THE HAMILTON AMATEUR

JUNE 1988

(Established 1932)

BOX 253, Hamilton, Ontario, Canada L8N 3C8.

CLUB MEETING: JUNE 15th

****

FREE COFFEE & DONUTS

The Hamilton Amateur Radio Club meets at 8:00pm on the 3rd Wednesday of each month except for July & August. The location is the Nash Auditorium, in the Chedoke Hospital grounds, Hamilton. Non-members & friends are welcome.

Membership fees are $20.00 per year with a common renewal date of January 1. Included is a subscription to the club bulletin. Additional Family Memberships (no bulletin) are $1 for each person.

The VE3NCF Repeater is owned and operated by the Hamilton Amateur Radio Club. Located on the Hamilton escarpment it is available for use by any amateur. **Input**: 146.16Mhz. **Output**: 146.76 MHz.

The Swap Net is held on VE3NCF every Tuesday at 8.00 pm except during July & August.

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545 1441

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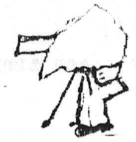


I just developed my 35 film which was purchased a year or more ago. Why it took so long? Well because it was a 36'er and I, haven't been taking many pictures lately.

One of the prints I want to share with you was taken at the H.A.R.C. Field Day Site last year. I just happened to catch Don "VE3OCY" calling CQ Field Day 2 meters, my camera was loaded so I shot before Don relized it I had recorded a first, solar powered, and making many contacts. Don built the panel and tripod. See you all " FIELD DAY 88 ".

de VE3BYM.

EXTRACTS FROM THE BULLETIN BOARDS

Relayed by VE3JSJ

From Bulletin 18 CRRL 1988 May 08

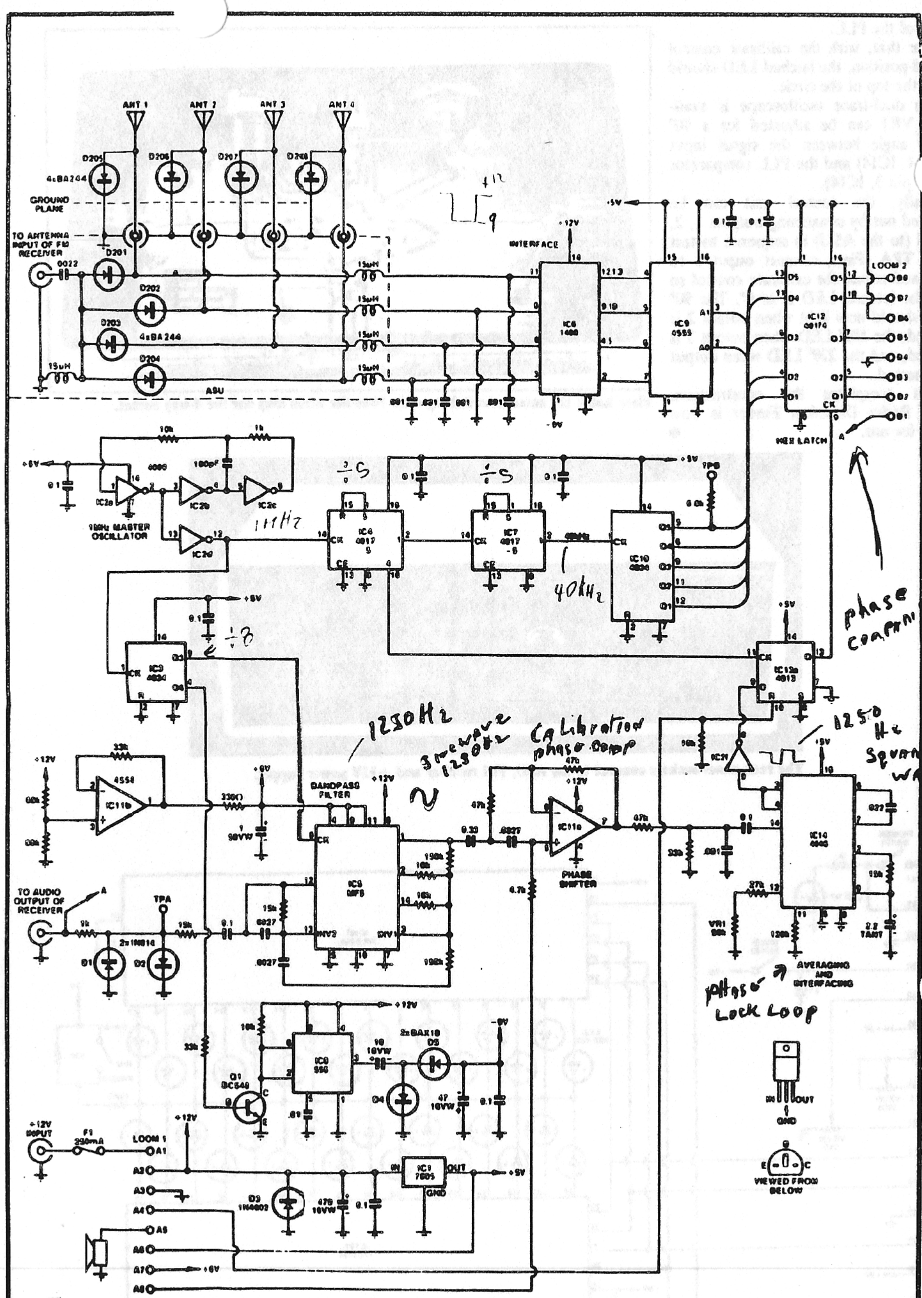
Leaders of AMSAT North America met in Geneva with representatives of the Soviet Space Research. Result: An agreement in principle to deploy PACSAT satellites from the Soviet MIR space station and possibly other Soviet launchers. Initial objective is to launch a small packet store-and-forward satellite for Satelife, a Boston-based medical group. Tentatively dubbed HEALTHSAT 1, the satellite would operate on commercial frequencies just outside of the 2-metre and 70-centimetre amateur bands, to provide electronic mail service for physicians working in remote areas. If suitable commercial frequencies were not available, the satellite would operate in the amateur bands, for use by all licensed radio amateurs. How soon for this project? Soviet cosmonauts in the MIR space station could be placing PACSAT-type satellites in orbit within 18 months.

In other satellite news, teams from AMSAT NA (North America) and AMSATDL (Federal Republic of Germany) are now in Kourou, French Guinea to make final preparations for launch of the new Phase 3C satellite, now expected in less than six weeks. Tasks include uncrating the satellite and its support materials, applying the thermal coatings needed for the flight, and the critical operation of fueling. What will be the minimum requirements for communicating through the new Phase 3C? 10 watts to a 12 dBic antenna on 435.4 Mhz on the uplink and a 10dBic antenna on 145.9 Mhz on the downlink. For more information, check the Amateur Satellite Communications column in May QST.

VE3CNE will be on the air from the Amateur Radio display at the Arts and Crafts Building, 1988 Canadian National Exhibition, Exhibition Place, Toronto, daily from 1000 to 2200 EDT, August 17 to September 05. This is probably the premier public display of Amateur Radio activity in Canada. Amateurs in Toronto during Exhibition weeks are invited to visit the display, operate, and talk to the public about Amateur Radio. Also, amateurs are asked to look for VE3CNE on the air, on voice, code, RTTY and packet radio, on 80 to 10 and 2 metres.

From Bulletin 19 CRRL 1988 May 15

Last year, amateurs across Canada received a letter from CRRL President Tom Atkins, VE3CDM, on behalf of the Canadian Amateur Call Directory. Tom's letter explained that, because of the Canada Privacy Act, DOC's Licensing Branch would no longer give out names and addresses of Canadian amateurs. As a result, the accuracy of listings of Canadian amateurs in all present call directories would soon deteriorate. This would create difficulties for amateurs trying to forward QSL cards or amateurs



RDF ADAPTOR CIRCUIT.

Work is going ahead on Restructuring the Amateur Service (see May QST "Canadian Newsfronts"), but very slowly. Representatives of CRRL and CARF have been meeting with representatives of Communications Canada (DOC) to try to fine-tune Communications Canada's proposals. Of particular concern are:

(1) a possible high level of difficulty for the first technical exam,

(2) insufficient incentives to upgrade to the highest level of certificate, and

(3) the requirement for holders of certain classes of certificate to use "commercial transmitting equipment" only.

At press time (Saturday, May 28), members of the Soviet-Canada Polar Skitrek expedition were only 70 km from their final destination, Ward Hunt Island near Cape Columbia, Ellesmere Island. They were waiting to see if ice would move in and close a 5-km stretch of open water lying in their path. When they reach Cape Columbia, likely on June 02, they will be flown to Ottawa for debriefing and several days of medical tests. The expedition's Canadian base station, CI8C at Resolute Bay, will be active until the end. At the moment, it is being manned by Rick, VO1SA, Wally, VE7HQ, Leonid, UA3CR, and Alexandr, UW3GZ.

On May 19, representatives of CRRL, CARF, the Toronto-based Ad Hoc Committee on VHF Utilization and other concerned amateurs met with representatives of Communications Canada to discuss the assignment of an Atmospheric Environment Service wind profiler to a frequency in the 430-450 MHz band. The amateurs presented their case through a professional quality 15-minute video, and Communications Canada agreed to do further technical investigations.

FROM CARF BULLETINS:

IRON CURTAIN NOW SUPER CONDUCTOR - Reports from the USSR at first ever National Amateur Radio Convention in April say that Israel, and in fact any country, will no longer be out of bounds to Soviet Hams who may give put their addresses and telephone numbers on the air, and print them on QSL cards.

FROM AMSAT NEWS SERVICE BULLETIN 128.05 FROM AMSAT HEADQUARTERS, WASHINGTON, DC May 07, 1988

Since early 1986, the Digital Communications Experiment (DCE) onboard the UoSAT OSCAR 11 satellite has been available to a network of Amateur Radio "gateway" stations for use as a long distance digital message forwarding channel. The network of active gateway stations has been steadily increasing, and the UK gateway alone has handled 1 Mbyte of messages so far this year. As

ASU construction

Commence construction of the ASU by installing the parts on the PC board (ZA-1543c) according to the parts layout diagram. This done, prepare 11 40mm lengths of tinned copper wire and solder them to the socket termination points, with the wires protruding from the copper side of the board.

Once the PC board has been assembled, drill the zippy box according to he diagram supplied with the kit and fit he plugs and sockets (see parts layout). The four antenna sockets are secured using self-tapping screws.

The PC board can now be installed in he case, copper side up, and the leads connected to the plugs and sockets using right angle bends (see photograph). Note the earth-loop for the 4-pole plug. This should be installed to ensure adequate shielding of the control cable.

Next, prepare four equal lengths of coaxial cable (70-100cm) and solder the line plugs to one end of each cable. These are used to connect the four antennas to the switching box.

Diodes D205-D208 are each mounted on the antenna bases which are supplied with the kit. These diodes and the coaxial cables are terminated using extra double-ended solder lugs which have also been included. The procedure is as follows:

First, solder the inner connection of he coax and the anode of the diode to he existing lug on the antenna base. This done, secure the double-ended lug to the ground-plane connection on the base of the antenna with a small self-tapping screw. Finally, solder the braid of the coax to one side of the lug and he diode cathode to the other.

Repeat this procedure for the remaining cables.

Connections between the ASU and the control unit should be run using 4-core cable, while the connection to the FM receiver should be run using coaxial cable. All you have to do is trim the cables to the desired lengths and terminate them with the appropriate plugs.

Note that the wiring connections to the plugs at both ends of the control cable must be made on a one-to-one basis, otherwise the antennas will not rotate in the correct sequence.

Setting up

An alligator clip lead and a small screwdriver are all that are necessary to adjust the unit.

Connect up a 12V supply (be careful of polarity!) and switch on with the hold off and the ASU disconnected. All the LEDs in the display should rapidly flicker on and off as the display is scanned.

Assuming all is well, connect the two

Radio Direction Finding: The Classic Technique

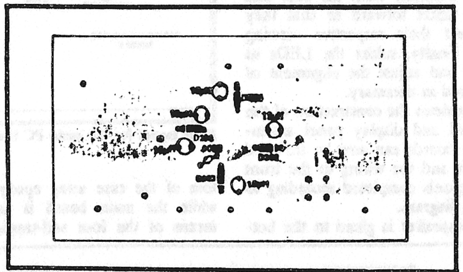
Most readers will be broadly familiar with the concept of a radio direction finder. In its most basic form, it consists of a receiver and an antenna which can be rotated on its own axis. The direction of the transmitter is then found by rotating the antenna for a signal peak or null.

You can easily demonstrate the effect for yourself using a portable transistor radio fitted with a ferrite rod antenna. By tuning the radio to a station and rotating the radio about its vertical axis, a null will be found in the signal strength. The ferrite rod antenna will then point in the direction of the station.

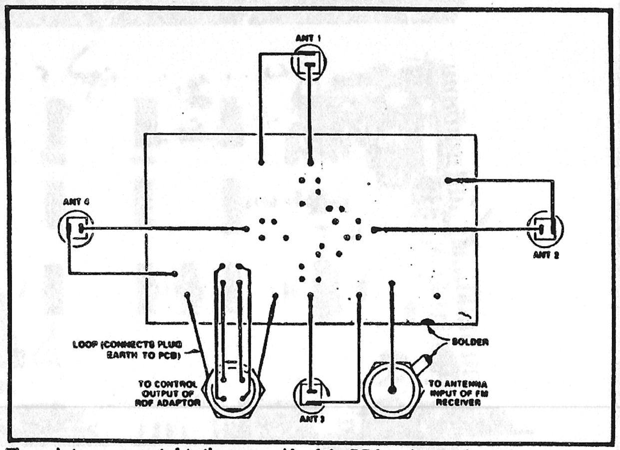
Of course, this method requires that "fixes" be taken at two or more widely spaced locations in order to find the true direction of the transmitter. In fact, two fixes enables the exact location of the transmitter to be determined by simple triangulation.

The classic application of this radio direction finding (RDF) technique was in World War II. Many war movies showed how it was possible to track down enemy transmitters using special vans fitted with RDF equipment.

Typically, these vans were fitted with a large external loop antenna which could be manually rotated. An operator inside the van listened in on headphones for peaks and dips in the signal strength. Provided the transmitter remained in the one location for long enough, its location could eventually be pinpointed.



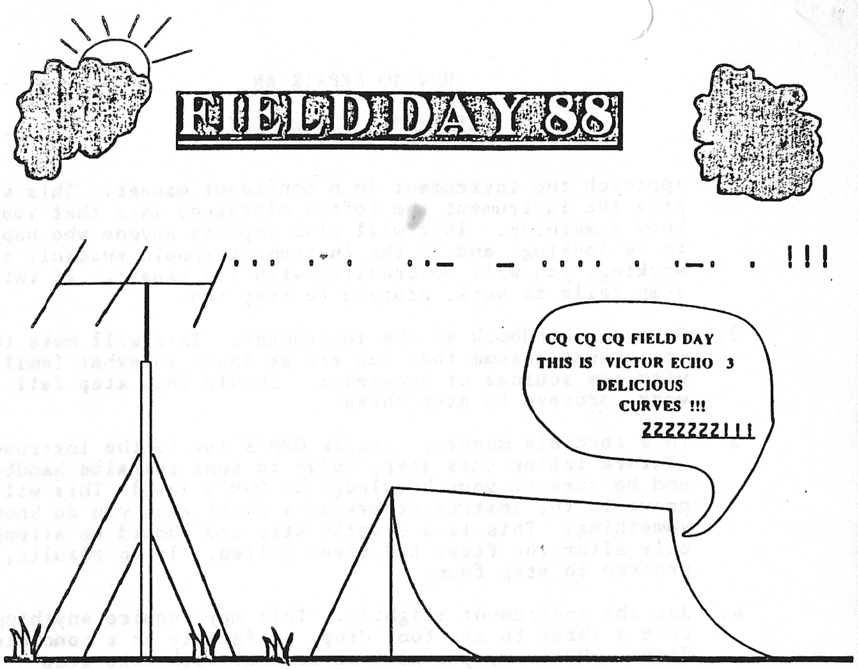
Parts layout for the antenna switching unit. The diodes are all BA244 types.



The sockets are connected to the copper side of the PC board using tinned copper wire.

using the clip lead and adjust VR1 until a single LED is latched. Confirm this adjustment by unhooking and recon-

If the display does not latch when the test lead is reconnected, repeat the above procedure. This adjustment



Paul, VE3HTF did not really fall asleep. The club location is at Bernie Arbour Stadium, about 2000 feet south of last years location. Paul has assured me that there will be plenty of signs so that I will not get lost. He has arraigned publicity in local media, and several groups have already accepted invitations. The hospitality tent promises some surprises so we are looking for a good presentation of HARC and Amateur Radio.

from an external 12V sou... which connects to a 2-pole socket on the rear panel. This supplies +12V direct to several ICs and to the input of 3-terminal regulator IC1. IC1, in turn, supplies a regulated +5V rail to the remaining ICs.

Op amp IC11b provides a buffered +6V rail to IC5 and also to the phase calibration control (VR101).

Finally, a −9V supply rail is required for the 1488 line driver IC. This is generated by a DC-DC converter circuit based on 555 timer IC8. It buffers a 16kHz square wave derived from IC3 and drives a diode charge pump based on D4 and D5 to produce the required −9V rail.

Transistor Q1 simply functions as a switch. Its job is to interface the +5V CMOS circuit to the +12V 555 circuit.

Antennas and Operation

For mobile operation, four ¼-wave vertical whip antennas attached to a roof-rack assembly would be the best approach. The ASU could then be conveniently located between the antennas. It should be weatherproofed using a silicone sealant.

In most cases, a separate ground plane will have to be provided adjacent to the antenna bases. A suggested method is to secure a sheet of aluminium to the roof-rack. Make sure that the assembly cannot come adrift.

A hand-held transceiver can be used to aid the initial setting-up procedure. Depending on the set-up, it may be necessary to "rotate" the antenna array until the compass rose reads true relative to the direction of the vehicle.

The calibrate control can be used to make the final adjustment. A walk around the antenna array with the hand-held transceiver will then reveal if the installation is functioning correctly. This should take place in an open area to avoid strong signal reflections.

In the case of a fixed installation, four ground plane antennas should be mounted symmetrically on a vertical mast, together with the ASU. The array can then be adjusted so that the compass rose displays the true bearing with the calibrate control set to mid-position.

Note that, in either case, the distance between opposing antennas should be between .07 and 0.4 wavelengths.

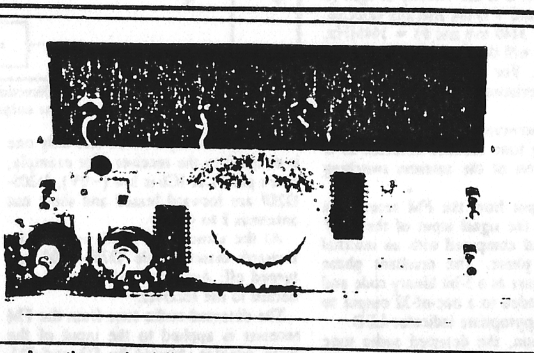
Construction

Construction is straightforward with most of the parts mounted on three PC boards, two in the main unit and one in the ASU. These boards are coded ZA-1643a, ZA-1643b and ZA1643c.

A plastic instrument case fitted with a perspex front panel houses the control electronics, while the ASU board is housed in a plastic zippy case.

Begin by constructing the main PC board (ZA-1643a). No special procedure need be followed when assembling the board although we suggest that the larger components be left till last. Note carefully the orientation of the semiconductors and electrolytic capacitors when they are being installed.

The 7805 regulator is installed so that its metal tab lies flat against the board. It is then secured using a machine screw and nut. Note that PC pins are used to terminate all external wiring connections.



This view shows the completed display board. The pot leads are soldered to PC stakes.

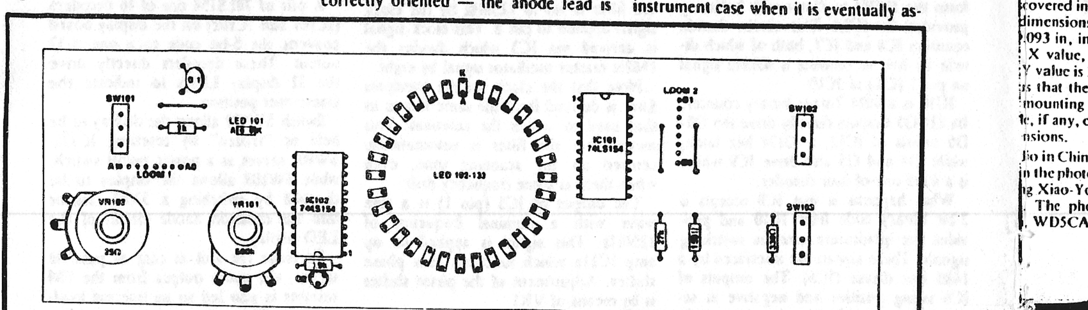
The display board (ZA-1543b) is constructed next. Begin by mounting all parts except for the two potentiometers and the 33 LEDs. Be careful with the orientation of the two LS154 decoder ICs as they face in opposite directions.

PC pins are used to terminate the wiring connections to the main board and to terminate the pot terminals. With the exception of the pot terminals, these should all be mounted on the copper side of the board.

Next, press all the LEDs into the board, noting that the yellow LEDs should be used for the quadrant markers and the red LED for power indication. Make sure that all the LEDs are correctly oriented — the anode lead is the longer of the two.

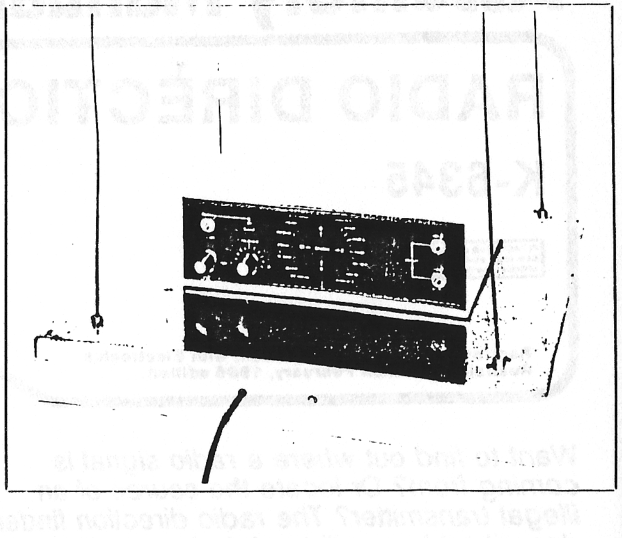
Do not solder them in at this stage as they must be aligned with the front panel later on.

Attention can now be turned to the perspex front panel. Using a smooth file, carefully file a radius on each corner. This is to prevent the right-angled corners of the panel from biting into the instrument case when it is eventually as-



By Bruce O. Williams, WA6IVC
Assistant Technical Editor

Dick Smith Electronics K-6345 Radio Direction Finder



Designed to provide an easy method of tracking down illegal transmitters, RFI sources and antisocial radio operators, the Dick Smith Electronics Radio Direction Finder (RDF) operates on any frequency within the range of 50-500 MHz. It will work with just about any FM receiver, such as hand-held transceivers, pocket scanners or fixed stations. It is provided in kit form and requires a middle-level construction ability—that is, it is *not* a project for the first-time kit builder.

Who Is Dick Smith?

Dick Smith Electronics, Inc, is an American subsidiary of an Australian company. The Dick Smith product line is well known in "downunda" land (Australia and New Zealand), but perhaps not so well known in the US. They have, however, in a very short time established several outlets, primarily in the San Francisco Bay area and Southern California. They stock a very complete line of electronic items, ranging from components to major assemblies, and market much of their product line through mail orders. Because the company emphasizes kit projects for the Amateur Radio operator, as well as the electronics enthusiast, *QST* has looked at some of their projects in the past.[1] This is the first time that we have reviewed one of their more-advanced electronics projects.

RDF Description

Physically the RDF consists of two separate units. The major unit contains the control and display electronics, and will be located adjacent to an FM receiver or transceiver. The second unit, the antenna switching unit, is connected to the control unit through a 4-conductor cable and 2-conductor audio line, and to the receiver antenna terminal through a coaxial cable.

An electronic "compass" display consisting of 32 LED indicators in a circular pattern on the front panel indicates the relative bearing from the RDF to the transmitter being tracked. When a signal is received, its relative bearing to the RDF antenna system is indicated by whichever of the 32 LEDs illuminates. In fixed installations, this allows the compass bearing of the signal to be directly indicated to within ±5.6°. When installed in a vehicle, successive readings allow you to pinpoint the exact location of the transmitter.

How It Works

The theory of operation is relatively simple. Radio signals transmitted from a moving location and received on a stationary antenna, or transmitted from a stationary point and received on a rapidly moving antenna, undergo a frequency shift due to the Doppler effect. This effect is similar to that observed when a moving car blows its horn or a moving train whistles at a crossing.

Consider a single antenna mounted on the edge of a rapidly spinning disk. As the antenna moves toward the source of the RF signal, the apparent frequency will increase due to the Doppler effect. Conversely, as the antenna moves away from the RF source, the apparent frequency decreases. Thus, the rotating antenna causes frequency modulation of the received carrier. When the antenna is connected to an FM receiver, a tone will be heard corresponding to the modulation induced by the rotation. By analyzing the phase of this tone, the direction to the transmitter can be determined.

To avoid the obvious drawbacks associated with a mechanically rotated antenna system, the Dick Smith RDF simulates a rotating antenna electronically. Four vertical whip antennas are arranged around a circle with a diameter of 0.07-0.4 wavelength. The antennas are electronically switched on and off in a clockwise direction such that all four antennas are scanned once every 1/1250th of a second. Only one antenna is active at any point in time. This situation is equivalent to one vertical antenna mounted on the perimeter of a disk spinning at 1250 revolutions per second. For a diameter of 800 mm (31½ inches), which is 0.4 wavelength at 144 MHz, this results in a tangential velocity of 10,300 feet per second, or 3140 meters per second (m/s).

The deviation of the received carrier is determined as follows. For $V \ll C$, we will neglect relativistic effects and use

$$Fr/Ft = 1 - V/C \qquad \text{(Eq 1)}$$

also,

$$dF = |Fr - Ft| \qquad \text{(Eq 2)}$$

therefore,

$$dF = Ft \times V/C \qquad \text{(Eq 3)}$$

where

Fr is the received frequency
Ft is the transmitted frequency
dF is the frequency shift
C is the velocity of light (3×10^8 m/s)
V is the antenna velocity

For V = 3140 m/s and Ft = 144 MHz, the carrier will deviate 1.5 kHz at a rate of 1250-Hz. For lower carrier frequencies, the deviation will be proportionately lower. Note, however, that the 1250-Hz modulating tone remains constant as it is a function of the antenna switching rate only.

The audio output from the FM receiver is fed to the signal input of the RDF and compared with an internal reference phase. The resultant phase angle appears as a 5-bit binary code that is decoded to a 1-of-32 output to drive the appropriate indicator LED. In addition, the detected audio tone is fed to an internal speaker to allow monitoring of receiver tuning.

Construction

The RDF control unit includes two PC boards, a main circuit board and a display-

[1] Bruce O. Williams, "Build a UHF Wattmeter," *QST*, Oct 1985, pp 35-37.

EDITION 2

Assembly Manual for the

RADIO DIRECTION FINDER

K-6345

PLEASE READ DISCLAIMER CAREFULLY AS WE CAN ONLY GUARANTEE PARTS AND NOT THE LABOUR CONTENT YOU PROVIDE

DICK SMITH KIT

Reprinted in part by arrangement with Electronics Australia from their February, 1986 edition.

Want to find out where a radio signal is coming from? Or locate the source of an illegal transmitter? The radio direction finder described here will track it down using an electronically rotated antenna.

Physically, the radio direction finder consists of two separate units. One contains the control and display electronics and is located adjacent to an FM transceiver or receiver; the other is a special antenna switching unit (ASU) which is connected to the control unit via a 4-way cable.

An electronic "compass" display consisting of 32 LEDs indicates the transmitter bearing. When a signal is received, its relative bearing to the antenna system is indicated by whichever of the 32 LEDs illuminates.

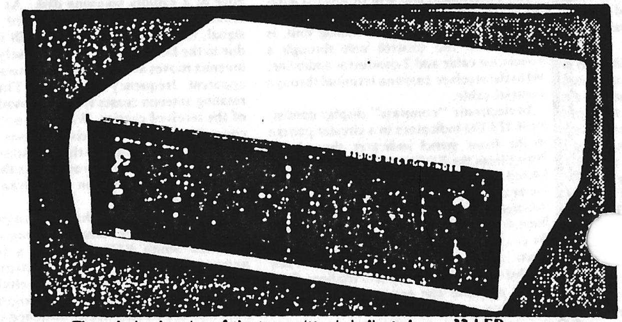
In fixed installations, this allows the compass bearing of the signal to be directly indicated to within ±5.6 degrees. When installed in a car, successive readings allow you to pinpoint the exact location of the transmitter.

As such, the Dick Smith Radio Direction Finder (or RDF for short) is just the ticket for tracking down illegal transmitters and anti-social radio operators. Depending on the antenna system, it can operate on any band within the range 50-500MHz and will work with FM receivers ranging from pocket scanners to amateur radio and CB transceivers.

Radio direction finders of this type can cost around $600 or more

We think it will be especially popular with amateur radio operators.

How it works



The relative bearing of the transmitter is indicated on a 32-LED compass rose.

simple. Radio signals received on a rapidly moving antenna undergo a frequency shift due to the Doppler effect, an effect well known to anyone who has observed a moving car with its horn blowing.

Consider a single antenna mounted on the edge of a rapidly spinning disc. As the antenna moves towards the source of the RF carrier, the apparent frequency will increase due to the Doppler effect. Conversely, as the antenna moves away, the frequency will decrease.

Thus, the rotating antenna causes frequency modulation of the received carrier. When this type of antenna is connected to an FM receiver (the type most often used on 2 metres), a tone is heard.

determined.

To avoid the obvious drawback of a mechanically rotated system, the Dick Smith RDF simulates a rotating antenna electronically. Four vertical whip antennas are arranged around a circle of diameter .07-0.4 wavelengths. These are electronically switched clockwise in sequence such that all four antennas are scanned once every 1/1250th of a second.

This situation is equivalent to one vertical antenna mounted on the perimeter of a disc spinning at 1250 revolutions per second. For a diameter of say 800mm (for the 2-metre band), this results in a tangential velocity of 3140 metres per second.

The deviation of the received carrier

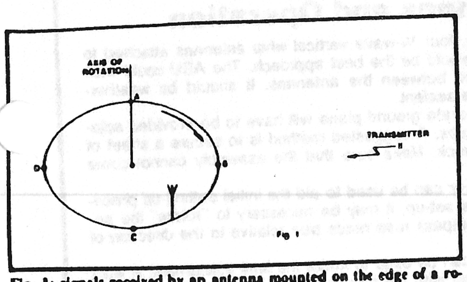


Fig. 1: signals received by an antenna mounted on the edge of a rotating disc are frequency modulated due to the Doppler effect.

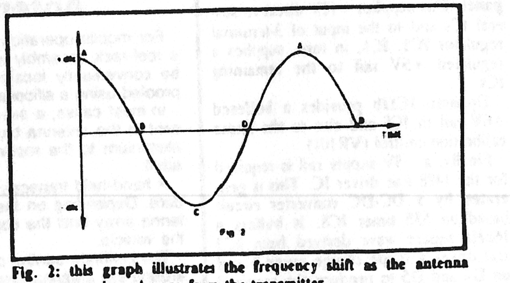


Fig. 2: this graph illustrates the frequency shift as the antenna moves towards and away from the transmitter.

$$Fr/Ft = 1 - V/C$$
$$\text{also } dF = |Fr - Ft|$$
$$\text{therefore } dF = Ft \times V/C$$

where Fr is the received frequency, Ft is the transmitter frequency, dF is the frequency shift, C is the velocity of light (3×10^8 m/s) and V is the antenna velocity.

For V = 3140 m/s and Ft = 144MHz, the carrier will deviate 1.5kHz at a rate of 1250Hz. For lower carrier frequencies, the deviation will be proportionally lower.

Note, however, that the 1250Hz modulating tone remains constant as it is a function of the antenna switching rate only.

The output from the FM receiver is applied to the signal input of the RDF adapter and compared with an internal reference phase. The resultant phase angle appears as a 5-bit binary code and this is decoded to a one-of-32 output to drive the appropriate indicator LED.

In addition, the detected audio tone can be monitored on an internal loudspeaker. This provides audible indication that the receiver is correctly tuned to the transmitter frequency.

The circuit

Antenna switching is accomplished by deriving a 2-bit binary code from a 1MHz master oscillator. Here's how it's done:

Inverter stages IC2a, b & c (4069) form the 1MHz oscillator with buffering provided by IC2d. This clocks decade counters IC4 and IC7, both of which divide by five to produce a 40kHz signal on pin 1 (CK) of IC10.

IC10 is a 4024 7-stage binary counter. Its Q1-Q5 outputs directly drive the D1-D5 inputs of IC12, a 40174 hex latch, while Q4 and Q5 also drive IC9 which is a 4555 one-of-four decoder.

What happens is that IC9 accepts a 2-bit binary code from IC10 and provides the quadrature antenna switching signals. These signals are interfaced by a 1488 line driver (IC6). The outputs of IC6 swing positive and negative in sequence to provide bias for the matrix diodes (D201-D208) in the antenna switching unit (ASU).

The diode matrix is arranged so that, at any given instant, three of the anten-

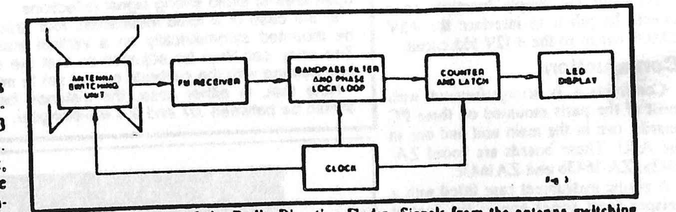


Fig. 3: block diagram of the Radio Direction Finder. Signals from the antenna switching unit are fed to an FM receiver and the output compared to a reference phase.

nas are effectively shorted and only one is coupled to the receiver. For example, when pin 11 of IC6 is low (−9V), D205-D207 are forward biased and short out antennas 2 to 4.

At the same time, D201 will also be forward biased while D202-D204 are turned off. Antenna 1 will thus be connected to the receiver.

The detected audio tone from the FM receiver is applied to the input of the RDF adapter, limited by D1 and D2, and filtered by a single-pole active low-pass filter stage (IC5). This chip is described by National Semiconductor as an MF5 Universal Monolithic Switched Capacitor Filter. Basically, it is a general purpose active filter building block.

The rest of IC5 is configured as a second-order bandpass filter to remove unwanted audio modulation from the 1250Hz tone. The centre frequency of the filter is set to 1250Hz by the clock signal applied to pin 8. This clock signal is derived via IC3 which divides the 1MHz master oscillator signal by eight.

Note that the clock for the bandpass filter is derived from the same source as that used to switch the antennas. This means that the filter is automatically centred on the scanning tone, even when there is some frequency drift.

The output of IC5 (pin 1) is a sine wave with a nominal frequency of 1250Hz. This signal is applied to op amp IC11a which functions as a phase shifter. Adjustment of the phase shifter is by means of VR1.

The job of the phase shifter is to allow calibration of the circuit and to compensate for any audio phase shifts in the receiver.

cessed by a 4046 phase lock loop (PLL). The function of this stage is to average out any modulation present in the passband of IC5 and to produce a 1250Hz square wave which is essentially free of noise and jitter.

It is this signal that is used to latch IC12. The output of the PLL (pins 3 & 4) is first inverted by IC2f and applied to D-type flipflop IC13a. Subsequently, when D goes high, IC13a latches IC12 on the first positive-going clock pulse from pin 10 of IC4.

The result of all this is that IC12 is latched with a 5-bit code which is directly related to the transmitter direction. A phase comparator function is thus performed.

Note that IC13a is necessary to prevent the latching signal from coinciding with a change of data on IC12's inputs.

A pair of 74LS154 one-of-16 decoders (IC101 and IC102) on the display board converts the 5-bit code to a one-of-32 output. These decoders directly drive the 32 display LEDs to indicate the transmitter position.

Switch SW102 allows the display to be held or "frozen" by resetting IC13a. SW101 serves as a power on/off switch, while SW103 allows the display to be dimmed by switching a 330Ω resistor into the common anode circuit of the LED display.

To make the unit as easy as possible to use, the audio output from the FM receiver is also fed to an internal loudspeaker. The volume is adjusted by means of potentiometer VR102 which is mounted on the front panel.

Power supply

HOW TO REPAIR AN ELECTRONIC INSTRUMENT

1. Approach the instrument in a confident manner. This will give the instrument the (often mistaken) idea that you know something. This will also impress anyone who happens to be looking, and if the instrument should suddenly start working, you will be credited with its repair. If this step fails to work, proceed to step two.

2. Wave the handbook at the instrument. This will make the instrument assume that you are at least somewhat familiar with the sources of knowledge. Should this step fail to work, proceed to step three.

3. In a forcible manner, recite OHM's law to the instrument. (Before taking this step, refer to some relialbe handbook and be sure of your knowledge of OHM's law.) This will prove to the instrument beyond a doubt that you do know something. This is a drastic step and should be attempted only after the first two steps failed. If no results, proceed to step four.

4. Jar the instrument slightly. This may require anything from a three to six foot drop, preferably on a concrete floor. However, you must be careful with this step because while jarring is an approved method of repair, we must not mar the floor. Again this is a drastic step, and if it fails, there is nothing to do but to proceed to step five.

5. Add a PCB..this will prove to the instrument that you are familiar with instrument design. Also, this step will give the instrument an added load to carry and will thereby increase your advantage. Should these five steps fail to work, you must proceed to the most drastic step of all. This step is seldom needed and must be used only as a final resort.

6. T H I N K . . . .

DE KC2FI FRANK'S MAILBOX
c/o VE3KOI BBS .... DE VE3NXK

***

Christmas is the season when radios keep you awake until three in the morning playing "Silent Night".

***

From the Peel ARC Bulletin

sembled.

The spacing between the PC board and the front panel is adjusted next. This procedure should be followed carefully, as it sets the length of the LED leads.

Attach the two pots to the front panel, then bolt the front panel to the display board via the switch nuts. Note that there should be two nuts on each switch — one behind the panel and the other in front.

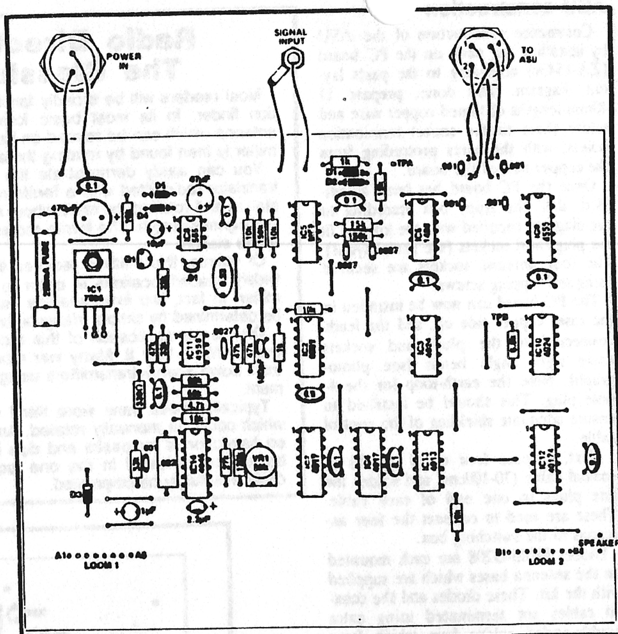
The board-to-panel spacing can now be adjusted by inserting them into their respective slots in the instrument case. The panel slides into the first slot while the PC board should fit into the third slot from the front of the case.

Adjust the nuts on the switches as necessary to achieve the correct alignment. This done, the pot terminations can be soldered to their adjacent PC pins.

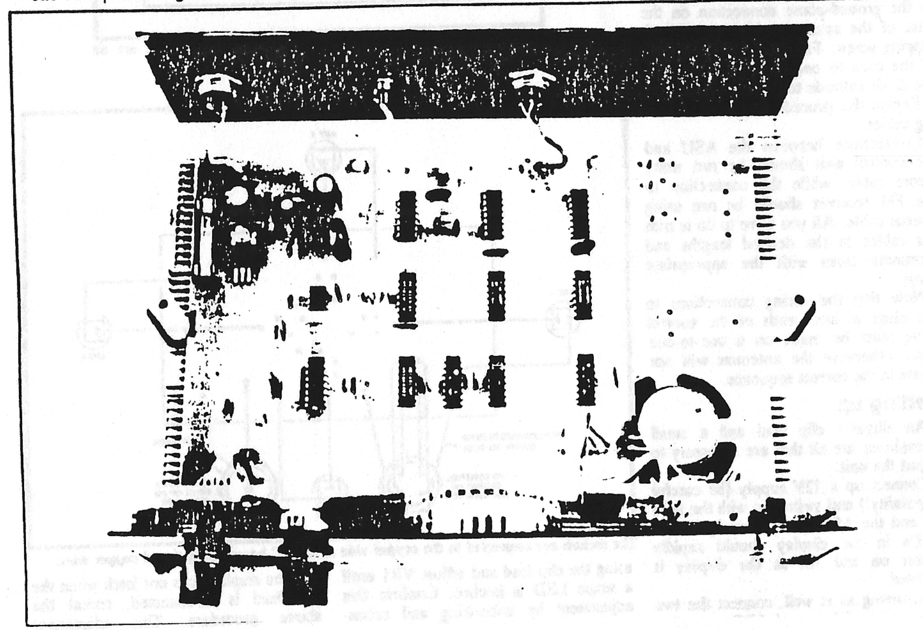
With the front panel assembly now correctly aligned, the display LEDs can be soldered in position. To do this, remove the assembly from the case and push the LEDs forward so that they butt against their respective viewing windows. Finally, solder the LEDs to the board and adjust the alignment of each by hand as necessary.

This completes the construction of the main board and display panel assemblies. The boards can now be installed in the case and the wiring to the front and rear panels completed according to the wiring diagram.

The loudspeaker is glued to the bottom of the case using epoxy adhesive while the main board is secured by means of the four self-tapping screws supplied. Wiring between the main board and the front and rear panels can be run using rainbow cable.



Parts layout for the main PC board. Take care with component orientation.



the first continuously available Amateur Radio "PACSAT" service, the DCEhas also been the first to come up against the international regulations which effect the flow of packet radio messages. In particular, strict third-partytraffic regulations in the USA made it impossible to forward messages to or from the UK through the USA packet network. To overcome this problem, UoSAT team members Jeff Ward (G0/K8KA) and Martin Sweeting (G3YJO) contacted the UK Department of Trade and Industry (DTI). This is the government department regulating Amateur Radio in the UK). The DTI recognized the UoSAT-2 DCE as an important experiment and they were willing help solve the USA third-party traffic problem. The solution was simple: the USA has a limited third party traffic agreement with the UK. The agreement covers messages passed by UK stations using callsign prefix "GB", except those with prefix "GB3". Since the PBBS at UoSAT has the callsign GB3UP, its messages were not legal under the existing agreement. To solve this problem, the DCE groundstation at the University of Surrey was granted the callsign GB2UP. Messages passed to and from GB2UP come within the third party agreement between the USA and the UK. Thus, messages received by the US packet network from the UK via GB2UP and the DCE have travelled via a legitimate international link. With recent reactivation of the DCE gateway station run by K1KSY (John Biro) and the expected activation of a station on the west coast of the USA, the UoSAT group feels it should be known by PBBS operators in the USA that messages from the UK via the DCE are not illegal third party traffic. These messages can be easily identified, since they have GB2UP as an intermediate PBBS in their forwarding headers. Individual USA gateway station operators will determine how messages should be routed to the UoSAT OSCAR 11 DCE, and how one can indicate your messages are bound for this authorized international link. With use of the UoSAT OSCAR 11 DCE increasing, and FO-12 and Phase 3C also able to provide international packet message forwarding, we must be careful to distinguish acceptable international traffic from that which should be suppressed. Simply killing all messages containing foreign calls will be "throwing the baby out with the bath water.

////////

At the May meeting, Don Graziano, VE3OCY gave an interesting talk on the Dick Smith Electronics K-6345 Radio Direction Finder. It took longer to get the kit than to assemble it, as he finally had to order from Australia. Several club members expressed interest since we can make use of several units in Fox Hunts. Lon provided the attached Product Review from QST and the assembly directions. While parts may not reproduce very well, you can get the general idea. If interested, call Lon at 560-1960.

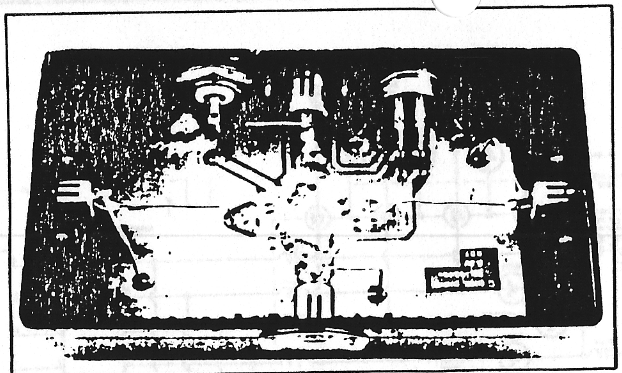
range of the PLL.

Note that, with the calibrate control at mid-position, the latched LED should be at the top of the circle.

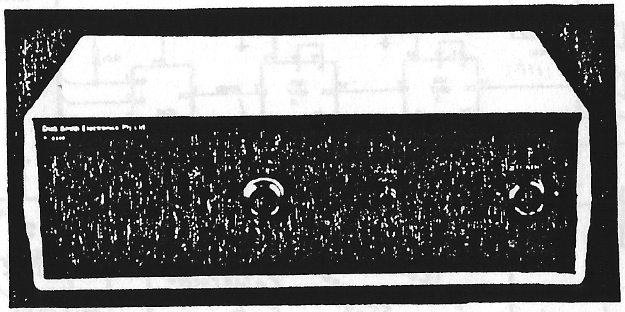
If a dual-trace oscilloscope is available, VR1 can be adjusted for a 90° phase angle between the signal input (pin 4, IC14) and the PLL comparator (pin 3, IC14).

Finally, the control unit can be checked out by connecting outputs 1, 2, 3 & 4 (to the ASU) in sequence to test point TPA. First, connect ouput 1 to TPA and adjust the calibrate control so that the latched LED is at 0°. The 90° LED should now light when output 2 is shorted, the 180° LED when output 3 is shorted, and the 270° LED when output 4 is shorted.

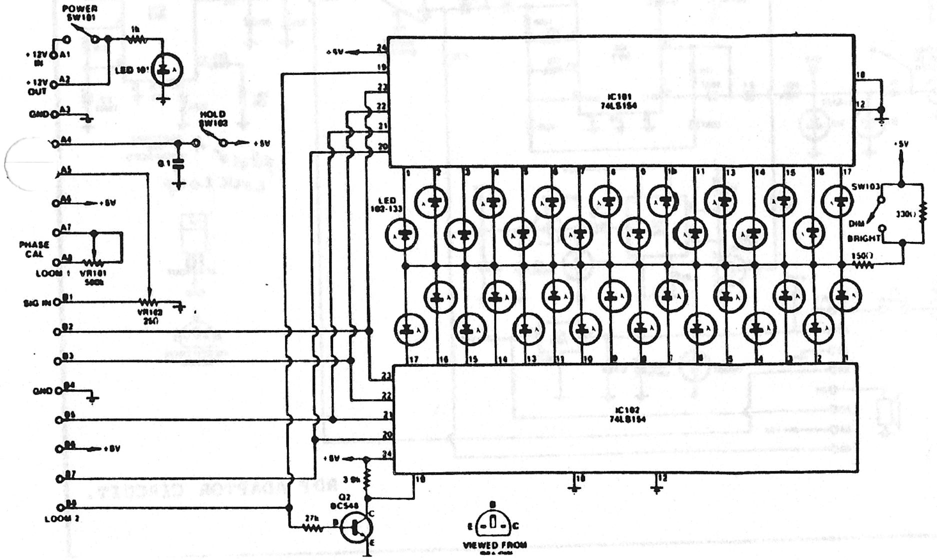
That completes the construction. Your Radio Direction Finder is now ready for use. ●



View inside the antenna switching unit. Note the earth loop for the 4-way socket.



The rear panel sockets connect to the ASU, FM receiver and +12V power supply.



trying to contact Canadian amateurs for whatever reason. In the letter was a request to forward accurate information which would eventually be used to produce an up-to-date Canadian Amateur Call Directory. That Canadian Amateur Call Directory is now available. How was this new Directory produced in only five short months? With a lot of hard work and a lot of cooperation from everyone. Listings were provided by provincial Amateur Radio societies, local radio clubs, Amateur Radio dealers and thousands of individual amateurs. These were keyboarded in by volunteers in London, Ontario and added to the CRRL database. Then other volunteers, in London and in Trois Rivieres, Quebec, undertook the painstaking work of proof-reading the text, deleting the duplicates, cross-checking and editing. The result: a complete, accurate and readable 360-page directory of Canada's over 23,000 radio amateurs. The Canadian Amateur Call Directory will soon be available at Amateur Radio dealers across Canada. For those who can't wait, it is available now from CRRL. For ordering information, contact CRRL, Box 7009, Station E, London, Ontario N5Y 4J9.

Note: A list of H.A.R.C. members was not forwarded to CRRL. The Executive decided that members should forward information individually if they wanted to (from - VE3JSJ, Gordon, Membership Chairperson).

From Bulletin 20 CRRL 1988 May 22

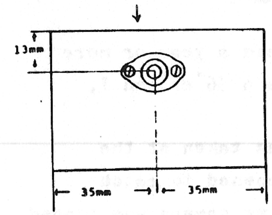
Most Canadian amateurs were pleased by the outcome of the appeal in the Jack Ravenscroft case. If the original decision in the case had been allowed to stand, any of us could have been subject to harassment and lawsuit for interfering with the operation of electrical and electronic equipment in nearby homes, equipment that, because of poor design, was susceptible to RF from our Amateur Radio transmitters. Unfortunately, however, the cost of conducting Jack's appeal was almost double what had been expected. As a result, there is now a $15,000 shortfall in the Jack Ravenscroft Susceptibility Fund. Jack was willing to follow through -- for all of us, really --and it's time to show our appreciation. Even if you have donated before, please take an envelope, write a cheque and send it to The JRSD Fund Box 8873 Ottawa, ONK1G 3J2. You'll be glad you did.

A Montreal man was recently given a $600 fine or 30 days in jail for operating a commercial service band radio without a licence.

From Bulletin 21 CRRL 1988 May 29

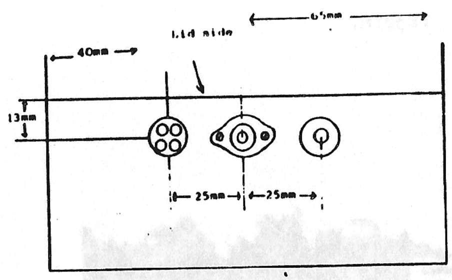
To celebrate the 105th Anniversary and Reunion of the Royal Canadian Regiment, London (Ontario) Amateur Radio Club will operate special-event station VE3VRI (Victoria Regina Imperator), on 80-10-metre CW and SSB on July 01-03. For a commemorative QSL, send an SASE to London Amateur Radio Club, Box 82, Station B, London ON N6A 4V3. (Special note: Congratulatory messages may be sent by packet radio to VE3VRI @ VE3GYQ.)

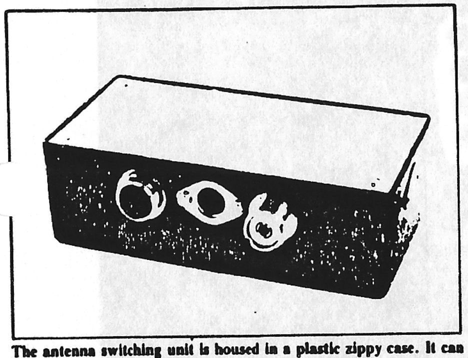
DRILLING DETAILS FOR RDF - ASU ZIPPY BOX.



HOLE DIMENSIONS:

belling lee skts - 11mm
so 239 - 16mm
4 pole plug - 16mm
belling lee mtg holes - 2mm





The antenna switching unit is housed in a plastic zippy case. It can be weatherproofed using silicone sealant.

PARTS LIST.

RESISTORS

All resistors are 1/4w unless specified
2x 330R Resistor □
1x 1K Resistor □
1x 4.7K Resistor □
1x 6.8K Resistor □
5x 10K Resistor □
3x 15K Resistor □
2x 27K Resistor □
3x 33K Resistor □
3x 47K Resistor □
2x 68K Resistor □
1x 120K Resistor □
2x 150K Resistor □
1x 50K Trimpot (VR1) □
1x 3.9K Resistor □
1x 150R Resistor □

CAPACITORS

3x .0027uf Greencap □
1x .001uf Greencap □
1x .33uf Greencap □
1x 100pf Ceramic cap □
4x .001uf Ceramic cap □
3x .01uf Ceramic cap □
11x .1uf Ceramic cap □
1x 1uf Electro cap 5.v RB □
1x 10uf Electro cap 16/25v RB □
1x 47uf Electro cap 16/25v RB □
1x 470uf Electro cap 16/25v RB □
1x 2.2uf Tantalum 25/35v □
1x .022uf Polycarbon □
1x .0022uf Ceramic cap □

SEMICONDUCTORS

1x Volt Reg 7805 □
1x 555 IC (IC8) □
1x 4558/LM1458 IC (IC11) □
1x 4046 IC (IC14) □
1x 4069 IC (IC2) □
2x 4017/14017 IC (IC7, IC4) □
1x 1488 IC (IC6) □
1x 4013 IC (IC13) □
2x 4024 IC (IC3, IC10) □
1x 4555 IC (IC9) □
1x 40174/14174 IC (IC12) □
2x 74LS154 IC (IC101, IC102) □
1x MF-5CN Mode Filter IC (IC5) □

COMPONENT PACK

1x IN4002 Diode (D1) □
2x IN4148/IN914 Diode (D1, D2) □
2x BAW62 Diode (D4, 5) □
2x DS548/BC548 Diode (Q1, 2) □
8x BA 244 Diode (D201 - D208) □
1x Red Led (Led 101) □
28x Green Leds □
4x Yellow Leds □
5x 15uh RF Choke □
1x 250mA Fuse □
2x Fuse clips □

MISCELLANEOUS

Toggle switches, knobs, tinned copper wire, rainbow cable, plugs & sockets, solder, PCH pins, screws, PCBs, front and back panel, speaker, instrument case & zippy box □

THE PRESIDENT'S MESSAGE

The presentation on Doppler effect radio direction finders by Don VE3OCY at the May membership meeting has invited many apreciative comments from the memb[illegible] of the club. The presentation confirmed again that our club has a wealth of ta[illegible]nt among the members. We hope that Don will return again so that the membership can again share his experience and expertise.

The Red Cross Presented certificates of appreciation for efforts for the Emergency Services Commitee to the following members; Kurt Vogel VE3PUI, John Card VE3RW, Glen Gibson VE3FHQ, George Olenick VE3BLG, Fred Spring VE3ITQ, Ev. Englert VE3OQX, Gord Murray VE3JSJ, Fiore Manga VE3OQG, Al Barker VE3HNG, and Ralph Tufts VE3BYM. For those that were not at the presentation luncheon certificates can be picked up from me at the June membership meeting.

As this will be the the last buletin for the summer I wish all of you pleasnt days and sunshine and the best of times.

73
Ev. VE3OQX

Coming Events

June 6 to 18 Amateur Radio display at the Hamilton Central Library.

June 18 Welland ARC Fleamarket, Wainfleet Arena.

June 25 & 26 Field Day.

July 9 Ontario Hamfest, Electronic Hobby Show and Fleamarket. Burlington Central Arena, Drury Lane.

August 13 Brantford ARC Fleamarket, Woodman Park Community Centre, 491 Grey St. Talk in VE3TCR 147.15 plus.

August VE3CNE willbe operating during the Exhibition. Amateurs are invited to visit. Two days are assigned to HARC. For details call Fred VE3GCP, 575-5197.

October 8 HARC Fleamarket

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OLLS & ENLS

The Fleamarket at Bingeman Park was quite a success, lots of people but still not too crowded. Got a copy of the new Canadian Amateur Call Directory. I have already noticed several errors, people have moved, but the old address is listed.
No report yet on the activity at the Boy Scout Rally. We heard them as we went along Highway 7 after leaving the Fleamarket, but was too broken up to join in. It sounded like Fred VE3GCP was having fun. Our new Bulletin format is getting mixed reviews. The smaller print bothers some but we can put in more info at quite a bit less cost than last year. No technical articles lately from HARC. I often hear you exchanging info (most of it printable) so how about it?

The Swap Shop by Ralph VE3BYM

VE3FCY-Bill 634-8560 Burlington.
FT 225RD 2 M 25 W. Almode xcvr, with Manual. $ 500.

VE3OCQ: Bob 549-6125. Hamilton.
Alinco VHF-FM 140-160 xcvr, c/w spkr. mike, ac to dc converter, batt. pac, plug & wall charger. Manual. 350.

VE3FMN: Wayne 639-0106 Burlington.
TR751A Almode 2 mtr., 25 W. SSB, CW, FM. 10 mem. Man. 700.

VE3LWM: Mike 1-416-772-3292 Cayauga.
Western Radio 4000 UHF handheld, 5 W, 4 chs., charger, and carrying case. Needs repairs on receive. 50.

VE3ABH: Joe 1-416-835-5665. Port Colborne.
Collins 325S-1 80-10 M. 100W. cont. c/w 516 sp/ps. Lots of tubes including finals. Gud condx wid manual. 275.

VE3CJW: Bob 662-7631 Stoney Creek.
Kenwood TS 900 xcvr. 80-10 M. 300 W. pep, Ext. VFO, spkr. 550.

VE3FCY: Bill 634-8560 Burlington.
Trinton 4 xcvr. c/w power supply & manual. 500.

SWL: Bart 560- 3807 Hamilton. Bearcat 220 scanner c/w air 200.

VE3OCY: Don 560-1960 Hamilton. Heathkit IB-101 freq. counter. 75.

VE3EMS: Peter 1-416-774-8766 Dunnville.
Digimax D1200 freq. counter to 1200 mhz. 300.

VE3LVV: John 692-3802 Mt. Hope.
IBM printer 2741 c/w R232 Interface and manual. 60.

VE3OIG: Tom 1-416-227-1522 Cantron KPC-2 Latest 230.

VE3OCQ: Bob 549-6125 Hamilton. Kenwood dc to dc converter. 35.

VE3OCY: Don 560-1960 Hamilton. Pwr. Sply. 13.8V. 8Amp. cont. 80.

VE3LWM: Mike 1-416-772-3292. Cayuga.
Cushcraft A3 , 3El beam. 10-15-20 Mtrs., 6 mons. old. 400.

VE3NKU: Harold 388-3117. Hamilton.
Butternut HF5B 3El beam 10-12-15-17-20 meters. NEW 350.

73 Ralph VE3BYM