CIRCUIT THEORY-LOW POWERED IND1 - REF SCHEMATIC FIG 1

Three wire cord (CO1) supply direct AC line voltage to bridge rectifier (BR1) thru switch (S1). Rectified current pulses are applied to intergrating capacitor (C1) thru surge current and fuse resistors (R1, R2). A DC voltage VC of approx. 1.4 x 115 VAC is developed across C1. The collector of oscillator transistor (Q1) is connected to VC thru induction coil (T1-PR1). Capacitor (C5 and C6) increases the circulating current, lowers the frequency and widens the energy pulses consequently increasing the overall effect. The base of Q1 is driven by feed back winding (T1-FB) coupled to the main coil T1-PRI and in the proper phase to cause oscillation.

This base current drive is limited by resistor (R10) while resistor (R13) initiates circuit oscillation by biasing Q1 into conduction. Output of the system is controlled thru pass transistor (Q2) by biasing the emitter of Q1.

Capacitor (C4) provides an AC bypass across the collector emitter of Q2. The base of pass transistor Q2 is controlled by power adjust pot (R9) and is fed by dividing resistor (R12). Capacitor (C2) bypasses any extraneous high frequency energy across the arm of R9.

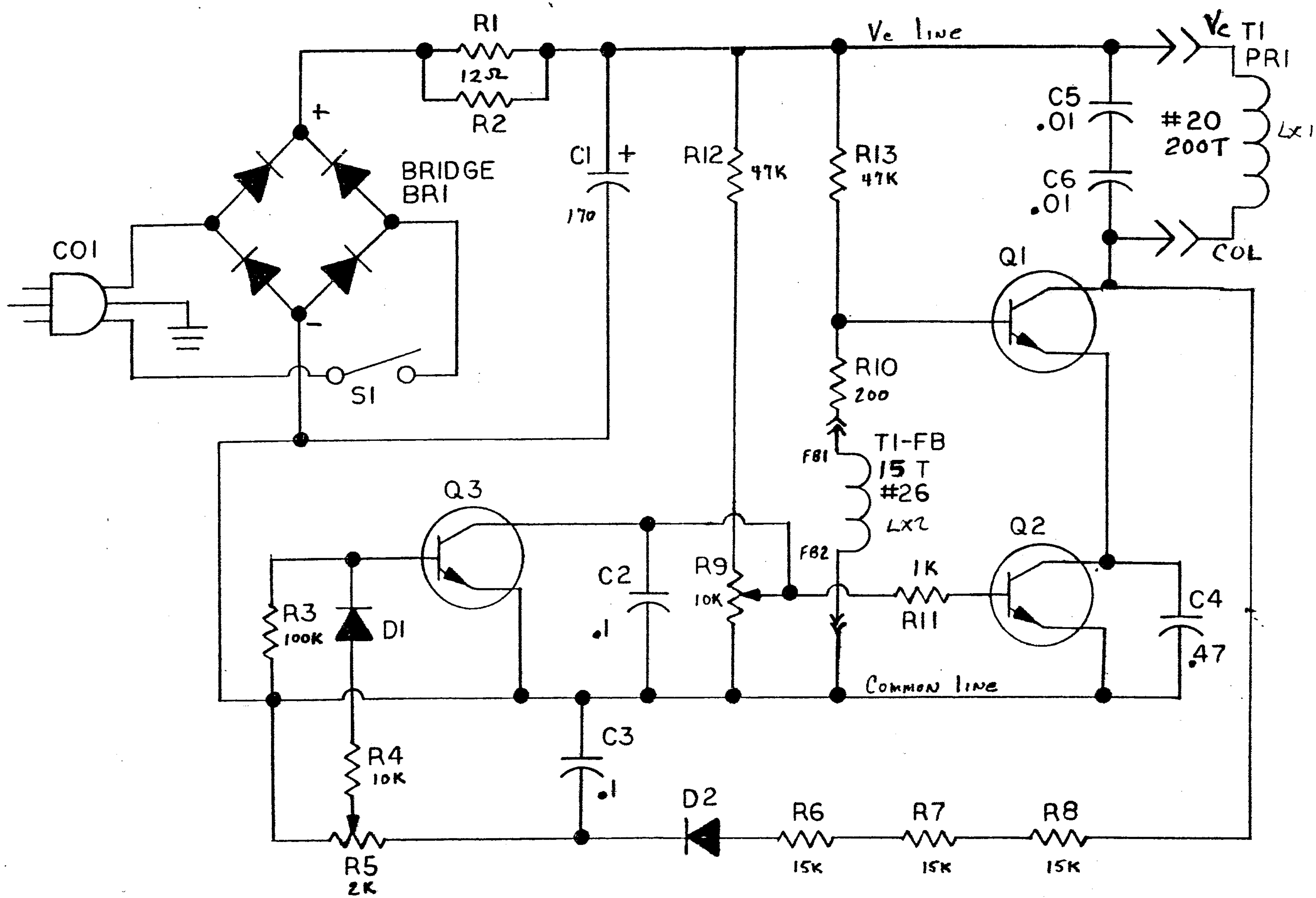
You will note that the output of the system is controlled by R9. A feed back network is necessary to reduce this output when the system is energized without any metallic object in the induction coil T1-PRI. The signal voltage at the collector of Q1 should never exceed 800 volts peak as its collector to emitter voltage ratings will be exceeded.

Absence of an object in the core can cause this voltage to soar. Resistor (R6,7,8) sample the voltage peaks of Q1 that are now rectified by (D1) and intergrated onto (C3) as a positive DC level. This level now starts to turn on control transistor (Q3) that now drops the voltage on the arm of R9 thus reducing or controlling system output. Trimpot (R5) sets this control level threshold that must exceed the forward drop thru diode (D1). Optimum setting of R5 is just to the point where the voltage peaks on the collector of Q1 just start to be affected when the induction coil is "loaded" with a metallic core. Now core removal causes Q3 to turn on more thus controlling system output.

INDUCTION HEATER

UUE

FIG 1 CIRCUIT SCHEMATIC



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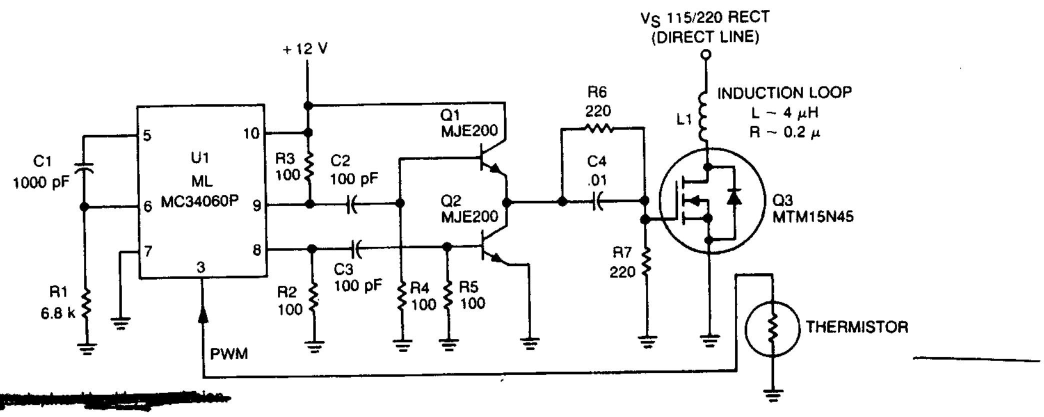
INDUCTION COIL ASSEMBLY SUGGESTIONS

The induction coil of your unit (IC) is "where the action takes place". It is a coil of wire wound in such a manner as to favor the physical dimension of the material to be heated or treated. An induction coil for a stove for example would be flat wound with its width dimension appropriate to the bottom of the pot or pan used for cooking etc.

The coil must contain several parameters for proper operation regarding frequency and power levels. The inductive value (turns) must be sufficient to supply the necessary reactance to control the system power by limiting the current at the operating frequency. Lower value of inductance will raise the frequency but will also increase current peaks. This obviously enhances the overall effect at the expense of higher input power, and more demand on the oscillating transistors operating parameters.

120-KHz 500-W INDUCTION HEATER



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Variable width pulses with fast rise times are provided by U1, and MC34060 operating at 120 kHz, the optimum frequency for heating aluminum alloy containers. The pulse width is modulated by sensing the temperature of the target with a thermistor, using its negative temperature coefficient to change pulse duration. The MC34060 produces output pulses that are ac-coupled to push-pull MJE200 transistors Q1 and Q2. This IC provides the current needed to ensure fast switching for MTM15N45 TMOS power FET Q3.

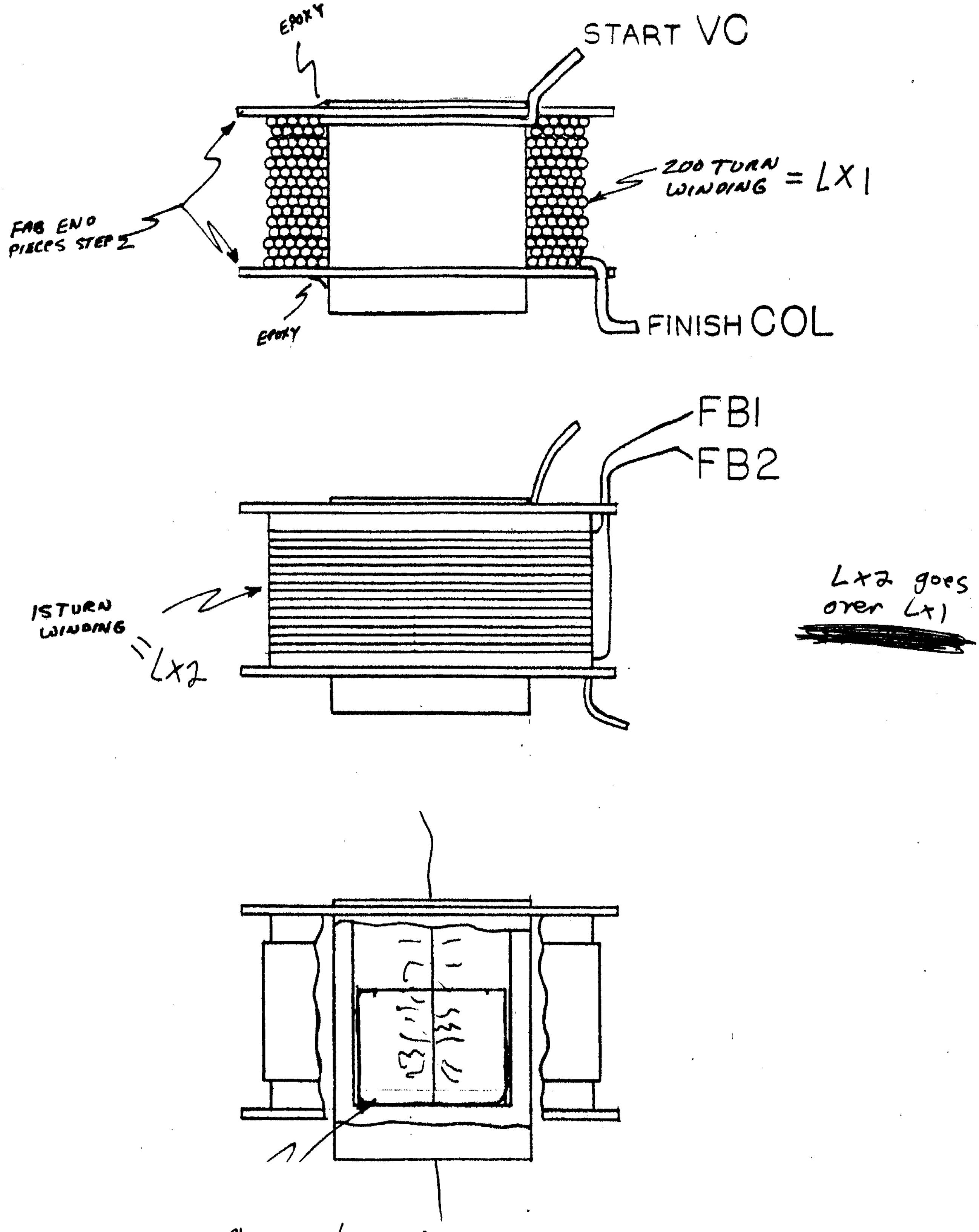
The estimated efficiency is 80%, based on switching losses and an R_{ON} of 0.4 Ω (max). The MTM15N45, with maximum ratings of 15 A and 450 V, was chosen because the induction heater might be operated from either 115 or 220 V sources. A modest heatsink is required because 100 W is dissipated in the power FETs at a full output power of 500 W.

IND1 PARTS LIST

R1,2	2	12 OHM 2 WATT CARBON RESISTOR
R3	1	100K 1/4 WATT RESISTOR
R4	1	10K 1/4 WATT RESISTOR
R5	1	2K TRIMPOT RESISTOR
R6,7,8	3	15K 1/4 WATT RESISTOR
R9/S1	1	10K POT AND SPST SWITCH FOR 115 VAC
R10	1	200 OHM 3 WATT WIRE WOUND RESISTOR
R11	1	1K 1/4 WATT RESISTOR
R12,13	2	47K 1 WATT RESISTOR
*C1	1	170 MFD/330V ELECT CAP (SPECIAL)
C2,3	2	.1 MFD 25V DISC CAP
C4	1	.47 MFD/250V PAPER CAP
*C5,6	2	.01 MFD/1KV POLYPROPENYL (SPECIAL CAP)
D1	1	IN914 SIGNAL DIODE
*D2	1	MR818 1KV DIODE (SPECIAL)
*Q1	1	MJ8501 HIGH VOLTAGE POWER TRANSISTOR (SPECIAL)
*Q2	1	TIP31C PWR TAB NPN POWER TRANSISTOR (SPECIAL)
Q3	1	PN2222 G.P. NPN
*BR1	1	100V 10 AMP BRIDGE RECTIFIER (SPECIAL)
CO1	1	3 WIRE GROUNDED CORD SET
HS1	1	DUAL TO3 MOUNTING HEATSINK-SEE FIG 3
MK1	1	MOUNTING KIT FOR Q1 - SEE FIG 3

EN1	1	MAIN ENCLOSURE FAB - SEE FIG 4
PB1	1	2-1/4 X 2-3/4 .1 X .1 PERFBOARD
WR1	4'	#24 VINYL STRANDED HOOK UP WIRE
WR2	10'	#20 VINYL STRANDED HOOK UP WIRE
SW1/NU1	2	6-32 X 1/4 SCREW/NUT
TAP1	1	2 X 2" PIECE OF FOAM TAPE FIG 4
BU1	1	CLAMP BUSING FOR LEAD TO REMOTE COIL HEAD
BU2	1	CLAMP BUSHING FOR 3 WIRE LINE CORD
SW2/NU2/ MICA		6-32 X 3/8 NYLON SCREW, NUT AND MICA WASHER FOR Q2 SEE FIG 3
*T1	1	SPECIAL INDUCTION COIL HEAD SEE TEXT

FIG 6 SUGGESTED INDUCTION COIL



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Place a bare wire inside Coil to Test.

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