P5

The Newsletter of
The Severnside Television Group

September 1995

CHAIRMAN G8YMM

Welcome to the September issue of P5.

I hope you all enjoyed the summer break and the wonderful weather we have been having here in the UK & Europe, not forgetting our members down under who are in spring time and are about to receive our SUN !!. The Longleat Radio Rally was enjoyed by all and was very successful. Thanks to everyone and the Bristol RSGB who helped on the day.

Brian Kelly (GW6BWX) your P5 editor, Print room operator, and project designer has been very busy over the year producing P5. I know how much time is involved with each issue so keep sending letters and articles to Brian as it all helps. Well done Brian and dont surrender yet.

Christmas is fast approaching , "dare I mention this word so early" !! So if you are about to dispose of your old Video, PC bits, Books, Electronic/Eelectrical bits, Bananas etc. please save them for our Christmas auction if you can. All the funds raised go towards the upkeep and purchasing of equipment for our two repeaters.

GB3XG & GB3ZZ REPEATER

Both repeaters have worked remarkably well considering the hot weather. Unfortunately, the pictures from GB3XG have been attenuated this summer due to foliage on the local trees. This will gradually rectify as the Autumn approaches.

IMPORTANT NOTICE (BANDS UNDER THREAT)

You will recall from the last P5, that changes to band allocations are being proposed by the European Radio Committee one of which is to reduce the 430-440 Mhz band to 432-438 MHz a loss of 4 MHz which will = a loss of ATV for this band. Because of the importance related to these changes which will effect you and ATV for ever, I have therefore, included an RSGB Questionnaire Form for you to fill in and return to their address at the footer. It will cost you 19 pence but it could cost us a lot more if we don't respond and fight to keep 435MHz as I hear rumbles that 1.3MHz is being targeted.

DATES FOR YOUR DIARY

- CHRISTMAS SOCIAL 95 9th Dec. 7.30pm The Pavilion, Elmpark, Filton, Bristol.

TV-DX NEWS

from Stephen Michie, G7KXD

Back a few (number deliberately unspecified) years ago I used to monitor for TV-DX activity myself. At the time it was difficult to resolve the weaker signals because BBC 405 line transmission were still around and often blanketed the band. The technique I used was to swap the tuner output connectors over on dual-standard TVs. The VHF output would then be used in 625 line mode. Using a simple indoor dipole it was possible to receive signals from all over Europe and Scandinavia when conditions were good. The high power of some of the continental broadcasters makes them very suitable for monitoring for lift conditions. Generally, although not always, VHF TV broadcast reception is an indicator of a two metre band lift. *Brian.*

Here is an extract from Stephen's log:

16th August
Dutch and French UHF signals.

18th August
Dutch and ZDF Germany (E3)
SPG NRK Norway (E2/3)
RUV Island PM5544 (E4)

19th August (major tropo opening)
NED1 (E6/29/39)
NED2 (E27/32/45/47)
DR Denmark (E7/10)
Nibe Telecom PM5534 Denmark
SPE TVE1 (E4)

20th August
NED1 (E6/29/39)
NED2 (E27/32/45/47)
NED3 (E30/35/42)
Denmark DR (E7)
TV2 (E22)
Tommerup telecom PM5534 (E32)
Svendborg PM5534 Germany
ARD1 (E11)

Tales from a Windy Hilltop

The summer of 1995 will be noted in the history books for its prolonged dry and sunny weather. However, all good things come to an end and this year God timed the deluge to coincide with the International ATV contest on September 9th and 10th. I guess from this that God isn't an ATVer!

Having exchanged the customary pleasantries and contest numbers from the home station, Bob, GW8AGI and myself decided to travel to the most distant hilltop that had an open view to the south east. The chosen spot was on a mountain known as Blorenge, just north of Blaenavon. The weather was dismal and as we started to climb on to high ground, we hit cloud level. Unsure of the exact road to take, we pulled over into a small parking area and studied the map. We found out later that this exact spot was used by Nigel G7JZP just a few hours before! The map showed some radio masts ahead. Figuring that if it works for commercial operators, it should work for us, we tried to find them. Eventually, through a clearing in the mist we spotted them, about 100 ft high, loaded with microwave dishes and only a few hundred yards ahead. Very conveniently, the local council have provided a car parking area opposite the masts, maybe the masts are a local tourist attraction.

Anyway, to an audience of damp sheep we set up tripods, dishes and a yagi and proceeded to assemble the station. Most of the equipment sat on the parcel shelf in the rear of Bob's car. The hatch door and a spare dish were used to keep some of the rain out of the electronics. Satellite dishes make good umbrellas! First attempt to contact the STG contest group was on 24cms, signals were so strong that it was impossible to miss their testcard. Numbers were sent and received and a quick panoramic view of the fog was sent. Next, 10GHz was tried, again the signals were very strong and clear despite some broadcast breakthrough from the towers. Next stop, home to dry off and defrost!. Well done STG contest team!

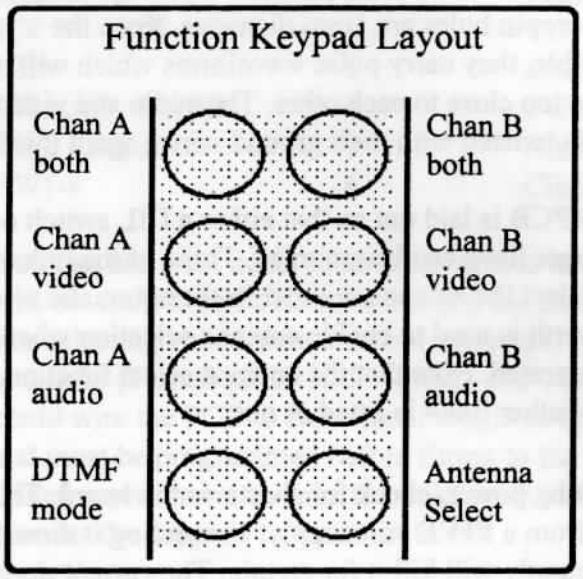
An 8 channel Audio & Video Selector.

by Brian Kelly
& Carol Webb

The design described here is for a compact, low-cost signal router that can feed any of eight audio inputs and eight video inputs to two pairs of outputs. It also includes a DTMF tone generator and an automatic antenna selector circuit. All the functions are controlled from a pair of keypads, the function keypad decides on which mode is to be used while the numeric keypad allows digit or channel selection. Antenna selection is achieved by pressing the "AS" function key or by grounding a pin on the PCB. By connecting this pin to your transmitter it is possible to automatically select your preferred antenna every time you start a transmission. The desired antenna number is programmed by fitting links or a small switch to the smallest of the PCBs.

Instructions for use:

The power-up condition is for the keypad to be in DTMF mode with channel 1 video and sound being fed to both A and B channel outputs.



The "both" function selects the audio and video channel together. For example pressing "Chan B both" followed by the 5 key will send audio input 5 to channel B audio output and video input 5 to channel B video output. The "video" keys only change the selected video output, leaving the sound selection as it was. Using the example above, pressing "Chan B video" then 2 would select video input 2 while still passing the sound from audio input 5. Audio selection is made in the same way by pressing the Chan A or B key then a digit, in this case the video selection remains unchanged.

The DTMF and antenna select keys work on both audio channels simultaneously. After pressing DTMF the numeric keypad becomes a tone dialler and produces all the standard tones when a key is held down. The "Antenna select" key sends a predefined sequence of tones through both audio channels. The tones correspond with the key sequence "*0" followed by the number set on the small PCB then "#". If the number 3 is programmed on the PCB, the sequence "*03#" is produced and so on. You will probably recognise that these are the tone codes for selecting antennas on GB3ZZ. The Antenna select key works at any time, the automatic method of selecting an antenna by grounding the pin on the PCB only works if the appropriate link is made on the small PCB. In automatic mode there is a short pause (about 750mS) between grounding the pin and the tones being sent, this is so the pin can be connected to your transmitter PTT line, allowing the 500mS repeater access delay before selecting the antenna. With the exception of the antenna select key, the mode set by the function keys remains in effect until changed. For example keying "Chan A video" followed by 1, 2, 3, 4 will select those video channels in succession, there is no need to press the function key before each selection. Also note that the Chan A and Chan B keys work independently, changing channel A leaves channel B alone and vice versa.

Construction:

All five boards can be cut from a standard 160x100mm PCB. The two 95-003D boards are mounted upright from the main board, this method minimises the video and audio track lengths so reducing the crosstalk between them. The function key PCB is the same height as the numeric keypad to make front panel mounting easy. The small board houses the antenna enable and selection links, as these will not require frequent adjustment, it can be mounted on the rear panel. Fit all the resistors first, then the capacitors and diodes. Keep all the wire clippings, they can be used to mount the upright PCBs later on. Note that all the upright diodes are mounted with the cathode (banded) end topmost. Next, fit the links, remaining components and finally the ICs. The PIC16C54 must be programmed before soldering it in place, an unprogrammed device will not work. The binary object file will be available on BetWiXt BBS. Contact me if you need devices programming and can't do it yourself. When mounting the upright boards their bottom edge should sit flat on the main PCB with the components facing its nearest edge. Fold the wire links flush against the boards, this will give greater mechanical stability. The mounting holes are all 3mm diameter, component holes can be 0.8 or 0.5mm diameter and the veropin holes are 1mm diameter. Keep the keypad interconnecting wires as short as possible, they carry pulse waveforms which will easily pick up on the signal wires if they come too close to each other. The audio and video input wires should be either screened or tightly twisted with their ground wires, again this is to minimise crosstalk between inputs.

Antenna selector link options

Ant	S1	S2	S3
0	no	no	no
1	yes	no	no
2	no	yes	no
3	yes	yes	no
4	no	no	yes
5	yes	no	yes

The smallest PCB is laid out so that either a DIL switch or pins and jumper links can be mounted. Three of the links are used to select the antenna number in the automatic select mode, the fourth is used to enable antenna selection when the PTT is operated. Note that the antenna select function key works whether link4 is fitted or not.

Testing:

Before applying power, check for shorts on the board. This design runs from a **FIVE** volt supply, connecting it directly to a 12 volt supply will kill it for certain. The current drawn is very small, in the region of 70mA so connect a small 5V regulator in line with the supply if you intend to use a 12V power source. For the prototypes I used a standard 7805 regulator on a 2cm square copper sheet and even after running for two days it was barely warm to touch. When you are happy that the current consumption is OK, measure the voltage between ground and each of the outputs, it should be less than 0.5V. If all is well you can connect a monitor to the video and audio outputs then put the unit in "self-test" mode by pressing the "Chan A both" and "DTMF" function keys simultaneously. You should hear alternating high and low pitched beeps at about 1 second intervals. Next, connect some audio and video sources to the inputs, in self-test mode the inputs are selected in sequence so you should see and hear the sources being selected one after another. Channel A and B sequences are staggered so you can confirm their independent operation. To exit "self-test" mode you can either switch the power off and on again or press and hold the "Chan B both" and "Antenna select" keys together until a rapid beeping is heard. You can release the keys as soon as the beeps start and after a few seconds the unit will initialise itself to its newly powered up state.

Component suppliers:

All components are available from Maplin Electronics or Farnell Electronic Components, where the part is available from both companies the cheaper source is listed.

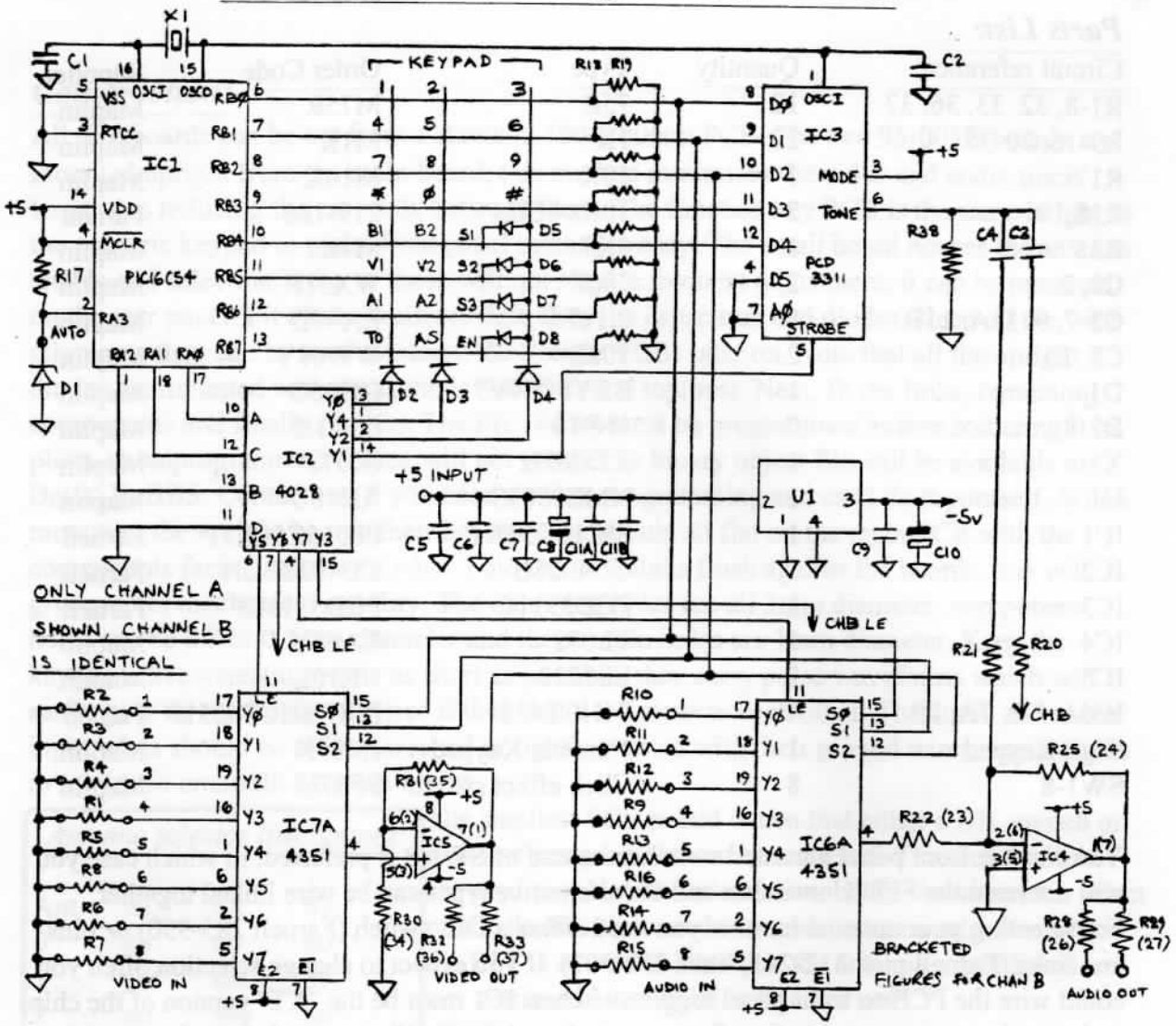
Parts List:

Circuit reference.	Quantity	Type	Order Code	Supplier
R1-8, 32, 33, 36, 37	12	75R	M75R	Maplin
R9-16, 20-35	22	1K	M1K	Maplin
R17	1	10K	M10K	Maplin
R18,19	2	10Kx4 SIL	219-186	Farnell
R38	1	4K7	M4K7	Maplin
C1, 2	2	39pF	WX51F	Maplin
C3-7, 9, 11A, 11B	8	0.1uF	RA49D	Maplin
C8, 10	2	10uF	WW68Y	Maplin
D1	1	BZY88C4V7	QH06G	Maplin
D2-8	7	1N914	QL71N	Maplin
X1	1	3.58MHz	DJ31J	Maplin
U1	1	NME0505S	AH18U	Maplin
IC1	1	PIC16C54XT	PIC16C54XTP	Farnell
IC2	1	CD4028B	CD4028BCN	Farnell
IC3	1	PCD3311C	PCD3311CP	Farnell
IC4	1	TL072	RA68Y	Maplin
IC5	1	EL2232	UR10L	Maplin
IC6A, 6B, 7A, 7B	4	74HCT4351	PCF74HCT4351P	Farnell
Digit Keypad	1	Numeric Keypad	JM09K	Maplin
SW1-8	8	Click effect switch	FF87U	Maplin

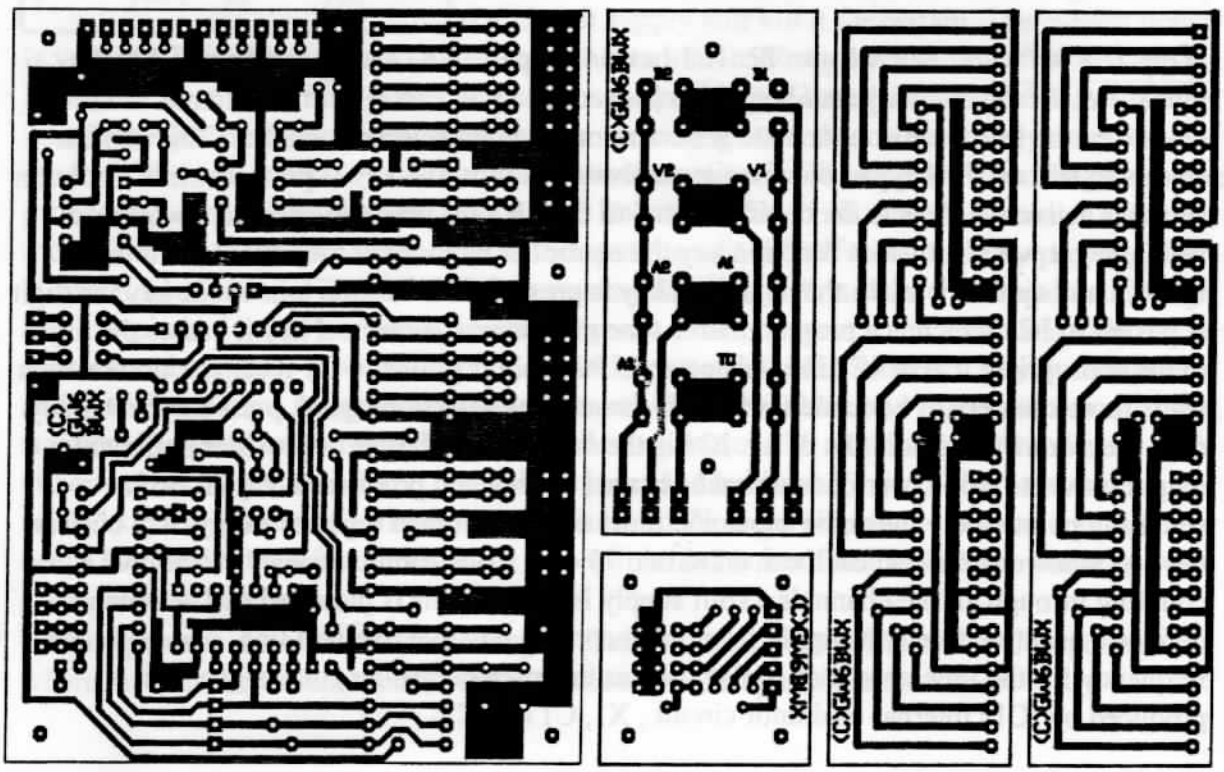
You can use front panel mounted switches instead of SW1-8 if preferred, in which case you will not need the FF87U switches and the alternative types can be wire linked together. For selecting your antenna number you need ***either*** a DIL switch (Farnell 285-950) ***or*** pins and links (Farnell pins 312-241, links 312-307). If you expect to change selection often you could wire the PCB to front panel toggle switches. IC1 must be the "XT" version of the chip, and must be programmed before fitting to the board. You will also need about 1 metre of tinned copper wire to make the links on the PCBs and about 1 metre of insulated wire to connect the keypads to the main board.

How it works: Microcontroller IC1 has a 4 bit port (RA) and an 8 bit port(RB). RA pins 0,1 & 2 carry a binary number which is decoded by IC2 to select the columns of the keypad or the select pins on the tone generator or the input selector switches. This number counts so that all the keypad columns are activated in turn. If a key is pressed while a column signal is active it connects the column signal to the RB pins where the program works out which key it was. If it was a function key the controller memorises the new mode it is to work in and applies it when the next digit key is pressed. If it was the tone mode key the digit is passed to IC3 which is a programmable tone generator, if a channel key it passes the digit to the appropriate IC6 or IC7 input selector. If RA3 pin is pulled to 0V it starts a timer which waits three-quarters of a second then sends the antenna selection signal, pressing the AS key does the same but without the delay. IC4 is the audio output buffer, it provides sufficient output power to drive two loads on each channel at once and produces a virtual earth summing point where the audio input and tones can be summed together safely. IC5 buffers the two video channels so each can drive two 75 ohm loads simultaneously. To allow DC coupling through all the channels a split supply is needed, this is provided by U1 which derives a negative five volt supply from the incoming positive five volt line. The reference frequency for the tone generator is also used as the microcontroller clock signal and is produced by IC1s internal oscillator circuit , X1, C1 and C2.

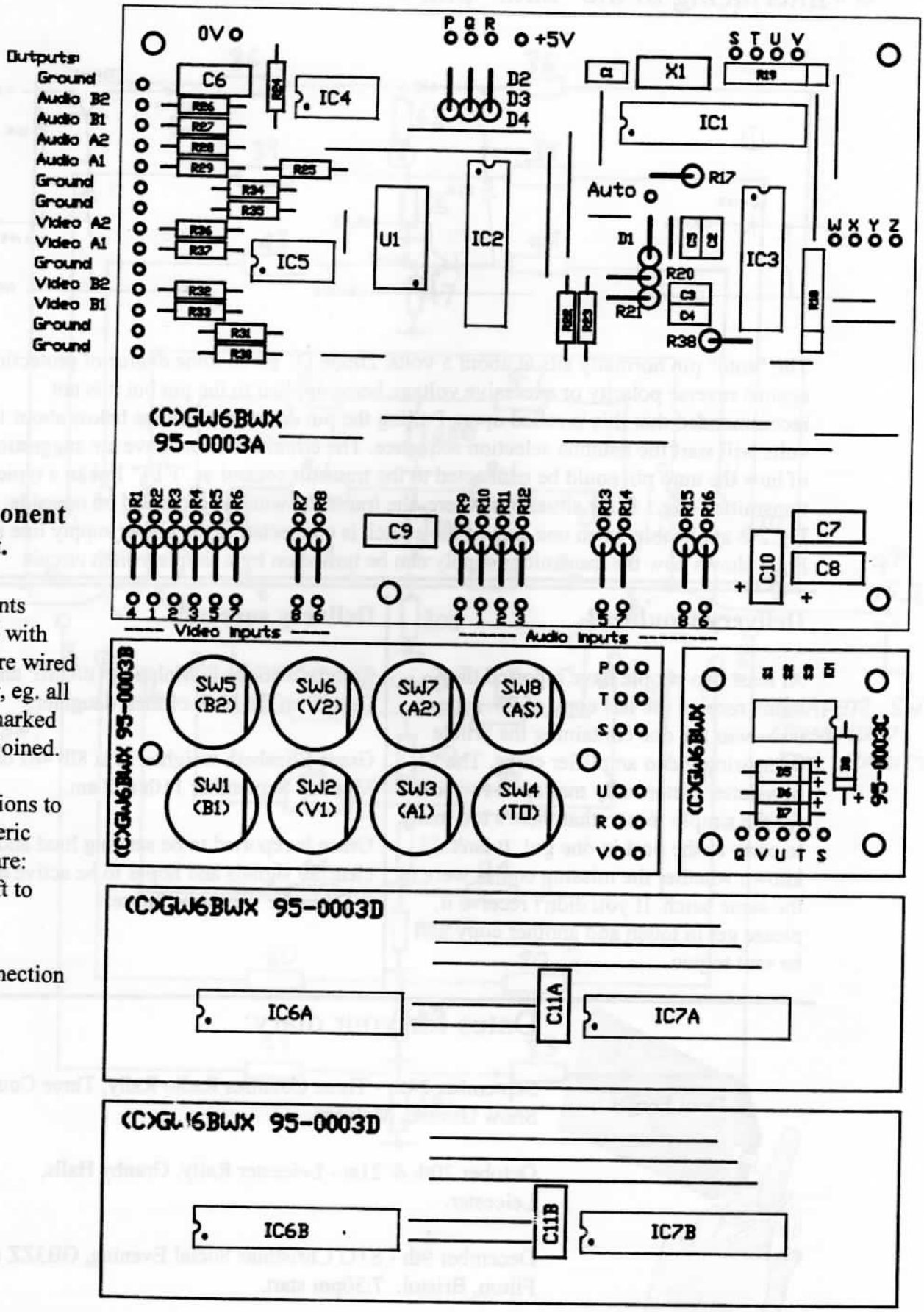
Switcher circuit diagram (C) GW6BWX



PCB track layout (*actual size*)



PCB Component layout.



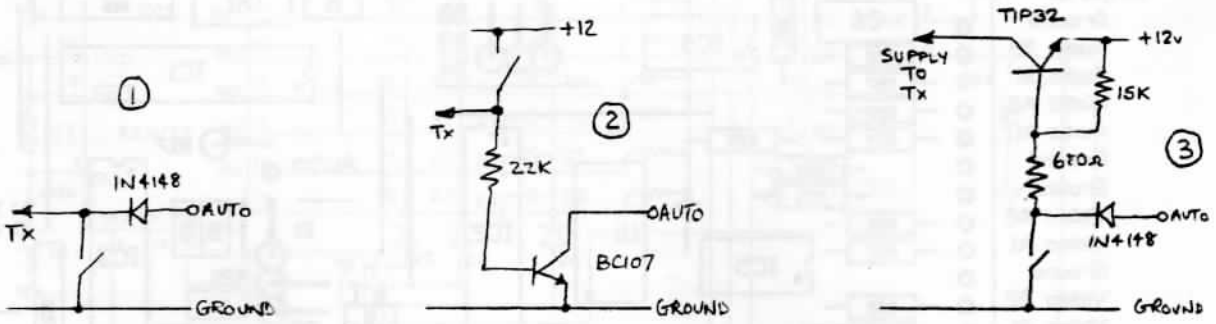
The points labelled with letters are wired together, eg. all points marked "T" are joined.

Connections to the numeric keypad are: (from left to right)

1. No conection
2. Q
3. P
4. R
5. Z
6. Y
7. X
8. W

The pin marked "Auto" is intended to be connected in such a way that it is joined to ground either directly or via a resistor of 1K or less at the start of your transmission. Under no circumstances connect it to a voltage source above 5 volts or a negative voltage.

Interfacing to the "auto" pin.



The "auto" pin normally sits at about 5 volts. Diode D1 gives some degree of protection against reverse polarity or excessive voltage being applied to the pin but it is not recommended that this is relied upon. Pulling the pin down to a voltage below about 1.5 volts will start the antenna selection sequence. The circuits shown above are suggestions of how the auto pin could be connected to the transmit control or "PTT" line in a typical transmitter. Fig.1 is for situations where the transmit switch is grounded on one side, Fig.2 is applicable when one side of the switch is connected to the power supply line and Fig.3 shows how the transmitter supply can be turned on by a simple switch circuit.

Delivery troubles?

At least two people have reported they didn't receive the last copy of P5. Junes issue was the one containing the article comparing video amplifier chips. The newsletter is normally mailed in two lots for the simple reason that there's too many to carry to the post in one go! It isn't known whether the missing copies were in the same batch. If you didn't receive it, please get in touch and another copy will be sent to you.

Delivery success!

Congratulations to Malcolm G0UMP and Derryn on the birth of their daughter.

Grace Elizabeth weighed in at 8lb 4oz on Monday September 11th at 2 am.

Grace is reported to be sending loud and clear S9 signals and hopes to be active on ATV in the very near future.

Dates for your diary:

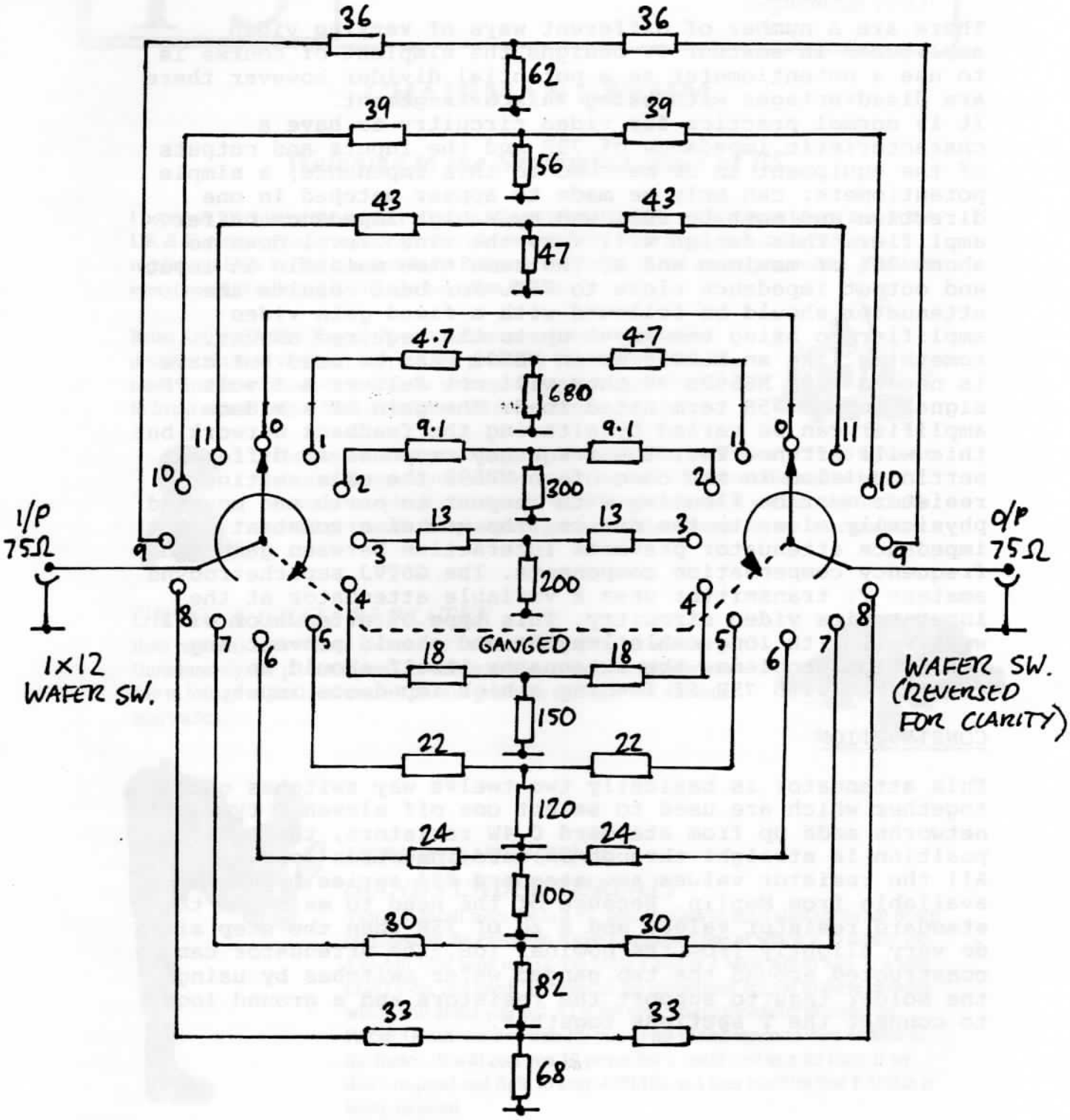
September 24th - Three Counties Radio Rally, Three Counties Show Ground, Malvern.

October 20th & 21st - Leicester Rally, Granby Halls, Leicester.

December 9th - STG Christmas Social Evening, GB3ZZ site, Filton, Bristol. 7:30pm start.

A 75Ω CONSTANT IMPEDANCE ATTENUATOR
0-11 dB 1dB STEPS.

by G6TVJ



A 75R CONSTANT IMPEDANCE ATTENUATOR by Ian F Bennett G6TVJ

Here is a design for a video variable attenuator in the range 0 to 11dB with a characteristic impedance of 75R and a step size of 1dB.

There are a number of different ways of varying video amplitudes in amateur TV designs the simplest of course is to use a potentiometer as a potential divider however there are disadvantages with using this arrangement.
It is normal practice for video circuitry to have a characteristic impedance of 75R and the inputs and outputs of the equipment to be matched to this impedance, a simple potentiometer can only be made to appear matched in one direction and must be followed by a high impedance buffer amplifier. This design will vary the video level down to about 25% of maximum and at the same time maintain an input and output impedance close to 75R. For best results the attenuator should be followed with a fixed gain video amplifier to bring the level up to the required amount, something like an EL2020 or an NE592 can be used but care is needed with NE592s as they will not deliver a 1 volt PP signal into a 75R terminated load. The gain of a video amplifier can be varied by altering the feedback network but this will often effect the frequency response at different settings, also in the case of an NE592 the gain setting resistor must be floating with respect to earth and mounted physically close to the device. The use of a constant impedance attenuator prevents interaction between gain and frequency compensation components. The G6TVJ superhetrodyne amateur TV transmitter uses a variable attenuator at the input to its video circuitry. This type of attenuator will work well with long cable lengths and should prevent any reflection problems, the attenuator itself should be terminated with 75R if feeding a high impedance input.

CONSTRUCTION

This attenuator is basically two twelve way switches ganged together which are used to select one off eleven T type networks made up from standard 0.4W resistors, the twelfth position is straight through or zero insertion loss.
All the resistor values are standard E24 series types available from Maplin. Because of the need to maintain the standard resistor values and a Zo of 75R then the step sizes do vary slightly from the nominal 1dB. The attenuator can be constructed around the two ganged wafer switches by using the solder tags to support the resistors and a ground loop to connect the T sections together.