

# IARS THE PROPAGATOR IARS

ILLAWARRA AMATEUR RADIO SOC. INC.

MONTHLY NEWSLETTER OF THE ILLAWARRA AMATEUR RADIO SOC. INC.

VOLUME - 89 , NUMBER : JULY 1989.

REGISTERED BY AUSTRALIA POST PUBLICATION NUMBER : NBH - 1491.

MEETINGS ARE HELD ON THE SECOND TUESDAY OF EACH MONTH,  
(EXCEPT JANUARY) AT 7.30.PM. AT THE STATE EMERGENCY SERVICES,  
BUILDING , IN MONTAGUE STREET , NORTH WOLLONGONG .

VISITORS ARE MOST WELCOME TO ATTEND THE MEETING'S .

## JUNE MEETING .

A head count at the June meeting showed 28 members present. The general topic at the meeting unfortunately was the one we discuss all too often - and that is "How do we make the Club a better and more interesting one?". Perhaps the idea chewed over of trying to get school science teachers to bring students along to see demonstrations of Amateur Radio in action instead of our usual performance of Amateur Radio inaction would be one means of promoting our hobby.

Because the sunspot cycle is near its peak the keen CB operator is able to work overseas stations, so our performance with a low power transceiver and a long wire antenna would be counter productive to say the least. It was then suggested that we approach S.E.S. to get approval to erect a gain antenna of some proportions (probably on 20 metres) that could enable us to work into Europe and some of the more exotic countries.

Providing we then have sufficient numbers in the students wanting to see a demonstration, we could show them some other facets of the hobby such as "Glass" RTTY or Packet Radio. Most young people are involved in computers as an off-shoot of their Science studies and to find a hobby that combines radio and computers may be the catalyst required to snare them.

It was mentioned that there are many amateurs in the area (according to the Call Book) who are not club members. The thought was that we may circularise them with either a free copy of The Propagator or else some form of letter expounding the virtues of the Society. Lets not forget however that quite often a visitor who may be an amateur or interested in being one, has turned up at our club and stood around by themselves because we were too busy ragchewing with "old friends" and ignored them. Not a terribly effective way of promoting our image and recruiting members is it?

Next month is our Annual General Meeting - I will be very surprised if the head count is even close to the 28 members who were at the June meeting. Try to think of what it would mean to you if the Society folded up because of lack of interest. Don't think it couldn't happen, the number of financial members has been going down at a steady rate over the last seven years and if the cutbacks to TAFE cause the Radio course to be abandoned at North Wollongong Tech the influx of new members will dry up. Can you imagine operating on the Dural repeater if Illawarra closed down its Two metre and 70 CM repeaters because the Society was disbanded? Think about it. While you are thinking about it ponder if you may be able to spare enough time to be a little more active in assisting those who are running the Society for YOUR benefit.

I don't like to be a prophet of doom, but your help and interest is needed if the Illawarra Amateur Radio Society is going to be around in five years.

# WOLLONGONG ALUMINIUM CENTRE

Available Ex Stock a Range of  
ALUMINIUM:-

- \* Rectangular Hollows.
- \* Round Hollows.
- \* Square Hollows.
- \* Flat Bars.
- \* Channels.
- \* Cutting Service Available \*

All at COMPETITIVE WHOLESALE  
PRICES. Suitable for building  
your own antennas.

Situated At :-

79 Gipps St; WOLLONGONG

Located close to railway  
crossing.

Phone: 299382 or 285932.

## KITS

From \$6 Full instructions

**FREE**  
STANDING  
TOWER  
REQUIRED.  
THE I.A.R.S.  
IS CURRENTLY  
NEGOTIATING  
WITH S.E.S.  
TO ERECT A  
MAST WITH A  
GAIN ANTENNA  
AT THE REAR  
OF THE S.E.S.  
BUILDING IN  
MONTAGUE ST.  
IF WE CAN  
PURCHASE A  
REASONABLY  
ROBUST AND  
PRESENTABLE  
TOWER ABOUT  
10 PLUS  
METRES HIGH

THAT WILL HOLD A 20 METRE MONOBAND ANTENNA WE  
MAY BE ABLE TO GET OUR CLUBROOM OPERATIONAL.  
SINCE THE ADVENT OF UHF TV IN THE DISTRICT  
THERE WILL PROBABLY BE A NUMBER OF OBSOLETE  
VHF TOWERS AROUND WHICH COULD PROVE SUITABLE.  
IF YOU KNOW OF ANY, CALL UP A COMMITTEE MEMBER  
WITH DETAILS AS TO HEIGHT, PRICE AND DIFFICULTY  
OF REMOVAL (PROXIMITY TO POWER LINES ETC).

Stereo vu meters  
Microphones  
Mini mixers  
Passive infrared modules  
Ultrasonic alarms  
Fm transmitters (bug)  
Ignition killers  
16 Channel remote controls

AVAILABLE NOW

FROM

## ILLAWARRA ITEC

Phone 264044

36/42 Auburn st Wollongong

## BINARY TABLE

0	00	32	100000	64	1000000	96	1100000
1	01	33	100001	65	1000001	97	1100001
2	10	34	100010	66	1000010	98	1100010
3	11	35	100011	67	1000011	99	1100011
4	100	36	100100	68	1000100	100	1100100
5	101	37	100101	69	1000101	101	1100101
6	110	38	100110	70	1000110	102	1100110
7	111	39	100111	71	1000111	103	1100111
8	1000	40	101000	72	1001000	104	1101000
9	1001	41	101001	73	1001001	105	1101001
10	1010	42	101010	74	1001010	106	1101010
11	1011	43	101011	75	1001011	107	1101011
12	1100	44	101100	76	1001100	108	1101100
13	1101	45	101101	77	1001101	109	1101101
14	1110	46	101110	78	1001110	110	1101110
15	1111	47	101111	79	1001111	111	1101111
16	10000	48	110000	80	1010000	112	1110000
17	10001	49	110001	81	1010001	113	1110001
18	10010	50	110010	82	1010010	114	1110010
19	10011	51	110011	83	1010011	115	1110011
20	10100	52	110100	84	1010100	116	1110100
21	10101	53	110101	85	1010101	117	1110101
22	10110	54	110110	86	1010110	118	1110110
23	10111	55	110111	87	1010111	119	1110111
24	11000	56	111000	88	1011000	120	1111000
25	11001	57	111001	89	1011001	121	1111001
26	11010	58	111010	90	1011010	122	1111010
27	11011	59	111011	91	1011011	123	1111011
28	11100	60	111100	92	1011100	124	1111100
29	11101	61	111101	93	1011101	125	1111101
30	11110	62	111110	94	1011110	126	1111110
31	11111	63	111111	95	1011111	127	1111111

**FOR PEOPLE WHO  
WANT QUALITY AND SUPPORT  
AT A REALISTIC PRICE  
THINKING ABOUT PC's?**

We sell quality IBM COMPATIBLES with SUPERIOR specifications to the original and at much LOWER PRICES.

XT, AT and 386 compatible Computers  
All are TURBO machines and have 12 month warranty.

ALL WE ASK IS THAT YOU PHONE US BEFORE  
BUYING COMPUTERS, SOFTWARE OR PERIPHERALS.

**SOFTWARE**

Available: Educational, Real Estate, Milko, Doctor, Hire,  
Register, Accounting, Sales Monitoring and Programming Languages  
for IBM and Compatibles

**HARDWARE**

Available: All peripheral for IBM and Compatibles including  
Printers, Monitors, Hard Disk and Expansion Cards.

**OTHER**

CONSULTING, CONTRACT PROGRAMMING & TRAINING AVAILABLE  
WE HAVE BEEN IN THE INDUSTRY SINCE 1979.

for your computer needs

**PHONE JANSON COMPUTER SERVICES**

(042) 61-5451 (042) 615451 (042)-61-5451

MON-FRI : 7.30 PM - 9.30 PM

SAT-SUN: 9.30 AM - 9.00 PM.

HOW WOULD YOU GO IF YOU HAD TO SIT FOR  
YOUR LICENCE AGAIN?

This is a question from the DOTC exam.

In comparing Frequency Modulation (FM) & Phase Modulation (PM) deviation, it would be correct to say that:

- FM deviation is proportional to amplitude and frequency.
- PM deviation is proportional to amplitude and frequency.
- PM deviation varies with the amplitude only.
- FM deviation varies with the frequency only.

**COAST-WIDE  
COMMUNICATIONS**

Lot B  
Lawrence Hargrave Drive,  
THIRROUL

We Stock: C.B. RADIOS  
C.B. AERIALS, COAX, CABLE  
MARINE RADIOS  
TV. AERIALS, ETC, ETC,  
SALES AND SERVICE  
OPPOSITE THE SHELL  
GARAGE.... Phone. 67-2134

**Wayne Newport  
VK2KWN**

FOR ALL MECHANICAL REPAIRS  
GO TO 423 PRINCES HIGHWAY

 **CORRIMAL** 

**MAZCARE**

**84-4359**

SPARES REPAIRS  
SERVICING ALARMS  
WHEEL BALANCING  
AIR CONDITIONING  
TOW BARS TOWING

# REPEATER REPORT. .... VK2XGJ

The Working Bee up at Mt Murray went off well with four turning up to do a bit to keep the beast up on the Hill content. Due to the small number only the jobs that needed doing to make the jib safe to lower and raise plus re reeving the lowering tackle with new wire rope, well greased.

The working bee consisted of the following people VK2MT, VK2JBS and XYL, VK2XLA and VK2XGJ. The second lock was replaced after finding that we have had someone cut one off the cubicle door about two months ago. Due to the lack of sunlight the batteries were also brought down for a recharge at the VK2JWH QTH and replaced a week later. Luckily we have had good sun on the panels over the last three weeks or so and the cells are holding the ident in the mid to high range. We are still getting a small amount of break-thru on the Sunday WIA broadcasts and will keep a monitor on the amount and duration.

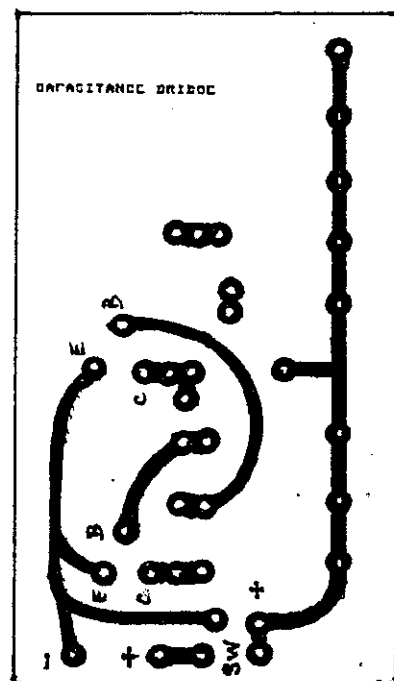
The new committee will have the job of replacing VK2RAW with its own antenna when the WX can be relied upon to put plans into motion and the antenna that is now on the voice repeater will go onto the packet Digi to enhance its propagation as the ringo that is there at the moment is getting a little long in the tooth.

VK2RUW, 70CM repeater at Hill 60 has had its first visit to the VK2CAG workbench for a long overdue tuneup and now is back in place. From Graeme's recollection, that is its first tune-up since it was installed.

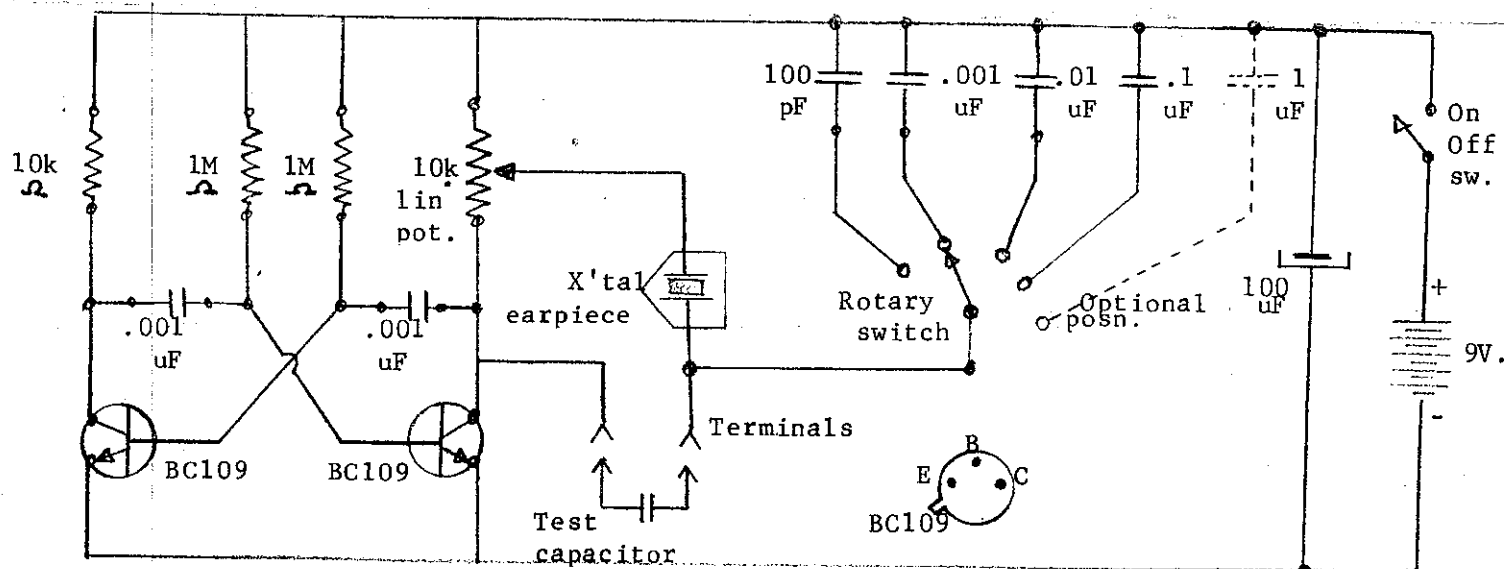
See you all at the Annual General Meeting.  
73's de VK2XGJ

**QUESTIONNAIRE**  
INCLUDED IN THIS ISSUE IS A QUESTIONNAIRE ON WHAT YOU WOULD LIKE TO SEE CHANGED OR NOT CHANGED IN YOUR CLUB PLEASE TAKE THE TIME TO FILL IT IN ONLY BY TELLING SOMEONE ON THE COMMITTEE AS TO WHAT YOU FEEL IS NEEDED DO WE OBTAIN INPUT OF IDEAS FROM CLUB MEMBERS.

## CAPACITANCE BRIDGE.



X1 X10 X100 X1K X10k



# CAPACITANCE BRIDGE.

This is the circuit for the capacitance bridge that I use at Tech to show students how a bridge circuit works. It is not as 'state of the art' as a digital unit but is very accurate if you set it up correctly.

As with most items using an earpiece you should be conscious of hygiene and whose ear it gets plugged into! otherwise it is a handy little unit.

The unit should be built on PCB or Matrix board and leads kept as short as possible around the "standard" capacitors and rotary switch. It will fit into a small 'Jiffy' box and have plenty of room. If you are like me and tend to forget things are switched on you can mount a LED across the + & - rails with a 1k series resistor.

## COMPONENTS LIST.

Resistors: all 1/4W 5%.

1 x 10 K Ohms

2 x 1 M Ohms

Capacitors:

1 x 100uF electro (PCB Mount)

2 x .001 ceramic

"High Grade Polystyrene"

1 x 100pf

1 x .001uF

1 x .01 uF

1 x .1 uF

1 x 1 uF (optional)

Semi-conductors.

2 x BC109 or equivalent.

Other:

1 x 4 or 5 posn rotary sw.

1 x 10k linear pot

1 x X'tal earpiece

1 miniture switch.

1 battery clip

1 9v battery

pce Matrix board or PCB

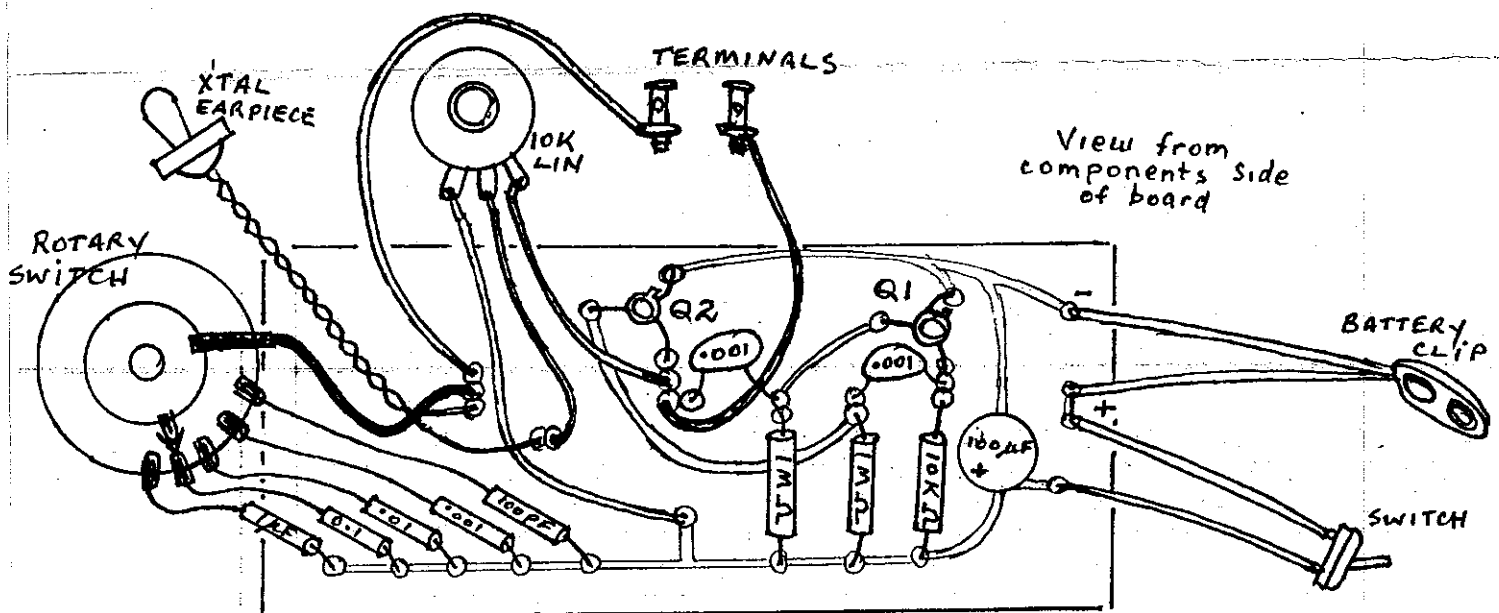
2 x clip type terminals

2 x pointer type knobs.

1 x small Jiffy Box

After building is complete switch the unit on - a 1 kHz tone 'should be heard in the earpiece. Switch rotary switch to X1 position and turn pot until a null is reached. This is the zero position of bridge and should be calibrated as such. Next connect a good quality 100pF capacitor to the test terminals and turn pot until a null is reached about halfway on the dial and mark this with 100. switch to X10 and find the null near the zero and mark that 10. Repeat this process with a 1000pF and mark the dial accordingly. Continue calibrating with any values you wish just make sure they are good capacitors. When you are satisfied with the calibration try checking some of the capacitors in your junk box. If you can't get a clean null the capacitor is leaky and should be diced. The unit can be extended to 10uF by using the optional position and mounting a 1uF polystyrene.

If you are feeling the effects from the current jump in the cost of living, the market for destitute 'Hams' at Bulli has polystyrene caps in all sorts of old PCBs and most of them are 1%. You may pick up most of the other bits while you are there as well.



Under this unlikely title is a book I enjoyed for its description of radio in the last days of the spark transmitter. The author Thomas Raddall is a Canadian, famous in his own country. Growing up in Nova Scotia, he went to sea at the age of 15 and served as a wireless operator on naval transports in the North Atlantic, towards the end of World War I. He put in a few more years as a radio operator in the coastal service in the early 1920's, and this background surely shows through in his writing.

"The Nymph and the Lamp" was published in 1950. Its heroine Isabel Jardine leaves mainland civilization to make a new life as bride of chief wireless operator Matthew Carney on desolate Marina Island off the Nova Scotia coast, date 1920. The radio station is a collection of small buildings nestled among sand dunes, with a tall wooden mast supporting the aerials. The transmitter is basically a giant spark coil, and the operators of course live and breathe Morse code. Here is Raddall's description of Isabel's first encounter with this fearsome machine:

She peered inside obediently. The place reeked of hot oil. It had a concrete floor and in the midst of it a large single-cylinder petrol engine whirled a pair of flywheels. From one of these a long slatting belt led her eye to the generator, spinning and whining at the farther end of the room. Outside she heard the steady thudding of the engine exhaust.

Young Sargent, in that barren cell across the hall, began to talk in dots and dashes to the ship that had engrossed his attention when they arrived, and Isabel, standing on the greasy floor, was startled by a terrific sound as sharp, as deafening as rifle shots. The little engine room was lit by a rapid succession of bright violet flashes that sprang, like the sound, from the revolving brass spark studs at the end of the generator shaft. The sound was frightful, like an enormous and explosive brass trumpet. She fled into the hall and covered her ears with her hands. Matthew merely grinned.

"You'll get used to it," he declared calmly. "There's a muffling drum that fits over the spark disc but we leave it off ... we have to file the studs clean and adjust the gap every day, sometimes two or three times a day."

"Do you mean to say," she demanded in a voice that sounded thin and strange in her singing ears, "that it goes on like that, day and night?"

"Only when the chap on watch is transmitting."

"But the transmitting goes on day and night...at intervals, I mean?"

"Oh yes. As I say, you'll get used to it."

She did not reply. How could anyone sleep, even exist, with this erratic uproar shattering the silence of the station and of all the dunes within half a mile?

.....

Months pass, long winter months when there is little to do on the desolate island except huddle close to the stove for warmth. But our heroine has been changing. We pick up the story again:

The sound of the spark no longer outraged Isabel. She had grown used to it, as Matthew had foretold. In fact, she had learned the code. It was not difficult...much easier than shorthand, she pointed out to Matthew. When the days grew short and the evenings intolerably long she fell into the habit of sitting at the instruments with the man on watch. He would plug in an extra pair of phones for her and explain this point or that in the babel of dots and dashes that filled her ears.

At first the great passenger liners were beyond her grasp. They shrilled away on high notes like operatic sopranos, and at speeds close to thirty words a minute. The smaller liners and tramps were more companionable, droning along at twenty or so; and frequently there were trawlers, rolling scuppers under out there somewhere on the Banks and muttering away to each other at a childish ten or fifteen. The trawlers were Isabel's kindergarten class, and

after a time she could follow the drift of tramp-steamer conversations, watching her companion's pencil for the letters she missed.

She learned to send as well. She cajoled Matthew into rigging a small key and buzzer at the end of the long instrument table, and there she practised with a diligence that surprised the men and somewhat surprised herself. The others helped her, Matthew indulgently, Sargent with the pleased but somewhat lofty air of a young man who sees a woman trying to play a man's game; but it was not long before she was sending patiently the tattered handbook of

ain!" Or, "You try to get a would snap, "Keep

!" Wonder? You'd have You've got to use dy style."

riptions of the . Can't possibly ne eventually ly on her own.

al meaning. Your letters of fire chair, reaching 11 that might There was QST, y had to do with chlike matters. t for all the frogs operator the

Then a bugle , she threw the t to the key. he made her n so insistent. picked up a he pencil move . "Once you've f comes in on

alifax, : bunkers and e-screamed la-dit, ring an en the deep swiftly like

Then "WO?" A smile played over Isabel's lips. She had half expected that. In the grey building at the harbour mouth, which she had seen blurred in the dusk as the ship carried her to sea, the operator had detected a strange hand at Marina and was curious. She answered crisply, "C's wife." Another pause. Then the drone again. "Well done." That was music.

The Illawarra Amateur Radio Society Inc.  
Nomination Form  
for Election to the Committee

I, \_\_\_\_\_ a member of the Illawarra Amateur Radio Society Inc. nominate the following people for the vacant Committee positions:

Nomination  
Accepted

President: \_\_\_\_\_

Vice Pres: \_\_\_\_\_

Secretary: \_\_\_\_\_

Treasurer: \_\_\_\_\_

Three Ordinary members:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

I, \_\_\_\_\_ a member of the Illawarra Amateur Radio Society Inc. second the above nominations for the Committee vacancies.  
dated: \_\_\_\_/\_\_\_\_/1908

Next time you are feeling important and think that the world centres around you, ponder on how insignificant we really are in the scheme of things.

If we could shrink the universe down in size so that our earth was 1 mm in diameter (instead of over 12700 kilometres) the following distances would result -

1. Earth to Moon 16 mm.
2. Earth to Sun 6 metres.
3. Earth to nearest star 1617 kilometres.
4. Diameter of Milky Way Galaxy 37,625,434 kilometres.
5. Distance to Andromeda Galaxy 752,508,680 kilometres.

This article reprinted from Scientific American (1973).

## DISTANCE MEASURER FOR GOLFERS

THIS IS a simple project for all those golfers who feel they have the need to measure the length of their drives.

The distance is measured by counting the number of revolutions of the wheel of the golf trolley. Having 12in diameter wheels, one revolution of the wheel of the trolley under load is very nearly one yard ( $\pi$ d).

A small magnet was fitted to the hub of a wheel, and a dry reed switch fitted to the axle. Each revolution closes the contacts briefly, but not for long enough to operate the counter.

A simple monostable is included to extend the time of the pulse long enough to operate the awkward counter (see Fig. 1). The time interval is adjusted by changing the value of capacitor C1 but  $6.8\mu\text{F}$  was found to be adequate.

The counter draws about 18mA at 36V, so a switching transistor is included. This can be any npn type capable of handling the current.

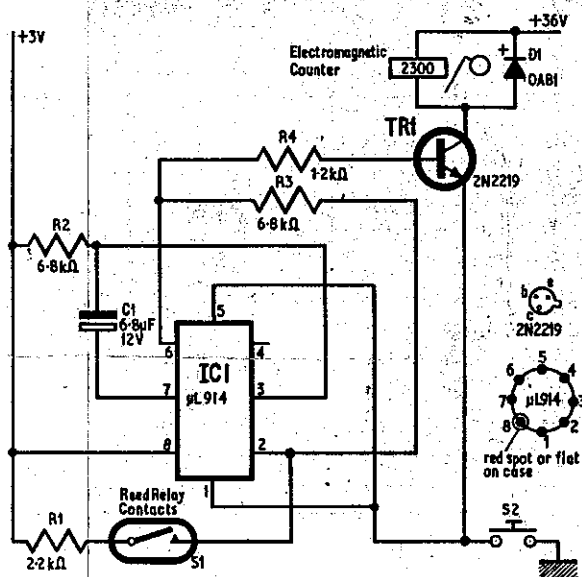


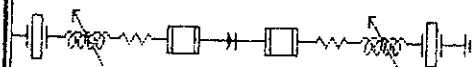
Fig. 1. Circuit of the distance measurer for golfers

NOTE  
EX TELECOM  
COUNTERS  
CAN BE USED  
AND THEY  
WORK ON 18V

PROBABLY  
AVAILABLE  
AT OUR NO. 1  
DISPOSALS  
MARKET.

----->>>

## CALLING all AMATEURS....



Its time to visit your local Market at BULLI if you need:-

METERS.....  
ANTENNA MATERIALS..  
RADIO PARTS.....  
BIT BITS AND PIECES..  
ELECTRONIC Thingammys  
TRUE VALUE for Money...

## CAVIONS

11 Molloy street BULLI.

PHONE: (042) 84-6838.

THIS IS A STORY ABOUT FOUR PEOPLE NAMED EVERYBODY, SOMEBODY, ANYBODY AND NOBODY. THERE WAS AN IMPORTANT JOB TO BE DONE AND EVERYBODY WAS ASKED TO DO IT. EVERYBODY WAS SURE SOMEBODY WOULD DO IT. ANYBODY COULD HAVE DONE IT, BUT NOBODY DID IT. SOMEBODY GOT ANGRY ABOUT THAT, BECAUSE IT WAS EVERYBODY'S JOB. EVERYBODY THOUGHT ANYBODY COULD DO IT BUT NOBODY REALIZED THAT EVERYBODY WOULDN'T DO IT. IT ENDED UP THAT EVERYBODY BLAMED SOMEBODY WHEN NOBODY DID WHAT ANYBODY COULD HAVE DONE.

WHOSE JOB IS IT ??



## PROTECTED POWER TRANSISTOR

### WITH A GAIN OF A MILLION

THE NEW LM395 series of devices available from National Semiconductor look like a normal TO3 power transistor, but are actually integrated circuits which behave like fast *n*-p-n power transistors with a current gain of the order of a million. They contain some fifty internal components, including 21 transistors.

The protective circuits incorporated in these devices are one of their most important features. If the temperature of the chip exceeds 165°C, the power output stage is shut down. This enables a much smaller heat-sink to be used with safety than would otherwise be possible. In addition, a current limiting circuit prevents damage to the device by excessive current.

Any number of the devices can be connected in parallel to increase the current capacity, since no device will pass more than the limiting value of the current.

#### THE LM395

The LM395 is the most economical device in the series, the price being about four times that of the well-known 2N3055 power transistor. The LM195 and LM295 are similar to the LM395, but can operate over a wider temperature range and have the higher maximum operating voltage of 42V.

The LM395 may be destroyed if the maximum permissible voltage rating (36V) is exceeded, but it is almost impossible to destroy it in any other way.

Even if this device is destroyed by the application of an excessive voltage, it will become open circuited

and will protect other devices in the circuit. (A normal power transistor becomes short circuited if an excessive voltage is applied to it.)

#### CONNECTIONS

The connections to the LM395 series of devices are shown in Fig. 1. It should be noted that the case of the device is connected to the emitter electrode. It is expected that the same type of device will be available in the smaller TO5 package in due course.

The typical base current is quoted as 3μA. If a current appreciably greater than this is fed into the base, the collector voltage will fall to its saturation value of about 1.8V for collector currents of up to 1A.

It was found that the device conducted when the base was open circuited, but became non-conducting when the base was connected to the emitter.

The switching time is typically 500ns.

#### TYPICAL APPLICATIONS

##### 1. Simple current limiter

The circuit of Fig. 2 forms a very simple current limiter. The internal circuit of the device limits the collector to emitter current to about 2A (minimum 1A at 15V). When no heatsink was used with an LM395 in this circuit with a 6V supply, the current fell to about 0.5A after a short time as the device became hot.

If the base connection is switched from the collector to the emitter of the device, the collector current will fall to the quiescent value of a few milliamps.

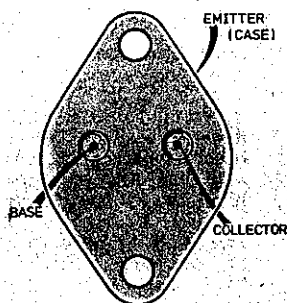


Fig. 1. Connections of the LM395 series of devices (looking at underside)

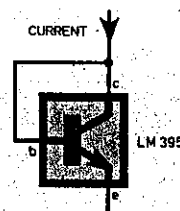


Fig. 2. A simple current limiter circuit using the LM395

## NEWTEC- ELECTRONICS

We stock:

ALARMS - ANTENNAS

BOOKS BOXES

COMPONENTS, COMPUTERS

HARDWARE, KITS, TOOLS

WIRE AND LARGE RANGE

OF SEMICONDUCTORS FOR

THE PROFESSIONAL AND

AMATEUR OR HOBBYIST

116 CORRIMAL STREET  
WOLLONGONG

(JUST UP FROM THE HARP-HOTEL)

Phone: 27-1620

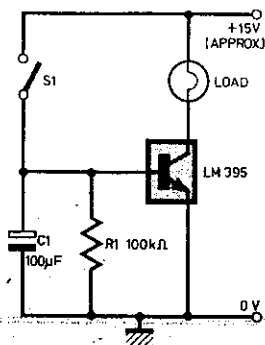


Fig. 3. A simple time delay circuit

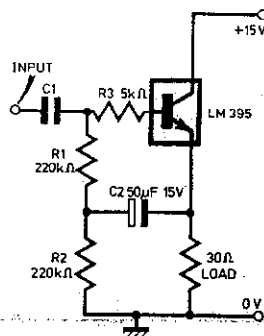


Fig. 4. A very high impedance emitter follower circuit

The base current which must be switched is very small and one could, for example, use the output from a TTL circuit to control a current of at least 1A in the emitter-collector circuit.

## 2. Time Delay

A very simple time delay circuit is shown in Fig. 3. When S1 is opened, C1 discharges through R1. The LM395 remains fully conducting until the voltage between the base and emitter falls below 1V. When the values of R1 and C1 shown are used, the current in the load begins to fall about ten seconds after S1 is opened.

The load shown in Fig. 3 is a lamp, but other types of load may be used. The maximum current is about 2A and this will not be exceeded even if the load is accidentally shorted.

## 3. Emitter Follower

An LM395 emitter follower circuit with a very high input impedance is shown in Fig. 4. The output voltage is fed back to the junction of R1 and R2 so that the voltage across R1 remains almost constant.

This feedback arrangement ensures that the input impedance is very high. The resistor R3 is required to prevent possible oscillation and should be used in all LM395 emitter follower circuits.

The circuit of Fig. 4 can be used to control a current of over 1A in the load using a control signal of high impedance.

## 4. 1A Regulator

The circuit of a voltage regulated supply which can deliver up to 1A is shown in Fig. 5. The output can be set anywhere in the range of 4.5V to 30V by adjusting VR1. The output current is automatically limited by the circuits inside the LM395.

The LM305 device is a voltage regulator which accepts an unregulated input at pins 2 and 3 and provides a regulated output from pin 8. The latter controls the LM395 which is connected as an emitter follower.

The voltage controlling signal is taken from the tapping on the load in the emitter circuit.

## 5. Power pnp transistor

If one requires a pnp circuit which is equivalent to the LM395, one may use the arrangement shown in Fig. 6. When a current is taken from the base lead through R1, the transistor TR1 conducts and supplies base current to the LM395.

This circuit has the same thermal overload protection and current protection as the LM395 itself. It may be used in the same way as an LM395 with all polarities reversed.

The LM395 can also be used in operational amplifier circuits which must provide a high output power, in high power oscillators at frequencies up to 1MHz, in switches with optical isolation, etc.

Further details on the LM395 series of devices are available from National Semiconductor, The Precinct, Broxbourne, Hertfordshire.

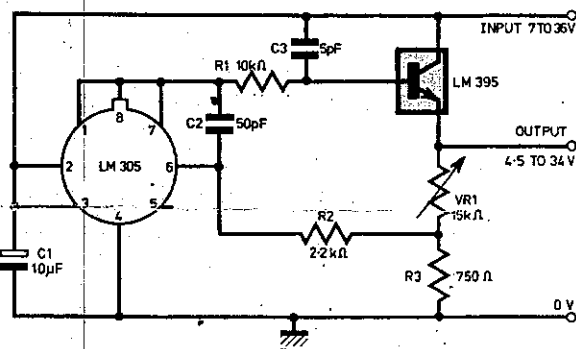


Fig. 5. A one amp voltage regulator with current limiting

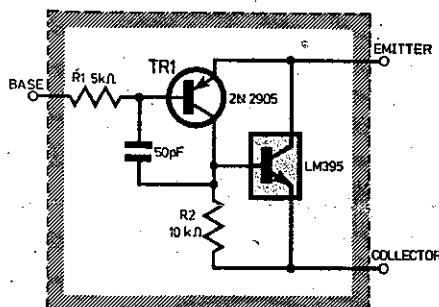


Fig. 6. A pnp circuit for a power transistor with thermal overload and current limiting

FOR SALE - TOWER  
6.2 metre tower (20') free  
standing suitable for radio  
or TV. Triangular construction  
with base. Takes 25mm  
(1") pipe extension at top.  
Will modify if necessary.  
\$150. Phone Russell 71 4103



# 741 COOKBOOK

**FIG. 28** shows a simple circuit that can be used to convert a 1mA f.s.d. meter into a d.c. voltmeter with any f.s.d. value in the range 100mV to 1000V, or into a d.c. current meter with any f.s.d. value in the range 1 $\mu$ A to 1A. Suitable component values for different ranges are shown in the tables.

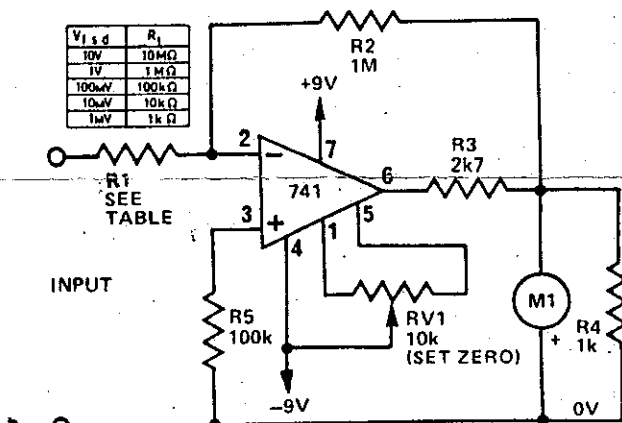
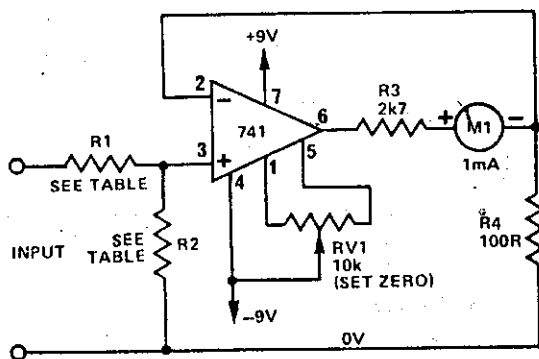


Fig. 27 High-performance d.c. voltmeter converter.



VOLTMETER		
f.s.d.	$R_1$	$R_2$
1000V	10M $\Omega$	1k $\Omega$
100V	1M $\Omega$	10k $\Omega$
10V	100k $\Omega$	100k $\Omega$
1V	10k $\Omega$	10k $\Omega$
100mV	1k $\Omega$	1k $\Omega$

CURRENT METER		
f.s.d.	$R_1$	$R_2$
1A	0 $\Omega$	0.1 $\Omega$
100mA	0 $\Omega$	1 $\Omega$
10mA	0 $\Omega$	10 $\Omega$
1mA	0 $\Omega$	100 $\Omega$
100 $\mu$ A	0 $\Omega$	1k $\Omega$
10 $\mu$ A	0 $\Omega$	10k $\Omega$
1 $\mu$ A	0 $\Omega$	100k $\Omega$

Fig. 28 Simple d.c. voltage or current meter.

**FIG. 29** shows the circuit of a precision d.c. millivoltmeter, which uses a 1mA f.s.d. meter to read f.s.d. voltages from 1mV to 1000mV in seven switch-selected ranges.

**FIG. 30** shows the basic circuit of a precision a.c. volt or millivolt meter. This circuit can be used with any moving-coil meter with a full scale current value in the range 100 $\mu$ A to 5mA, and can be made to give any full scale a.c. voltage reading in the range 1mV to 1000mV. The tables show the alternative values of  $R_1$  and  $R_2$  that must be used to satisfy different basic meter sensitivities, and the values of  $R_3$  and  $R_4$  that must be used for different f.s.d. voltage sensitivities.

## HOME OHM

Finally, to conclude, Fig. 31 shows how the 741 op-amp can be used in conjunction with a 1mA f.s.d. meter to make a linear-scale ohmmeter that has five decade ranges from 1k to 10M.

The circuit is divided into two parts, and consists of a voltage generator that is used to generate a standard test

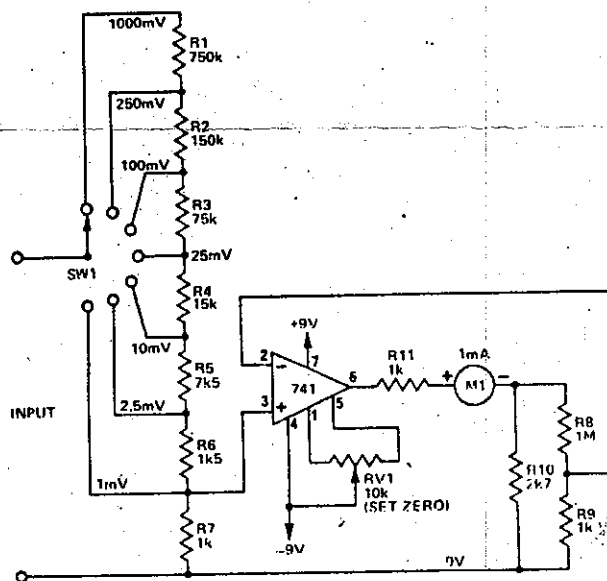
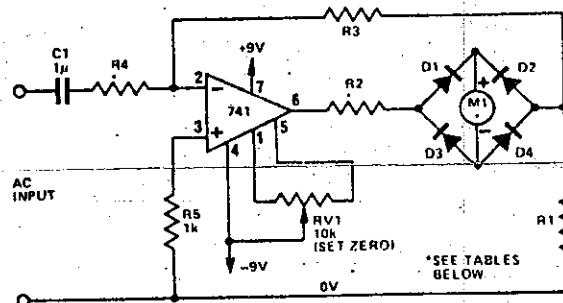


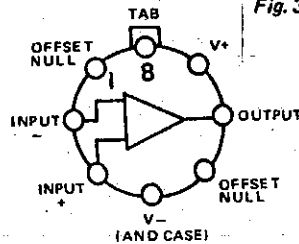
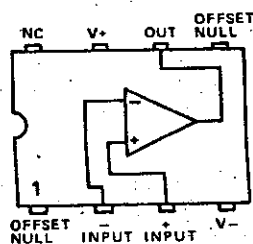
Fig. 29 Precision d.c. millivoltmeter.



$M_1$	$R_1$	$R_2$
100 $\mu$ A	1k $\Omega$	2k $\Omega$
50 $\mu$ A	1k $\Omega$	1k $\Omega$
10 $\mu$ A	1k $\Omega$	200 $\Omega$
1 $\mu$ A	1k $\Omega$	20 $\Omega$

$V_{f.s.d.}$	$R_3$	$R_4$
1000V	10M $\Omega$	10k $\Omega$
100V	1M $\Omega$	1k $\Omega$
10V	100k $\Omega$	100 $\Omega$
1V	10k $\Omega$	10 $\Omega$
100mV	1k $\Omega$	1k $\Omega$
10mV	100 $\Omega$	100 $\Omega$
1mV	10 $\Omega$	10 $\Omega$

Fig. 30 Precision a.c. volt/millivolt meter.



# THE ILLAWARRA AMATEUR RADIO SOCIETY, INC.

## P.O. BOX 1838, WOLLONGONG, 2500, N.S.W.

**MEETINGS:** Are held every 2nd Tuesday of the Month except January, at 7.30 pm. in the S.E.S. Headquarters, Montague street, North Wollongong.

**REPEATERS:**  
 VK2RAW - 146.850. - (VOICE) VHF Mt Murray.  
 VK2RAW - 147.575. - (PACKET) VHF Mt Murray.  
 VK2RIL - 147.275. - (VOICE & R.T.T.Y) VHF Sublime Point.  
 VK2RUW - 438.225. - (VOICE) UHF Hill 60 Port Kembla.  
 VK2RIL - 438.725. - (VOICE & R.T.T.Y) UHF Sublime Point.

**BROADCAST:** On Sunday evening prior to the club meeting, at 6.45 pm. R.T.T.Y. Mode Transmitted on 147.275 VHF, and relay on 3.562 Mhz. +/- QRM. Callbacks taken immediately afterwards. The voice broadcast will be held straight after the WIA Broadcast on 146.850 Mhz < VK2RAW > and 3.562 Mhz +/- QRM.

**W.I.A. RELAY:** On 146.850. at 10.45 am. and at 7.15 pm. each Sunday.

**CLUB - NETS:** On 3.562 Mhz. SSB +/- QRM on Sunday at 8.00 pm.

**NEWSLETTER:** "THE PROPAGATOR", published Monthly to reach FINANCIAL-MEMBERS in the week preceeding the club meeting. All articles, adds etc, to the editor must be in, or try, by the 3rd Tuesday each month.

**MEMBERSHIP:** The Secretary, I.A.R.S. Inc, P.O.Box. 1838. Wollongong. 2500. Full membership is \$12 per annum; students & pensioners concessional members \$9 per annum.

**AWARDS:** The Award of the Illawarra Amateur Radio Society, Inc. is the LAWRENCE-HARGRAVE-AWARD. VK stations require 10 contacts with I.A.R.S. members. Overseas stations require 5 contacts with I.A.R.S. members. A contact with VK2AMW is sufficient for the award. Band-details, date, frequency, station worked and \$2 or 2 I.R.C.'s to THE AWARD-MANAGER, I.A.R.S. Inc, P.O.Box. 1838. WOLLONGONG. 2500. No BSL-CARD is required.

**STORE:** The club store operates at each club meeting. by COMMITTEE-MEMBERS.

### COMMITTEE:

**PRESIDENT:** VK2DYU- BILL CHADBURN. 45. Beltana Ave, Dapto.  
**VICE-PRESIDENT:** VK2OB - KEITH CURLE. 24. Beach Drv, Woonona.  
**SECRETARY:** VK2TPH- PHILL HOWCHIN. 12. Mawarra Ave, Dapto.  
**TREASURER:** VK2DMR- DENIS MCKAY. 17 Doncaster street Corrimal.

**GENERAL - COMMITTEE:** VK2BIT - Peter Woods, VK2XCC - Ray Ball, VK2FPN - Peter.  
**REPEATER - CHAIRMAN:** VK2XGJ - JOHN SIMON.  
**REPEATER - COMMITTEE:** VK2CAG - GRAEME DOWSE, \*VK2EXN - IAN CALLCOTT, VK2KHE - Peter Tomlin, VK2FPN - Peter, \*VK2EMV - MORRY v.d. VORSTENBOSCH, VK2MT-ROB-MCKNIGHT, VK2BIT-PETER WOODS, VK2FCF-FRED BROWN.

**BSL-CARD'S OUT :** VK2IU - RAFFAEL BUONO.

**BSL-CARD'S IN :** VK2BIT - PETER WOODS.

**PUBLICITY - OFFICER:** - (STILL LOOKING FOR ONE) (?)

**BROADCAST - OFFICER:** VK2KHE - PETER TOMLIN.

**CARTOONIST :** VK2AXI - BRIAN WADE.

**PROPAGATOR-EDITORS :** VK2JT - JOCK TAYLOR, VK2EMV - MORRY.v.d.VORSTENBOSCH, VK2DTC - DAVE CAPON.

**PRINTERS :** VK2DFK - MIKE KEECH. AND POSTED BY VK2BIT - PETER WOODS.

**SOCIAL-DIRECTOR :** VK2XCC/PHD - RAY BALL. D.O.C.LIASION VK2OB - KEITH CURLE.

**CANTEEN-MANAGER :** VK2DYU - BILL CHADBURN.

**LIFE - MEMBERS :** VK2CAG-GRAEME DOWSE. VK2OB-KEITH CURLE.VK2ALU-LYLE PATISON

**SUNDAY - EVENING - CLUB-NET - ROSTER: STARTING AT 8.00 pm.**

8.00 pm. FIRST SUNDAY OF THE MONTH : VK2MT - ROB-MCKNIGHT.

2nd SUNDAY OF THE MONTH : VK2ENX - TONY MOWBRAY.

3rd SUNDAY OF THE MONTH : VK2DTC - DAVE CAPON.

4th SUNDAY OF THE MONTH : VK2PHD - RAY BALL.

5th SUNDAY OF THE MONTH : VK2EBI - KEVIN MURPHY.

And on stand-by : VK2EMV after NOTIFICATION ONLY!