CABLE FM FOR BETTER STEREO FM

Popular Electronics

FIFTY CENTS / JANUARY 1971

Crystal-Controlled Time Base Generator

(see page 33)

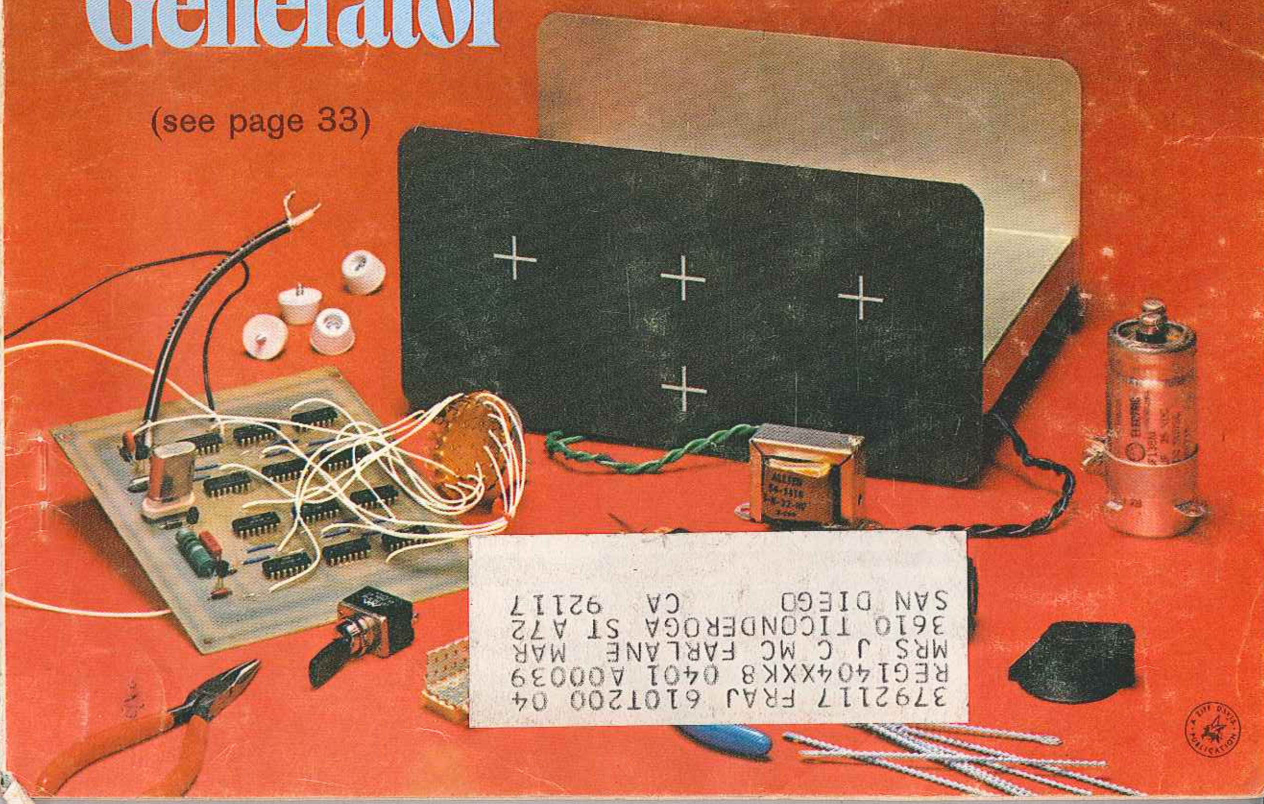
DIGITAL CLOCK READS TO 6 FIGURES

ELECTRICITY & PHYSIOLOGY

NEW ELECTRONICALLY ACTIVATED LOCK

ELECTRONIC CLINICAL THERMOMETER

VOLTMETER FOR SOLID-STATE TESTING



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director gets it into his head to out-conduct the orchestral conductor.

Most recording companies do some of this gimmicking and it frequently escapes the listener's attention because it is done subtly. One wonders if someone at Columbia Records forgot the meaning of subtle. They have produced some of the most shocking recordings I have heard with instrumental groups zooming back and forth like the slides of a trombone ensemble.

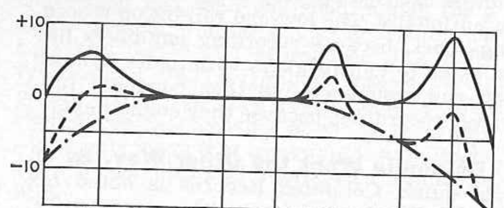
RCA Tells All. Columbia Records did have the discretion not to publicly admit audible gimmicking, but RCA Records was somewhat less discreet. In fact, RCA publicized gimmickry in their massive advertising campaign to introduce the "Dynagroove" system.

As I interpret Dr. Harry Olson's description of the Dynagroove system, it involves "modifying" the original sound so as to compensate for deficiencies in the average home hi-fi reproducing system—as well as the deficiencies of the average listener! These modifications include compression of musical dynamics and a continuously variable loudness compensation system predicated on the contention that the human ear's frequency response curve varies with the volume level of the sound being heard. Thus it becomes necessary for the Dynagroove system to correct for these deficiencies every time the orchestra plays more loudly or softly. It is undeniable that the ear's response changes as sound level changes, but like it or not, this is *the way* human beings hear sounds. The changing response of the ear contributes to the sound we think of as the "real thing," and any attempt to make the ear more efficient by adding corrections simply falsifies the original sonic content. Not too happily for RCA, Dynagroove was not a smashing commercial success—possibly because so many of the early releases sounded ghastly!

You don't need market researchers to show that while hi-fi stereo may be on every tongue, it isn't in every ear. Listeners with Magnavoxes, Philcos and Zeniths vastly outnumber listeners with Dyna-Kits, Sherwoods, Scotts, etc., and the cheap portable stereo is scarcely extinct. When record manufacturers sell sound, they sell ultimate sound and if this means turning up the treble to overcome the mellowness of the average home reproducer, then so be it. Of course, that extra treble boost is added to the boost required to complement the RIAA equalization curve, which is one reason why so many 1960-70 disc recordings are impossible to track cleanly. The high frequency groove modulations become so sharp and emphasized that the grooves get narrower than the playback stylus tip, which rattles across the tops of the modulations. I scarcely consider this high fidelity.

This columnist cannot help but note with amusement the ploy of record critics who, seeking to dull the edge of a cavil about a disc recording's miserable frequency response, will add the statement, "Of course, judicious use of tone controls can remedy the problem." I say—hogwash! Tone controls will never straighten out a fouled-up disc recording any more than a pair of yellow-tinted sunglasses can turn a cloudy day into sunshine.

What Your Tone Controls Can't Do. Every audio enthusiast must initially realize that tone controls are not the equivalent of a professional recording studio equalizer. The recording engineer can, if he wishes, add a sharp peak at 3000 Hz for the sake of "presence," a 10 dB-per-octave boost from 8 to 10 kHz (for "overtones"), and a sharp cutoff above to keep the stylus from jumping out of the groove. The engineer can also



What a recording engineer can do with his equalizers (solid line) versus what you can do with ordinary tone controls (dashed line). The resulting frequency response is shown by the dotted line.

add a broad bump at 80 Hz so that the listener imagines that he's hearing bass notes and the hi-fi enthusiast won't be too aware of the roll-off below 60 Hz. An engineer can add this sort of equalization on any selective basis to any one or more of the 18 channels he might be mixing. And once he has prepared his master and you have it on two-channel stereo disc or tape, the equalized and unequalized channels are irrevocably and inextricably combined. The listener can't "de-equalize" the violin section without adding unwanted equalization to the woodwinds.

Realizing the built-in deficiencies of tone controls, we are seeing the introduction of multiband equalizers such as the Advent Frequency Balance Control, Citation 11 and Infinity preamps. These equalizers can make the average mixed-down recording somewhat more listenable. But nothing can overcome the continuously-varying "loudness compensation," of a Dynagroove recording.

How does the listener get realistic sound from recordings? Well, with electronically-

(Continued on page 96)

Assemble the SIX-DIGIT Popular Electronics DIGI-VISTA

ELECTRONIC READOUT TO THE TENTH OF A SECOND

TRUE ELECTRONIC digital clocks are hard to find these days—most digital clocks work electrically with some type of mechanical readout. In the December 1970 POPULAR ELECTRONICS, we introduced the "Digi-Vista" clock, a completely electronic unit using transistor-transistor logic and Nixie® readout tubes. Described in detail in that article was a four-digit clock, which indicates hours and minutes and has a blinker to indicate every other second.

This month, we will describe the six-digit Digi-Vista. Since some of the details of theory and construction will not be repeated here, we suggest you consult the December article before assembling the six-digit clock.

The six-digit clock indicates hours, minutes, *and* seconds. The logic-flow diagram of the clock is shown in Fig. 1. The circuit is essentially the same as the four-digit version, except for the addition of a seconds decade counter and a tens-of-seconds modulo-6 counter. Theses two counters are the same as those previously described for the minutes and tens-of-minutes counters. And since the six-digit version actually counts the seconds rather than indicating them by a flashing lamp, only two IC's (*IC2* and *IC4*) are used on the scaler module. The one-pulse-per-second output of *IC4* drives the seconds decade counter.

The circuits of the pushbutton controls have been changed slightly and a new HOLD pushbutton has been added. When the latter is depressed, counting is stopped and does not start again until the button is released. This permits the user to set the clock to some pre-

BY CHARLES G. KAY AND DANIEL MEYER

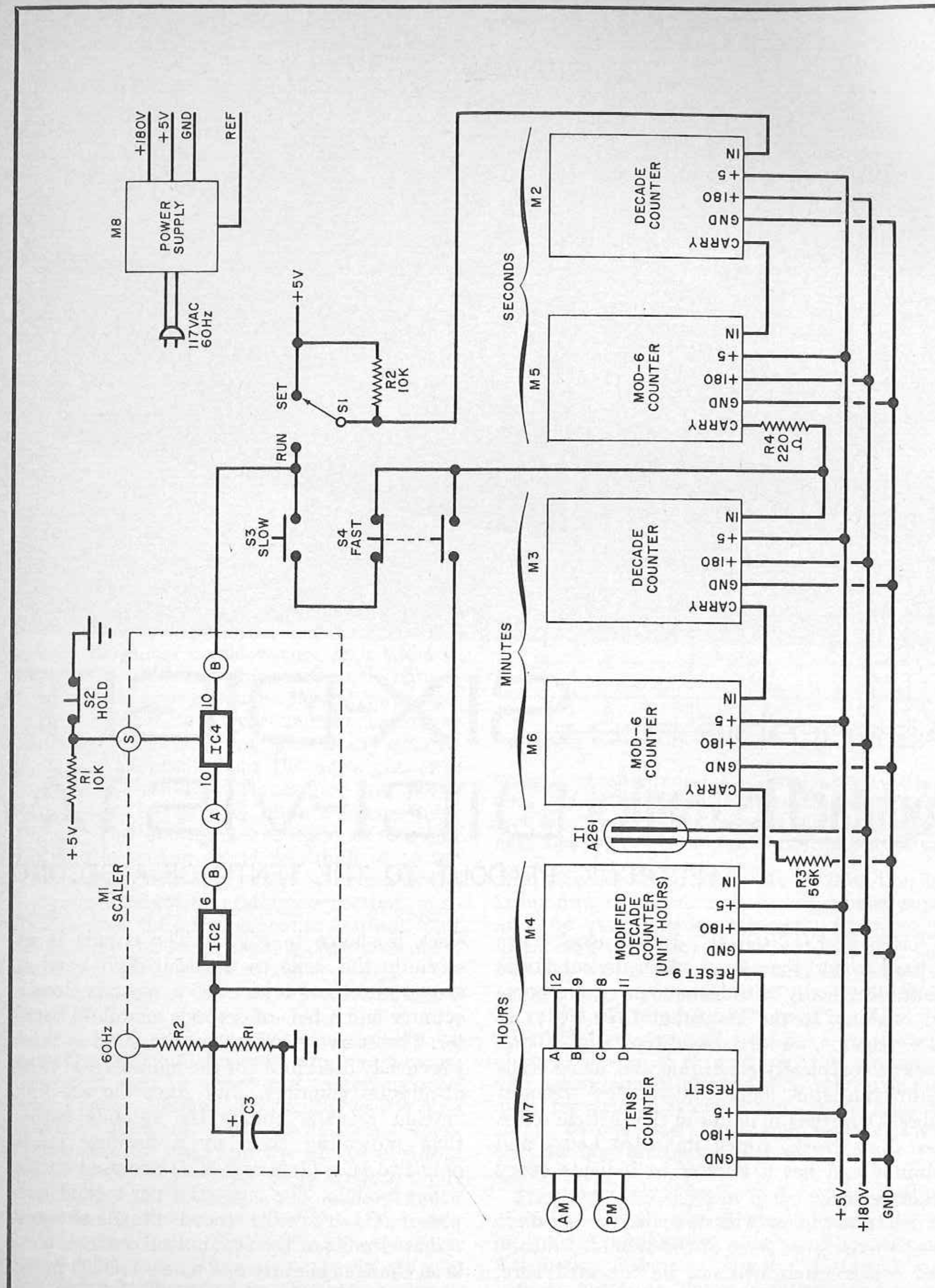
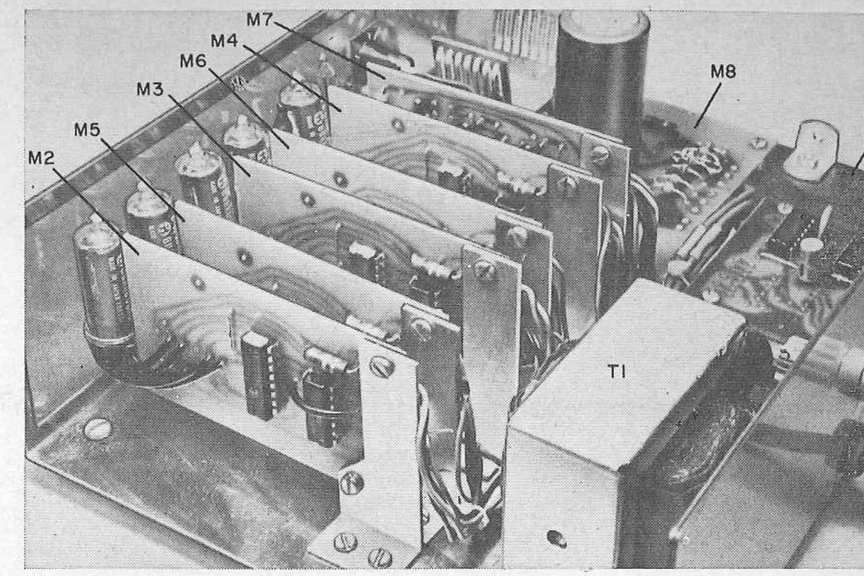


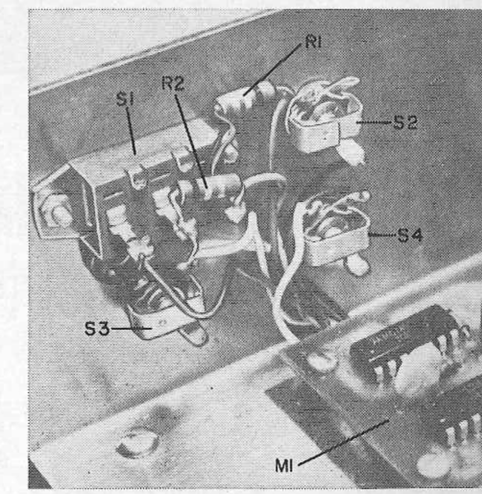
Fig. 1. The logic flow of the six-digit clock is essentially the same as the four-digit clock previously described. Because of the addition of the seconds readouts, only two IC's are used in the scaler module.



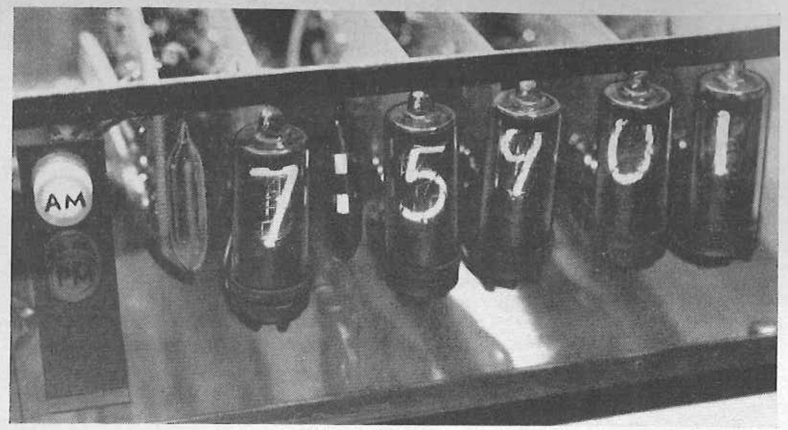
Although the prototype was built into a metal cabinet with the arrangement shown here, it could be mounted within any type of cabinet deep enough to accept the modules. The power supply and scaler can be above or below the readouts, and the operating controls hidden away.

PARTS LIST

I1—Neon lamp (optional) (Signalite A261 or similar)
M1—Scaler module
M2-M4—Decade counter module
M5,M6—Modulo-6 counter module
M7—Tens counter module
M8—Power supply module
R1,R2—10,000-ohm, ½-watt resistor
R3—56,000-ohm, ½-watt resistor
R4—220-ohm, ½-watt resistor
S1—Spdt slide or toggle switch
S2—Spst normally closed pushbutton switch
S3—Spst normally open pushbutton switch
S4—Dpdt no/nc pushbutton switch
Misc.—Suitable chassis, polarized plastic glare shield, spacers, mounting brackets, hook-up wire, etc.
Note—The following are available from Southwest Technical Products Corp., 219 W. Rhapsody, San Antonio, TX 78216: decade counter module NX-10 at $15, postpaid; modulo-6 counter module NX-6 at $15, postpaid; tens counter module CL-1 at $8.50, postpaid (specify neon or incandescent lamp); scaler module SC-6 at $8.75, postpaid; power supply module 169 at $11.55, plus postage for 4 lb; polaroid plastic at 25¢/sq in. (specify size required).



The operating controls can be mounted anywhere desired. Once the clock is set, the controls are not used, so they can be hidden from sight on the rear apron, or concealed in chassis.

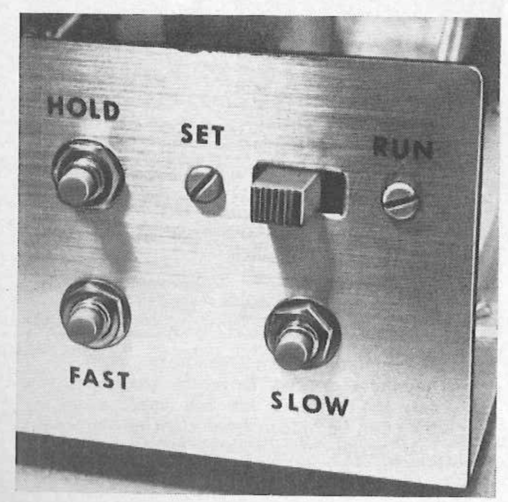


The colon is made by painting black bands on a neon lamp. If desired, another colon may be used between the seconds (the two readouts on the right) and the adjacent unit minutes indicator. In this time example, the tens hours neon is not lit.

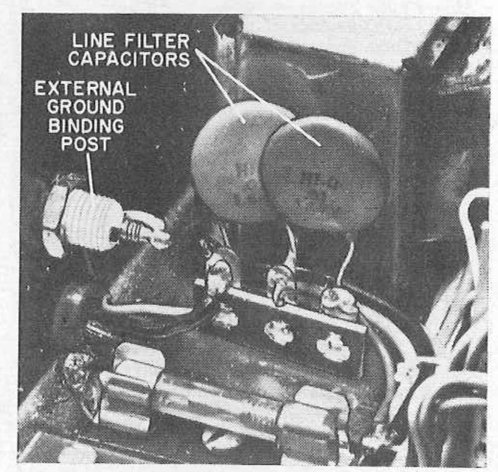
determined time and, when the standard time source (WWV, CHU, or other form of time tick) is correctly indicated, start the clock at the desired point.

Like the four-digit unit, this clock has an a.m./p.m. indicator and can be fitted with an optional alarm circuit. If desired an additional A261 neon lamp, with parts blanked out to make it look like a colon, can be mounted between the minutes and seconds to separate the readings. All modules are the same as those used in the four-digit clock readout.

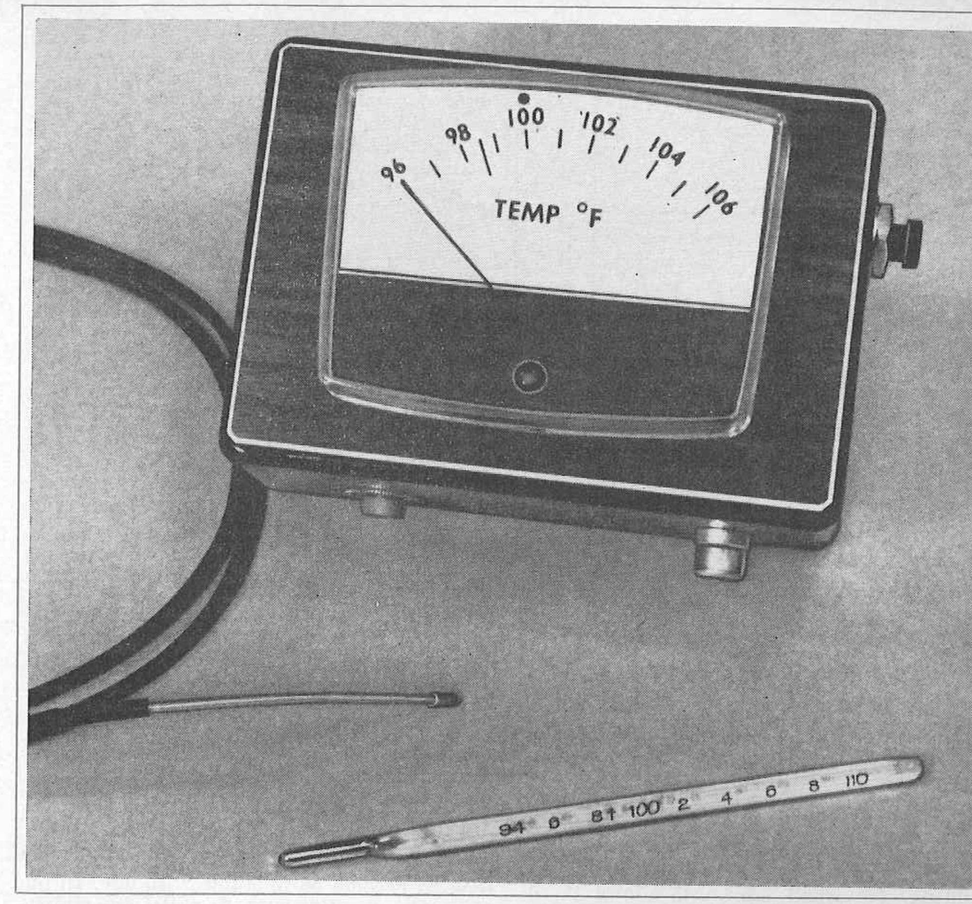
To reduce the possible effects of line transients, each side of the input ac line can be decoupled to an external ground through a pair of 0.1-μF capacitors with the common capacitor point connected to a five-way binding post. The binding post is connected to a good ground. –30–



Operating controls should be clearly identified wherever they are located. Ordinary press-on type (available at all art stores) can be used for this.



If you experience erratic timekeeping due to a noisy ac line, connect a capacitor from each side of the line to a good ground, via a binding post.



BUILD AN

Electronic Clinical Thermometer

FAST, EASY-TO-READ AND ACCURATE

There is no mystery to the construction of an electronic clinical thermometer. Besides accuracy and measurement repeatability, the thermistor reaction time is of prime importance. POPULAR ELECTRONICS believes that this project offers the most practical solution to these problems.

THE OLD mercury-glass thermometers that we have all used for so long have many disadvantages. They have to be shaken down before each use, they're hard to read, and they are all too easily broken. Modern electronic technology now permits us to build a small, portable, self-powered, electronic thermometer that provides a temperature indication in about 30 seconds, is easy to read, and is practically indestructible.

Temperature is sensed by a tiny precision thermistor mounted in a small metal enclosure and connected to the electronics and indicating unit through a length of very flexible cable. The diameter of the thermistor probe is considerably less than that of a

BY J. R. LAUGHLIN