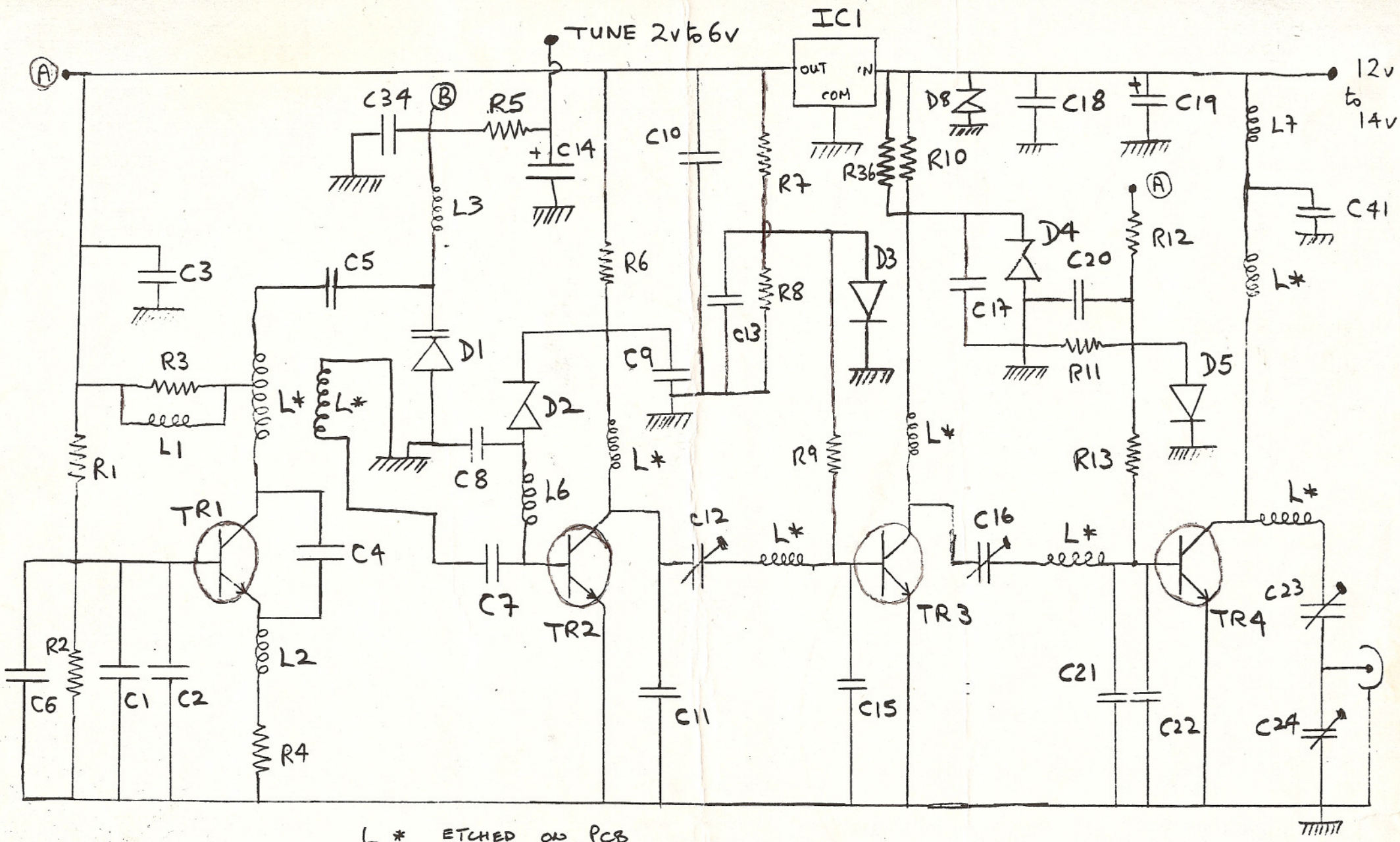
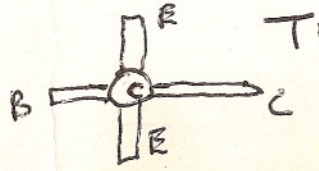


L * ETCHED ON PCB

TR3 BLU98

TR4 BLV91

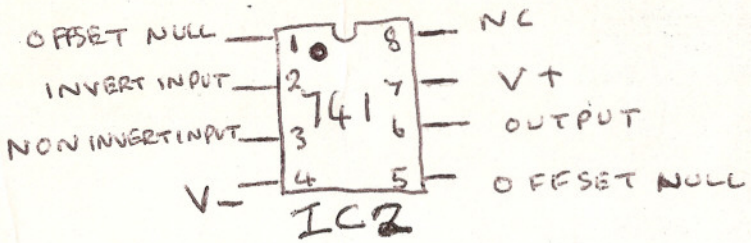


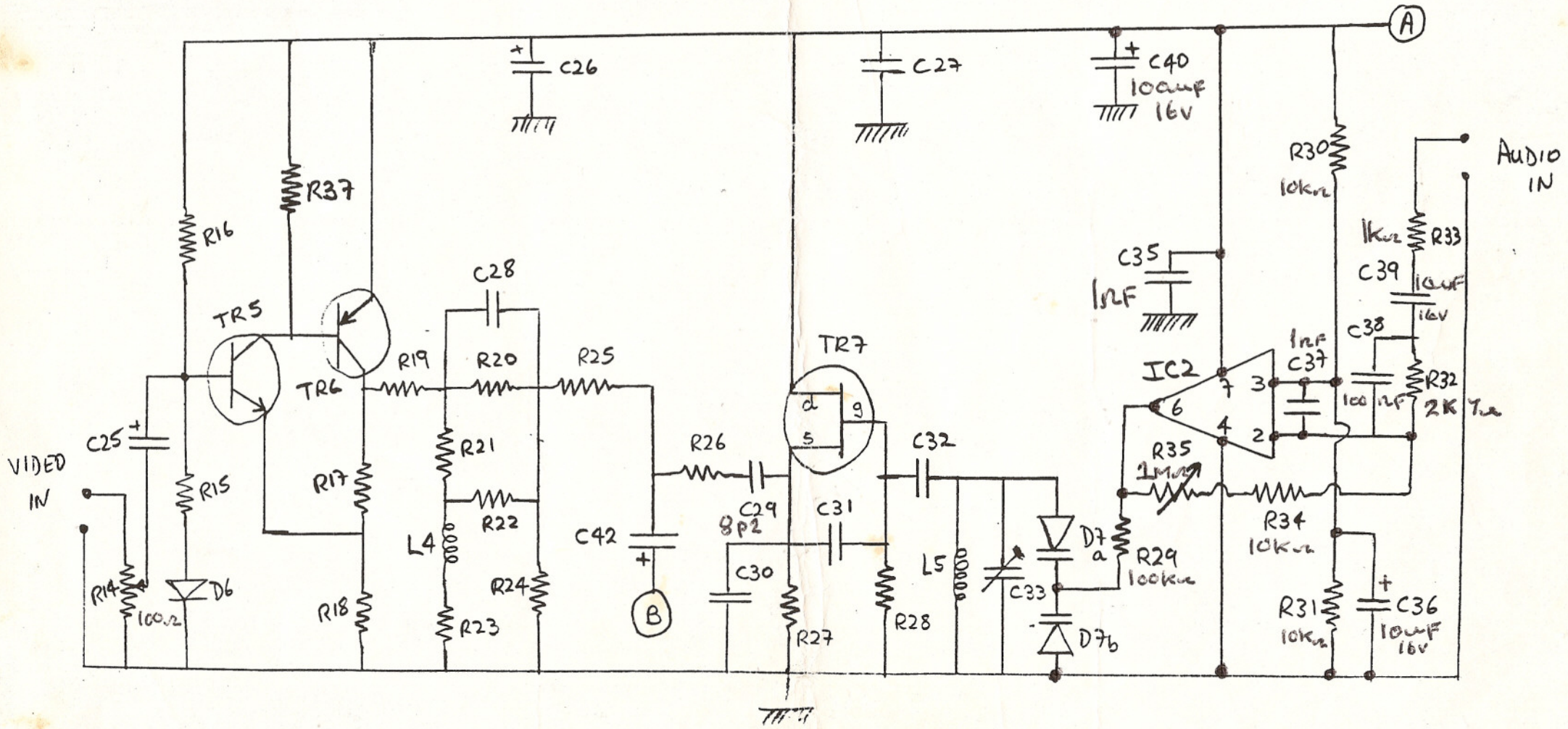
SOLENT 24CMS TV TX
R.F. CIRCUIT

CIRCUIT DIAGRAM (3) A

1W 23cm TV TX

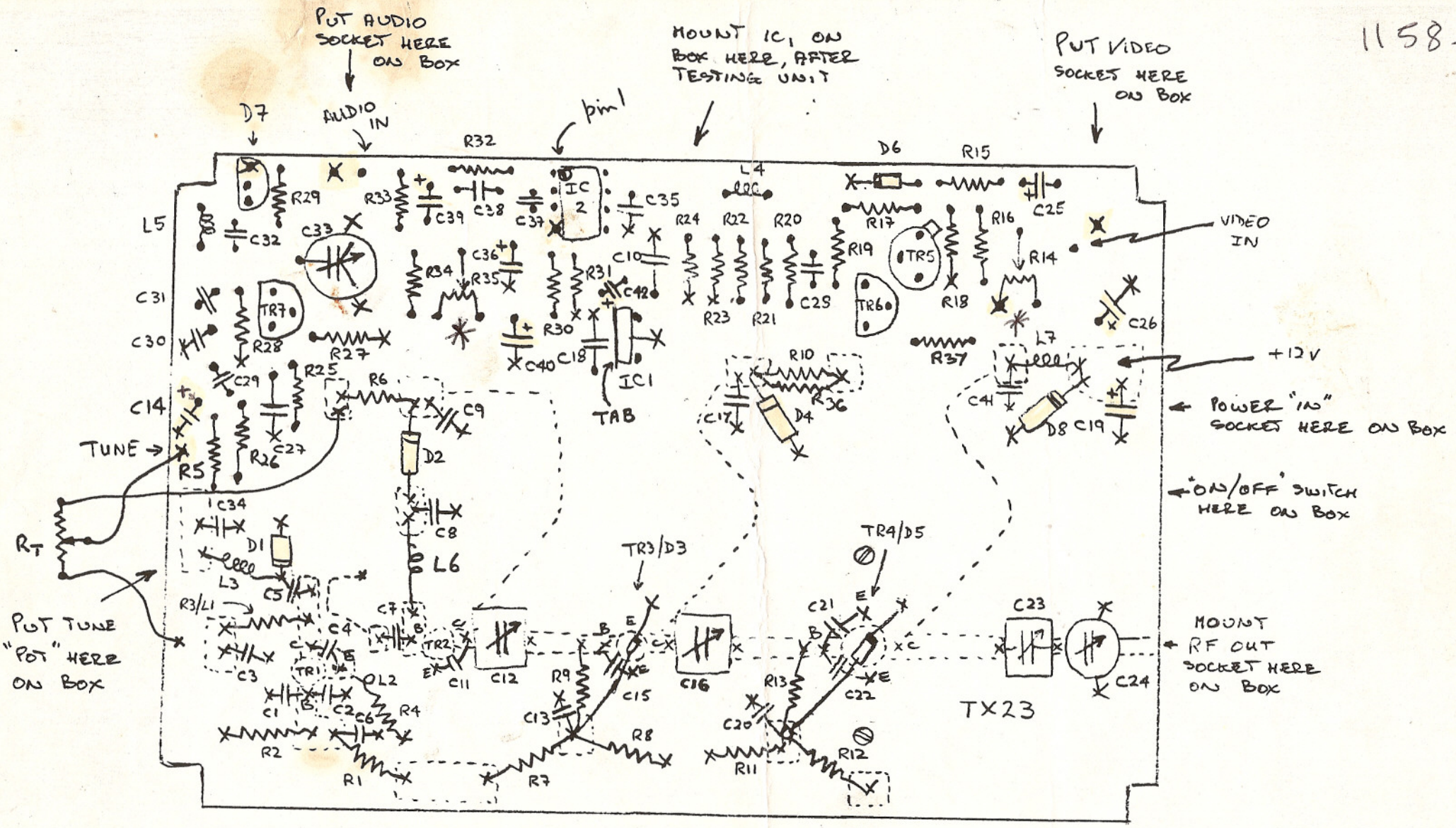
ISSUE 2





CIRCUIT DIAGRAM (3)B 1W 23cm TVTX © 1987 ISSUE 2

1158-1215



X = SOLDER TO FRONT OF PCB

• = SOLDER TO BACK OF PCB

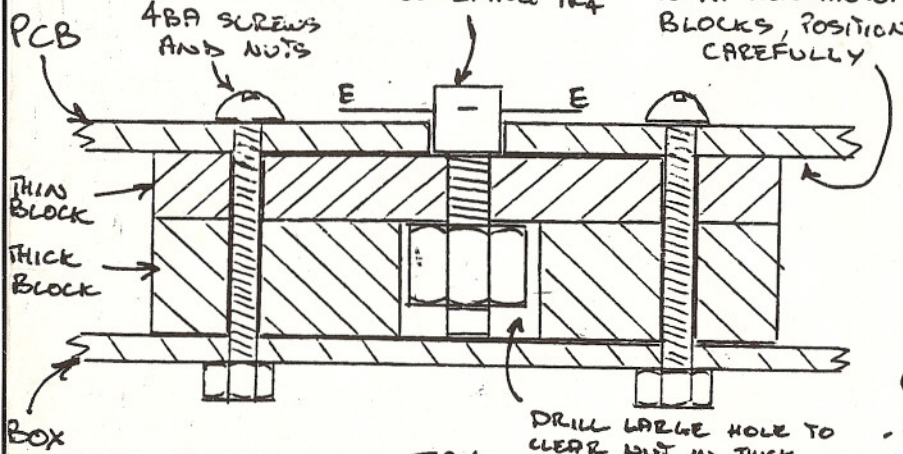
X = BOTH

R35 1MΩ
AUDIO GAIN

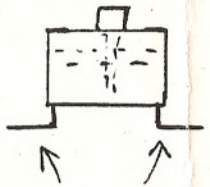
R14 100Ω
VIDEO GAIN

 PCB COMPONENT OVERLAY (2) 1W 23cm FMTV TX

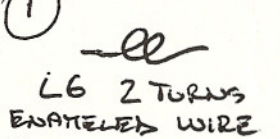
ASSEMBLY DIAGRAMS (1)



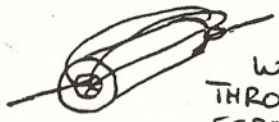
TR4 MOUNTING DETAIL



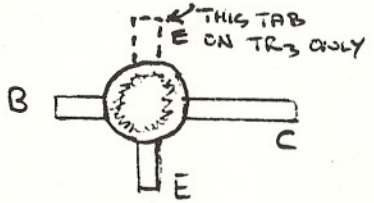
bend leads as close to body of 5-3pF trimmers as possible



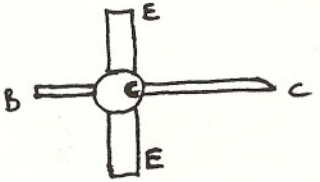
L6 2 TURNS ENAMELED WIRE 3MM DIA.



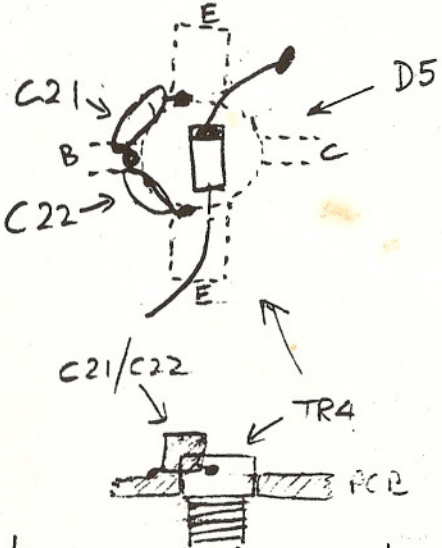
WIND 3 TURNS THROUGH FX1115 FERRITE BEAD FOR L7 USING ENAMELED WIRE



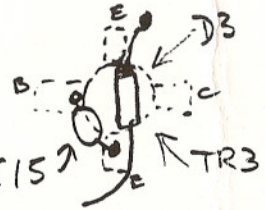
TR1, TR2, TR3
Top View



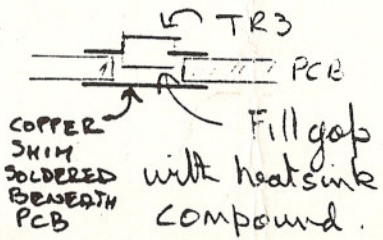
TR4 - BLV91
TOP VIEW

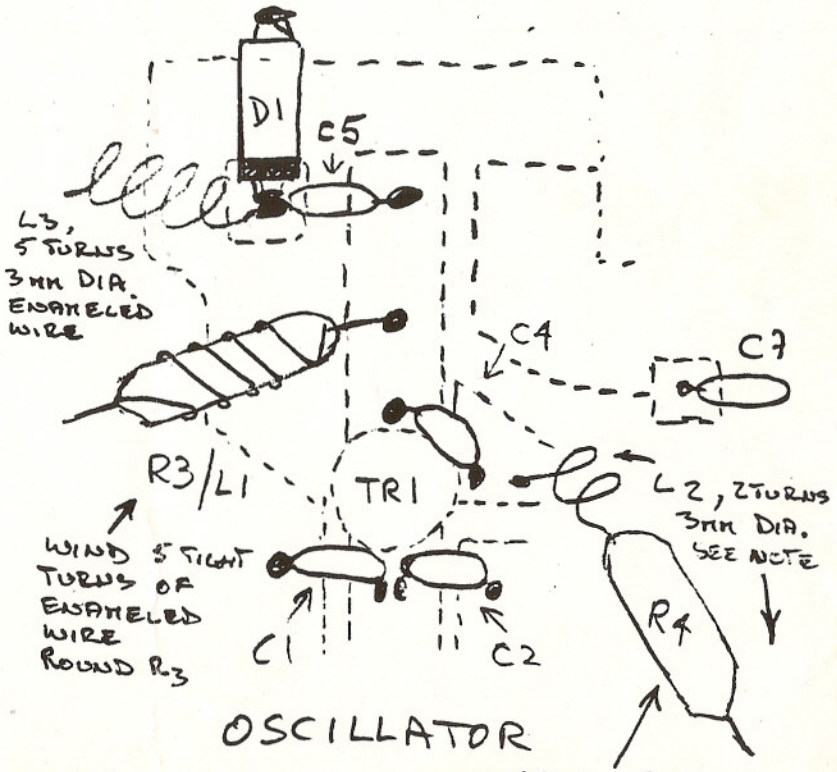


C21/C22 must be as close as possible to transistor body and have zero lead length



C15 must be as close to TR3 as possible and zero lead length



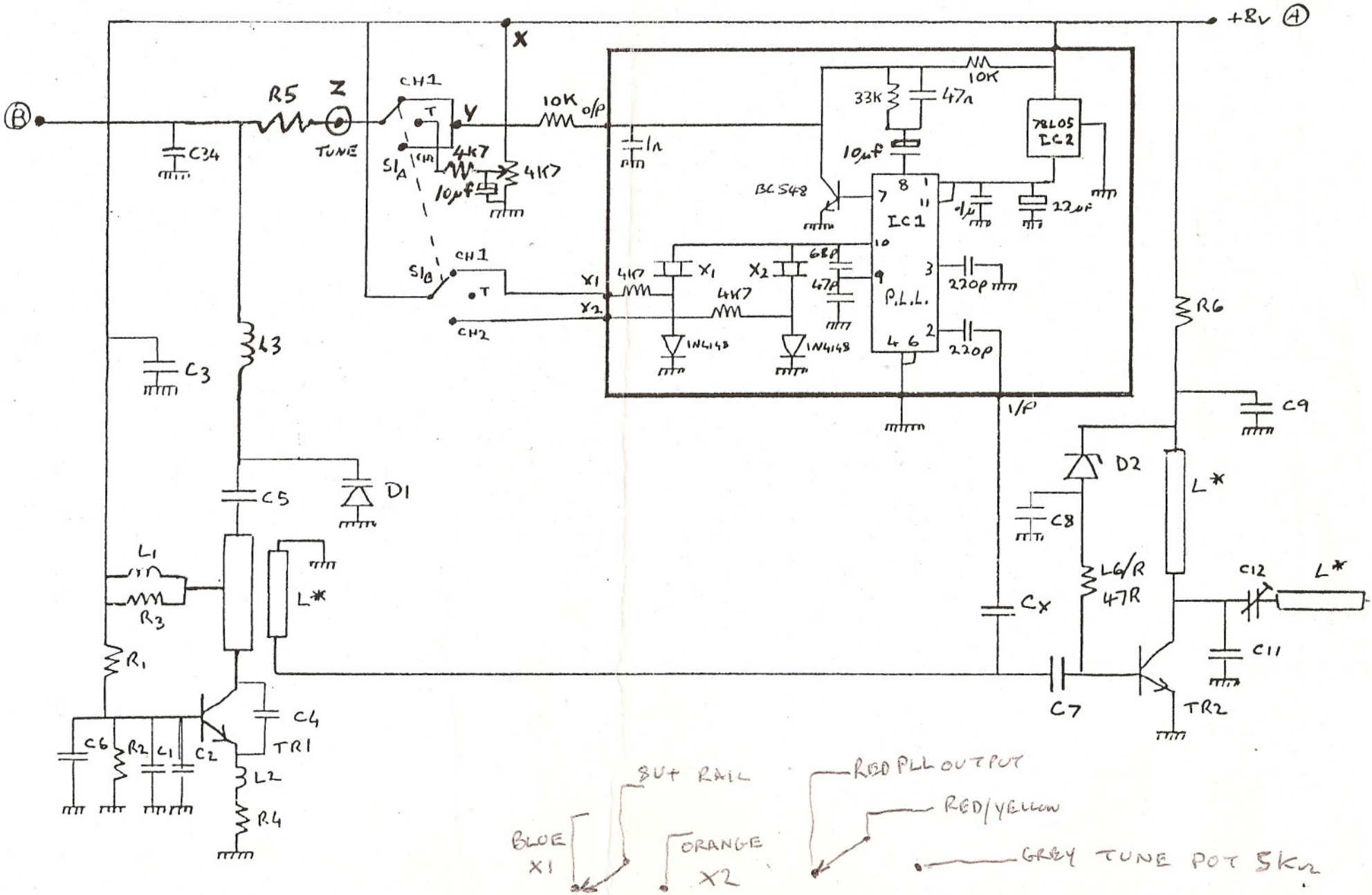


ISSUE 2

1W 23cm FMTVTX © 1987

2 CHANNEL P.L.L. FOR SOLENT SCIENTIFIC 1W TX

ISSUE II



WORTHING VIDEO REPEATER GROUP

GB3VR

Chairman:-
Mr M.Newell
G8KOE
0903 782318

Hon.Sec.:-
Mr R.Humphreys
G4WTV & G6WOR
0903 67764

Treasurer:-
Mr R.Stephens
G8XEU
0903 67228

PRESTEL MBX 219999803

SOLENT - 23/24cm 1W FMTV TRANSMITTER

GENERAL

Please read these instructions thoroughly before starting the kit, and do not open the bag containing the components yet. As if there is a possibility that the kit may be returned to us for construction, we would rather receive the bag unopened.

The PCB consists of two areas. One is concerned with audio, video and 6MHz subcarrier, which is a conventional circuit with tracks on the underneath and groundplane on top. Assembly is straightforward, and some of the components have to be soldered to the top groundplane as well as the tracks underneath.

The other part of the board works at microwave frequencies, and a different assembly technique is required. Components are soldered to the top of the PCB. The underneath of this part is a groundplane and is joined to the top groundplane by plated through holes. It is absolutely important that components in this area are mounted as close to the board as possible, with the minimum amount of soldering and shortest possible lead lengths. In some cases the physical arrangement of components is so important that extra large drawings are provided.

The expensive R.F. devices are tested prior to despatch for gain and leakage. Any subsequent failure will be due to error in construction or alignment.

CONSTRUCTION

1. Check the PCB for missed holes or bridged tracks, and that there are no obvious faults. Make sure that you can identify the components against the parts list before you begin. We strongly recommend that the PCB is fitted into the box supplied. The PCB will need to be carefully trimmed, due to variations in manufacture, and must be a loose fit in the box. So that when the PCB is mounted on the aluminium blocks, there will be a gap of approximately 0.5mm all round between box and PCB.

2. See diagram 1, which shows the correct way to mount TR4. The stud of TR4 passes though two blocks of aluminium 40mm square, one is 3mm thick the other is 9mm thick. Two small holes should be drilled, through the PCB and blocks to allow for bolting to the box later. When the orientation of TR4 is correct, trim the leads and pass the stud through the blocks, and screw TR4 and both blocks to the PCB, using heatsink compound between each block and PCB. Do not fit the unit into the box yet. Solder TR4 to the PCB with the minimum amount of soldering necessary.

CONSTRUCTION (cont)

3. Solder a small piece of copper under the hole for TR3, see diagram, and fill the hole with heatsink compound. Fit TR3, TR2 & TR1 using minimum solder, trimming the leads as required.

4. Fit all resistors except R6, R7, R10, R12 and R36.

5. Fit all the small ceramic capacitors. See large diagrams for the exact location of the capacitors near TR2, TR3, TR4 and the oscillator layout.

6. Fit the remaining transistors, IC's and all diodes except D4. Fit IC1 (8 volt regulator) on terminal pins, as it will be removed and screwed to the box later. Use a small amount of heatsink compound on the tops of TR3 & TR4 to make good thermal contact with D3 & D5.

7. Fit the inductors (see diagrams) except L7, and all the remaining capacitors, trimmers and presets, except C24 & C23. Fit the terminal pins for video and audio input.

8. Check the board thoroughly for any possible track bridges or faulty joints, and wrongly located components.

BOXING THE PCB

1. It is not absolutely essential to box the unit before testing. However it will need adjusting after fitting in the box. It is worthwhile carrying out initial testing before boxing the PCB, untill the final stages when TR4 starts to draw current.

2. After initial tests, the unit should be fitted into the box supplied. The blocks of aluminium determine how high the PCB sits in the box (12mm).

3. The RF output socket must be rated for 23cm use, flanged N-types are the only sockets suitable. The PCB groundplane must make a very low inductance contact with the output socket. Therefore, take solder tags from the two upper screws holding the output socket, and bend them carefully over the PCB and solder. Do not bend the PCB. Then the centre pin of the socket can be soldered directly onto the RF output stripline on the PCB. Now fit C24 & C23.

4. Connect video and audio input sockets of your choice, flanged BNC for video, and phono for audio are probably the best. Mount the sockets on the box, near to the terminal pins on the PCB. Ground the PCB to the box near the input sockets. If later on there is vision on sound, it will almost certainly be a grounding problem.

5. Mount the 8 volt regulator on the side of the box, and reconnect to the PCB with insulated wire, ensuring that it is correctly connected. Fit an on-off switch to the box and suitable power socket. Finally fit a 4K7 pot to the box near the TUNE pin and connect to the PCB as shown in the layout diagram. Ground the PCB to the box at this point.

replace it with the 47R (TX Kits from March 1992 already have L6 replaced with 47R (R39)) resistor provided, note carefully its positioning as it will foul the end of the IC on the PLL board if it is fitted incorrectly.
If necessary reposition C8 & C9 as shown on the diagram so that the PLL board can be fitted in position. Similarly it may be necessary to check the positioning of C11 as the earthy end may foul the PLL board. Adjust if required.

The PLL board can now be aligned over TR2 (see diagram for positioning) make sure that no components are in the way, C11 and C7 will be quite close to the board. If all seems OK then 'tack' the PLL board in place with two 'blobs' of solder to connect earth and supply rails (see diagram) for the time being, this will suffice during initial tests.

Fit the 10K resistor between the o/p pin on the PLL board and the switch (or the tune pin on TX board if only a single channel is required). Fit the other links to the switch from the supply rail and the switching pins on the PLL board (or link the supply rail to the appropriate switch pin, if single channel only).

Now carefully check all your work against the circuit diagram to ensure that you have it all correct!

TESTING

Power up the board, and with a voltmeter check that the 5 Volt line from the regulator on the PLL board is correct.
Check with a voltmeter that the channel switching pins are connected to the 8 volt rail when the switch (if fitted) is correctly operated.
If an H.F. receiver is available then the crystals should be heard on the appropriate frequency. If an oscilloscope is available, then using a X10 or X100 probe the crystals can be seen to be oscillating, but do not load the crystals with too much capacitance as the oscillator can be stopped very easily.
Connect a voltmerter to the o/p pin of the PLL, if the voltage is between 1 and 7 volts and stable then the oscillator is already locked up and the PLL is actually working.
If the voltage is at 0 volts or at the 8 volt rail then most likely there is insufficient coupling of the 1.3GHz signal to the i/p pin. First push the lower 220pF (i/p coupling) capacitor downwards so that it is in close contact with TR2, this is usually sufficient. If lock is still not obtained then connect a short, 2 cm length of insulated wire to the input pin, and position it above the oscillator coupling loop marked L* on the diagrams.
Once lock is obtained the output frequency can be checked on a counter to ensure that the correct xtals are fitted. If single channel operation is all that is required then it is recommend that the control signal is adjusted to between 3 and 4 volts by adjusting carefully and slowly the size of L2 and the position of C1 and C2.

Once correct operation is obtained the PLL board should be soldered fully into place by running a bead of solder along both sides of the PLL board where it is in contact with the ground plane of the Tx board.

If the circuit fails to pull the oscillator into lock, then check for the following conditions:-

Is the 8 volt supply rail actually connected to the regulator? - Check with a voltmeter.
Is the 5 volt line working OK? - Check with a voltmeter on pins 1 or 11 of the SP5060.
Is the crystal selected? - Check by measuring that 8 volts is applied to the correct pin on the PLL board, then check that 0.6 volts appears accross the appropriate diode.

Is the crystal reference oscillator running? - Listen with a receiver to the fundamental frequency as marked on the crystal.
Is the 1.3GHz oscillator running? - Check with a frequency counter or listening/watching on a receiver at the appropriate frequency.
Is the 1.3GHz oscillator actually within the lock range of the PLL? - Check by measuring the frequency or by listening/watching on a receiver. If the oscillator is within about + or - 15 MHz the PLL should be able to pull the frequency into lock.
Is the control voltage actually being applied to the varicap? - Confirm with a voltmeter that D1 does have the control voltage applied to it, faulty switch connections?
Have you had a cup of tea lately? - No? Then have a break and try again later!

COMPONENT LIST

Resistors	Qty	Capacitors	Qyt	Miscellaneous
33K	1 ✓	22uF	1 ✓	BC548 ✓
10K	2 ✓	10uf	2 ✓	78L05 5volt reg. ✓
4K7 Minature	2 ✓	0.1uF	1 ✓	SP5060 PLL IC ✓
4K7	1 ✓	47nF	1 ✓	1N4148 2 off ✓
47R	1 ✓	1nF	1 ✓	PCB pins 4 off ✓
		220pF	2 ✓	Crystals as ordered ✓
		68pF	1 ✓	
		47pf	1 ✓	

The following crystals are available from the group.

RMT1	1276.5Mhz	--	xtal freq. = 4.98630Mhz	NOTE:-
* RMT2	1249.0Mhz	--	xtal freq. = 4.87891Mhz	xtal frequency equals
RMT3	1248.0Mhz	--	xtal freq = 4.87500Mhz	Frequency required
* Simplex	1255.0Mhz	--	xtal freq = 4.90234Mhz	by 256.
Simplex	1260.0Mhz	--	xtal freq = 4.92187Mhz	

Designed by G Mather, G8DHE, 72 Cranleigh Rd., Worthing, Sx., BN14 7QW.
Phone:- 0903 32161 (7pm to 8pm please)

WORTHING & DISTRICT VIDEO REPEATER GROUP

GB3VR

AFFILIATED TO THE B.A.T.C. & R.S.G.B.

TX23 1WATT FM TV: for the 23/24cms band.

With over 250 kits sold to date , this kit is by far the most popular 23cms TX kit in the country. The Transmitters have been used in repeaters throughout the land including GB3VR where one runs 24hrs a day 365 days a year, outdoor mobile operation, portable operation in fact the TX is suitable almost anywhere, it comes with a strong di-cast box, and seems to withstand a lot of bangs and knocks without going off frequency. The TX was designed by Allan Latham G8CMQ and uses all descrete components except for a 741 in the sound stage, you can see how it works and will really enjoy building it. Once completed you will have a FM TV Transmitter that will last for years and years.

The 1 watt TV TX is supplied in kit form which consists of a PCB, with plated through holes, the correct size Di-cast box, heat sinks for the power output transistor, varactor tuning pot, and all the on board components. Average construction time is about three evenings work. The kit does not contain the Video in socket the sound in socket or the RF socket.

The TX generates its signal at the wanted frequency and this may be tuned anywhere within the band and via varactor diode tuning. Pre-emphsis is fitted and uses the amateur standard. (can be bypassed for other systems) Intercarrier sound is also included and this of course can be tuned to suit you requirements, (4.5 to 7.5 Mhz) Two sound stages can be used for stereo, or a data channel if required. The transmitter is an ideal for colour or black/white.

Output is 1 watt although 1.3 watts should be achieved using the device supplied.(That being the very rugged BLV91) Although the TX is free runnig it is found by most to be quite stable however the frequency can be locked by using our Phase Lock Loop board using the latest plessey pll chip. The Xtal frequency is the wanted frequency dived by 256. i.e. a frequency of 1280Mhz would require a Xtal of 5Mhz.

The TX kit is not for the beginner, it is quite difficult to build. UK residents may order the TX built and tested. By order only.

1watt FMTVTX kit	£80.00
PLL kit for FMTVTX	£30.00
XTAL RMT 1,2,3, 1255 & 1260Mhz	£7.00 each

VIDEO AGC BOARD

The Worthing and District Video Repeater Group have developed this board for use in various applications where there is likely to be a difference in video levels presented to a monitor or transmitter. The board is capable of accepting signal levels in the range of 0.15Vpk-pk to 2.5Vpk-pk and generating a constant output level of approximatley 1Vpk-pk, the AGC has a time constant of about 3-4 secs, both i/p and o/p present a 75 Ohm impedence. The active elements of the circuit are contained within the AN302 IC which is frequently used in video recorders. The chip also contains other circuits which may be of use in some applications and for this reason the other connections are made available on the board. The additional functions contained within the IC are signal conditioning (Pre-emphasis/De-emphasis/Filtering), sync pulse clamping and peak white clapping.

More details can obtained on any of the kits mention over leaf by writing sending an sae to:- Mr. R Stephens, 21 St.James Ave, Lancing, W.Sussex, BN15 ONN

TEST AND ALIGNMENT

1. Set all trimmers and presets halfway except C24 which is unmeshed.

2. Connect a 12 volt DC supply with a 500mA fast blow fuse in the line, to the unit. Also connect a 1 volt pp video signal, and microphone to the input sockets.

3. Check that the regulator output is 8 volts. Adjust the voltage on the TUNE pin, until the 23cm TV signal is received on the shack monitor, at the required frequency. 2v to 6v should cover 1245 to 1300MHz. Note, once adjusted the transmitter will not "tune" a large frequncy range. It will "tune" in the order of 20 to 30MHz without loss of power. Therefore carry out alignment at the highest frequency intended to be used.

4. Adjust C33 to set the audio subcarrier to 6MHz or the carrier frequency required. Set the audio deviation with R35. Alternatively, use a DFM (without a vidio signal connected) on the junction of C34 & L3 to set the audio carrier frequency.

5. Set R14 for the required video deviation. Do not set to high and wait for on air tests to finally set it.

6. Switch off power and change the fuse to a 1A fast blow fuse. Fit R6, and R10/R36 at the C17 end only. Lift R3/L1 from the C3 end to disable the oscillator. Check that D4 has not been fitted. Switch on, and measure the current through R10/R36 from the 12v supply with a multimeter set to mA range. The meter should read zero.

7. Switch off and fit a 330 Ohm resistor in the R7 position. Switch back on and measure the current again, which should now read between 1 and 4mA. If not, switch off and change the value of R7, lower values raise the current, higher values lower it. Do not use a preset as it would be unreliable.

8. Switch off and refit R3/L1. With the multimeter still connected to R10/R36, switch back on and adjust C12 for maximum current. Adjust "tune" to bring the transmitter back on to frequncy. The current being drawn now, should be between 30 and 50mA. Do not run with more than 70mA in TR3 for more than a few seconds, as there may be instability, and this must be traced (check for errors in construction).

9. Switch off and lift the end of R3/L1 again. Fit D4 and solder the other end of R10/R36 in place. Connect the multimeter in place of L7 and switch back on. The meter should read zero.

10. Switch off and fit a 220 Ohm resistor in R12. Switch back on and measure the current again, which should now read between 10 and 25mA. If not, switch off and select a different value for R12 (refer to notes in paragraph 7).

11. Switch off, and at this stage if not already fitted, the PCB should be boxed. Refit R3/L1 and connect a power meter, if available, and dummy load to the RF output socket.

TEST AND ALIGNMENT (cont)

12. Switch on and with the multimeter still connected in place of L7, adjust C16 for maximum current. The current being drawn now, in TR4 should be approx. 200mA. Do not leave switched on, with more than 300mA in TR4 for more than a few seconds, as there is probabably some instability (check for errors in construction).

13. Switch off and fit L7 in place. Switch on and adjust C23 and C24 for maximum RF output on the power meter. Try detuning C24 a little, and adjusting C23 untill you're sure that the genuine maximum has been obtained.

14. Adjusting C16, C23 & C24 should have no effect on frequency, if it does there may be some instability, and this must be traced (check for constructional errors). Finally peak C12, C16, C23 & C24 for maximum RF output, when there should be over 1 watt out. Now "tune" for the exact frequency required.

CONCLUSION

The unit is overvoltage and reverse voltage protected by a 15v zener, therefore a fuse in the supply line is ESSENTIAL.

The RF transistors are fairly rugged devices, but because of variations in manufacture it is possible to end up with enough power to cause dissipation problems. Therefore it is important not to exceed 75mA in the TR3 collector current. Also, never exceed 325mA in the TR4 collector current.

We hope you will enjoy constructing this kit, but if after reading these instructions you are doubtful of your abilities, please contact G4WTV before commencing construction. Who can construct the kit for you, there is however, a charge for this service.

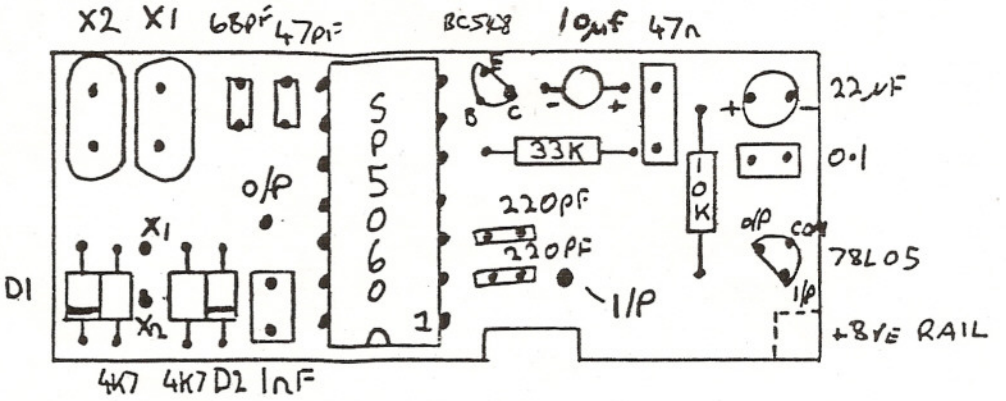
If there is a query on these instructions, telephone G4WTV or G8KOE between 7pm and 8pm on weekday evenings only please.

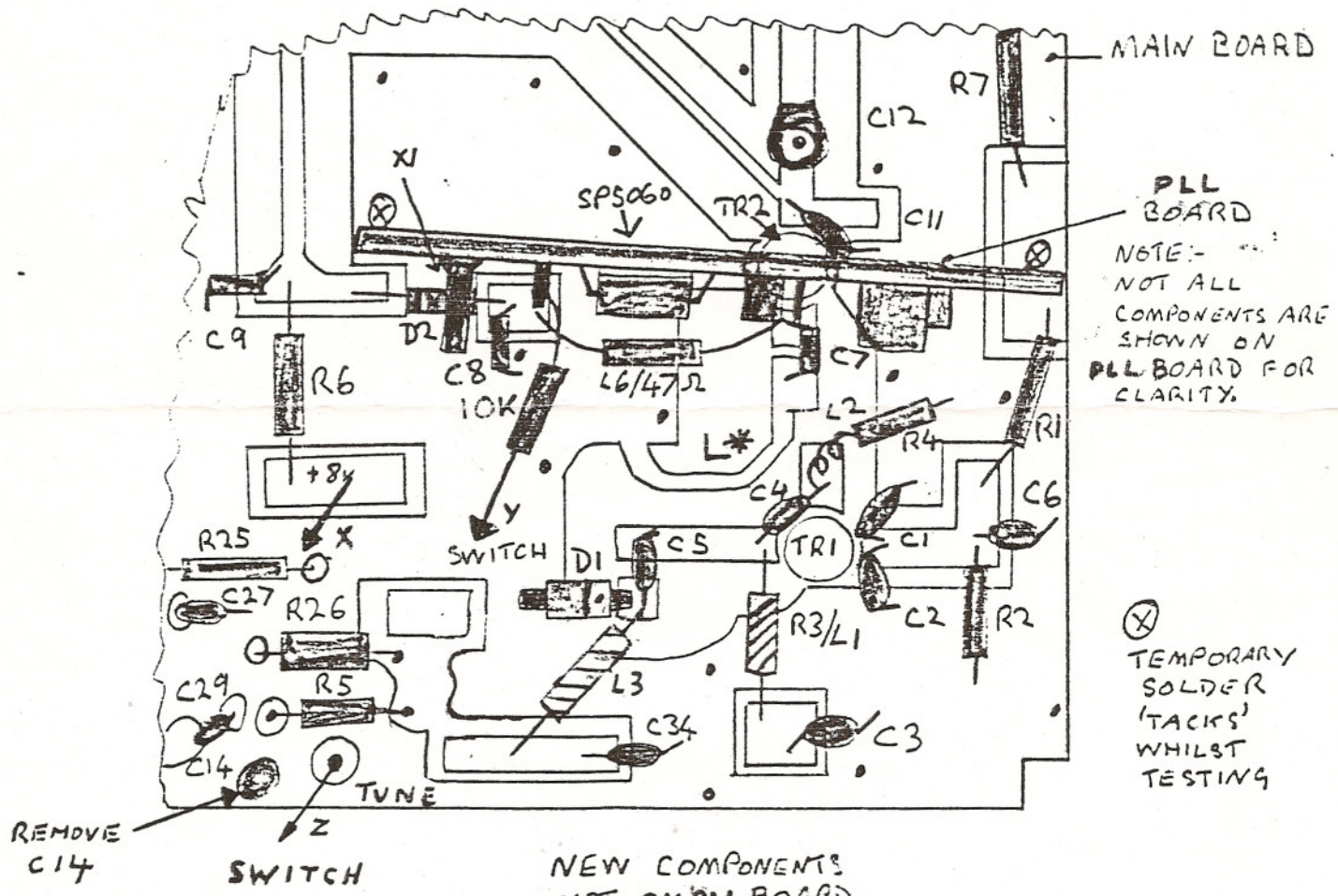
ROY G4WTV 0903 67764
MARTIN G8KOE 0903 782318

WORTHING VIDEO REPEATER GROUP

GB3VR

PLL LAYOUT





10K
47R (REPLACES L6)

ISSUE II

TX 23 PARTS LIST

No	Resistors	Capacitors	Semiconductors	Diodes	Inductors	I.Cs
1	1.8K	22pf	BFR96S	BB105	5t on R3	7808
2	470R	22pf	BFR96S	5v6Zen	2t 3mm dia	UA741
3	33R	1nf	BLU98	1N4148	5t 3mm dia	
4	33R	2.2pf	BLV91 (BFQ34)	10vZen	8.2uH	
5	4.7K	2.2pf	BC107 (237)	1N4148	8.2uH	
6	18R	1nf	BC557	1N4148	2t 3mm dia	
7	330R	4.7pf	BF245	BB204	3t FX1115	
8	33R	1nf		15vZen		
9	33R	1nf				
10	82R	100nf				
11	33R	2.2pf				
12	220R	0.5-3pf trimmer				
13	18R	1nf				
14	100R preset	10uf 16volts				
15	1k	4.7pf				
16	10k	0.5-3pf trimmer				
17	68R	1nf				
18	12R	100nf				
19	47R	100uf 16volts				
20	270R	1nf				
21	68R	4.7pf				
22	68R	4.7pf				
23	18R	0.5-3pf trimmer				
24	82R	1-6pf trimmer				
25	180R	100uf 6volts				
26	1k	470uf 16volts				
27	1k	100nf				
28	470k	2.2nf				
29	100k	8.2pf				
30	10k	33pf				
31	10k	33pf				
32	2.7k	1nf				
33	1k	5-60pf trimmer				
34	10k	33pf				
35	1M preset	1nf				
36	82R	10uf 16volts				
37	1k	1nf				
38		100nf				
39		10uf 16volts				
40		100uf 16volts				
41		1nf				
42		10uf 16volts				