

G.W.M. Radio Ltd.

Dealers in Radio and Electronic Surplus

Registered Office

40/42 PORTLAND ROAD, WORTHING, WEST SUSSEX. BN11 1QN

Telephone: (0903) 234897 Fax: (0903) 239050

Fax: (0903) 239050

Subject:

Dymar/Burndept 2000 Modifications for 2M Band.

Release Information:

Revision No.	2.0
Date	3 January, 1994
Document Reference	GWMM9401.DOC
Issued By	N.G.Mundy

Revision History:

Although this document has been written during, and checked after, the modification of the above equipment, errors may be present in this document. If an error is discovered, please contact GWM Radio Ltd. on the above number, so that this may be rectified during the next revision.

Dymar/Burndep 2000 Modifications for 2M Band.

These radios were made for the Power authorities who used them on the PMR "mid-band" (i.e. mobile TX on 107MHz, mobile RX on 139MHz). When VHF Broadcast radio expanded up to 108MHz, they lost the lower frequency allocation, and this has caused a lot of this equipment to become redundant.

PLEASE READ THESE SHEETS FIRST BEFORE ATTEMPTING MODIFICATION.

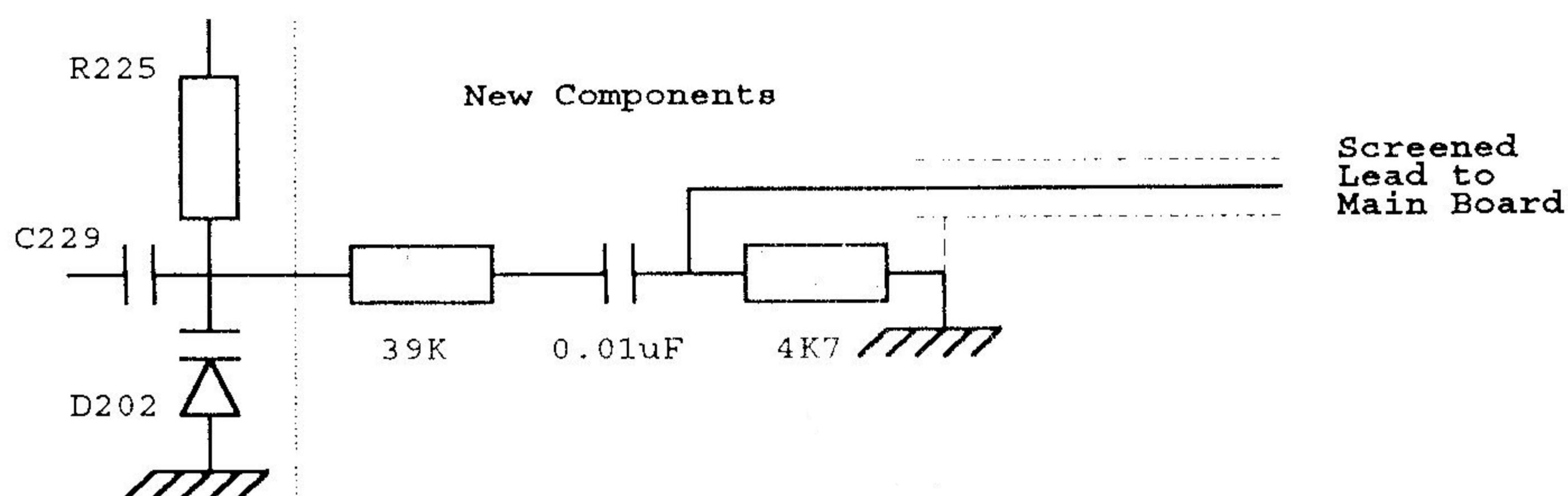
Part 1 - Getting In.

Remove the top and bottom covers from the radio. At the back of the set, remove the 2 self tapping screws that hold the top aluminium cover in place, also remove the 2 countersunk screws that hold the top boards in place from this plate, and remove the plate from the radio. Some sets have a selective calling unit fitted, this can be determined by an extra thumbwheel and "Call/Reset" switch being present on the front panel. If this is present, undo the two screws from the larger top-board, and carefully lift it out and place it beside the set, making sure not to break any of the wires attaching it to the main transmit/receive board. The smaller board on the top is the synthesiser board, to remove this, undo the screw which fixes it to the front panel, and lay it beside the set as it also has leads attached.

Part 2 - Synthesiser Modifications.

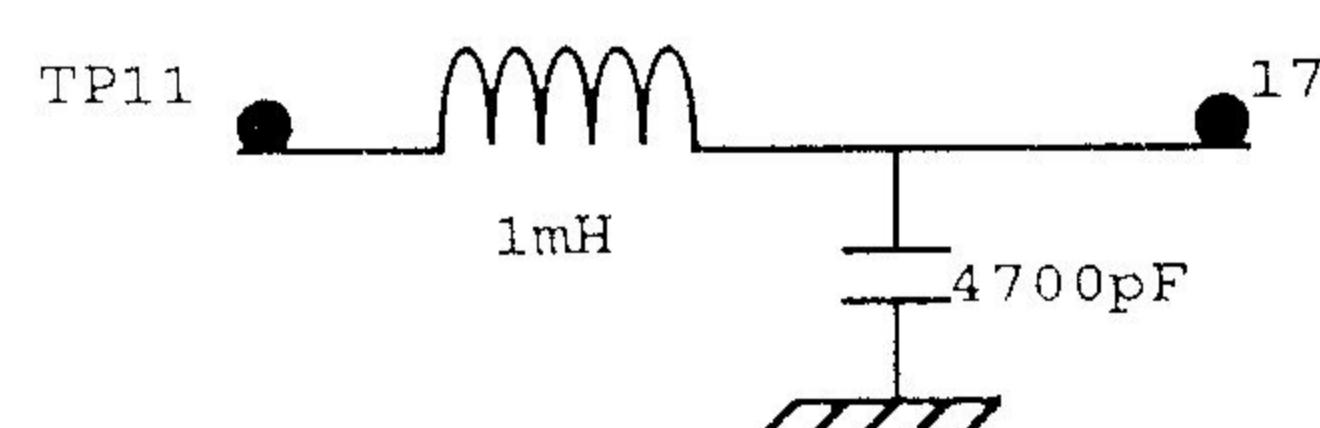
Remove the four countersunk screws in the lid of the synthesiser box and remove the lid. Also unsolder the screening plate from underneath. Look at the layout diagram and remove C227 (39pF) and fit a 15pF in its place. Also change the value of C248 (18pF) to 12pF. Next, assemble a 0.01uF capacitor between a 39KΩ and 4K7Ω resistor. Connect the free end of the 39KΩ resistor to the junction of D202/R225/C229, with the free end of the 4K7Ω resistor to ground. Then connect a 12" length of screened audio lead across the 4K7Ω Resistor, with the centre core being on the capacitor side. Feed this cable out through the grommet in the front of the synthesiser box. Now solder the screening can back on to the underside of the synthesiser board. Fit the new EPROM marked A and B in their respective sockets (Pin 1 towards the front of the box).

This completes the synthesiser modifications.



Part 3 - Receiver Modifications.

Refer to the layout diagram, and remove the link between tags 16 and 17 (if fitted). If the selcall board is fitted, trace the wires coming from this to tags 19 and 20, remove the wires and tape them up, then link tags 19 and 20 together. Connect a small RF Choke (approx. 1mH) between TP11 and tag 17, then connect a 4700pF or similar capacitor from tag 17 down to ground, as in the diagram below.



Part 4 - Transmitter Modifications.

If you refer once again to the layout diagram, in the bottom left hand corner of the radio you may see fitted a small PCB marked BRD2. This is the transmitter timeout board, which for speech operation is a bit inconvenient. This may be removed by unsoldering the three connections and replacing with Link 5 as indicated on the main board.

Next, remove the transmitter PA cover. This is held in place by three screws on the side of the case and two screws on the rear panel. Also remove the screening can which covers L23 and C108, this is held in place by two solder tags

Now comes our least favourite bit, at this point a cup of coffee is recommended in order to give you time to study the circuit board layout as we have to change 8 capacitors. Under the board is a screened lead which often gets in the way, we suggest that you unsolder this lead temporarily at the end near the PA transistors, but that you also temporarily solder a 2" offcut of flexible wire to the pad which you remove it from in order that you may reconnect it back to the right place! Also use a solder braid or solder pump to remove the components in order to prevent damaging tracks. Replace as follows:

C85	Change to 12pF
C86	Change to 47pF
C92	Change to 12pF
C93	Change to 47pF
C94	Change to 12pF
C100	Change to 47pF
C148	Change to 47pF
C108	Change to 12pF Or 10pF SUPPLIED IN KIT

Now Remove Completely the following components:

C156	(27pF)
R107	(3.3KΩ)

Next, change the following:

R103 Change to 3.3KΩ.

If during later stages the deviation is too high, then reduce this to a lower value (e.g. 2.2KΩ).

Finally the following coils require modification:

L14, L16, L17, L20, L21*, L22, L23, L24

Carefully unsolder the coils one at a time, so you don't lose their positions, and reduce the number of turns by one for each coil. Then re-solder each coil back into the board. We find it useful to slide something inside the coil when removing the turn (e.g. screwdriver or trimming tool) to prevent the coil getting squashed.

*L21 on some sets is just a loop. If this is so, leave alone.

Replace the screened can over L23/C108, and reconnect the coax on the underside of the radio

The other end of the screened lead from the synthesiser should be connected to TP21, with the screen down to earth.

This completes the modifications.

Part 5 - Alignment to 2M.

5.1 Synthesiser Tuning.

Make sure your boards are safe and not touching anything, connect your 12v supply, and switch on.

Select channel 20 on the channel indicator.

Connect an AVO 8 or similar to TP205 on the synthesiser board, with the negative connected to the chassis or earth. Adjust the core of L202 carefully anticlockwise until the meter reads about 6.5 volts, also check that the red LED near the front of the synthesiser board is now out.

Then key up the TX, and adjust the core of L201 anticlockwise until a reading of 6.5 volts is measured on TP205. Again, check that the red "lock" LED is out. Now adjust the core of L203 until the core is about 2mm out of the top of the can.

This completes the synthesiser tuning.

5.2 Receiver Tuning.

Leave the channel set to 20, and connect your meter positive lead to the anode (striped end) of D18 (located near TP8). With no signal, a reading of approximately 4.5 volts should be obtained. Now connect a signal generator or similar to the antenna lead and tune it to 145.500MHz. Increase the output level until a signal is heard, then increase further until the voltage on D18 starts to fall.

Adjust the cores of L1, L2, L3, L4, L5, L7 for minimum voltage on D18, reducing the signal generator level as the gain comes up, keeping the voltage on D18 above 3.5 volts. Repeat the above tuning for optimum gain.

If an oscilloscope is available, connect this to TP8, and with the signal generator injecting a 2.5KHz deviation signal, tune T6 for minimum distortion.

If an oscilloscope is not available, select a channel where a known god local signal can be found, and adjust T6 for best audio quality.

Set the mute adjust pot (RV6) so that the front panel mute control works at about midway. There is a bit of hysteresis on the control anyway, so don't bee too critical.

This completes the receiver alignment.

5.3 Transmitter Tuning

Connect a power meter to the aerial connector which is capable of reading about 25 Watts. Connect a diode probe to TP15 (If a diode probe is not available, see below for a simple circuit to connect to your AVO). Select channel 20, and key up the transmitter. Adjust L9 for maximum, then move the probe to TP16 and adjust L10 and L12 for maximum. At this point there should be a slight output indication on the power meter. If not, put the diode probe near (or on) L16, and adjust trimmer C95 for maximum. You will now have an indication on the power meter.

Next tune C96, C98, C103, C104 and C105 for maximum output. If this exceeds about 15W, then reduce the power be turning down RV5. These trimmers tend to interact, so we advise going through the above sequence several times to get the optimum. As a word of warning, it is fairly easy to get the oscillating or an output on a frequency lower than wanted. Check this with a frequency counter with the probe near the output. When we had this condition, we found that the trimmers were screwed down. The correct position is roughly mid-travel, so repeat the above tuning and look for a second peak nearer mid-trimmer.

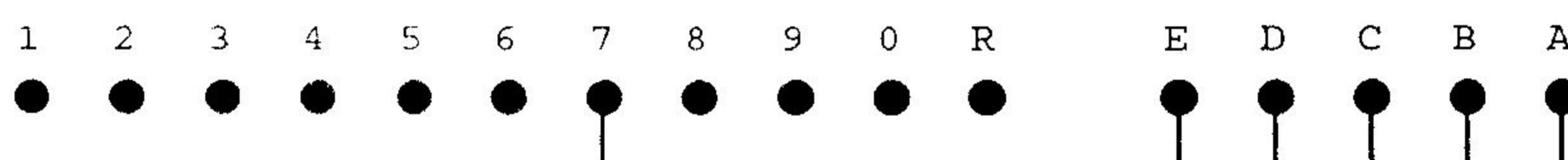
When you are sure that you have a nice output on 2M, set the output power to 15W by using RV5, and seal the trimmers with quick drying paint (i.e. model enamel, nail varnish or similar). Then replace the screening cover and check the RF output again, making any final readjustments before the paint dries.

Next check the deviation using either a deviation meter or over the air using a friend. The deviation level can be adjusted using RV4.

If you are fitting a toneburst, feed the 1750Hz output into pin 32 on the main board (Selcall Input).

Alternatively, if your set had the original selcall board fitted, it is possible to set this to send a string of 7s, which correspond to 1748Hz (near enough for most repeaters) This is done as follows:

Remove the codeplug (PL401) from the selcall board, and hard wire the socket (SK401) as shown below. Cut the track below the board that runs from pin 20 of IC406 to pins 9/20 of IC408



If the tone is off frequency, take the following steps:

First, link together TP408/TP409, connect a dummy load to the aerial socket, and a frequency counter to pin 32 (White lead). Press the call button. The TX will key for a few second and then drop out leaving the tone running. Now adjust the frequency with RV404, and the mod level with RV403. This is all the setting up required.

Now unlink TP408/TP409 and remove all test equipment. The call button will now act as a toneburst. If this is not the case, link 401 may have to be removed to get results.

Channel Information.

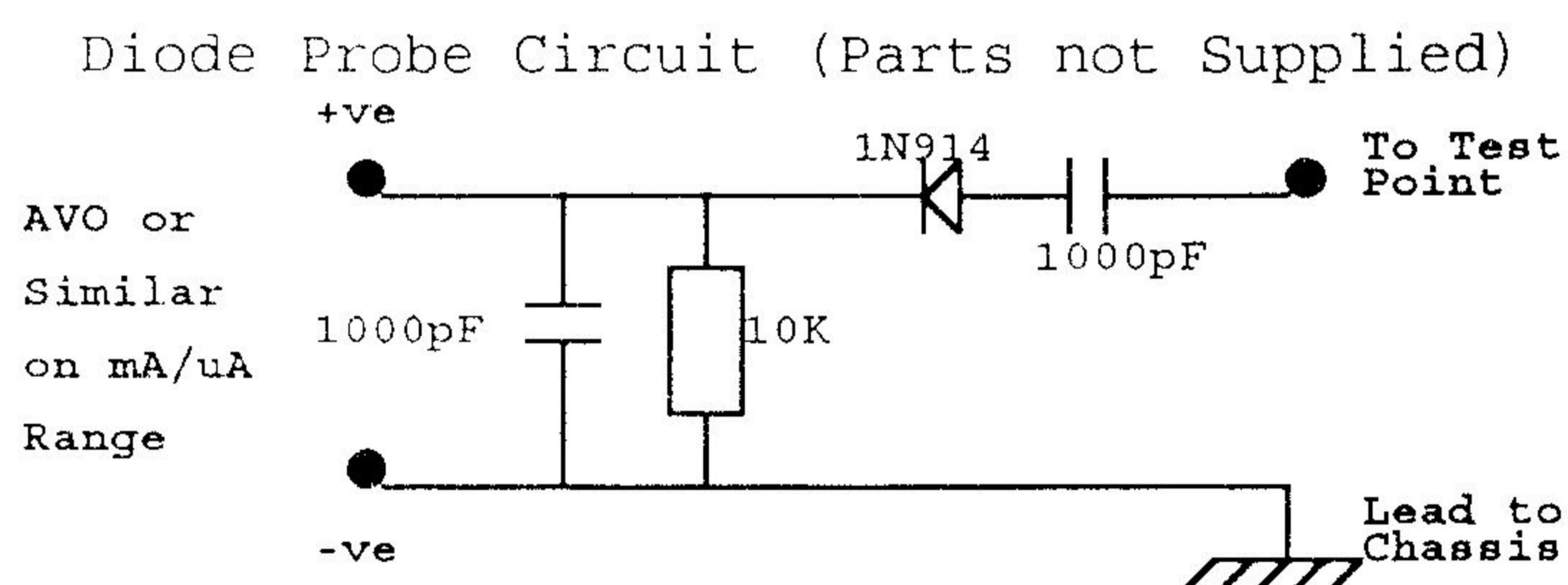
00 to 07 Repeater (i.e. R0 to R7)
08 to 23 Simplex (i.e. 20 = S20, 145.500MHz)
40 to 59 All Mode Section (144.500MHz to 144.975MHz)
70 to 77 Satellite (145.800MHz to 145.975MHz)
90 to 97 Reverse Repeater (i.e. 90 is R0 Reversed)
All channels not mentioned are S20 (145.500MHz)
All channel steps are in 25KHz steps.

The following two pages contain copies of the channel table, the small one being intended for sticking to the radio if wanted, and a larger one for easier readability.

GOOD MODIFYING!!!

73 De G0ELN. 1993

Thanks also to Mick, G8JVE for extra help and information.



BURNDEPT DYMAR 2000

Channel Table

(25kc Spacing)

Dial No.	TX Freq.	Rx Freq.	Dial No.	TX Freq.	RX Freq.	Dial No.	TX Freq.	RX Freq.	Dial No.	TX Freq.	RX Freq.	Dial No.	TX Freq.	RX Freq.
00	145.000	145.600	20	145.500	145.500	40	144.500	144.500	60	145.500	145.500	80	145.500	145.500
01	145.025	145.625	21	145.525	145.525	41	144.525	144.525	61	145.500	145.500	81	145.500	145.500
02	145.050	145.650	22	145.550	145.550	42	144.550	144.550	62	145.500	145.500	82	145.500	145.500
03	145.075	145.675	23	145.575	145.575	43	144.575	144.575	63	145.500	145.500	83	145.500	145.500
04	145.100	145.700	24	145.500	145.500	44	144.600	144.600	64	145.500	145.500	84	145.500	145.500
05	145.125	145.725	25	145.500	145.500	45	144.625	144.625	65	145.500	145.500	85	145.500	145.500
06	145.150	145.750	26	145.500	145.500	46	144.650	144.650	66	145.500	145.500	86	145.500	145.500
07	145.175	145.775	27	145.500	145.500	47	144.675	144.675	67	145.500	145.500	87	145.500	145.500
08	145.200	145.200	28	145.500	145.500	48	144.700	144.700	68	145.500	145.500	88	145.500	145.500
09	145.225	145.225	29	145.500	145.500	49	144.725	144.725	69	145.500	145.500	89	145.500	145.500
10	145.250	145.250	30	145.500	145.500	50	144.750	144.750	70	145.800	145.800	90	145.600	145.000
11	145.275	145.275	31	145.500	145.500	51	144.775	144.775	71	145.825	145.825	91	145.625	145.025
12	145.300	145.300	32	145.500	145.500	52	144.800	144.800	72	145.850	145.850	92	145.650	145.050
13	145.325	145.325	33	145.500	145.500	53	144.825	144.825	73	145.875	145.875	93	145.675	145.075
14	145.350	145.350	34	145.500	145.500	54	144.850	144.850	74	145.900	145.900	94	145.700	145.100
15	145.375	145.375	35	145.500	145.500	55	144.875	144.875	75	145.925	145.925	95	145.725	145.125
16	145.400	145.400	36	145.500	145.500	56	144.900	144.900	76	145.950	145.950	96	145.750	145.150
17	145.425	145.425	37	145.500	145.500	57	144.925	144.925	77	145.975	145.975	97	145.775	145.175
18	145.450	145.450	38	145.500	145.500	58	144.950	144.950	78	145.500	145.500	98	145.500	145.500
19	145.475	145.475	39	145.500	145.500	59	144.975	144.975	79	145.500	145.500	99	145.500	145.500