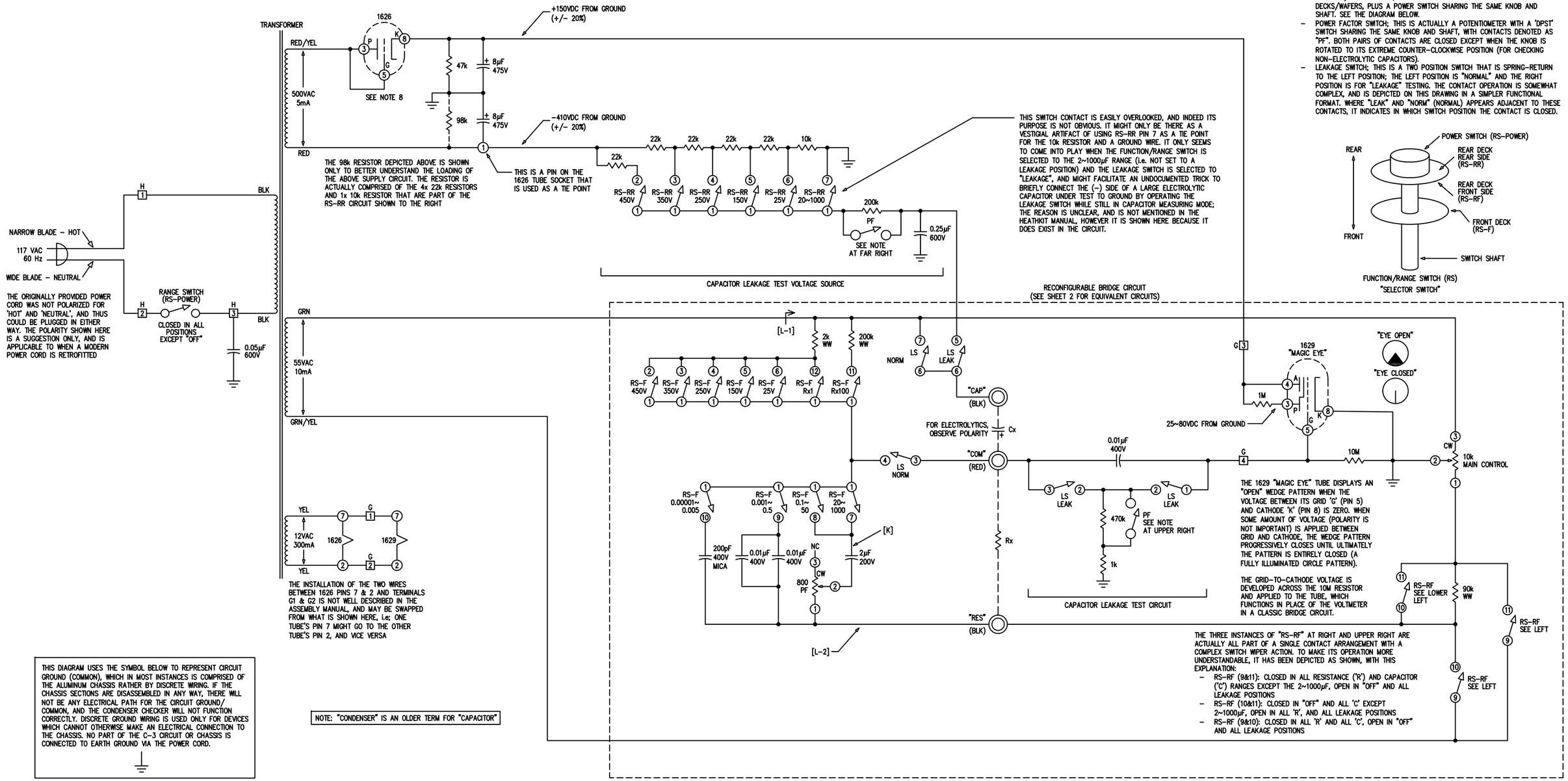

THIS DIAGRAM USES THE SYMBOL BELOW TO REPRESENT CIRCUIT GROUND (COMMON), WHICH IN MOST INSTANCES IS COMPRISED OF THE ALUMINUM CHASSIS RATHER BY DISCRETE WIRING. IF THE CHASSIS SECTIONS ARE DISASSEMBLED IN ANY WAY, THERE WILL NOT BE ANY ELECTRICAL PATH FOR THE CIRCUIT GROUND/COMMON, AND THE CONDENSER CHECKER WILL NOT FUNCTION CORRECTLY. DISCRETE GROUND WIRING IS USED ONLY FOR DEVICES WHICH CANNOT OTHERWISE MAKE AN ELECTRICAL CONNECTION TO THE CHASSIS. NO PART OF THE C-3 CIRCUIT OR CHASSIS IS CONNECTED TO EARTH GROUND VIA THE POWER CORD.

NOTE: "CONDENSER" IS AN OLDER TERM FOR "CAPACITOR"

NOTES:

1) ALL RESISTANCES ARE SHOWN IN OHMS UNLESS MARKED 'k' (KILO) OR 'M' (MEGA). RESISTORS ARE 1/2W CARBON COMPOSITE (CC) UNLESS DENOTED "WW" FOR 'WIREWOUND' (HEATHKIT DOES NOT SPECIFY THE WATTAGE ON THESE WIREWOUND RESISTORS, AND THE PARTS ARE NOT MARKED WITH THEIR WATTAGE; THEY ARE PROBABLY 1W). 'CC' RESISTORS ARE 10% TOLERANCE, AND "WW" RESISTORS ARE 1% TOLERANCE.
2) THE "MAIN CONTROL" AND "POWER FACTOR" POTENTIOMETERS ARE DENOTED ON HEATHKIT ASSEMBLY DIAGRAMS WITH 'TERMINAL 1' ON THE CCW END OF THE ELEMENT, 'TERMINAL 3' ON THE CW END OF THE ELEMENT, AND 'TERMINAL 2' ON THE WIPER. THE ACTUAL POTS ARE NOT SO MARKED, AND THE HEATHKIT SCHEMATIC DOES NOT INCLUDE THESE NUMBERS..
3) WHERE SPARE NUMBERED TERMINALS ON TUBE SOCKETS AND/OR SWITCHES ARE USED AS TIE POINTS, THEY ARE MARKED "TP" OR "TIE POINT".
4) WHILE THIS SCHEMATIC IS DRAWN SPECIFICALLY FOR THE HEATHKIT C-3 CONDENSER CHECKER (MADE FROM 1952-1961), IT SHOULD BE MOSTLY APPLICABLE TO EARLIER C-1 (1948-1949) AND C-2 (1950-1952); THE C-1 & C-2 ARE ELECTRICALLY IDENTICAL, AND THE C-3 DIFFERS FROM THEM BY ITS SUBSTITUTION OF THE EARLIER MODELS' 12A6 TUBE WITH THE 1626 TUBE, AND THE ADDITION OF A SPRING-LOADED LEAKAGE TEST SWITCH.
5) CIRCUIT POINTS DESIGNATED WITH A SMALL SQUARE SYMBOL ☐ DENOTE A 4-LUG TERMINAL STRIP THAT JOINS THE CHASSIS WIRING TO THE MULTI-WIRE BUNDLE SERVING THE 1629 "MAGIC EYE" TUBE. HEATHKIT DOCUMENTATION REFERS TO THIS TERMINAL STRIP AS "G". SIMILARLY, THE 3-LUG 'H' TERMINAL STRIP IS DENOTED HERE WITH THE SQUARE SYMBOL.
6) SIMILARLY TO TERMINAL STRIPS "G" & "H" DESCRIBED ABOVE, NOTATIONS HERE INCLUDE THE 2-LUG "L" (e.g. [L-1]), AND THE 1-LUG "K" (i.e. [K]) TERMINAL STRIPS; AS MULTIPLE COMPONENTS OFTEN CONNECT TO THE SAME POINTS ON THESE TERMINAL STRIPS, THEIR NOTATIONS HERE ARE LESS LOCATION-SPECIFIC THAN WITH "G".
7) SWITCH AND TUBE SOCKET TERMINALS ARE DESIGNATED WITH A SMALL ROUND SYMBOL ○; THE INTERNAL NUMBERS SHOWN ON THIS DRAWING MATCH THE ORIGINAL HEATHKIT SCHEMATICS.
8) THIS DESIGN USES A 1626 TRIODE TUBE, BUT BY CONNECTING ITS PLATE AND GRID TOGETHER, HAS IT FUNCTIONING AS A DIODE TUBE. THIS MAY HAVE BEEN DONE TO USE UP SOME OF HEATH'S WWII 'WAR SURPLUS' STOCK OF THE OLDER TUBES.
9) NON-ELECTROLYTIC CAPACITORS SHOULD HAVE A TOLERANCE OF 2.5% OR BETTER. THE 200pF CAP SHOULD BE MICA TYPE.
10) SEE SHEET 2 OF THIS DRAWING FOR ADDITIONAL NOTES, OPERATION INSTRUCTIONS, DIAGRAMS, AND THEORY OF CIRCUIT OPERATION.
11) THE FUNCTION/RANGE SELECTOR SWITCH HAS MULTIPLE DECKS (WAFERS), SOME WITH FRONT AND REAR HALVES, AND THEIR PLATE & WIPER ARRANGEMENTS ARE COMPLEX, WHICH IN MOST CASES CANNOT BE CLEARLY DEPICTED USING COMPOSITE SYMBOLOGY. INSTEAD, THIS SCHEMATIC DEPICTS ALL SWITCH CONTACTS INDIVIDUALLY; WHERE TERMINALS SHOW MORE THAN ONE SWITCH CONTACT WITH THE SAME NUMBER, THIS DENOTES POINTS THAT ARE ACTUALLY THE SAME ON THE SWITCH.

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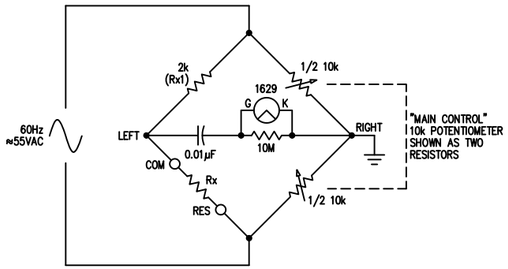
THIS SCHEMATIC WAS DRAWN, USING AUTOCAD, AS A MEANS TO GET A MORE LEGIBLE AND UNDERSTANDABLE SCHEMATIC FOR THE HEATHKIT C-3. AN EFFORT HAS BEEN MADE TO SIZE AND SCALE COMPONENTS AND TEXT FOR THE LARGEST AND BEST VISIBILITY AND LEGIBILITY WHILE STILL FITTING ON A NORMAL 11 X 17" SHEET OF PAPER.

HEATHKIT C-3 CONDENSER CHECKER SCHEMATIC DIAGRAM

SHEET 1 OF 2

EQUIVALENT BRIDGE CIRCUIT DIAGRAMS

RESISTANCE



A 60 Hz SINE WAVE, PROVIDED BY THE 55VAC SECONDARY WINDING OF THE TRANSFORMER, ACTS AS THE AC EXCITATION VOLTAGE FOR THE BRIDGE CIRCUIT.

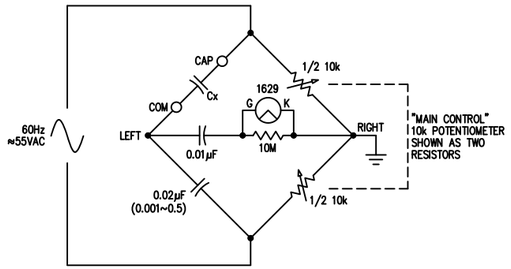
WHEN THE 'FUNCTION/RANGE SWITCH' IS SET TO THE 'Rx1' POSITION, THE CIRCUIT IS ESSENTIALLY THE SAME AS SHOWN ABOVE. THE SWITCH INSERTS A PRECISION 2k RESISTOR IN THE UPPER LEFT QUADRANT OF THE BRIDGE, AND THE RESISTOR UNDER TEST (Rx) IS INSERTED IN THE LOWER LEFT QUADRANT. THE "MAIN CONTROL" POTENTIOMETER IS ALWAYS CONNECTED SO THAT ITS TWO HALVES ARE AS SHOWN ABOVE (THE RESISTANCE ELEMENT ON EITHER SIDE OF THE WIPER COMPRISES TWO RESISTANCES WHICH VARY INVERSELY WITH EACH OTHER AS THE MAIN CONTROL KNOB IS ADJUSTED). WHEN THE KNOB IS POINTING AT THE 2000 ON THE SCALE, THE POT IS EQUALLY DIVIDED SO THAT 5K IS IN THE BRIDGE'S UPPER RIGHT QUADRANT AND 5K IS IN THE LOWER RIGHT QUADRANT. THIS EQUALLY DIVIDES THE EXCITATION VOLTAGE IN HALF, AND SINCE THE WIPER OF THE POT IS CONNECTED TO CIRCUIT GROUND, THE GROUND REFERENCE IS MADE.

THE FIXED 2k REFERENCE RESISTOR AND THE RESISTOR UNDER TEST Rx FORM ANOTHER VOLTAGE DIVIDER ACROSS THE EXCITATION VOLTAGE. AS AN EXAMPLE, ASSUME THAT Rx = 2000 OHMS, SO THIS IS EQUAL TO THE 2k REFERENCE, AND THUS HALF OF THE EXCITATION VOLTAGE APPEARS AT THE 'LEFT' SIDE OF THE BRIDGE. AS THE MAIN CONTROL KNOB IS ADJUSTED, THE VOLTAGE ON THE 'RIGHT' SIDE OF THE BRIDGE CHANGES ABOVE AND BELOW HALF OF THE EXCITATION. WHEN THE KNOB IS POINTING AT THE 2000 POINT ON THE SCALE, THE VOLTAGES AT LEFT AND RIGHT ARE BOTH HALF OF THE EXCITATION, AND THUS ARE THE SAME. WITH BOTH SIDES OF THE BRIDGE BEING THE SAME VOLTAGE, THERE IS NO VOLTAGE BETWEEN THE LEFT AND RIGHT SIDES. VIA A SERIES AC-COUPLING (DC BLOCKING) CAPACITOR, THE 1629 "MAGIC EYE" TUBE IS CONNECTED ACROSS THE BRIDGE FROM LEFT TO RIGHT, AND THUS SERVES TO MONITOR WHETHER THE BRIDGE HAS THE SAME VOLTAGE ON BOTH SIDES, AND IF SO, HOW MUCH. SINCE THE "MAGIC EYE" TUBE DISPLAYS AN "OPEN" PATTERN WHEN THERE IS ZERO VOLTS BETWEEN ITS GRID AND CATHODE, IT THUSLY INDICATES BY THAT PATTERN THAT THE KNOB IS NOW POINTING AT THE VALUE OF Rx, i.e; 2000 OHMS. IF THE KNOB IS MOVED EVEN A SLIGHT AMOUNT TO EITHER SIDE OF THE 2000, THE BRIDGE WILL HAVE AN IMBALANCE OF VOLTAGES ON EITHER SIDE, AND THUS THE 1629 TUBE WILL SEE A VOLTAGE AND IT WILL DISPLAY A SOMEWHAT CLOSED PATTERN, AND A GREATER KNOB MOVEMENT WILL RESULT IN A FULLY "CLOSED" PATTERN.

WHEN Rx IS SOME OTHER RESISTANCE VALUE, THE VOLTAGE ON THE LEFT SIDE OF THE BRIDGE WILL BE DIFFERENT, AND THE MAIN CONTROL KNOB WILL NEED TO BE ROTATED UNTIL THE "MAGIC EYE" AGAIN SHOWS A FULLY "OPEN" PATTERN, AND THEN THE RESISTANCE VALUE CAN BE READ FROM THE SCALE.

WHEN THE RESISTANCE VALUE OF Rx IS TOO GREAT FOR THE 'Rx1' RANGE, THE FUNCTION/RANGE SWITCH CAN BE MOVED TO THE 'Rx100' RANGE, IN THIS SWITCH POSITION, THE 2K REFERENCE RESISTOR IS REPLACED WITH A 200k RESISTOR. FOR EXAMPLE, IF Rx HAPPENS TO BE ALSO 200K, THEN THE BRIDGE WILL BE BALANCED WITH THE KNOB POINTING AT THE 2000 ON THE SCALE, AND 2000 x 100 = 200k.

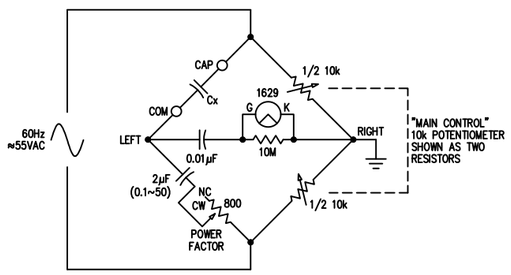
CAPACITANCE



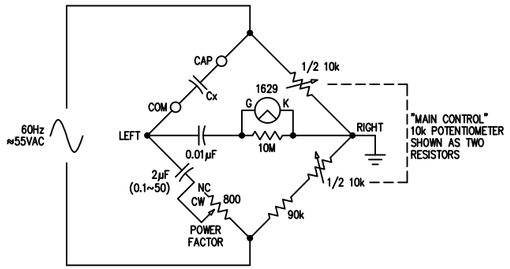
THE BRIDGE FOR MEASURING CAPACITANCE IS ALMOST THE SAME AS FOR MEASURING RESISTANCE. THE DIFFERENCE IS THAT THE TWO RESISTANCES THAT COMPRISE THE VOLTAGE DIVIDER ON THE LEFT SIDE OF THE BRIDGE ARE REPLACED BY TWO CAPACITANCES. BECAUSE THE EXCITATION VOLTAGE IS AC, THE BRIDGE IS REACTING TO THE CAPACITIVE REACTANCE OF THESE TWO CAPACITORS, WHICH IS RELATED TO THE RECIPROCAL OF THE CAPACITANCE VALUES (AS THE CAPACITANCE VALUE GOES UP, THE ASSOCIATED REACTANCE GOES DOWN. IN THIS SENSE, THE CAPACITIVE VOLTAGE DIVIDER NEEDS TO BE ARRANGED 'UPSIDE DOWN' IN ORDER FOR IT TO PROPERLY BALANCE AGAINST THE RIGHT SIDE OF THE BRIDGE. ACCORDINGLY, THE CAPACITOR UNDER TEST, Cx, IS IN THE UPPER LEFT QUADRANT WHILE THE PRECISION REFERENCE CAPACITOR IS IN THE LOWER LEFT QUADRANT.

THE DIAGRAM AVOVE SHOWS THE BRIDGE ARRANGED FOR THE '0.001~0.5µF' RANGE, WITH THE REFERENCE CAPACITOR BEING 0.02µF (SINCE THIS IS AN UNCOMMON VALUE, IT IS ACTUALLY COMPRISED OF TWO 0.01µF CAPACITORS CONNECTED IN PARALLEL). AS AN EXAMPLE, IF Cx = 0.02µF, THEN THE LEFT SIDE VOLTAGE DIVIDER WILL HAVE HALF OF THE EXCITATION VOLTAGE AT THE LEFT SIDE OF THE BRIDGE, AND IN ORDER TO BALANCE THE BRIDGE THE "MAIN CONTROL" WILL NEED TO BE ADJUSTED SO THAT ITS KNOB POINTS AT THE CENTER OF THE SCALE, WHICH FOR THIS RANGE IS MARKED '.02', WHICH MATCHES THE VALUE OF Cx.

FOR THE -0.00001~0.005µF' RANGE, THE REFERENCE CAPACITOR HAS A VALUE OF 200pF (0.0002µF), SO AS AN EXAMPLE, IF Cx = 200pF AS WELL, THE BRIDGE WILL BE BALANCED WHEN THE KNOB POINTS AT THE '.0002' ON THE ASSOCIATED SCALE, WHICH OF COURSE IS THE CORRECT VALUE (0.0002µF = 200pF).



ON THE HIGHER CAPACITANCE RANGE OF '0.1~50µF', THE CIRCUIT IS THE SAME AS BEFORE, EXCEPT THE REFERENCE CAPACITOR IS NOW 2µF, AND THE 800 OHM 'POWER FACTOR' POTENTIOMETER IS CONNECTED IN SERIES WITH THAT CAPACITOR. THIS EFFECTIVELY ALLOWS 'ADJUSTING OUT' THE EQUIVALENT INTERNAL RESISTANCE INHERENT IN LARGER CAPACITORS, ESPECIALLY ELECTROLYTICS. NORMALLY, THE TEST BEGINS WITH THE ASSUMPTION THAT Cx HAS MINIMAL INTERNAL RESISTANCE, SO THE POWER FACTOR POTENTIOMETER IS TURNED TO ITS COUINTER-CLOCKWISE POSITION SO THAT IT ADDS NO SERIES RESISTANCE, AND THEN ONLY ADJUSTING IN SOME RESISTANCE AFTER THE TEST HAS BEGUN IF NECESSARY TO BALANCE THE BRIDGE.



IN THE HIGHEST CAPACITANCE RANGE OF '20~1000µF', THE CIRCUIT IS THE SAME AS AT LOWER LEFT, EXCEPT AN ADDITIONAL FIXED RESISTANCE OF 90k IS CONNECTED IN SERIES WITH THE HALF OF THE "MAIN CONTROL" POTENTIOMETER THAT IS LOCATED IN THE LOWER RIGHT QUADRANT OF THE BRIDGE. THIS IS TO COMPENSATE FOR THE SIGNIFICANT MISMATCH OF THE MUCH HIGHER Cx VALUES IN THE UPPER LEFT QUADRANT, COMPARED TO THE SAME 2µF REFERENCE CAPACITOR THAT WAS ALSO USED FOR THE NEXT LOWEST RANGE. BECAUSE THIS HIGHEST RANGE DOES NOT HAVE THE SAME '1 TO 5' SCALING AS ALL LOWER RANGES, THE ASYMMETRICAL OFFSETS WORK OUT TO RESULT IN A BRIDGE THAT CAN STILL BE BALANCED.

CALIBRATION

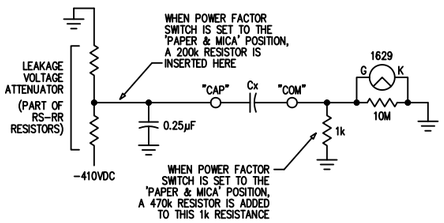
THIS INSTRUMENT DOES NOT HAVE ANY ADJUSTABLE COMPONENTS WHICH MIGHT BE USED TO AFFECT CALIBRATION. THE ONLY CALIBRATION STEP THAT MAY BE DONE IS AS FOLLOWS:

OBTAIN A CALIBRATION RESISTOR WITH AN ACCURATE VALUE OF EITHER 2000 OHMS (2k) OR 200k. THIS RESISTOR MAY BE A HIGH PRECISION TYPE OF 1% TOLERANCE OR BETTER, OR IT MAY BE A LOWER TOLERANCE PART THAT HAS BEEN SELECTED BY MEASURING WITH AN ACCURATE OHMMETER TO WITHIN 1% OF 2k OR 200k.

WITH THE INSTRUMENT PLUGGED IN TO AC POWER, TURN THE FUNCTION/RANGE SWITCH TO ONE OF THE TWO RESISTANCE RANGES. IF THE SELECTED CALIBRATION RESISTOR HAS A VALUE OF 2K, THEN SELECT THE 'Rx1' RANGE, AND IF IT IS 200k, SELECT THE 'Rx100' RANGE. WAIT FOR AT LEAST ONE MINUTE FOR THE TUBES TO FULLY WARM UP.

ADJUST THE "MAIN CONTROL" KNOB UNTIL THE WIDEST (MOST "OPEN") DISPLAY IS OBTAINED ON THE 1629 "MAGIC EYE" TUBE. LOOSEN THE SET SCREW ON THE KNOB SUFFICIENTLY THAT THE KNOB MAY NOW BE TURNED WITHOUT THE SHAFT TURNING. ROTATE THE LOOSE KNOB UNTIL ITS POINTER IS EXACTLY ALIGNED WITH THE '2000' MARK AT THE TOP OF THE SCALE (12 O'CLOCK POSITION). TIGHTEN THE SET SCREW. CALIBRATION IS NOW COMPLETE.

EQUIVALENT LEAKAGE TEST CIRCUIT



THE CAPACITOR LEAKAGE TEST IS DONE BY APPLYING THE SELECTED TEST VOLTAGE TO A VOLTAGE DIVIDER THAT IS COMPRISED OF THE CAPACITOR UNDER TEST, Cx, AND A RESISTOR TO GROUND (1k IN THE DIAGRAM AT LEFT). THE VOLTAGE AT THE CENTER OF THE DIVIDER IS APPLIED ACROSS THE 10M RESISTOR, AND ALSO BETWEEN THE 1629 "MAGIC EYE" TUBE'S GRID AND CATHODE.

A HEALTHY CAPACITOR WILL HAVE A LEAKAGE CURRENT THAT IS VERY LOW, SO ONLY A TINY VOLTAGE IS DROPPED ACROSS THE 1k RESISTOR, AND THUS ACROSS THE 1M RESISTOR AND ALSO ACROSS THE TUBE, THUS THE TUBE WILL DISPLAY A WIDE "OPEN" PATTERN. HOWEVER, IF THE LEAKAGE CURRENT IS HIGHER, MORE VOLTAGE WILL BE DROPPED ACROSS THE 1k RESISTOR, AND HENCE ACROSS THE TUBE, RESULTING IN A NARROW "CLOSED" DISPLAY PATTERN.

BECAUSE OF THE NORMAL INRUSH CHARGING CURRENT, EVEN A HEALTHY CAPACITOR'S LEAKAGE TEST WILL RESULT IN A BRIEF "BLINK" AS THE DISPLAY GOES FROM OPEN TO CLOSED AND BACK TO OPEN. THIS BLINK WILL TAKE LONGER WITH LARGER ELECTROLYTIC CAPACITORS, BUT IF THE DISPLAY REMAINS CLOSED, THE CAPACITOR IS LEAKY.

THE ABOVE DIAGRAM ONLY SHOWS THE CRITICAL COMPONENTS AND CONNECTIONS FOR THE LEAKAGE TEST. THE ACTUAL CIRCUIT INCLUDES SEVERAL SWITCHES. TWO SWITCHES, WHICH ARE PART OF THE "POWER FACTOR" POTENTIOMETER ASSEMBLY, WILL ENGAGE ADDITION RESISTORS IN THE TWO PLACES SHOWN ABOVE. THREE MORE SWITCH CONTACT PAIRS REARRANGE THE LEAKAGE TEST CIRCUIT ACCORDING TO WHETHER THE TEST SWITCH IS IN THE "NORMAL" OR "LEAKAGE" POSITION. WHEN IN "LEAKAGE" POSITION, THE CIRCUIT IS AS SHOWN ABOVE. WHEN IN THE "NORMAL" POSITION, THE CAPACITOR UNDER TEST, Cx, IS DISCONNECTED FROM THE TEST VOLTAGE SOURCE, AND A 2k RESISTOR IS CONNECTED ACROSS IT IN ORDER TO QUICKLY DISCHARGE IT BEFORE THE USER IS LIKELY TO HANDLE IT. SINCE CAPACITORS OF UP TO 1000µF MIGHT BE CHARGED TO AS MUCH AS 450V, HANDLING SUCH A STILL-CHARGED CAPACITOR CAN BE QUITE DANGEROUS; THE AUTOMATIC DISCHARGING FEATURE MAKES THE LEAKAGE TEST MUCH SAFER.

OPERATING INSTRUCTIONS

NOTE: "CONDENSER" IS AN OLDER TERM FOR "CAPACITOR"

FOR THE MOST ACCURATE MEASUREMENTS, ESPECIALLY OF LOW RESISTANCE OR CAPACITANCE VALUES, THE COMPONENT UNDER TEST SHOULD BE CONNECTED DIRECTLY TO THE FRONT PANEL BINDING POSTS. HOWEVER, FOR CONVENIENCE AND FOR MOST MEASUREMENTS, TEST LEADS MAY BE USED. THE RED CENTER BINDING POST IS THE 'COMMON' FOR ALL MEASUREMENTS, WHILE ONLY ONE OF THE BLACK OUTER BINDING POSTS MAY BE USED FOR ANY GIVEN MEASUREMENT, DEPENDING ON WHETHER THE COMPONENT UNDER TEST IS A RESISTOR (LEFT BINDING POST) OR A CAPACITOR (RIGHT POST). WHEN TESTING POLARIZED CAPACITORS SUCH AS ELECTROLYTICS, THE + SIDE OF THE COMPONENT MUST BE CONNECTED TO THE RED BINDING POST.

WHEN MEASURING COMPONENT VALUES (CAPACITANCE OR RESISTANCE), THE EXCITATION VOLTAGE PRESENT AT THE BINDING POSTS IS NO GREATER THAN 55VAC, SO HANDLING THE CONNECTED COMPONENT IS SAFE. HOWEVER, WHEN MEASURING THE LEAKAGE OF CAPACITORS, LARGE VOLTAGES UP TO 450VDC MAY BE PRESENT AND NORMAL SAFETY PRECAUTIONS SHOULD BE FOLLOWED; THE TEST VOLTAGE IS NOT PRESENT WHEN THE LEAKAGE TEST SWITCH IS IN THE "NORMAL" POSITION, AND IN THAT POSITION THE INTERNAL CIRCUITRY SHORT CIRCUITS THE "COM" AND "CAP" BINDING POSTS THROUGH A LOW VALUE RESISTANCE.

AFTER TURNING THE INSTRUMENT ON BY ROTATING THE FUNCTION/RANGE SWITCH TO ANY POSITION OTHER THAN "OFF", ALLOW AT LEAST ONE MINUTE FOR THE VACUUM TUBES TO WARM UP BEFORE PERFORMING ANY MEASUREMENT. WHEN NO COMPONENT IS CONNECTED, THE "MAGIC EYE" TUBE SHOULD GIVE A FULLY ROUND GREEN COLORED DISPLAY (DISPLAY "CLOSED") WHEN THE INSTRUMENT IS READY TO USE.

FOR CAPACITANCE OR RESISTANCE MEASUREMENTS, THE "MAGIC EYE" TUBE NORMALLY SHOWS THE FULLY "CLOSED" DISPLAY EXCEPT WHEN THE BRIDGE IS BALANCED.

TO MEASURE THE VALUE OF A RESISTOR, CONNECT THE COMPONENT TO THE ASSOCIATED BINDING POSTS. ROTATE THE FUNCTION/RANGE SWITCH TO EITHER THE 'Rx1' OR 'Rx100' RANGE POSITION. SWEEP THE "MASTER CONTROL" KNOB THROUGH ITS ENTIRE RANGE OF ROTATION, WATCHING THE "EYE" FOR WHEN THE DISPLAYED PATTERN CHANGES FROM A "CLOSED" DISPLAY TO AN "OPEN" DISPLAY (WITH THE DARK 'PIE SLICE' PATTERN). IF THE EYE DOES NOT OPEN AT ANY POINT IN THE ROTATION, TRY THE SAME PROCEDURE USING THE OTHER RESISTANCE RANGE SELECTION. WITH THE KNOB ROTATED TO THE POSITION THAT GIVES THE 'MOST OPEN' DISPLAY ON THE EYE, READ THE RESISTANCE DIRECTLY FROM THE OUTERMOST SCALE (OUTSIDE THE LARGER DIAMETER CIRCLE); IF THE FUNCTION/RANGE SWITCH IS IN THE 'Rx100' POSITION, MULTIPLY THE DIRECT SCALE READING BY 100 TO OBTAIN THE ACTUAL RESISTANCE VALUE. USING THE TWO RANGES, THE INSTRUMENT CAN MEASURE WITHIN THE 100 OHM TO 5M OHM SPAN.

TO MEASURE CAPACITANCE, FIRST DETERMINE IF THE CAPACITOR IS AN ELECTROLYTIC TYPE OR NOT. IF IT IS, ROTATE THE "POWER FACTOR" KNOB FULLY COUNTER-CLOCKWISE BUT NOT SO FAR THAT THE ASSOCIATED SWITCH CLICKS INTO THE "PAPER & MICA" POSITION; FOR NON-ELECTROLYTICS, THE KNOB MUST BE CLICKED FULLY INTO THE "PAPER & MICA" POSITION. USE THE ASSOCIATED BINDING POSTS (CONNECTING ACCORDING TO THE CAPACITOR'S POLARITY, IF ANY) AND FOLLOW THE SAME PROCEDURE AS WITH RESISTANCE MEASUREMENTS, EXCEPT SELECT FROM THE FOUR CAPACITANCE RANGES '0.00001~0.005µF', '0.001~0.5µF', '0.1~50µF', AND '20~1000µF'. INSTEAD OF A SINGLE SCALE AS USED FOR RESISTANCE MEASUREMENT, THERE ARE THREE CAPACITANCE SCALES BETWEEN THE TWO CIRCLES, PLUS A FOURTH "EXTENDED RANGE" SCALE INSIDE THE SMALLER DIAMETER CIRCLE; TAKE THE READINGS FROM THE SCALE THAT MATCHES THE CAPACITANCE RANGE SELECTED. NOTE THAT LEAKY CAPACITORS MAY NOT RESULT IN AN OPEN PATTERN ON ANY OF THE RANGES; A SUBSEQUENT LEAKAGE TEST CAN CONFIRM THIS CONDITION.

WHEN MEASURING ELECTROLYTIC CAPACITORS, THE "POWER FACTOR" KNOB AS WELL AS THE "MAIN CONTROL" KNOB SHOULD BOTH BE ADJUSTED FOR THE NULL ("EYE" FULLY OPEN) DISPLAY, AND BOTH CAPACITANCE AND POWER FACTOR READINGS CAN BE READ ACCORDINGLY.

AFTER MEASURING A CAPACITANCE VALUE, THE LEAKAGE MAY BE QUICKLY TESTED. ROTATE THE FUNCTION/RANGE SWITCH TO ANY OF THE FIVE TEST VOLTAGES 25V, 150V, 250V, 350V, 450V, TAKING CARE TO NOT EXCEED THE CAPACITOR'S VOLTAGE RATING. BRIEFLY ROTATE THE LEAKAGE SWITCH FROM THE "NORMAL" TO THE "LEAKAGE" POSITION WHILE OBSERVING THE ACTION ON THE "EYE". A SUDDEN CLOSING AND RETURN TO THE NORMAL "OPEN" DISPLAY INDICATES A SATISFACTORY CAPACITOR. A PARTIALLY CLOSED EYE OR A FLUTTERING DISPLAY INDICATES A LEAKY CAPACITOR. IF THE EYE CLOSES ENTIRELY OR OVERLAPS, THE CAPACITOR IS SHORTED.

NOTE THAT FOR CAPACITORS, TOLERANCES ARE OFTEN QUITE WIDE, SO THE TESTED CAPACITANCE MIGHT BE VERY DIFFERENT FROM THE MARKED VALUE ON THE COMPONENT. TOLERANCES OF 50% ARE NOT UNCOMMON FOR LARGE VALUE CAPACITORS, ESPECIALLY ONES THAT ARE DECADES OLD.

REMEMBER THAT A CAPACITOR THAT WILL NOT 'BALANCE' OR 'NULL' ON ANY OF THE RANGES, BUT WHICH ALLOWS THE "EYE" TO OPEN ON THE LOW END OF THE SELECTED RANGE, IS AN OPEN CAPACITOR. A CAPACITOR WHICH WILL NOT 'BALANCE/NULL', BUT ALLOWS THE "EYE" TO OPEN ON THE HIGH END OF THE HIGHER RANGES, IS SHORTED.

NOTE: THIS INSTRUMENT IS NOT AN "IN-CIRCUIT" TESTER; THE COMPONENT UNDER TEST SHOULD BE DISCONNECTED FROM ANY CIRCUITRY, OR AT LEAST ONE OF THE COMPONEMT'S LEADS MUST BE DISCONNECTED FROM THE CIRCUIT.

REVISION A 2-25-2023

HEATHKIT C-3
CONDENSER CHECKER
SCHEMATIC DIAGRAM
SHEET 2 OF 2