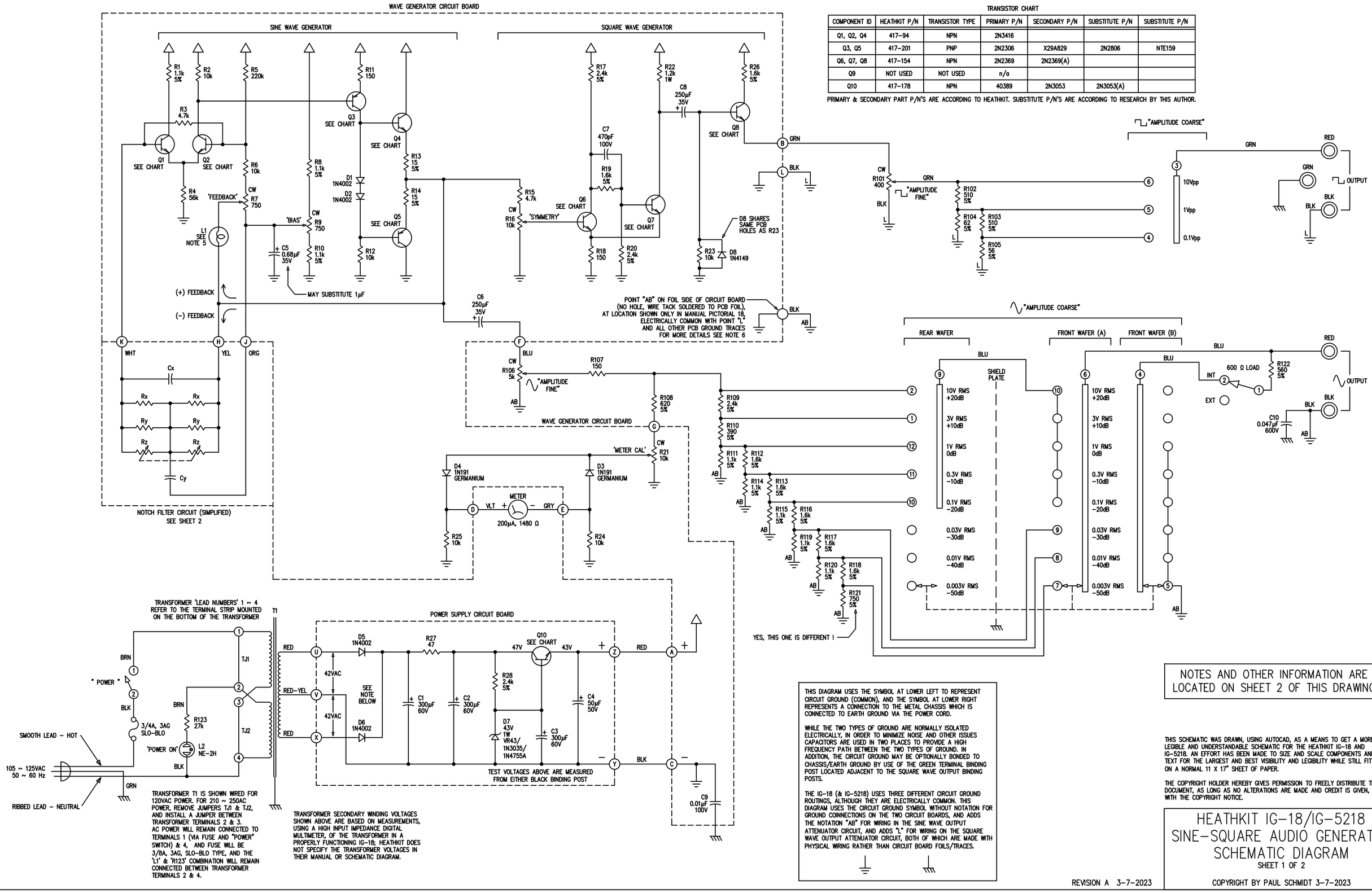


TRANSISTOR CHART

COMPONENT ID	HEATHKIT P/N	TRANSISTOR TYPE	PRIMARY P/N	SECONDARY P/N	SUBSTITUTE P/N	SUBSTITUTE P/N
Q1, Q2, Q4	417-94	NPN	2N3416			
Q3, Q5	417-201	PNP	2N2306	X29A829	2N2806	NTE159
Q6, Q7, Q8	417-154	NPN	2N2369	2N2369(A)		
Q9	NOT USED	NOT USED	n/a			
Q10	417-178	NPN	40389	2N3053	2N3053(A)	

PRIMARY & SECONDARY PART P/N'S ARE ACCORDING TO HEATHKIT. SUBSTITUTE P/N'S ARE ACCORDING TO RESEARCH BY THIS AUTHOR.

THIS DIAGRAM USES THE SYMBOL AT LOWER LEFT TO REPRESENT CIRCUIT GROUND (COMMON), AND THE SYMBOL AT LOWER RIGHT REPRESENTS A CONNECTION TO THE METAL CHASSIS WHICH IS CONNECTED TO EARTH GROUND VIA THE POWER CORD.

WHILE THE TWO TYPES OF GROUND ARE NORMALLY ISOLATED ELECTRICALLY, IN ORDER TO MINIMIZE NOISE AND OTHER ISSUES CAPACITORS ARE USED IN TWO PLACES TO PROVIDE A HIGH FREQUENCY PATH BETWEEN THE TWO TYPES OF GROUND. IN ADDITION, THE CIRCUIT GROUND MAY BE OPTIONALLY BONDED TO CHASSIS/EARTH GROUND BY USE OF THE GREEN TERMINAL BINDING POST LOCATED ADJACENT TO THE SQUARE WAVE OUTPUT BINDING POSTS.

THE IG-18 (& IG-5218) USES THREE DIFFERENT CIRCUIT GROUND ROUTINGS, ALTHOUGH THEY ARE ELECTRICALLY COMMON. THIS DIAGRAM USES THE CIRCUIT GROUND SYMBOL WITHOUT NOTATION FOR GROUND COINNECTIONS ON THE TWO CIRCUIT BOARDS, AND ADDS THE NOTATION "AB" FOR WIRING IN THE SINE WAVE OUTPUT ATTENUATOR CIRCUIT, AND ADDS "L" FOR WIRING ON THE SQUARE WAVE OUTPUT ATTENUATOR CIRCUIT, BOTH OF WHICH ARE MADE WITH PHYSICAL WIRING RATHER THAN CIRCUIT BOARD FOILS/TRACES.

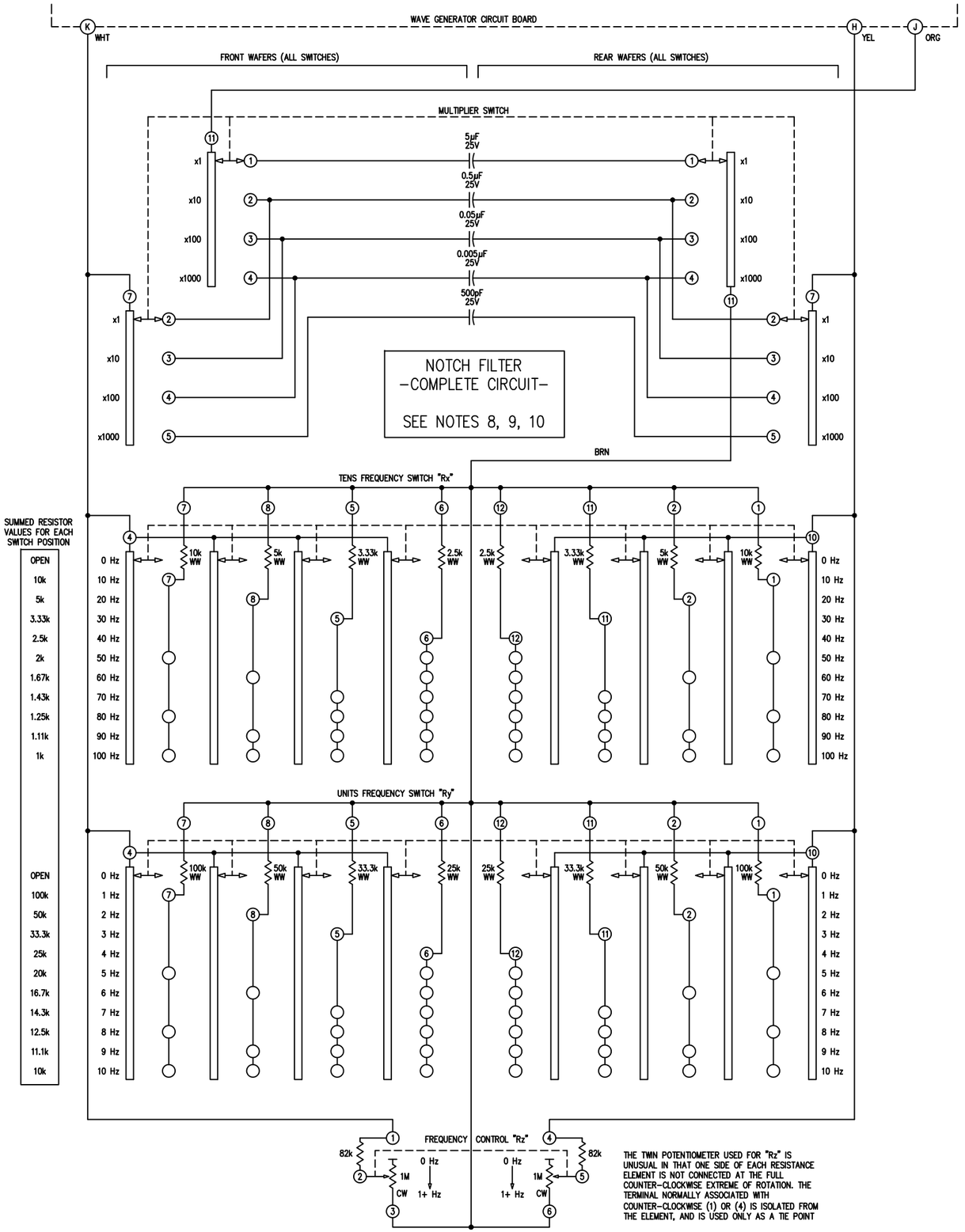
NOTES AND OTHER INFORMATION ARE LOCATED ON SHEET 2 OF THIS DRAWING

THIS SCHEMATIC WAS DRAWN, USING AUTOCAD, AS A MEANS TO GET A MORE LEGIBLE AND UNDERSTANDABLE SCHEMATIC FOR THE HEATHKIT IG-18 AND IG-5218. 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 IG-18/IG-5218 SINE-SQUARE AUDIO GENERATOR SCHEMATIC DIAGRAM

SHEET 1 OF 2

REVISION A 3-7-2023



NOTES:

1) ALL RESISTANCES ARE SHOWN IN OHMS UNLESS MARKED 'k' (KILO) OR 'M' (MEGA). EXCEPT FOR THE 1W 'R22', 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 UNLESS DENOTED, AND "WW" RESISTORS ARE 1% TOLERANCE.
2) SWITCH AND FRONT PANEL POTENTIOMETER TERMINALS ARE DESIGNATED WITH A SMALL CIRCULAR SYMBOL ◯; THE NUMBERS SHOWN INSIDE THE ROUND TERMINAL SYMBOLS THIS DRAWING MATCH THE ORIGINAL HEATHKIT SCHEMATICS.
3) HEATHKIT DOES NOT PROVIDE COMPONENT ID NUMBERS FOR FRONT PANEL MOUNTED CONTROLS ON THIS PRODUCT, AND IDENTIFIES THEM ONLY BY NAME; THIS DRAWING USES THE SAME NOMENCLATURE AS THE ORIGINAL HEATHKIT SCHEMATIC.
4) SEE SHEET 1 OF THIS DRAWING FOR THE ACTUAL SCHEMATIC DIAGRAM.
5) LAMP 'L1' IS A VERY SMALL INCANDESCENT BULB, WHICH HEATHKIT PROVIDED ASSEMBLED INTO A SMALL HOUSING THAT ALLOWED IT TO BE MOUNTED TO THE CIRCUIT BOARD VIA A SINGLE FUSE CLIP, AND BY CONNECTING ITS TWO LEADS TO CIRCUIT BOARD HOLES. HEATHKIT DOCUMENTATION DOES NOT IDENTIFY THE TYPE OF BULB, ITS VOLTAGE, OR ANY OTHER SPECIFICATION. ONLINE RESEARCH DID NOT FIND ANY INFORMATION ON HOW TO REPLACE THIS COMPONENT IF IT MIGHT FAIL. HEATHKIT'S CIRCUIT DESCRIPTION IN THE MANUAL HAS THIS TO SAY ABOUT "L1"; ANY TENDENCY OF THE OSCILLATOR TO PRODUCE SIGNALS OF INCREASING AMPLITUDE IS CONTROLLED BY LAMP 'L1'. IF THE OSCILLATOR OUTPUT INCREASES, MORE CURRENT IS FED THROUGH THE FEEDBACK CIRCUIT AND THROUGH 'L1'. THIS INCREASED CURRENT CAUSES THE FILAMENT OF THE LAMP TO HEAT SLIGHTLY, WHICH CAUSES ITS RESISTANCE TO INCREASE. THIS INCREASE IN RESISTANCE ATTENUATES THE FEEDBACK SIGNAL TO THE BASE OF TRANSISTOR 'Q2'. THE RESULT IS A REGULATED OUTPUT FROM TRANSISTOR 'Q2' (AT ITS COLLECTOR). [REDUCED AMPLITUDE SIGNAL RESULTS IN LESS FILAMENT HEATING, THUS LESS ATTENUATION OF THE FEEDBACK SIGNAL].
6) THIS REDRAWN SCHEMATIC ATTEMPTS TO DEPICT THE THREE DIFFERENT ROUTING GROUPS FOR THE 'CIRCUIT GROUND'. IT APPEARS THAT HEATHKIT ORIGINALLY USED A SINGLE SERIES OF 'DAISY-CHAIN' GROUND WIRING TO CONNECT FROM THE "WAVE GENERATOR" CIRCUIT BOARD'S GROUND TRACES TO ALL OF THE CIRCUIT GROUND POINTS ON THE VARIOUS FRONT PANEL CONTROLS AND BLACK BINDING POSTS, BUT DISCOVERED THAT NOISE OR OTHER SIGNAL INTEGRITY ISSUES RESULTED, AND THEN 'BODGED' A COMPROMISE WIRE ROUTING THAT IS NOT REPRESENTED IN THEIR SCHEMATIC, AND IS ONLY DEFINED IN THE ASSEMBLY INSTRUCTIONS AND ON THE MANUAL'S "PICTORIAL 18". THE RESULT IS THE CIRCUIT BOARD GROUND (COMMON TO BOTH CIRCUIT BOARDS), THE SINE WAVE ATTENUATOR CIRCUIT GROUND, AND THE SQUARE WAVE ATTENUATOR CIRCUIT GROUND. THIS NEW REDRAWN SCHEMATIC USES LETTERING ADJACENT TO THE GROUND SYMBOLS TO SHOW WHICH OF THE SUB-GROUNDS ARE USED FOR EACH GROUNDED POINT. SEE THE ADDITIONAL NOTE ON THE SCHEMATIC.
7) IN THE SINE WAVE GENERATOR PORTION OF THE CIRCUIT, THE SINE WAVE OSCILLATES ABOVE AND BELOW A "BIAS" VOLTAGE SET BY TRIM POTENTIOMETER R9 WHICH IS ROUGHLY HALF OF THE 43 VOLT POWER SUPPLY; THE WAVEFORM IN THE OSCILLATOR SUB-CIRCUIT NEVER GOES BELOW 0 VOLTS. THE SQUARE WAVE GENERATORS DOES NOT HAVE ITS OWN OSCILLATOR, RATHER IT CONVERTS THE GENERATED SINE WAVE TO A SQUARE WAVE, AND LIKE THE SINE WAVE UP TO THAT POINT IN THE CIRCUIT, THE SQUARE WAVE IS ALWAYS POSITIVE (AT OR ABOVE ZERO VOLTS). WHEN THE GENERATED SINE WAVE SIGNAL LEAVES THE CIRCUIT BOARD, IT PASSES THROUGH CAPACITOR 'C6' AND THE RESISTANCE OF 'R106', WHICH CONVERTS THE SINE WAVE SIGNAL TO A BIPOLAR ONE WHERE THE SIGNAL IS ALTERNATING ABOVE AND BELOW ZERO VOLTS. THE SINE WAVE SIGNAL REMAINS AC (OR BI-POLAR) THROUGH THE REST OF THE SINE WAVE ATTENUATOR CIRCUIT AND THE OUTPUT BINDING POSTS.
8) THE SINE WAVE OSCILLATOR, COMPRISED OF TRANSISTORS 'Q1' & 'Q2' AND SURROUNDING COMPONENTS, RELIES ON A "NOTCH FILTER" CIRCUIT TO DEFINE THE FREQUENCY OF OSCILLATION AS WELL AS CONTRIBUTING TO THE SINUSOIDAL WAVEFORM SHAPE. ON THE MAIN SCHEMATIC ON SHEET 1, THE NOTCH FILTER IS REPRESENTED BY A SIMPLIFIED VERSION THAT SHOWS THE BASIC COMPONENT ARRANGEMENT WHILE IGNORING ALL THE SWITCHING. ON SHEET 2 (THIS SHEET, AT LEFT) THE FULL NOTCH FILTER CIRCUIT, WITH SWITCHING, IS SHOWN.
9) ON THE SCHEMATIC OF THE NOTCH FILTER'S COMPLETE CIRCUIT, SOME ADDITIONAL EXPLANATIONS ARE IN ORDER. IN THE AREA NEAR TO TOP OF THE DIAGRAM WHERE THE FIVE CAPACITORS ARE LOCATED, THEY ARE SURROUNDED BY BANKS OF A SOMEWHAT COMPLEX "MULTIPLIER SWITCH" ARRAY. FOR EACH OF THE FOUR SWITCH POSITIONS, TWO OF THE FIVE CAPACITORS ARE CONNECTED AT DIFFERENT PARTS OF THE OVERALL CIRCUIT. THE HIGHER VALUE CAPACITOR (e.g. 5µF WHILE IN THE "x1" POSITION) WILL BE CONNECTED BETWEEN POINT "J" ON THE WAVE GENERATOR CIRCUIT BOARD AND THE CENTRAL VERTICAL 'RAIL' IN THE "FREQUENCY CONTROL" SWITCHES AND POTENTIOMETERS SUB-CIRCUIT; THIS CAPACITOR CORRESPONDS TO "Cy" ON THE SIMPLIFIED NOTCH FILTER CIRCUIT THAT IS SHOWN ON THE MAIN SCHEMATIC ON SHEET 1. MEANWHILE, A SECOND CAPACITOR WITH A VALUE ONE ORDER OF MAGNITUDE LOWER THAN THE FIRST CAPACITOR (e.g. 0.5µF IN THE "x1" POSITION) WILL BE CONNECTED ACROSS THE TWO OUTER 'RAILS' OF THE "FREQUENCY CONTROL" SWITCHES AND POTENTIOMETERS SUB-CIRCUIT, WHICH ULTIMATELY ARE CONNECTED TO POINTS "K" & "H" ON THE WAVE GENERATOR CIRCUIT BOARD; THIS CORRESPONDS TO "Cx" ON THE SIMPLIFIED NOTCH FILTER CIRCUIT ON SHEET 1.
10) FOLLOWING THE EXPLANATION BEGUN IN NOTE 9 ABOVE, THE "FREQUENCY CONTROL" SWITCHES HAVE SOME TERMINAL DESIGNATIONS WHICH MIGHT BE CONFUSING WITHOUT THE FOLLOWING EXPLANATION. TAKING THE "TENS FREQUENCY SWITCH" AS AN EXAMPLE, MOST OF THE SWITCH TERMINALS ON THE LEFT HALF ARE PART OF THE SWITCH'S 'FRONT WAFER TOP' SECTION, EXCEPT FOR THE TERMINALS WHICH ACT AS TIE POINTS FOR THE FOUR ASSOCIATED RESISTORS WHERE THEY CONNECT TO THE CENTRAL VERTICAL 'RAIL'; THESE ARE PART OF THE SWITCH'S 'REAR WAFER TOP' SECTION. LIKEWISE, MOST TERMINALS ON THE RIGHT HALF ARE PART OF THE SWITCH'S 'REAR WAFER BOTTOM', WHILE THE ASSOCIATED RESISTOR TIE POINTS ARE PART OF THE SWITCH'S 'FRONT WAFER BOTTOM'.

CALIBRATION PROCEDURE

1) REQUIRES AN AC VOLTMETER AND AN OSCILLOSCOPE.
2) SET CONTROLS AS FOLLOWS: MULTIPLIER = x100, TENS FREQUENCY = 10, UNITS FREQUENCY = 0, FREQUENCY CONTROL = 0 (FULL CCW).
3) SINE WAVE AMPLITUDE (COARSE) = 10V, (FINE) = FULLY CW. SQUARE WAVE AMPLITUDE (COARSE) = 10V, (FINE) = FULLY CW. 600 Ω LOAD = "EXT".
4) ON WAVE GENERATOR PCB, SET ALL FOUR TRIM POTENTIOMETERS TO CENTER OF THEIR ROTATION.
5) ADJUST "FEEDBACK" TRIM POT UNTIL THE PANEL METER READS BETWEEN 6 & 8 ON THE 0~10 VOLT SCALE. SET EXTERNAL AC VOLTMETER TO READ 10VAC, AND CONNECT TO THE RED & BLK SINE WAVE OUTPUT BINDING POSTS.
6) ADJUST "METER CAL" TRIM POT UNTIL PANEL METER READS THE SAME VOLTAGE AS THE AC VOLTMETER, THEN DISCONNECT THE EXTERNAL VOLTMETER.
7) SET OSCILLOSCOPE TO DISPLAY A 1000 Hz WAVEFORM OF 10 VOLTS, AND CONNECT SCOPE TO THE SINE WAVE OUTPUT BINDING POSTS.
8) ADJUST "FEEDBACK" TRIM POT FULLY CW, AND NOTE THAT THE SCOPE SHOWS EITHER THE POSITIVE OR NEGATIVE HALF OF THE WAVEFORM IS CLIPPED.
9) ADJUST "BIAS" TRIM POT SO THAT BOTH HALVES OF THE WAVEFORM ARE CLIPPED EQUALLY.
10) ADJUST "FEEDBACK" TRIM POT UNTIL THE PANEL METER INDICATES 10V. DISCONNECT THE SCOPE.
11) IN THE FOLLOWING STEPS, IF NO CHANGE CAN BE DETECTED ON THE PANEL METER READING, IT WILL NOT BE NECESSARY TO READJUST THE "FEEDBACK" TRIM POT.
12) TURN THE "TENS FREQUENCY" SWITCH TO EACH POSITION, 10 THROUGH 100, LEAVING IT IN THE POSITION WHERE THE PANEL METER INDICATES THE LOWEST VOLTAGE.
13) TURN THE "MULTIPLIER" SWITCH TO EACH POSITION, x1 THROUGH x1000, LEAVING IT IN THE POSITION THAT INDICATES THE LOWEST VOLTAGE.
14) READJUST THE "FEEDBACK" TRIM POT SO THAT THE PANEL METER READS 10V.
15) RESET THE FREQUENCY AND MULTIPLIER SWITCHES FOR A 1000Hz OUTPUT AT 10v (MULTIPLIER AT x100, TENS FREQUENCY AT 10). CONNECT THE SCOPE TO THE SQUARE WAVE OUTPUT BINDING POSTS. SET THE SCOPE INPUT SWITCH FOR "AC" COUPLING.
16) IN THE FOLLOWING, NOTE THAT THE VERY FAST RISE TIME OF THE SQUARE WAVE SIGNAL MAY, ON VARIOUS SCOPES (ESPECIALLY LOWER BANDWIDTH MODELS), RESULT IN ROUNDED LEADING EDGES OR "RINGING" OR "OVERSHOOT" ON THE DISPLAYED WAVEFORM.
17) ADJUST THE "SYMMETRY" TRIM POT UNTIL THE POSITIVE AND NEGATIVE HALVES OF THE SQUARE WAVEFORM ARE EQUAL IN DURATION. THIS COMPLETES THE CALIBRATION PROCEDURE.

BASIC SPECIFICATIONS

SINE WAVE OUTPUT
FREQUENCY RANGE: 1Hz TO 100kHz
INTERNAL LOAD: 600Ω AVAILABLE ON ALL AMPLITUDE RANGES EXCEPT 3V & 10V
OUTPUT LEVEL VARIATION: +/- 1dB FROM 10Hz TO 100kHz
OUTPUT IMPEDANCE: 10V RANGE = 0~1000Ω, 3V RANGE = 800~1000Ω, 1V RANGE AND LOWER = 600Ω
PANEL METER ACCURACY = +/-10% OF FULL SCALE WITH PROPER LOAD TERMINATION
DISTORTION: LESS THAN 0.1% FROM 10Hz TO 20kHz
OUTPUT CIRCUIT: DIFFERENTIAL AMPLIFIER OSCILLATOR WITH COMPLEMENTARY TRANSISTOR PAIR OUTPUT, NOTCH FILTER FOR FREQUENCY DETERMINATION

SQUARE WAVE OUTPUT
FREQUENCY RANGE: 5Hz TO 100kHz
OUTPUT IMPEDANCE: 52Ω ON 0.1V AND 1V RANGES, UP TO 220Ω ON 10V RANGE
RISE TIME: LESS THAN 50 NANOSECONDS (ns)

GENERAL
FREQUENCY ERROR: WITHIN +/- 5% OF FIRST AND SECOND DIGIT (TENS & UNITS)
POWER REQUIREMENTS: 105~125 VAC OR 210~250 VAC, 50~60Hz, 6 WATTS
DIMENSIONS: 5-1/8" HIGH, 13-1/4" WIDE, 7" DEEP
NET WEIGHT: 7 POUNDS

OPERATING INSTRUCTIONS

- THIS AUDIO GENERATOR SIMULTANEOUSLY OUTPUTS BOTH A SINE WAVE SIGNAL AND A SQUARE WAVE SIGNAL. BOTH OUTPUTS WILL BE THE SAME FREQUENCY, AS SELECTED USING THE FREQUENCY CONTROL SWITCHES AND POTENTIOMETERS, BUT EACH CAN HAVE ITS AMPLITUDE ADJUSTED INDEPENDENTLY USING THE ASSOCIATED ATTENUATOR CONTROLS.
- TO SELECT A DESIRED FREQUENCY, SET THE "TENS FREQUENCY" AND THE "UNITS FREQUENCY" SWITCHES TO CORRESPOND WITH THE FIRST TWO (MOST SIGNIFICANT) DIGITS OF THE FREQUENCY. IF A THIRD DIGIT (LEAST SIGNIFICANT) DIGIT IS REQUIRED, SET THE "FREQUENCY CONTROL" POTENTIOMETER TO THE CORRECT NUMBER. THEN SET THE "MULTIPLIER" SWITCH TO THE APPROPRIATE POSITION, SO THAT MULTIPLYING THE OTHER FREQUENCY SWITCH/POTENTIOMETER DIGITS BY THE MULTIPLIER WILL RESULT IN THE DESIRED FREQUENCY. SOME EXAMPLES:

DESIRED FREQUENCY	MULTIPLIER	TENS FREQUENCY	UNITS FREQUENCY	FREQUENCY CONTROL
60Hz	x1	60	0	0
60Hz	x10	0	6	0
400Hz	x10	40	0	0
1520Hz	x100	10	5	0.2
15.2kHz	x1000	10	5	0.2

- FOR SETTING THE AMPLITUDE OF THE SINE WAVE OUTPUT, IT MUST BE PROPERLY TERMINATED TO OBTAIN ACCURATE PANEL METER INDICATIONS. IF USING A HIGH IMPEDANCE LOAD (10kΩ OR MORE), SET THE "600 Ω LOAD" SWITCH TO "INT", AND SET THE "SINE WAVE AMPLITUDE" SWITCH (COARSE) TO THE NEAREST FULL SCALE VALUE 'ABOVE' THE DESIRED OUTPUT LEVEL. THEN ADJUST THE "SINE WAVE AMPLITUDE" CONTROL (FINE) TO GIVE THE DESIRED OUTPUT ON THE PROPER PANEL METER SCALE. EXAMPLE 1: FOR AN OUTPUT VOLTAGE OF 7.3V RMS, SET THE COARSE SWITCH TO THE 10V POSITION, THEN TURN THE FINE CONTROL UNTIL A PANEL METER READING OF 7.3 ON THE 0~10V SCALE IS OBTAINED. EXAMPLE 2: FOR AN OUTPUT OF 0.025V RMS, SET THE COARSE SWITCH TO THE 0.03V POSITION AND TURN THE FINE CONTROL TO UNTIL A READING OF 2.5 ON THE 0~3V METER SCALE IS OBTAINED. TO OBTAIN CORRECT PANEL METER READINGS WITH AN EXTERNAL 600 Ω LOAD (1V MAXIMUM OUTPUT SIGNAL LEVEL), SET THE "600 Ω LOAD" SWITCH TO "EXT".
- TO SELECT A SQUARE WAVE OUTPUT LEVEL, SET THE "SQUARE WAVE AMPLITUDE" SWITCH (COARSE) TO THE LOWEST RANGE THAT INCLUDES THE DESIRED PEAK-TO-PEAK (Vpp) SQUARE WAVE SIGNAL VOLTAGE, THEN ADJUST THE "SQUARE WAVE AMPLITUDE" CONTROL (FINE) UNTIL THE DESIRED VOLTAGE IS PRODUCED; NOTE THAT THE PANEL METER WILL 'NOT' INDICATE THE SQUARE WAVE OUTPUT SIGNAL'S AMPLITUDE. THE THREE SQUARE WAVE VOLTAGE RANGES (0.1V, 1V, 10V) ARE FOR LOADS OF 2000 Ω IMPEDANCE OR GREATER. THE OUTPUT LEVEL MAY BE MEASURED WITH A HIGH IMPEDANCE AC VOLTMETER OR WITH AN OSCILLOSCOPE; KEEP IN MIND THAT WHEN USING AN AC VOLTMETER FOR THIS PURPOSE, THAT MOST SUCH METERS READ RMS VOLTS, WHILE SQUARE WAVES ARE MEASURED IN PEAK-TO-PEAK (Vpp) VOLTS; FOR THIS REASON, THE OSCILLOSCOPE IS BETTER. ALSO NOTE THAT THE SQUARE WAVE OUTPUT IS DC-COUPLED TO AVOID POOR LOW FREQUENCY RESPONSE; THE OUTPUT IS A DC SIGNAL THAT VARIES BETWEEN ZERO VOLTS AND SOME POSITIVE VOLTAGE AS SPECIFIED BY THE USER. DO NOT CONNECT THIS GENERATOR SQUARE WAVE OUTPUT INTO DC CIRCUITRY WITHOUT USING APPROPRIATE CAPACITIVE COUPLING (OBSERVING CAPACITOR POLARITY IF APPLICABLE), AND DO NOT SHORT THE SQUARE WAVE OUTPUT TERMINALS AT MAXIMUM 10V OUTPUT.
- IN GENERAL, IMPEDANCE MATCHING IS NOT CRITICAL IN TEST WORK. HOWEVER, IF CLOSE MATCHING IS REQUIRED (PRIMARILY FOR THE SINE WAVE OUTPUT), "MATCHING PADS" MAY BE USED. THE SELECTION AND/OR DESIGN OF SUCH PADS IS BEYOND THE SCOPE OF THIS DOCUMENT.

REVISION A 3-7-2023

HEATHKIT IG-18/IG-5218 SINE-SQUARE AUDIO GENERATOR SCHEMATIC DIAGRAM

SHEET 2 OF 2