OFFICIAL NEWSLETTER FOR THE WEST AUSTRALIAN VHF GROUP (INC)
P.O. BOX 189, APPLECROSS WA 6153.

MEETINGS ON THE FOURTH MONDAY OF EACH MONTH AT WIRELESS HILL
TELECOMMUNICATIONS MUSEUM, ALMONDBURY RD, ARDROSS

VK6WH

WEST AUSTRALIAN VHF GROUP INCORPORATED

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LIBRARIAN ILMAR BELTS VK6AIB

CALENDAR

JUNE
18 COMMITTEE MEETING
23 FOX HUNT
25 GENERAL MEETING

JULY
16 COMMITTEE MEETING
21 FOX HUNT
23 GENERAL MEETING

AUGUST
20 COMMITTEE MEETING
25 FOX HUNT
27 GENERAL MEETING

SEPTEMBER
17 COMMITTEE MEETING
22 FOX HUNT
24 GENERAL MEETING

JULY / AUGUST

THIS PROGAM CALCULATES THE db.LOSS OF CO-AXIAL CABLE AT SPECIFIC FREQ.. INPUT VARIABLES AND (RETURN).

```
5 CLS
6 PRINTTAB(8)"G4JUJ 12th JUNE 1989"
7 PRINTTAB(8)"-------------------------"
8 PRINT
10 PRINT"THIS PROGRAM CALCULATES THE      db.
LOSS OF"
20 PRINT"CO-AXIAL CABLE AT SPECIFIC
FREQUENCIES."
30 PRINT"INPUT VARIABLES AND RETURN"
35 PRINT"--------------------------------------"
40 PRINT
60 INPUT "WORKING FREQUENCY ";X
70 INPUT "UPPER KNOWN REF. FREQ";L
80 PRINT "ATTENUATION AT"U" Mc/s
90 INPUT A
100 INPUT "LOWER KNOWN FREQ";L
110 PRINT"ATTENUATION AT"L" Mc/s"
120 INPUT B
130 P=LN (X)
140 Q=LN (U)
150 R=LN (L)
160 S=LN (A)
170 T=LN (B)
180 C=EXP  (((P-R)*(S-T)/(Q-R))+T)
190 PRINT "ATTENUATION AT "X" Mc/s"
200 PRINT "IS "C" db"
210 PRINT
220 PRINT"ANOTHER ? Y/N"
230 IF GET$="Y" THEN GOTO 5
```

SIMPLE TO CONSTRUCT PARABOLIC DISH FOR SATELLITE COMMUNICATIONS

de Guchteneire Freddy ON6UG

Construction of antennae for amateur satellite communication has always been a source of discussion. The construction of a dish by amateurs has always been seen as impractical or too difficult.

Simple construction techniques can make an antenna which outperforms most other systems like yagis and helicals on high frequency bands.
The following description is made to allow the average amateur to construct a dish as a weekend project. The dish can be used for a portable (transportable) satellite station as demonstrated during the International Satellite Meeting - Amsat UK satellite colloqium , University of Surrey Guildford july 1989.
The dish has also been used during my holidays in Hungary .

The use of modest power levels to transmit on the mode L uplink Oscar 13, make it possible to use this antenna in areas where no other power is available than car batteries or similar power storage. This makes the antenna ideal for emergency communications as the dish has the added advantage of requiring no special tools to set it up.
The dish can also be used easily for the coming generation of satellites using the higher frequencies as the main communication bands.

The total cost of the dish is low in comparison to commercial yagi or helical systems.

A few general rules should be kept in mind during the construction.
- A dish surface curb must be accurate to the true parabola within 1/20 th of the wavelength used. (1 cm for mode L, .5 cm for mode S)for a loss of 1 dB in gain.
- The surface of the dish must have no holes greater then 1/10th of the wavelength used for a loss of 1 dB in gain.
- Surface irregularities small in size in reference to the total dish surface do not influence the gain of the dish.

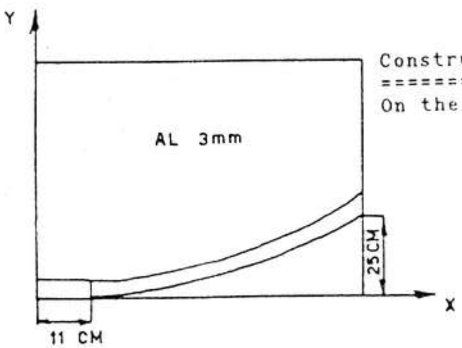


Fig 1

Construction
============

On the Al plate 20 points are plotted

X	Y mm
0	0
50	.6
100	2.5
150	5.6
200	10
250	15.6
300	22.5
350	30.6
400	40
450	50.6
500	62.5
550	75.6
600	90
650	105.6
700	122.5
750	140.6
800	160
850	180.6
900	202.5
950	225.6
1000	250

If different F/D ratio (0.5) then calculate X and Y with formula

$$y = x^2 / 4D(f/D)$$

where
D = diameter dish
f = focal length

The points X and Y are pointed on an Aluminum plate 3 mm thick. After connecting all points with a ruler, the central part is traced rectangular to the side of the plate with a try square. A second line 3 cm from the first is traced on the plate. after fixing the plate on a stable underground, the first rib can be cut with the electric orbital jigsaw. Before cutting, oil along the traced lines, this will make the job easier. After cutting, and removing all burrs, the rib can be used to trace the other 15 ribs.
All the ribs can be packed together and the flat part in the center filed flat. This has to be done very carefully as the flat surface does determine the parabolic shape of the final dish.
If you have access to a mill then both flat surfaces can be precisely milled.
After this, all ribs can be cut off 3 cm from the center line of the dish.

The central bracket plate (fig 2)

The ribs are kept together between 2 Aluminum plates 5 - 10 mm thick and 20 cm diameter. One of the plates holds all the brackets.
After cutting the plates to 20 cm diameter, one plate is drilled in the center with 22 mm.
The other plate is traced with the position of the 16 ribs, or a copy of the drilling template can be glued on the plate.
All holes are 3 mm diameter, except for the center hole which is 22 mm.
32 brackets are cut from a length of L shaped aluminum profile, 15 x 15 x 2 mm. the brackets are then cut on one side with a metal shear or a saw. The 4 mm holes for keeping the ribs are then drilled. Those holes are used to position the brackets on the plate.
Now the brackets are positioned, drilled and screwed one by one on the plate. A piece of 3 mm Al. is used between two brackets.
Place the ribs one by one between the brackets and drill the 4 mm

hole trough the ribs and screw them on the brackets. (fig 4) The nuts are secured with glue or self-locking nuts can be used. After deploying the ribs sandwich them between the two plates with the central 22 mm diameter screw and nuts, a last check is made to ensure that all ribs are firmly kept between the two plates. (fig 3)
To finish the dish, place the assembly on a table . The mesh can be placed on the backside, for easier surface mounting without affecting the performance of the dish. Start at the middle of the mesh binding it to the ribs and work towards the sides of the mesh. The sides are then cut along the circumference of the dish. The mesh can be attached to the ribs with short galvanized wires bent around the ribs.
The feeds are mounted by means of a central tube with a M22 nut soldered on one side to the center of the dish. Sliding a PVC or if available a fiber glass tube over or in the central tube. This tube exhibits the least influence to the radiation pattern of the feed.

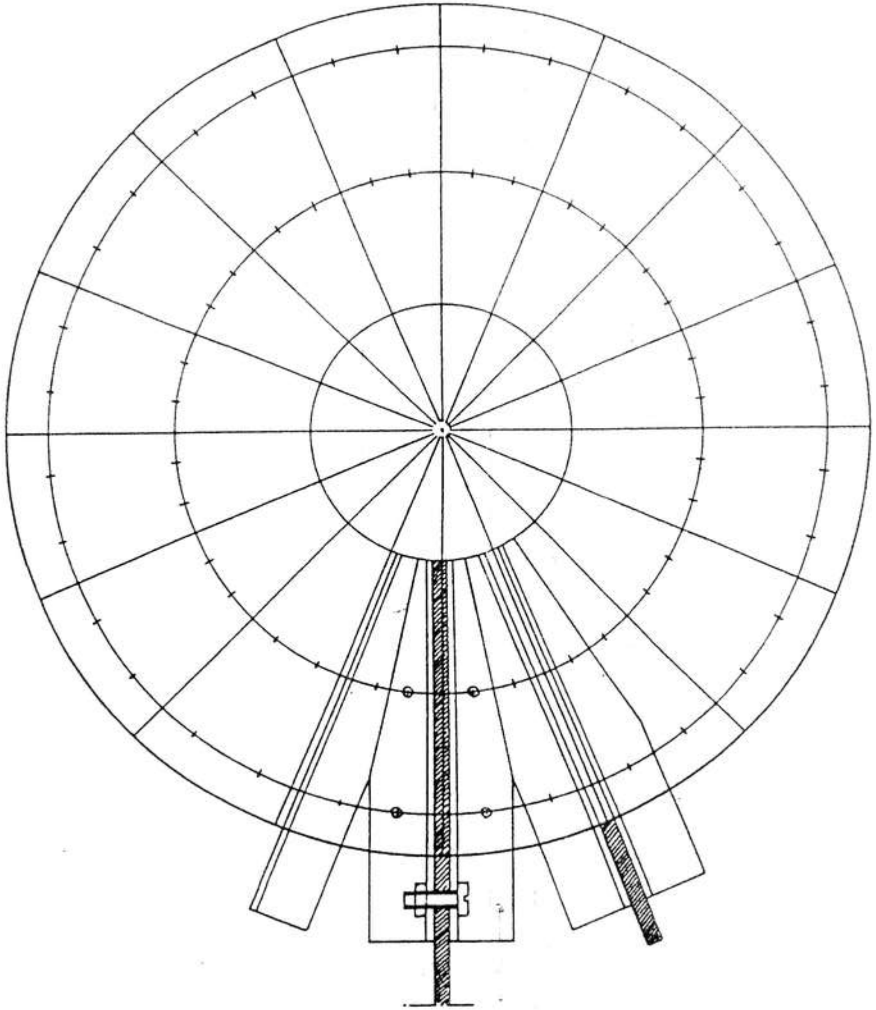


Fig 2

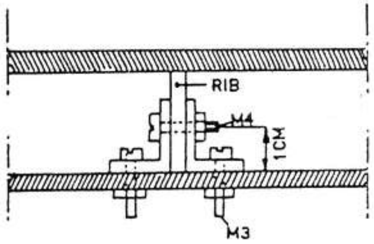


Fig 4

MODE-S FEED

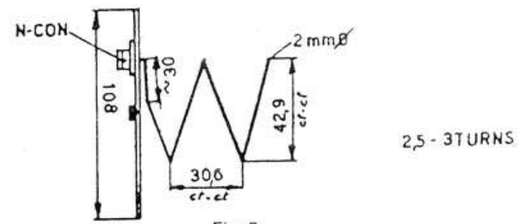


Fig 5

MODE B(S)-L FEED

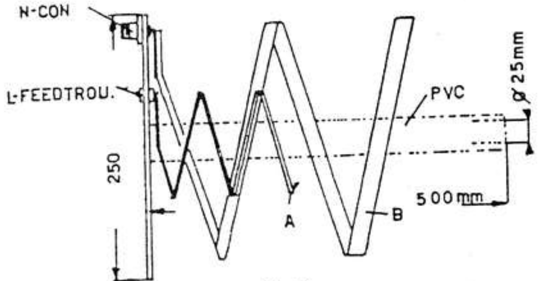


Fig 6

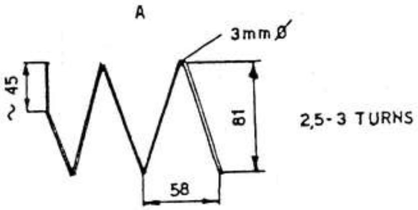


Fig 7

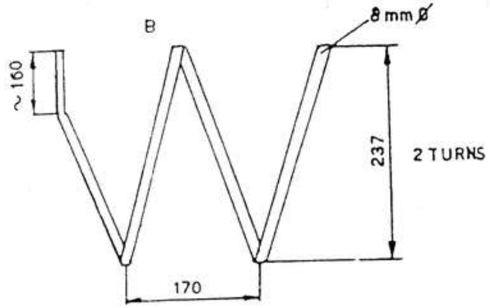
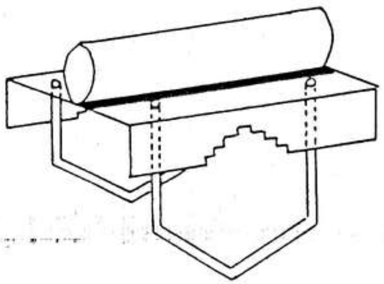


Fig 8

Different feeds are shown in fig 5,7 and 6,8.
To combine all feeds on the dish, the combined feed for mode L is in the focus of the dish. The mode S feed is mounted slightly offset in the horizontal plane. This asks for a correction of the azimuth when mode S is used.
The central M22 rod, can be used for mounting the dish and the counterweigth or a smaller rod prolonged with a tube for the counterweight. in both cases, the dish is mounted on the pole with a mastclamp on which a heavy tube with 22 mm inner diameter is brazed. (fig 9)

The dish enables you to work on mode B,L and S of oscar 13.
For mode B a 2 m dipole with preamplifier in front of the dish is sufficient to give adequate downlink signals, using 10-50 W uplink. For mode L, 15 W give you a crocodile signal (signal stronger then the beacon), so beware !
On mode S the dish gives more then 30 dB gain, so strong signals but narrow beamwidth.



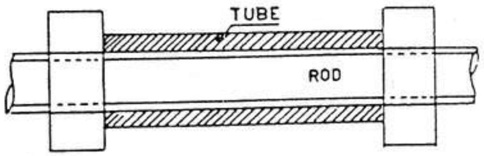


Fig 8

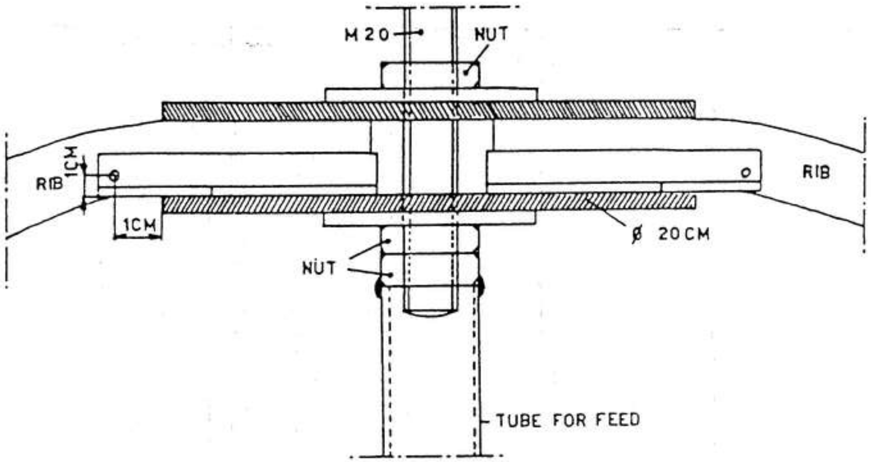


Fig 3

DIMENSIONS OF ON6UG SATELLITE DISK AT THREE FREQUENCIES

2401 MHz

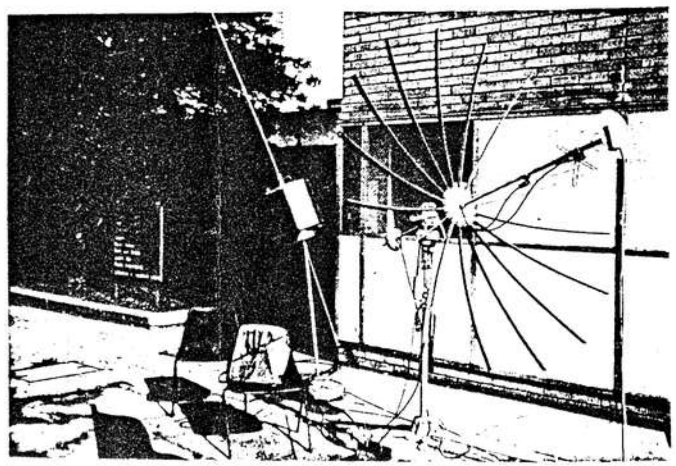
CIRCUMFERENCE 134.9 MM
DIAMETER CT-CT 42.9 MM
TURN LENGTH 138.3 MM
TURN SPACING 30.6 MM
WIRE DIAMETER 2 MM
REFLECTOR 108 X 108 MM OR 108 MM DIAMETER
CLOSE WOUND EXPANDED OUTSIDE DIAMETER OF COIL 46 MM
MARK TOP OF EACH TURN AFTER STRETCHING THE OUTER
DIAMETER OF THE HELIX MUST BE 44.9 MM
WIRE LENGTH FOR 3 TURNS: 40 CM
WIRE LENGTH FOR 2.5 TURNS: 33 CM

1269 MHz

CIRCUMFERENCE 255.3 MM
DIAMETER CT-CT 81.2 MM
TURN LENGTH 261.8 MM
TURN SPACING 58.0 MM
WIRE DIAMETER 3 MM
REFLECTOR 250 X 250 MM OR 250 MM DIAMETER
CLOSE WOUND EXPANDED OUTSIDE DIAMETER OF COIL 86.3 MM
MARK TOP OF EACH TURN AFTER STRETCHING THE OUTER
DIAMETER OF THE HELIX MUST BE 84.2 MM
WIRE LENGTH FOR 3 TURNS: 76 CM
WIRE LENGTH FOR 2.5 TURNS: 63 CM

435 MHz

CIRCUMFERENCE 744.8 MM
DIAMETER CT-CT 237 MM
TURN LENGTH 763.7 MM
TURN SPACING 169.2 MM
WIRE DIAMETER 8 MM COPPER TUBE
REFLECTOR 250 X 250 MM OR 250 MM DIAMETER
CLOSE WOUND EXPANDED OUTSIDE DIAMETER OF COIL 251 MM
MARK TOP OF EACH TURN AFTER STRETCHING THE OUTER
DIAMETER OF THE HELIX MUST BE 245 MM
WIRE LENGTH FOR 2 TURNS: 148 CM



ON6UG Disk Part Assembled at U. of S. 1989 Colloquium

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AO-10
1 14129U 83 58 B 90213.36267875 -.00000040 00000-0 0000000 0 5396
2 14129 26.0301 191.8631 5956581 164.0686 228.7653 2.05880742 53638
UO-11
1 14781U 84 21 B 90217.58851262 .00001031 00000-0 19855-3 0 7648
2 14781 97.9470 268.5243 0013822 90.2140 270.0664 14.65532084343206
MIR
1 16609U 86 17 A 90215.88240174 .00023141 00000-0 24396-3 0 8455
2 16609 51.6114 70.5089 0010214 234.6552 125.3580 15.64080983256154
RS-10/11
1 18129U 87 54 A 90217.82715155 .00000117 00000-0 11819-3 0 2779
2 18129 82.9280 291.8551 0011451 349.0308 11.0661 13.72100897156257
AO-13
1 19216U 88 51 B 90216.89332159 -.00000150 00000-0 99999-4 0 1436
2 19216 56.3610 142.4159 7002982 232.8606 40.9111 2.09704479 16396
UO-14
1 20437U 90 5 B 90216.50065588 -.00000[illegible] 00000-0 -30333-4 0 1904
2 20437 98.6060 292.4674 0011190 20.0[illegible] 340.0952 14.28667622 27762
UO-15
1 20438U 90 5 C 90214.50215826 .000002[illegible] 00000-0 -79003-4 0 1095
2 20438 98.[illegible] 290.4493 0010657 [illegible] 326.0860 14.28399163 27472
AO-16
1 20439U 90 5 D 90207.10311923 .00000158 00000-0 86573-4 0 969
2 20439 98.7020 283.2202 0012450 [illegible] 313.0305 14.28756803 26423
DO-17
1 20440U 90 5 E 90216.41160871 .00000247 00000-0 11374-3 0 1037
2 20440 98.7018 292.5172 0011973 20.8550 339.2096 14.28821119 27758
WO-18
1 20441U 90 5 F 90207.08444772 .00000082 00000-0 40321-4 0 1007
2 20441 98.7018 283.2375 0013067 46.7923 313.4346 14.28908466 26420
LO-19
1 20442U 90 5 G 90218.48878346 .00000448 00000-0 19300-3 0 1033
2 20442 98.7026 294.6374 0012998 13.3090 346.2448 14.28986138 28058
FO-20
1 20479U 90 13 B 90210.11254104 -.00000005 00000-0 16953-4 0 956
2 20479 99.0366 248.7026 0540669 313.6364 42.0895 12.83157781 22122

GALILEO MISSION STATUS

August 3, 1990

The Galileo spacecraft is 76.9 million miles from Earth, a distance that is decreasing by more than half a million miles per day. Round-trip communication time is less than 14 minutes. The speed in solar orbit is about 50,000 mph.

The spacecraft has flown almost 477 million miles since launch, and has about 170 million miles to go before the first Earth gravity assist, just over four months from now, and about 2 billion miles to travel before reaching Jupiter in December 1995 to begin its primary scientific mission. Between those events lie the first close approach to an asteroid (Gaspra), a second Earth gravity assist (and scientific observations) and a second asteroid opportunity.

Meanwhile, Galileo is in excellent condition, with spacecraft and ground-system performance as planned. The monthly sun-point maneuver occurs today, and a continuing series of tests is characterizing and calibrating the ultrastable oscillator, a device used with the spacecraft transmitter to provide a highly stable signal frequency for radio science. The next trajectory-correction maneuver, another small one, is scheduled for October 8.

Subject AO-13 TRANSPONDER SCHEDULE

A new Transponder Schedule for AO-13 was put into effect on July 3. The present transponder schedule [illegible] is as follows:

Mode-B	MA 003 to MA 165
Mode-JL	MA 165 to MA 190
Mode-LS	MA 190 to MA 195 (Mode S beacon only)
Mode-S	MA 195 to MA 200
Mode-BS	MA 200 to MA 205
Mode-B	MA 205 to MA 240
Off	MA 240 to MA 003 (Mode [illegible])
Omni Antennas	MA 240 to MA 060

Cross mode B and S QSOs are possible from MA 200 to 205. The current attitude estimate [illegible] BLAT = +1

AMSAT-OSCAR-10 appears NOT TO BE to be receiving sufficient solar panel illumi nation to support Mode B transponder operations as the beacon and transponder signals started showing signs of FMing during the first week of August. Therefore, please DO NOT USE the transponder if you find the beacon or transponder [illegible]. The current estimate of AO-10's attitude [illegible] 12 deg. LAT [illegible] illumination of 73%. If this was the actual [illegible] then AO-10 should have sufficient [illegible] transponder operation, therefore one must assume that the extrapolated attitude estimate [illegible] rather inaccurate - not surprising since we have not been able to make an accurate attitude estimate since the [illegible] AO-10 failed in November 1986. However as AO-10 started FMing on or about 01Aug90 I would expect that AO-10 should receive sufficient solar illumination to support Mode-B transponder operation by the first week of November - Graham VK5AGR

AMSAT-NA Operations Net Schedule Announced AMSAT Operations Nets are planned for the following times. Mode B nets are conducted on an AO-13 downlink frequency of 145.950. Mode J/L nets are conducted on an AO-13 downlink frequency of 435.970.

Date UTC	Time	Phs	Mode	NCS	Alt.	U.S. Day
18 Aug 90	0045	170	J/L	WB6LLO	WA5ZIB	Friday
28 Aug 90	0100	169	J/L	WA4UPD	WD0E	Monday
08 Sep 90	0020	171	J/L	WB9ANQ	N5BF	Monday

V.H.F. MATERIALS

PART NUMBER	DESCRIPTION	QTY.	RQTY	LIST
2N29Ø6	PNP AUD.GEN.PURP	7	Ø	$Ø.Ø5
2N4Ø91	NJD FET RF SW	5	Ø	$Ø.1Ø
2N577Ø	NPN UHF SW	276	Ø	$Ø.15
BC548	NPN GEN.PURP.AMP	651	Ø	$Ø.15
BFY9Ø	NPN 1GHZ AMP.	54	Ø	$2.ØØ
MFE131	NMD DFET VHF GEN.PUR	2Ø	Ø	$2.2Ø
MRF9Ø1	NPN 1GHZ 2.5DB NOISE	22	Ø	$3.ØØ
OC96Ø		89	Ø	$Ø.Ø5
OC971		1Ø4	Ø	$Ø.Ø5

PART NUMBER	DESCRIPTION	QTY.	RQTY	LIST
1.8-22PF	TRIMMER S/GRN	73	Ø	$Ø.45
1ØØN-C	CERAMIC	266	Ø	$Ø.1Ø
1ØØN-G	GREENCAP	1ØØ	Ø	$Ø.Ø6
1ØN-C	63V	23	Ø	$Ø.Ø3
1ØN-DC	CERAMIC	393	Ø	$Ø.15
1ØN-MP	MIN.PLATE CER.	9Ø8	Ø	$Ø.1Ø
1N-FT	FEED THRU	8	Ø	$Ø.4Ø
BK 5-65PF	TRIMMER L/YEL	29	Ø	$Ø.45
FT 2-1ØPF	TRIMMER S/YEL	71	Ø	$Ø.45
MID 1.4-8.5PF	TRIMMER S/WHT	1Ø8	Ø	$Ø.45

PART NUMBER	DESCRIPTION	QTY.	RQTY	LIST
1N5344	8V2 5W ZENER	17	Ø	$Ø.3Ø
1N537Ø	56V 5W ZENER	24	Ø	$Ø.3Ø
1N914	SMALL SIG.SW	4Ø	Ø	$Ø.Ø3
1N917B	27V .4W ZENER	81	Ø	$Ø.1Ø
MV22Ø9	33PF VARICAP	34	Ø	$Ø.45

PART NUMBER	DESCRIPTION	QTY.	RQTY	LIST
1"VIDECON		12	Ø	$15.ØØ
BNC PLUG	PLUG	46	Ø	$3.ØØ
BNC SOCKET	SOCKET	11	Ø	$2.7Ø
F28 SLUG	NEOSID	446	Ø	$Ø.Ø8
F29 SLUG	NEOSID	127	Ø	$Ø.Ø8
LED----	5MM GREEN	52	Ø	$Ø.2Ø
PCB----	TAPES SOME SORTS	1Ø	Ø	$4.ØØ
QQEØ3/2Ø	VALVE UHF	2	Ø	$7.ØØ
TO3----	HEATSINK	13	Ø	$1.ØØ
TO66---	HEATSINK	35	Ø	$1.ØØ
XTAL---	OVEN MULTI HC33	5	Ø	$1.ØØ
XTALS	HC33 ALL SORT VAL.	11Ø	Ø	$Ø.2Ø

THE WEST AUSTRALIAN V.H.F. GROUP BULLETIN

AUGUST 1990

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