

## DELTA STANDARD

actual capacitance of these strays is approximately 10 to 20  $\mu\mu\text{fd}$ . No effort is made to standardize this value. As the switch is rotated, capacitors are switched into the circuit to provide a change (or "Delta") of capacitance as indicated. In the 0  $\mu\mu\text{fd}$  position, an additional 3  $\mu\mu\text{fd}$  has been added in addition to the strays.

### NOTE

Later models of the Type S-30 have the capacitance ranges marked in picofarads. Since one picofarad equals one micromicrofarad the actual value of capacitance selected remains unchanged.

### Calibration of Capacitance Ranges

Calibration of the capacitance ranges is possible with most commercial bridges. The procedure is to measure the capacitance of the S-30 in the  $-3 \mu\mu\text{fd}$  position, then switch to the 0  $\mu\mu\text{fd}$  position and determine if the "Delta" change is  $3 \mu\mu\text{fd} \pm 1\%$ . Adjustment of C-2 will be necessary if not within tolerance. Continue to switch to each range and measure the capacitance, adjusting the trimmer as indicated in Table I to give the correct "Delta" changes.

TABLE I

Switch Position	Typical Value	Adjustment
$-3 \mu\mu\text{fd}$	13 $\mu\mu\text{fd}$	None
0 $\mu\mu\text{fd}$	16 $\mu\mu\text{fd}$	C-2
+3 $\mu\mu\text{fd}$	19 $\mu\mu\text{fd}$	C-4
+10 $\mu\mu\text{fd}$	26 $\mu\mu\text{fd}$	C-6
+30 $\mu\mu\text{fd}$	46 $\mu\mu\text{fd}$	C-7
+100 $\mu\mu\text{fd}$	116 $\mu\mu\text{fd}$	C-9
+300 $\mu\mu\text{fd}$	316 $\mu\mu\text{fd}$	C-11

### Calibration of Resistance Ranges

Two precision resistors of identical manufacture are used to standardize the resistance compensation. These can be checked for resistance value with any reliable bridge. If either resistor is out of tolerance, it is advisable to change both to maintain the balance of capacity, unless a resistor of similar manufacture is available.

### Calibration of Inductance Ranges

Standardization of the 300  $\mu\text{h}$  inductance is somewhat complicated since its value cannot be read directly with a "Bridge" type device. This is due to the fact that the circuit has stray capacitance in parallel with the inductance which will give false indications on a bridge due to the



Fig. 6-1. The S-30 Delta Standards.

The S-30 Delta Standards provides a means for calibrating the Type 130 L-C Meter. The accuracy of the S-30 is  $\pm 1\%$  or better in all ranges.

The S-30 provides seven calibrated capacitance ranges, two precision resistors, and one standard inductance of 300  $\mu\text{h}$  at 140 kc.

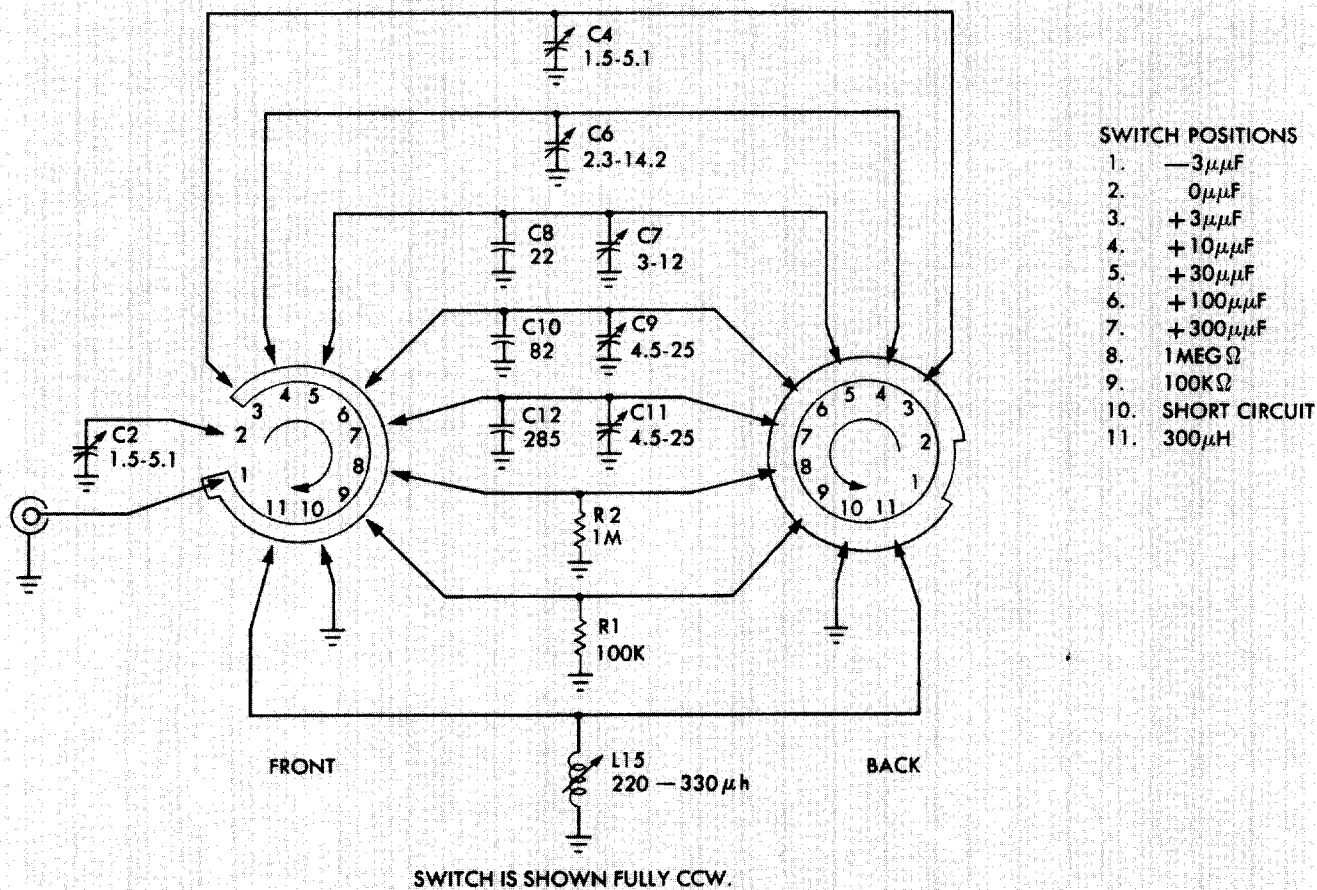
### Equipment Required for Calibration of Delta Standards

A commercial impedance bridge with tolerances of  $\pm$  one quarter of one per cent for capacitance, and one per cent for inductance.

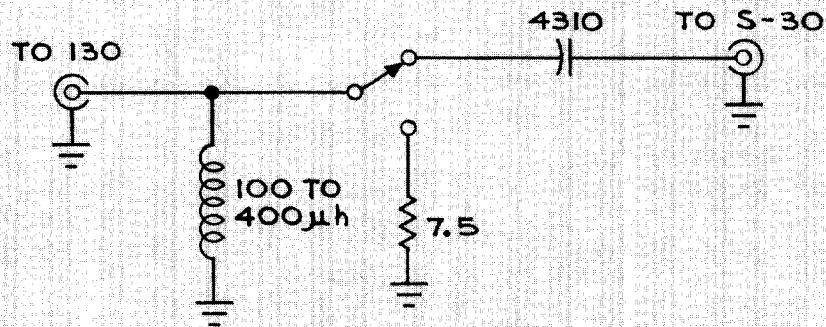
Inductance Standardizer, to be constructed from the following specifications in the circuit diagram preceding all sections on the S-30 Delta Standards. The value of the capacitor and resistor must be within 2% of those shown. Figure 6-2 is a pictorial representation of the completed Inductance Standardizer.

### Operation

Only the stray capacitance of the connector and switch assembly is in the circuit in the  $-3 \mu\mu\text{fd}$  position. The



TYPE S-30 DELTA STANDARD



INDUCTANCE STANDARDIZER

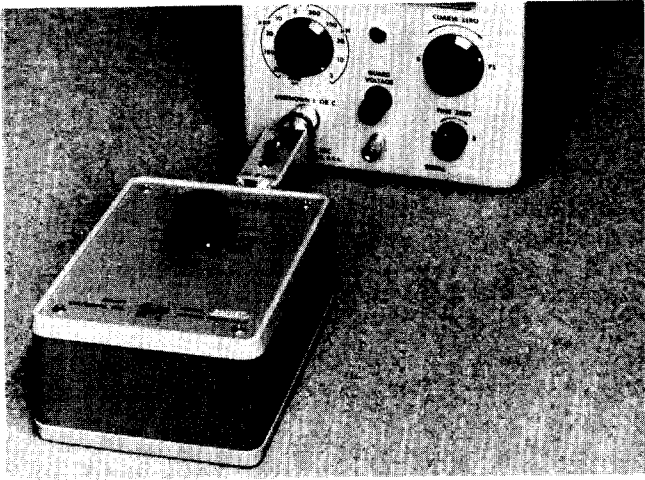


Fig. 6-2. The Type S-30 and the Type 130 L-C Meter connected with the Inductance Standardizer.

change in admittance caused by the stray capacitance. With the circuitry used in the Type 130 L-C Meter, only the inductance in the circuit materially affects the oscillator frequency.

To calibrate the  $300 \mu\text{h}$  range of the Type S-30, construction of the Inductance Standardizer shown on the facing page is suggested. The value of the capacitor and resistor must be within 2% of those shown.

Connect the Type S-30, the Inductance Standardizer, and the Type 130 as shown in Fig. 6-2. Place the switch of the Type 130 in the  $300 \mu\text{h}$  position. Depress the switch on the inductance standardizer. With the COARSE and FINE ZERO controls bring the meter reading of the Type 130 to 0. With the switch depressed, the  $100\text{-}400 \mu\text{h}$  coil is parallel resonant with the internal capacity of the 130 LC meter, and the  $7.5 \Omega$  resistor replaces the DC resistance of the  $300 \mu\text{h}$  coil in the 130.

Release the shorting switch on the Inductance Standardizer and adjust L15 until the Type 130 meter reading is brought back to 0.

The  $4310 \mu\mu\text{f}$  Capacitor in the Inductance Standard is series resonant with the  $300 \mu\text{h}$  coil in the type 130 at 140 KC, and the 130 sees only the  $7.5 \Omega$  resistance of the coil.

After completing the adjustment, lock the slug of L15 in place.

Replace the outer case of the Type S-30.