

NATIONAL RADIO ASTRONOMY OBSERVATORY

MEMORANDUM

May 13, 1982

To: J. Findlay  
 From: R. Lacasse and G. Grove  
 Subj: Temperature Transducer Multiplexed Interface

The purpose of this memo is twofold. First, it documents the Temperature Transducer Multiplexed Interface designed for the 12-meter measurement project. Second, it gives some measured performance data.

Specifications

The Temperature Transducer is designed to operate with AD 590 temperature transducers, which have current, in microamps, nominally equal to temperature in °K. Eight of these transducers can be accommodated by this circuit. The circuit output consists of a voltage proportional to temperature with scale factor 100 mV/°K and with 0.00 V equal to 0°C. Three TTL compatible input signals select the sensor to be output. In the 12-m set-up these three signals are the same signals which control the B channel multiplexer of the ADIOS interface.

Circuit Description

Circuit operation is straightforward. As shown in Figure 1, the selected sensor, along with its gain and offset setting and trim resistors, are connected to the op-amp inverting input through the multiplexer. The op-amp converts the sum of the sensor and reference currents into a voltage. A display is provided to indicate the selected channel.

Summary of Circuit Error Budget

The following error budget takes worst case specifications for temperature variations of components to arrive at an RSS worst case for accuracy errors, excluding calibration, for ambient temperature variations from 10°C to 40°C.

	<u>Error °C</u>
Temperature sensor non-linearity (AD 590LF) ...	.16
Reference voltage (AD 581K) drift .....	.0742
Op-amp offset voltage drift .....	.017
Op-amp bias current drift .....	.006
Reference current resistor drift .....	.06
Gain set resistor .....	.09
Reference current trim resistor .....	.03
Gain adjust trim resistor .....	.045
RSS .....	<u>.218°C</u>

Performance Data

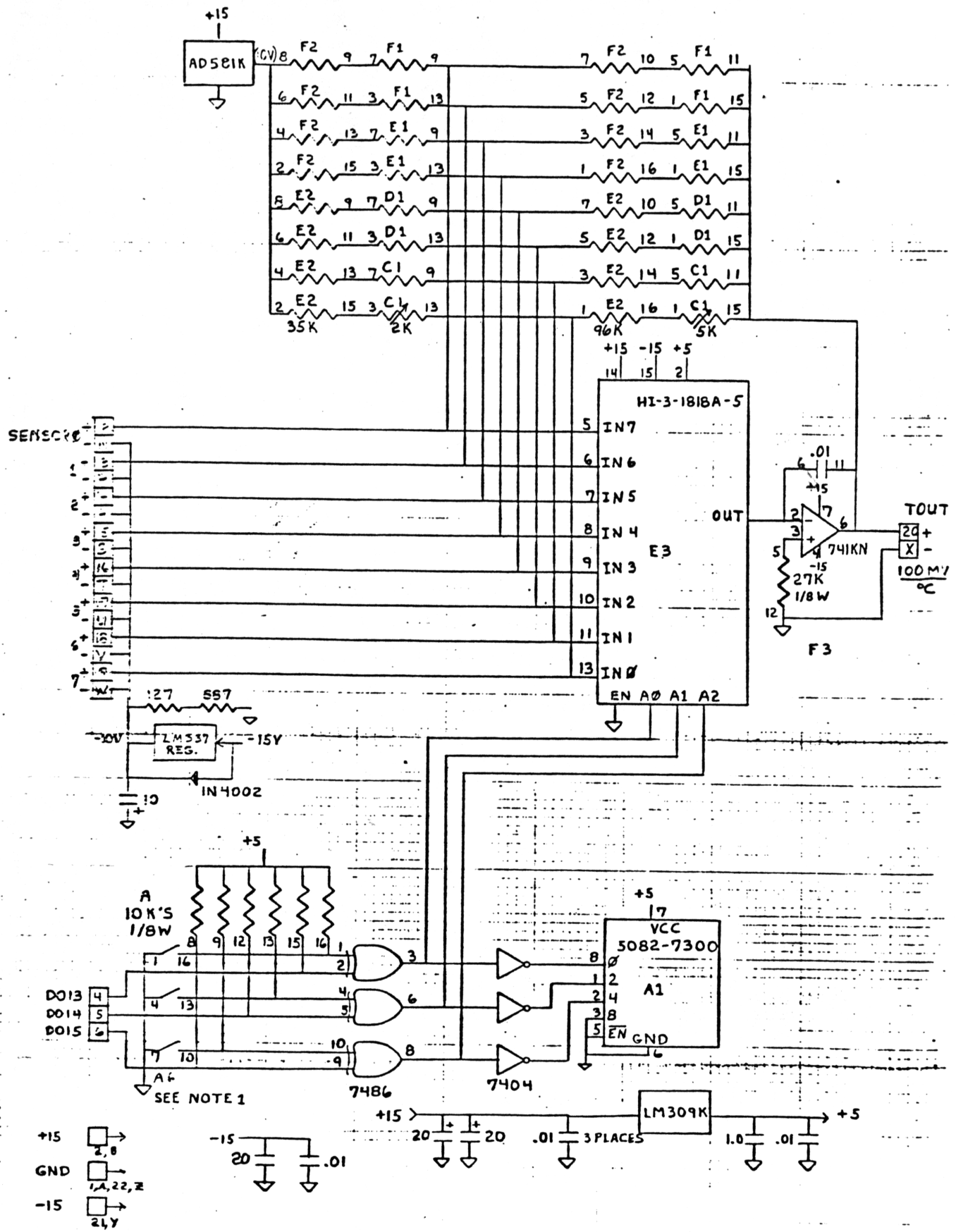
Supply Sensitivity (measured):

+15 V ..... .005°C/volt  
-15 V ..... <.001°C/volt

RJL/GG/cjd

Enclosures:

Drawing: AD 590 Temperature  
Transducer Multiplexed  
Interface (Lacasse, 2-8-82)  
Calibration Curves for Seven  
Probes (G. Grove, 5-13-82)



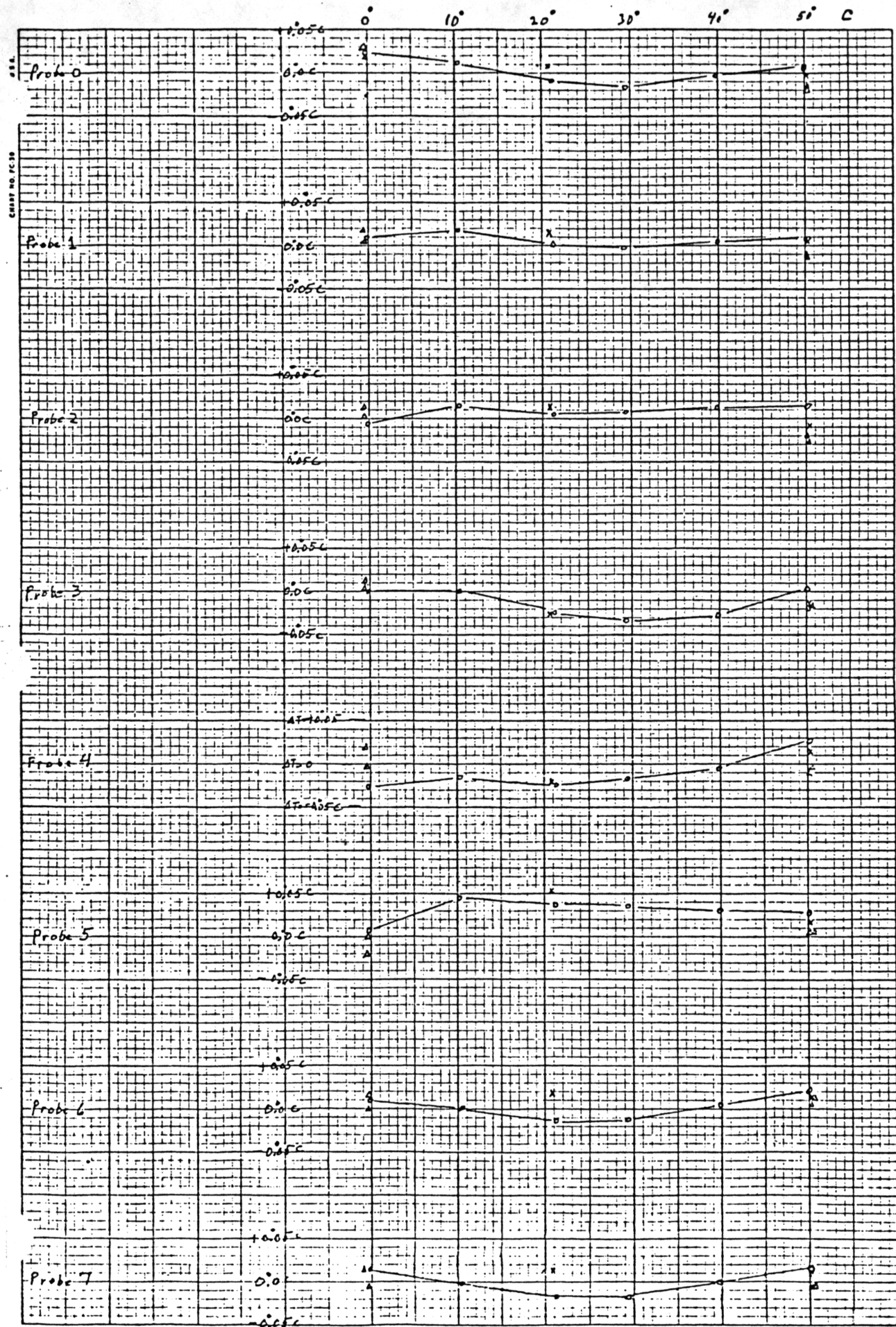
NOTES

1. SWITCHES SHOULD BE OPEN FOR NORMAL OPERATION.
2. ALL RESISTOR AND CAPACITOR VALUES ARE IN OHMS AND MICROFARADS, RESP.
3. SEE BOARD LAYOUT FOR DECOUPLING CAP LOCATIONS.

AD590 TEMP TRANSDUCER  
MULTIPLEXED INTERFACE

R. LACASSE  
2-8-82

OMNIGRAPHIC  
COMPLLOT



Plot of  $\Delta T = T_{pr} - T_{Probe}$   
 10 May 1972

o = Calibration Run  
 x, Δ = previous runs