QUINTE AMATEUR RADIO CLUB *Q. R. M.*
P. O. Box 292, Belleville ON K8N 5A2

M E E T I N G

DATE: December 4, 1992.
TIME: 6:30 p.m.
LOCATION: Mirage Restaurant

PROGRAM: Christmas Dinner

***** WANTED *****

The Club is looking for volunteers to form a working committee for Field Day 1993. Please contact a member of the executive if you are interested. If there is no response we will have to ask for volunteers Army Style.

The Club wants to form a committee to start planning a special celebration. This celebration will be to Commemorate FIFTY YEARS OF THE QUINTE AMATEUR RADIO CLUB. Anyone wishing to be on this committee please contact a member of the Executive.

***** FOR SALE *****

Realistic SX190 General Coverage Receiver. Solid State, with an external speaker Good for serious SWL.
Contact: John Lester VE3MB

Heathkit HW 5400 HF Transceiver, solid state.Price for radio $400.00 if you want a power supply mike and speaker, the price will be $500.00.
Contact: Al Smardon VE3OX

Halacrafter #1200 one of the last radios that were made. It is a 12 Band all Wave portable from broadcast to UHF. This radio works on AC and DC. Price $50.00
Contact: John Lester VE3MB

****** CONGRATULATIONS TO VE3RKD ******

D. J. (Di) Diamantides was honoured by YMCA with the YMCA's 1992 Canada Peace Medal, for a lifetime of dedication to the YMCA and its principles.

13.8 Volt, 20 ampere Power Supply

Reprint from Canadian Amateur Radio Magazine

In the last year, some Amateurs in the Regina area have built 13.8 volt, 20 ampere power supplies.

The design used proved to be quite straight forward, built with voltage regulation and crowbar protection circuits combined on a single printed circuit board. The biggest challenge was to find the major parts (transformer, the filter capacitor, and a large heatsink). We found these to be expensive if purchased new, so scrounging was critical to success. This did not prove to be too difficult. We found most of the parts by listing a "wanted" on a local net, or by checking for electronics at some salvage locations.

The main power supply design was based on a 13.8 volt, 10 ampere supply built by Larry VE5TP and expanded to handle 20 amps using information from the ARRL Handbook.

The crowbar protection circuit was added from the October 1983 QST. Other good references were the July and August 1986 Radio Communications from RSGB. I recommend these references to anybody who wishes to understand how the circuit works.

The schematic, parts list, printed circuit board image, and a parts placement diagram are shown here.

Some tips for construction

* All ground points shown in the schematic should be made above chassis. A single line should be run from the negative terminal on the filter capacitor (C1) to the chassis. This will provide a common ground for all components prior to being connected to the chassis ground.

* The chassis needs to be grounded to the ground wire on the 117 volt AC input cord.

* The portions of the schematic contained within the boxed areas fit onto the printed circuit board (PCB). The connection points to the external components are identified with letters on the schematic and PCB.

SETTING THE VOLTAGE AND CROWBAR CIRCUITS

The first step in setting these circuits is to disconnect and isolate the lead to the Anode of the Crowbar SCR. This will prevent an accidental closing of the SCR from blowing the fuse while the circuits are being set.

To set the voltage sense to 13.8 volts, connect a DC voltmeter across the output terminals. Turn on the power, and adjust R15 until 13.8 volts is measured across the output terminals.

This proves that the voltage regulation portion of your circuit works!
Congratulations.

I suggest you set the crowbar protection circuit to trigger the SCR at about 15.5 volts. This gives you good protection (most mobile rigs should handle up to 18 volts). If this trigger is set to low, you get artificial triggering with the initial surge of current into the circuit when the power supply is turned on.

This is the method I used to set the crowbar to understand how the circuit works:

1) Disconnect the lead to the anode of the SCR. Connect an Ohmmeter across the anode and cathode leads to the SCR. With the SCR closed, the ohmmeter measured less than 1 ohm. With the SCR open, the ohmmeter measured many megohms.
2) Adjust the output voltage of the power supply to 15.5 volts (using R15).
3) Turn R16 so that the trigger point of the trigger point of the crowbar circuit driving the SCR gate is above 15.5 volts (using R15).
4) Gradually adjust R16 watching for the SCR to close. When it closes, you have reached the trigger point on the crowbar circuit.
5) Check your setting of R16, by turning down the voltage, turning off the power supply, allowing C1 to discharge, then turning on the supply and gradually adjusting R15 to increase the voltage. The SCR will close when the trigger voltage is reached. You may need to repeat steps 3, 4, and 5 a few times to get your desired trigger voltage properly set.
6) When you reach your desired crowbar protection adjustment, reset R15 to give 13.8 volts output, and reconnect the lead to the anode of the SCR.

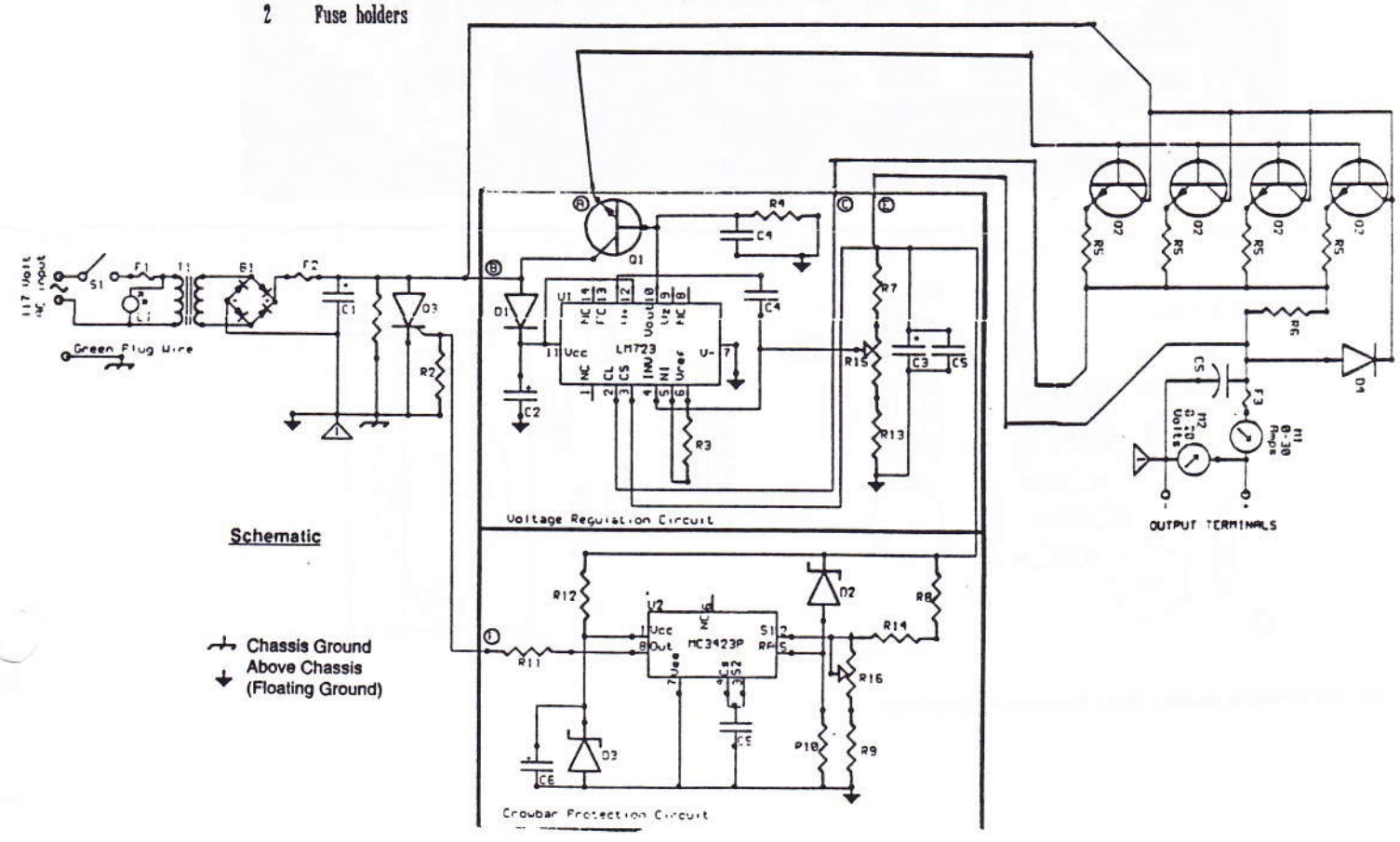
Good operating!

PARTS LIST AND CONSTRUCTION COMMENTS

PART	QTY	DESCRIPTION AND COMMENTS
T1	1	Transformer with 117 volt primary, 16.8 to 20 volt secondary. to accommodate the 20 ampere output of the power supply. The windings in the secondary need to be 10 gauge or heavier. (Alternatively a centre tapped transformer with a 14 gauge secondary may be used if the centre tapped configuration can be modified to run both halves of the windings in parallel. This will give you sufficient capacity in the secondary windings).
B1	1	25 ampere @ 200v diode bridge. When you mount this in your chassis, it is a good idea to place it on a small heatsink.
F1	1	4 Ampere breaker
F2	1	25 ampere slow blow fuse
F3	1	20 ampere fuse
C1	1	500,000 microfarad @ 50v filter capacitor. You should have a minimum of 1000 microfarad for every ampere of output in the supply.
C2	1	300 microfarad @ 50v electrolytic
C3	1	300 microfarad @ 25v electrolytic
C4	1	.001 microfarad @ 50v poly or ceramic
C5	2	.01 microfarad @ 25v poly or ceramic
C6	1	22 microfarad @ 25v electrolytic or titanium
R1	1	1.2K ohm @ 5w bleeder resistor
R2	1	10k ohm @ 1w
R3	1	1.5k ohm @ .5w
R4	1	1.8k ohm @ .5w
R5	4	.1 ohm @ 5w
R6	4	.12 ohm @ 10w mounted in parallel. NOTE: this resistor sets the current limiting portion of the voltage regulator. To calculate the size of the resistor needed for R6 use the following formula: R=.55/x amps where x is the maximum current desired. The 4 .12 resistors in parallel will give you .03 ohms for R6. This will give you (.55v/.03 ohms = 18.333 amps output. you will need .0275 ohms for a full 20 amps output.
R7	1	3.3k ohm @ .5w
R8	1	10k ohm @ .5w
R9	1	2k ohm @ .5w
R10	1	1K ohm @ .5w
R11	1	10 ohm @ .5w
R12	1	220 ohm @ .5w
R13	1	2.8 ohm @ .5w
R14	1	510 ohm @ .5w
R15	1	1k ohm variable (low profile trimmer pot)
R16	1	500 ohm variable (low profile trimmer pot)
U1	1	LM723 14 pin voltage regulator IC
U2	1	MC3423P over voltage protection IC

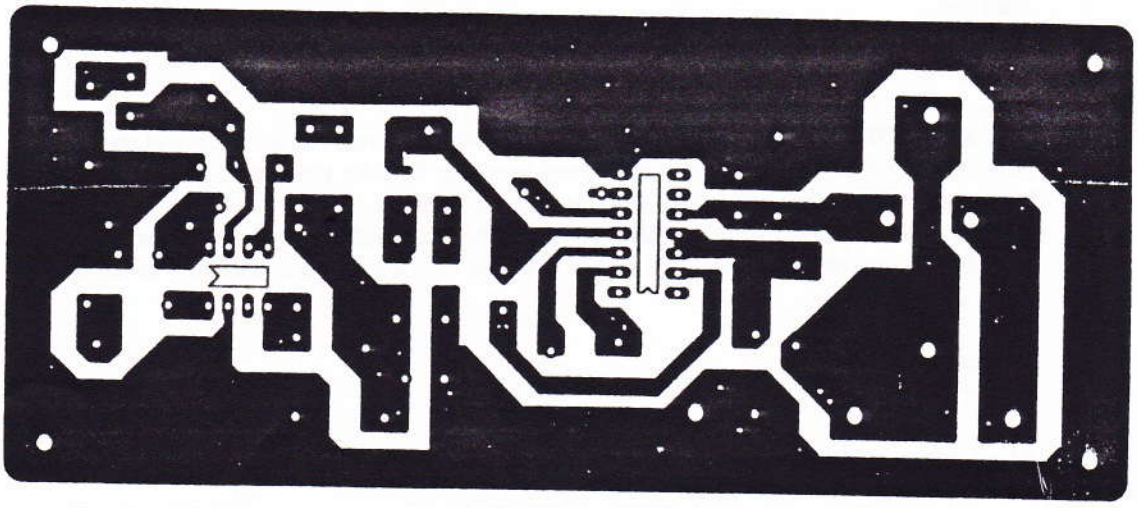
D1	2	1N4004 diode
D2	1	15v 400-mW 5% tolerance Zener diode
D3	1	8.2 1W 5% Zener diode
Q1	1	2N3772 or 2N3055 NPN pass transistor. This transistor needs to be mounted with a small heatsink on the printed circuit board
Q2	4	2N3772 or 2N3055 NPN pass transistor. (2N3055's could be used however, the 2N3772 has much better tolerance and is recommended for this "workhorse" part of the circuit). These must be mounted on a heatsink
Q3	1	Crowbar SCR 50v 100ampere peak (or higher). This needs to be mounted on some surface within the chassis. The surface should be able to dissipate some heat (in the event the SCR triggers) in mounting the SCR, it needs to be isolated from the surface it is mounted on
M1	1	0-30 ampere meter (optional)
M2	1	0-20 Volt meter (optional)
L1	1	117 volt indicator lamp (optional)

1	3 prong AC power cord
1	Switch
5	TO3 mica insulators
10	Nylon insulating bushings for mounting TO3 transistors
4	TO3 mounting sockets (for mounting the pass transistors Q4 on heatsink
1	TO3 heatsink (for mounting Q1 on printed circuit board)
1	Heatsink needs to be large enough to mount the 4 Q2 pass transistors.(if there is extra room on the heatsink the crowbar SCR could be mounted on it
1	tube (small) heatsink compound
1	Heatsink (for diode bridge
1	SCR isolating kit (2 mica washers, 1 teflon bushing, 1 solder terminal)
2	Fuse holders



Printed Circuit Board

Foil side image:



Parts placement (from component side):