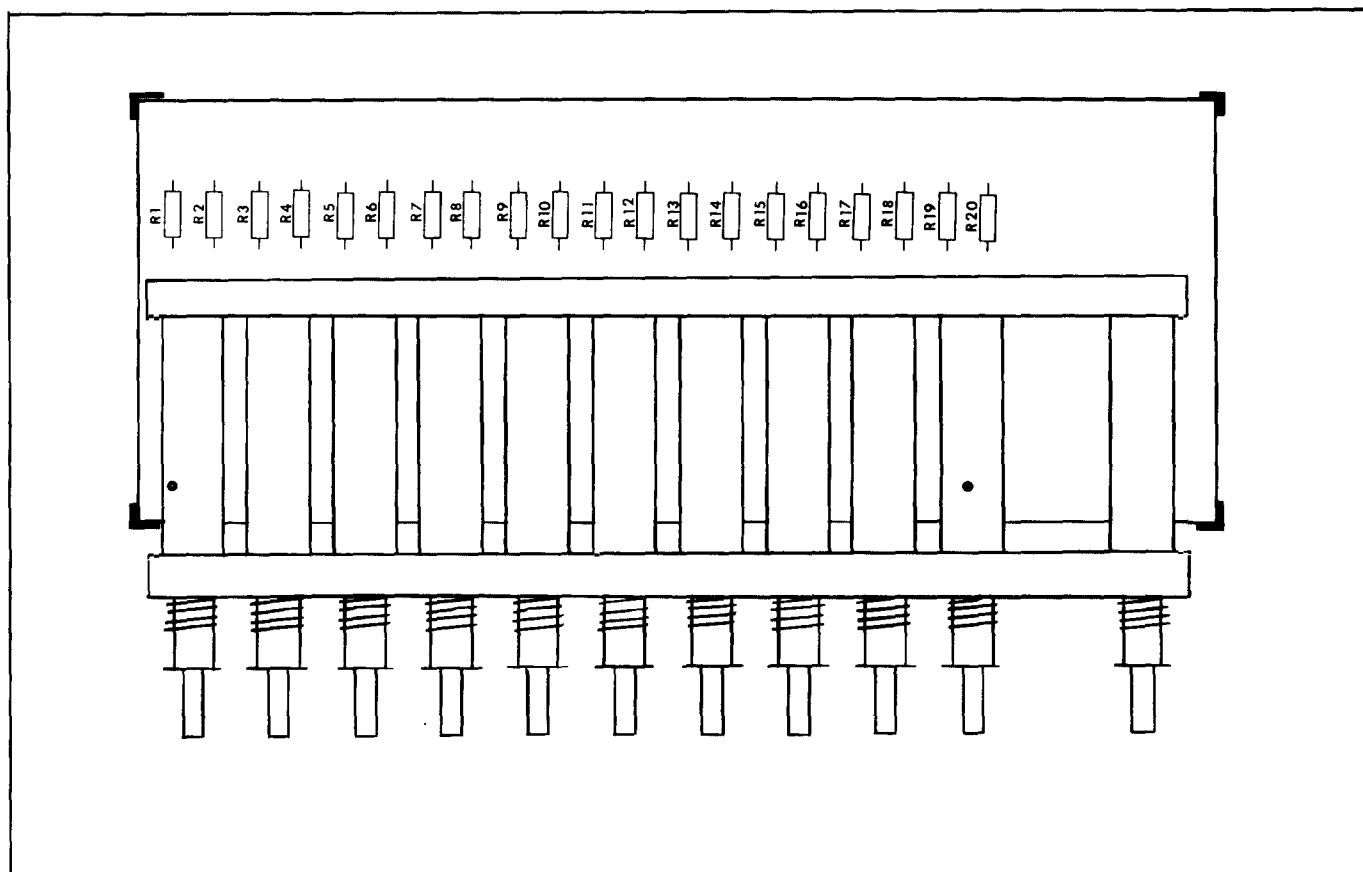
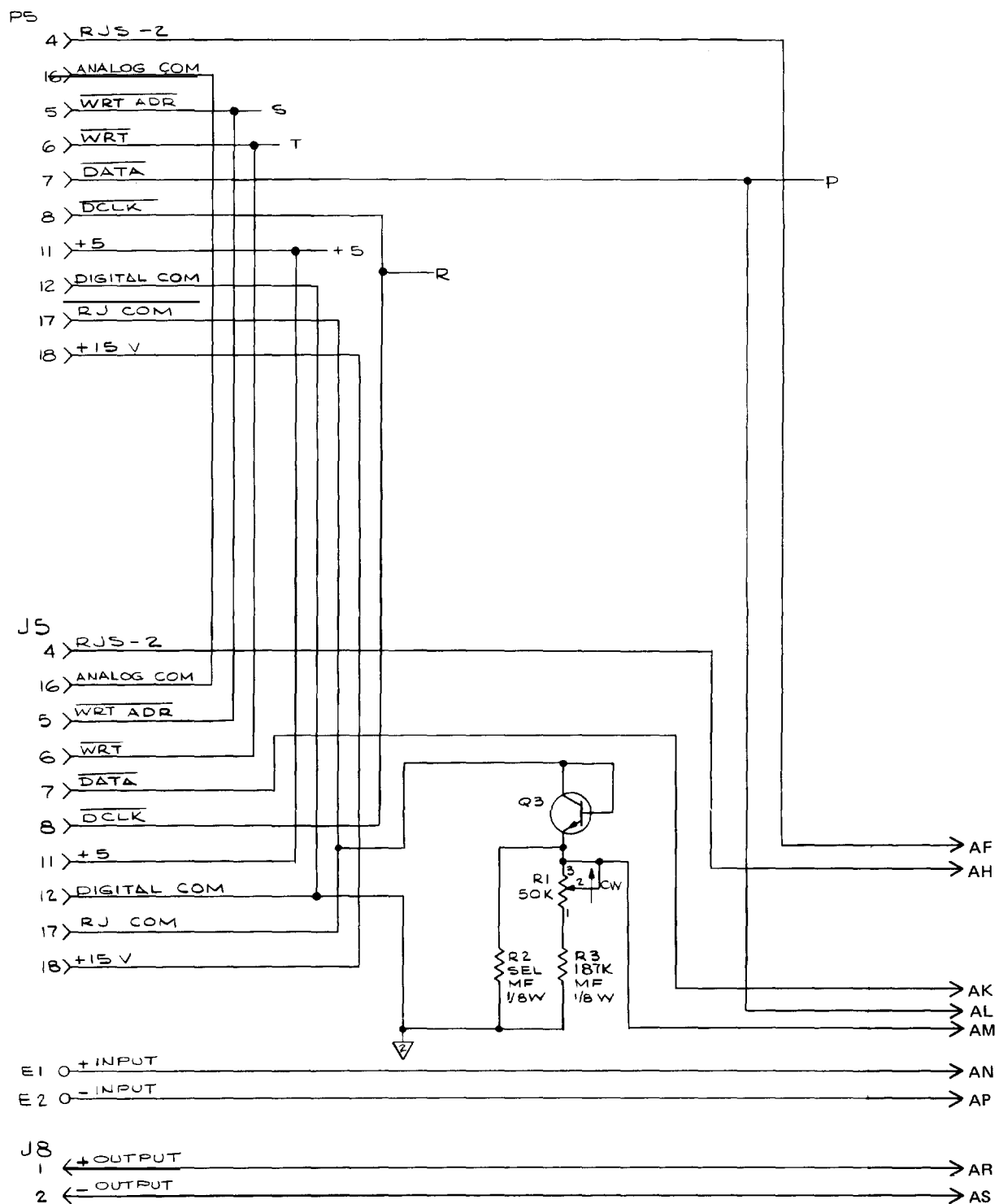


Figure 4. A1A1 Switch Assembly



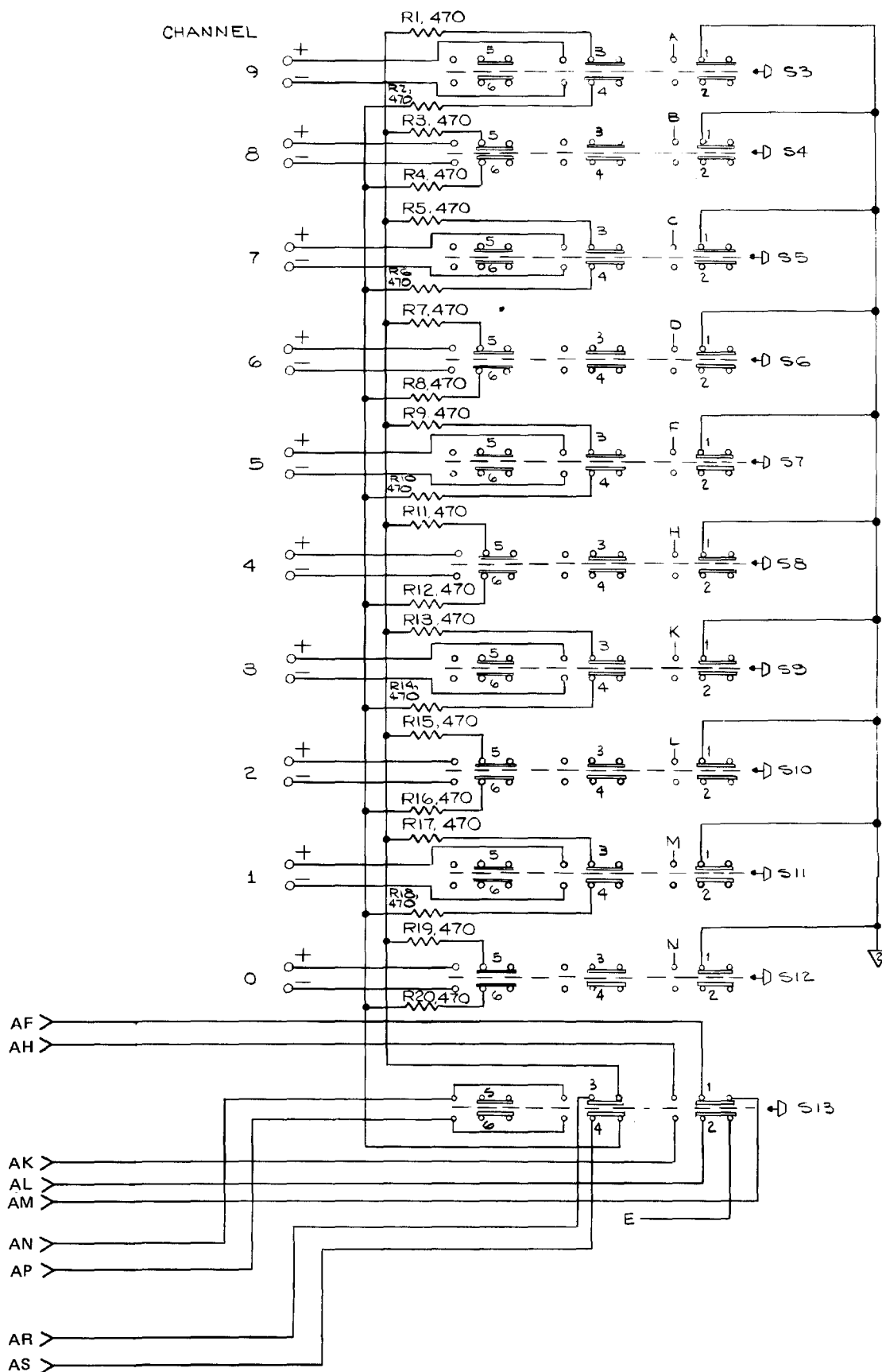


Figure 5. Thermocouple Multipoint Selector Schematic (cont)

### **APPENDIX A BACK DATING INFORMATION**

If the Revision letter stamped on the main PCB is E or lower switches S1 and S2 are a rotary switch in lieu of the binary DIP switches. The Fluke and Mfg. Stock No. is 429357 and the Federal Supply Code is 89536.

# TECHNICAL SERVICE CENTERS

## United States

### California

**Burbank**  
Fluke Western Technical Center  
2020 N. Lincoln St.  
Zip: 91504  
Tel. (213) 849-4641

### Santa Clara

Fluke Western Technical Center  
2359 De La Cruz Blvd.  
Zip: 95050  
Tel. (408) 985-1200

### Colorado

**Denver**  
Fluke Southwestern Technical Center  
1980 S. Quebec St.  
Unit 4  
Zip: 80231  
Tel. (303) 750-1228

### Florida

**Orlando**  
Fluke S.E. Technical Center  
P.O. Box 6578  
940 N. Fern Creek Ave  
Zip: 32803  
Tel. (305) 896-2296

### Illinois

**Rolling Meadows**  
Fluke Midwestern Technical Center  
1400 Hicks Road  
Zip: 60008  
Tel. (312) 398-5800

### Maryland

**Kensington**  
Fluke Midwestern Technical Center  
11501 Huff Court  
Zip: 20795  
Tel. (301) 881-6155

### Massachusetts

**Waltham**  
Fluke N.E. Technical Center  
244 Second Avenue  
Zip: 02154  
Tel. (617) 890-1600

### Minnesota

**Minneapolis**  
Fluke Midwestern Technical Center  
10800 Lyndale Ave. So.  
Zip: 55420  
Tel. (612) 884-4541

### New Jersey

**Clifton**  
Fluke Eastern Technical Center  
460 Colfax Ave.  
Zip: 07013  
Tel. (201) 778-4040

### North Carolina

**Greensboro**  
Fluke S.E. Technical Center  
P.O. Box 9619  
1310 Beaman Place  
Zip: 27408  
Tel. (919) 273-1918

### Washington

**Mountlake Terrace**  
John Fluke Mfg. Co., Inc.  
7001 - 220th Ave. S.W.  
Zip: 98043  
Tel. 774-2206

### Canada

#### Alberta

**Calgary**  
Fluke Canadian Technical Center  
3829 - 12th St. N.E.  
Zip: T2E 6M5  
Tel. (403) 276-9658

#### Ontario

**Mississauga**  
Fluke Canadian Technical Center  
6503 Northam Drive  
Zip: L4V 1J5  
Tel. (416) 678-1500

## International Central & South America

### Argentina

Coasin S.A.  
Virrey del Pino 4071  
Buenos Aires, Argentina  
Te. 523185

### Brazil

Arotec S.A.  
Industria e Comercio  
Av. Pacaembu 811  
Sao Paulo S.P., Brazil  
Tel. 67-2392

Arotec S.A.  
Av. Rio Branco, 277  
Grupo 1309  
Rio de Janeiro, R.J., Brazil  
Tel. 242-9776

### Chile

Coasin Chile Ltda.  
Ismael Valdes Vergara 336 of. 41  
Casilla 14588 - Correo 21  
Santiago, Chile  
Tel. 396713

### Columbia

Asistec Limitada  
Carrera 7, N°83-40, Int 10  
Bogota DE, Columbia  
Tel. 257-2675, 257-2898

### Ecuador

Proteco Coasin CIA, Ltda.  
Ing Jaime Jaramillo  
Apartado 228A  
Quito, Ecuador  
Tel. 526759

### Mexico

C.J. Christensen S.A. de C.V.  
Instrumentos Electronicos de Medicion  
Melchor Ocampo 150-8  
Mexico 4, D.F., Mexico  
Tel. (905) 5352258

### Peru

Importaciones & Representaciones  
Electronicas S.A.  
Avda Franklin D. Roosevelt 105  
Lima I, Peru  
Tel. 288650

### Venezuela

Coasin C.A.  
Apdo. Postal 50939  
Sabana Grande No. 1  
Caracas 105, Venezuela  
Tel. 782-9109

## Europe

### Austria

Walter Rekersch Electronische Gerate  
GMBH & Co. KG  
Gotfried-Keller-Gasse 2/9  
A-1030 Vienna, Austria  
Tel. (0222) 734294

### Belgium

C.N. Rood S.A.  
37 Place de Jamblinne de Meux  
B-1040 Brussels, Belgium  
Tel. (02) 27352135

### Denmark

Tage Olsen A/S  
Teglvaerksgade 37  
DK-2100 Copenhagen O  
Denmark  
Tel. (01) 294800

### Finland

OY Findip AB  
Teollisuystie 7  
02700 Kauniainen  
Finland  
Tel. (080) 502255

### France

M.B. Electronique S.A.  
29, Rue Emile Duclaux  
92150, Suresnes, France  
Tel. 7723111 (108)

## German Federal Republic

Fluke (Deutschland) GMBH  
Meineckestrasse 53  
4 Dusseldorf 30  
West Germany  
Tel. (0211) 450831

Fluke (Deutschland) GMBH  
Mutschellestrasse 1  
8000 Munich 80  
West Germany  
Tel. (089) 433021

## Greece

Hellenic Scientific Representations Ltd.  
10 Nymphaeu Street  
Athens 615, Greece  
Tel. (021) 7792320

## Italy

Sistrel S.p.A.  
Via Giuseppe Armellini No. 37  
00143 Rome, Italy  
Tel. (06) 5915551

Sistrel S.p.A.  
Via Timavo 66  
20099 Sesto S. Gioranni (Milan)  
Italy  
Tel. (02) 2476693

## Netherlands

C.N. Rood N.V.  
Cort van der Lindenstraat 11-13  
P.O. Box 42  
Rijswijk ZH 2100  
Tel. 070-996360

Fluke (Nederland) B.V.  
P.O. Box 5053  
Zevenheuvelenweg 53  
Tilburg, Netherlands  
Tel. (013) 673973

## Norway

Morgenstjerne & Co. A/S  
Konghellegate 3  
P.O. Box 6688, Rodelokka  
Oslo 5, Norway  
Tel. 472356110

## Portugal

Equipamentos De Laboratorio Ltda.  
P.O. Box 1100  
Lisbon-I, Portugal  
Tel. (019) 976551

## Spain

Hispano Electronica S.A.  
Poligono Industrial Urtsina  
Apartada de Correos 48  
Alcorcon (Madrid) Spain  
Tel. 09-3416194108

## Sweden

Teleinstrument AB  
P.O. Box 490  
S-162 Vallingby 4  
Sweden  
Tel. 08-380370

## Switzerland

Traco Electronic AG  
Jenatschstrasse 1  
8002 Zurich  
Switzerland  
Tel. (01) 2010711

## United Kingdom

Fluke International Corporation  
Garnet Close  
Watford, WD2 4TT  
England  
Tel. 0923-33066

## Africa, Asia & Australia

### Australia

Elmeasco Instruments Pty Ltd.  
P.O. Box 30  
Concord, N.S.W.  
Australia 2137  
Tel. (02) 736-2888

Melbourne Branch Office  
Elmeasco Instruments Pty Ltd.  
P.O. Box 107  
Mt. Waverly, VIC 3149  
Australia  
Tel. 233-4044

## Hong Kong

Gilman & Co. Ltd.  
P.O. Box 56  
Hong Kong  
Tel. 227011 (14)

## India

Hinditron Services Pvt. Ltd.  
69/A.L. Jagmohandas Marg  
Bombay - 400 006, India  
Tel. 365344

## Indonesia

C.V. Cempaka Putih  
P.O. Box 4328 JKT  
J.L. Kramat Pulo 33  
Jakarta Pusat, Indonesia  
Tel. 41332

## Iran

Irantronics Company, Ltd.  
20 Salm Road, Roosevelt Ave.  
Tehran, Iran  
Tel. 828294

## Israel

R.D.T. Electronics Engineering Ltd.  
P.O. Box 75  
46 Sokolov Street  
Ramat Hasharon 47235  
Israel  
Tel. 483211

## Korea

Shin Han Scientific Co., Ltd.  
International P.O. Box 1250  
Seoul, Korea  
Tel. 76-2761

## Japan

John Fluke Mfg. Co., Inc.  
Japan Branch  
1 Higashikata Machi  
Midori-Ku  
Yokohama 226, Japan  
Tel. (045) 473-5428, 473-5429

## Malaysia

O'Connor's (PTE) Ltd.  
P.O. Box 91  
Petaling Jaya, Selangor  
West Malaysia  
Tel. 51563

## New Zealand

W & K McLean Ltd.  
P.O. Box 3097  
Auckland, New Zealand  
Tel. 587-037

## Nigeria

Molat Engineering Co., Ltd.  
P.O. Box 6369  
Lagos, Nigeria

## Singapore

O'Connor's (PTE) Ltd.  
98 Pasir Panjang Road  
Singapore 5, Singapore  
Tel. 637944

## South Africa

Fluke S.A. (PTY) Ltd.  
P.O. Box 39797  
Bramley 2018  
Republic of South Africa

## Taiwan

Tatung Company  
22 Chungshan North Road  
3rd Section  
Taipei, Taiwan  
Republic of China  
Tel. 5215252

## Turkey

Erkman Elektronik Aletler  
Necatibey Cad. 92/2  
Karakoy/Istanbul  
Turkey  
Tel. 441546

For areas not listed, contact the  
Fluke Technical Center nearest  
you or contact Fluke directly at  
Mountlake Terrace, WA.