An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

Formerly the RSGB Microwave Newsletter and now published by the UK Microwave Group

FROM THE EDITOR

2004 – JULY/AUGUST

At last, here we are as Scatterpoint! It's taken a while and we hope you all think it's been worth the move. If you are a former reader of the RSGB Microwave Newsletter, you won't notice very much change in this issue, apart from the logo above and the much improved print quality, but we do hope to bring in some more interesting changes as time goes on. Many thanks to all our contributers to his month's edition

The idea of having a self supporting amateur UK Microwave Group, with real identity and a bit of "clout" has been a dream for some time.Now it's a reality. All of you reading this are now members of UK Microwave Group, whether you live in the UK or not. You all have a say in what the Group does and we welcome your suggestions for future projects and activities. The Committee can be contacted via email or "snailmail" post. This newsletter is your forum. Articles, news, advertisements and general comments are most welcome. While we can't compete with the Internet for up-to-the-minute news, we are probably the next best thing, being weeks ahead of the amateur radio magazines.

As you can see by the date above, this issue covers the two midsummer months. A similar situation exists for the period November-December when there will be one issue. The rest of the year sees an edition each month, thus making a total of ten newsletters a year.

See you all again in September and thanks for supporting the UK Microwave Group!

73 from Peter Day, G3PHO, Editor

In this issue ...

News, views and articles for this newsletter are always welcome. Please send them to G3PHO (preferably by email) to the address shown below. The closing date is the Friday at the end of the first full week of the month if you want your material to be published in the next issue.

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SUBSCRIPTION ENQUIRIES SHOULD BE SENT TO THE UKuW GROUP SECRETARY AT THE ADDRESS SHOWN ON PAGE 2

About the UK Microwave Group

The Group is affiliated to the RSGB and, through the Group Committee and the RSGB Microwave Manager, works with the RSGB Spectrum Forum in matters of interest to the amateur microwaver.

Membership of the UK Microwave Group is open to all interested in amateur microwaves whether they are resident in the UK or not.

Membership benefits include the Group's newsletter, Scatterpoint which is published ten times a year, discount on Group products, representation via the Group committee on the RSGB Spectrum Forum, fully voting rights at Group meetings, UKuG-organised microwave events in the UK such as contests and "microwave roundtable meetings", operating awards and trophies. The Group's Annual General Meeting is held at Martlesham, Suffolk, each November.

Membership enquiries and applications should be sent to the Group Secretary. A membership form is available at www.microwavers.org/ukugmemb.htm

Annual Subscription rates (renewable on or before July 1st each year) are as follows and include **10** copies of Scatterpoint per year:

UK residents:
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Residents outside Europe and Eu Zone:
Details can be obtained from the Group Secretary

IMPORTANT:

Overseas subscribers should send sufficient extra funds, in excess of the amounts stated above,to ensure that the UK Microwave Group receives the full subscription amount AFTER all due commissions and levies by the bank or PayPal. Please check current exchange rates and PayPal commission rates before you send your money.

Subscriptions can be paid by any of the following methods (please note that we cannot, at present, accept payments by credit card):

- **UK cheque payable to the "UK Microwave Group"**
- **Cash (only Sterling, Euro or U.S dollars) posted in an envelope at your own risk**
- **Banker's draft (expensive!) or International Money Transfer to the Group's bank account**
- **PayPal (details available from The Treasurer, G4KNZ)**

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Report on Ham Radio 2004 .... by Jonathan Naylor, G4KLX

This was my first visit to Ham Radio for two years. My last had been in 2002 at the old Messe in Friedericksh afen when I had bought my 10W PA for 3cms. This time, my shopping list was probably even longer and more expensive. My first (and at the time I though, only) visit was on the Friday when, due to some unpleasantness on the border, I was unable to drive to the New Messe as hoped. I got around the problem by driving to Romanshorn and taking the ferry as a foot passenger; free buses operated between the ferry terminal and the Messe. I found the new Messe to be an improvement on the old one. True, it is still essentially a large box but the new one seemed to be nicer in lots of ways.

My first port of call was to the DB6NT stand to drop off some items and to pick up a 3.4GHz transverter and an EME pre-amp for 23cms. The pre-amp had its usual calibration data and had a NF of 0.32 dB ... wow ! Michael showed me the box containing his 50W PA for 3cm that was used at the 20m dish in Bochum and it was explained that the 200W PA was still at the dish focus for access reasons. The problem they had with leakage through the waveguide switch blowing up the pre-amplifiers had unfortunately still not been sorted out.

As usual, the DB6NT stand was a magnet for microwave operators and, on the Friday, I met Arnold HB9AMH for a long chat, along with Klaus DL3YEE. In the same area as DB6NT was Eisch Electronics, ID-Electronics and Dirk Fischer, DK2FD, who took over the DL2AM amplifier business when Philip Prinz retired. Each stand had lots of goodies and I could have spent (actually I did!) a lot of money at each. My shopping list included things to build up a 23cm EME system and a 9cm system.

After visiting USKA, the Swiss national society, and notifying them of my change of address to the UK, I moved on to the flea market.

The flea market was held in two halls that were almost the same size as the main trader area. Unlike the trader area, the flea market did not have any sort of list of traders which meant that you would have to spend days looking around in order to see everything. Luckily I only had two stands I really wished to see. I already had the locations for both written down and so I was able to see both easily. First, I saw DG0VE who does a set of modules for most of the microwave bands, including multipliers and small amplifiers. Next, I went to see DL4KH who, along with making nice antenna hardware, also does complete amplifier control systems for various valves like 4CX250Bs and the Russian valves.

After that I did a little more wandering around and saw I0JXX who designs and sells high gain yagis and associated hardware. He had what appeared to be Tonna style element stand offs for 23cm antennas, and DJ3FI was there selling huge valve amplifiers. I have been told that OE9ERC was also there, selling OE9PMJ's equipment, but I missed that. Since I had limited time, I did not spend long looking at other stands, which is a shame. Another problem I faced was that I was flying and so I was limited to the size and weight of the equipment I could take with me. In one case I actually paid extra to have it sent to my home in the UK rather than try and carry it on the plane.

I returned to Ham Radio again on the Sunday primarily to swap the 23cm EME pre-amp and also to pick up some more parts that I had remembered that I had needed in the intervening day. Due to an oversight, I had the version with SMA sockets, and I wanted the version with the N plug so as to reduce losses in the system. The exchange was made and the new pre-amplifier had a NF of 0.39 dB. However, after the co-ax adapters required, it is unlikely that the previous one would have been much better than this figure. At the stand this time I met Rico DF2CK and Dave G4RQI.

The show seemed quieter on the Sunday and a number of traders were starting to pack up even as I arrived at around 10am. Howeve,r the stand that I was interested in, UKW-Berichte, was still set up and I plundered them for all manner of co-ax connectors that would be useful for my 9cm system.

On the way back home, I bumped into Gordon, VK2ZAB, on the lake front while waiting for my ferry. He is a big V/U/SHF DX operator from Sydney and we chatted about EME and other topics. He mentioned that there is a daily schedule between operators in Melbourne, Sydney and Canberra on 23cm using aircraft scatter and it lasts for eighteen minutes.

The conversation was unfortunately cut short by my ferry arriving. I had some more unpleasantness with Swiss customs on the way back in, caused by them having previously marked my passport. Despite this I enjoyed the two days at the show and wished it had been longer.

There is much more I could say about Ham Radio 2004. I met many non-microwave amateurs and attended a DX Dinner on the Friday night at Lindau and may be peripheral to the story but added to the experience to make it extremely memorable. I hope to be back next year, maybe with a van so I can bring home all the things I would like to have brought home this time.

Recent threats to the Amateur Services in the Microwave bands.

Part 1

Introduction

What follows is an extract of some of the many papers which have been submitted, by various commercial users, to the various radio authorities throughout Europe and the UK. The news is a bit like the proverbial Curate's Egg – good in parts and bad in others, but unfortunately, mainly bad!

However you view it, the eventual outcome may seriously affect all amateur microwave operators and their ability to exploit "very low signal-flux" signals. If you need more detail than that given in this brief review, the references in the text will provide you with some good bedtime reading!

The "6cm" band

As a result of CEPT WGFM (Warsaw 2002), all EU countries and some other European countries have implemented an "interim" regulation allowing 5GHz WLAN devices which are not fully compliant with the ERC decisions. Subsequently, WRC 2003 adopted the "Mobile Service" allocation of 455MHz of spectrum for "Wireless Access Systems, including WLANS" in the 5GHz band. ETSI is currently revising the EN 301 893 Harmonised Standard because of the outcome of WRC 2003.

What this all means will become apparent from what follows ... I leave it to you more technical guys to work out what the impact might be!

EICTA paper 04-001-RSPC, Brussels 21January, 2004

- **5150 – 5250MHz:** "indoor only", max. EIRP 200mW, max. PSD 10mW/MHz.
- **5250 – 5350MHz:** Main use "should be indoor, but outdoor not prohibited", max. EIRP 200mW (with no restriction on antennas), 1W if antenna mask used, max. PSD 10mW/MHz for 200mW systems, 50mW for 1W systems + antenna mask.
- **5470 – 5725MHz:** Indoor + outdoor, max. EIRP 1W, max. PSD, 50mW/MHz.

OfCom "Radio Interface Requirement 2007", 19 December 2003

- Note that these parameters are interim and subject to revision in light of changes to the EN 301 893 Harmonised Standard, mentioned above.
- **5725 – 5850MHz:** max. EIRP 2W, max. PSD not greater than 100mW/MHz, duplex TDD
- DFS "Equipment operating in this band must implement a random channel access mechnism capable of operating across all of this frequency range. Shall prevent co-channel operation in the presence of Radar signals. The DFS detection threshold sgall be based upon -67dBm for devices with EIRP greater than 1W, -64dBm from 200mW to 1W EIRP, -62dBm for devices less than 200mW.
- These thresholds represent the levels at the output of the antenna, and are normalised to 0dBi antenna gain. For devices with a higher gain, the threshold may be increased by 1dB for each dB of antenna gain.
- Footnote 1: Licences shall be issued on a non-protection and non-interference (to other Primary Users) basis.
- Footnote 2: The EIRP PSD shall not exceed the following values for the elevation angle θ above the local horizontal plane (of the Earth)

-34dB(W/4kHz)	for $0^o \le \theta < 4^o$
$-34 - 1.2(\theta - 4)$dB(W/4kHz)	for $4^o \le \theta < 28^o$
-62.8dB(W/4kHz)	for $\theta \le 28^o$

or, for Azimuth beamwidths less than 25°:

-34dB(W/4kHz)	for $0^o \le \theta < 90^o$

- Table A1, on the next page, gives a channel plan:

Carrier centre frequency, Fc (MHz)		
5MHz channelisation	10MHz channelisation	20MHz channelisation
5275.5, 5732.5, 5737.5, 5742.5, 5747.5, 5752.5, 5757.5, 5762.5, 5767.5, 5772.5, 5777.5, 5782.5, 5787.5, 5792.5, 5817.5, 5822.5, 5827.5, 5832.5, 5837.5, 5842.5, 5847.5	5730, 5740, 5750, 5760, 5770, 5780, 5820, 5830, 5840	5735, 5755, 5775, 5835

There are some exclusion zones (at the moment) and these are shown in the next list: (see Ofcom file 5.8_ex_licence.pdf)

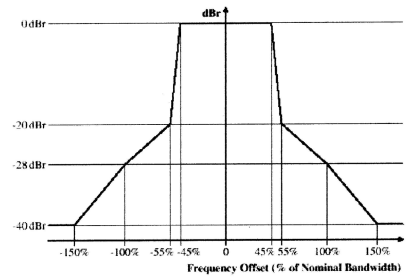
"Use of radio equipment is permitted in the frequency bands between 5725MHz to 5795MHz and 5815MHz to 5850MHz and may be used anywhere in the United Kingdom ***except in the areas shown below where no use is permitted."***

NGR	Eastings	Northings	Radius (km)
TQ	300	800	20
SK	113	003	20
TQ	139	121	10
SU	375	616	10
SP	060	836	10
SE	095	040	10
SK	461	132	10
SJ	368	979	10
ST	588	398	10
NO	499	178	10
NS	333	294	10
SP	179	957	10
SK	424	258	10
TQ	574	648	10
SP	675	427	10
SP	897	912	10
TQ	242	722	10
SO	952	245	10
SU	923	688	10
TQ	215	585	10
SU	982	677	10
NZ	378	666	10

Figure A2 gives a spectral power mask for all the channelisation schemes:

G3PFR,
RSGB Microwave Manager

Figure A2: Spectral Power Mask for 5, 10 and 20 MHz channelisation schemes



dBr is the spectral density relative to the maximum spectral power density of the transmitted signal. For 5, 10 and 20 MHz channelisation schemes this mask should be scaled accordingly

MARTLESHAM MICROWAVE ROUND TABLE 13-14th NOVEMBER 2004

While this annual microwave gathering is not yet Europe's answer to the American Microwave Update, there's no doubt that it gets better and better each year. For the first time in many moons we are not struggling for speakers! In fact there has been excellent response to a recent Internet plea for people to take the stage at this event.

The Martlesham Amateur Radio Society with the help of the UK Microwave Group are presently putting together a whole weekend package for you ... that's right, a **weekend package**! We plan to have something happening on both days, from around lunchtime on Saturday to late afternoon Sunday. The usual test gear (including antenna testing) and the bring and buy surplus tables will be there as will the Saturday night dinner but we expect to have double the number of lectures this year, with some on the Saturday afternoon. If you want to be fully included in the happenings then watch this space and book the weekend away from home!

Details of hotel reservations and the programme for the two days will be published as soon as possible. Eventually there will be information posted on the UKuG website: **(www.microwavers.org)** and on those of G4DDK and G3PHO.

At the time of writing this we have prior notice of attendees from the USA (maybe 3), Germany, Belgium, Holland and even Scotland ... truly an international event!

The Martlesham Round Table is also the venue for the annual general meeting of your very own microwave organisation... the UK Microwave Group.

So put the dates in your diary now!

UK MICROWAVE GROUP INTERNET REFLECTOR

http://groups.yahoo.com/group/ukmicrowaves/

This has recently been changed so that new subscribers have to be approved, but this is fairly automatic, implemented due to a few junk emailers joining up and posting promotional messages.

The group web site is: **http://www.microwavers.org/**

THE 10GHz WHITEBOX ... A FLASH FROM THE PAST

This late 1980s/early 1990s surplus M/A Comm gear is still around, especially in the USA and Canada! In fact a couple of units were on sale for £90 each at the recent Elvaston Rally in the UK. For readers who may still have one of these rugged units, there is a wealth of modification information available on the Internet to allow the owner to get onto 10GHz narrowband at modest cost. The latest addition to this information comes from Steve, VE3SMA (we like that callsign!). The email tells all. If you download the article be aware that it is in MS Word format. An Acrobat PDF version can be obtained from the Scatterpoint editor on request. The article mentioned below also contains the Internet links to the WA6CGR and G3PHO whitebox mod articles, which should both be read before embarking on the changes to Microwave Associate's equipment.

From: Steve Kavanagh, VE3SMA [sjkavanagh1@yahoo.ca]:

Tom, VE3IEY, has put the notes assembled by Murray, VE3NPB, and myself on the conversion of the M/A-COM "White Box" to 10 GHz transverter service up on the Ontario VHF Association website at:

http://amherstisland.on.ca/ovhfa/resources.htm

It is in Microsoft Word format (at least for now) and is about a 1.6MB file. It covers what has been done to get VE3NPB's transverter on the air, but he and I are still working on a few bits - hopefully we will be able to update the notes when it's finished ... but it really is notes, not a full tutorial on how to do the conversion. You should read the earlier descriptions by WA6CGR and G3PHO first.

I hope this is useful to those of you who have acquired one but do not yet have it running. Thanks to the many denizens of the WA1MBA reflector who have provided assistance and suggestions regarding this project.

73, Steve VE3SMA

144MHz direct conversion receiver with I/Q outputs for use with Software Defined Radio

by Andy Talbot, G4JNT

In the RF path, two modamps, a MAR-6 and a MAR-3 amplify the RF; there is a two stage bandpass filter between them with 10MHz bandwidth. The output feeds into two SRA-1 type DBMs via a resistive splitter, with the quadrature LO signal generated using a MiniCircuits PSCQ-2-160. This device guarantees less than 3 degrees phase error over 100 to 160MHz. As 144MHz is near the middle of the range we can expect a fair bit better performance here.

The local oscillator is an AD9851 DDS, currently clocked at 100MHz, generating 16 to 16.67MHz followed by a X9 RF multiplier. The DDS source is not described here, but the module in a basic form is described in Reference 3. The active stages in the multiplier consist of MAR-6 modamps configured as a pair of cascaded tuned X3 stages with a final MAR-6 as amplifier/limiter, this combination forming probably the simplest tuned RF multiplier possible! (There are a couple of CW spurii generated by the DDS but I know where they are and can ignore them). All filtering is designed to allow the LO to tune over 144 to 150MHz to cover a bit wider than the normal 2MHz narrowband segments on the microwave bands, and allow for odd LO frequencies. Multiplier output level is +10dBm drive to the quadrature hybrid.

By using the internal X6 option in the AD9851 DDS Chip, the LO can be driven from a 10MHz frequency reference, producing a clock of 60MHz, but this has not been implemented yet. Hopefully spurious levels will be no worse, with none falling in the beacon bands at the lower clock frequency.

The mixer outputs drive a pair of identical NE5532 opamps with a voltage gain approaching 300 (exact value a bit uncertain due to internal impedance of the mixer IF port) No clever matching, just the mixer feeding the inverting input giving 800 ohms input resistance at audio and low pass filtering to get rid of RF leakage. The I/Q outputs feed another pair of op-amps with precisely switchable gain from 0 to 40dB in 10dB steps. Audio bandwidth is not especially tailored but rolls off gently from about 20kHz to allow for 44100Hz sampling rate in a soundcard.

The total system gain and dynamic range is based on 16 bit digitisation and is sufficient, at maximum (+40dB), to place its own thermal noise least 10dB above the quantisation noise pedestal. Strong signals and extra RF gain in transverters is catered for by backing off the audio gain. For signals too strong even for this (80db S/N in 20kHz) an external (calibrated) RF attenuator can be added

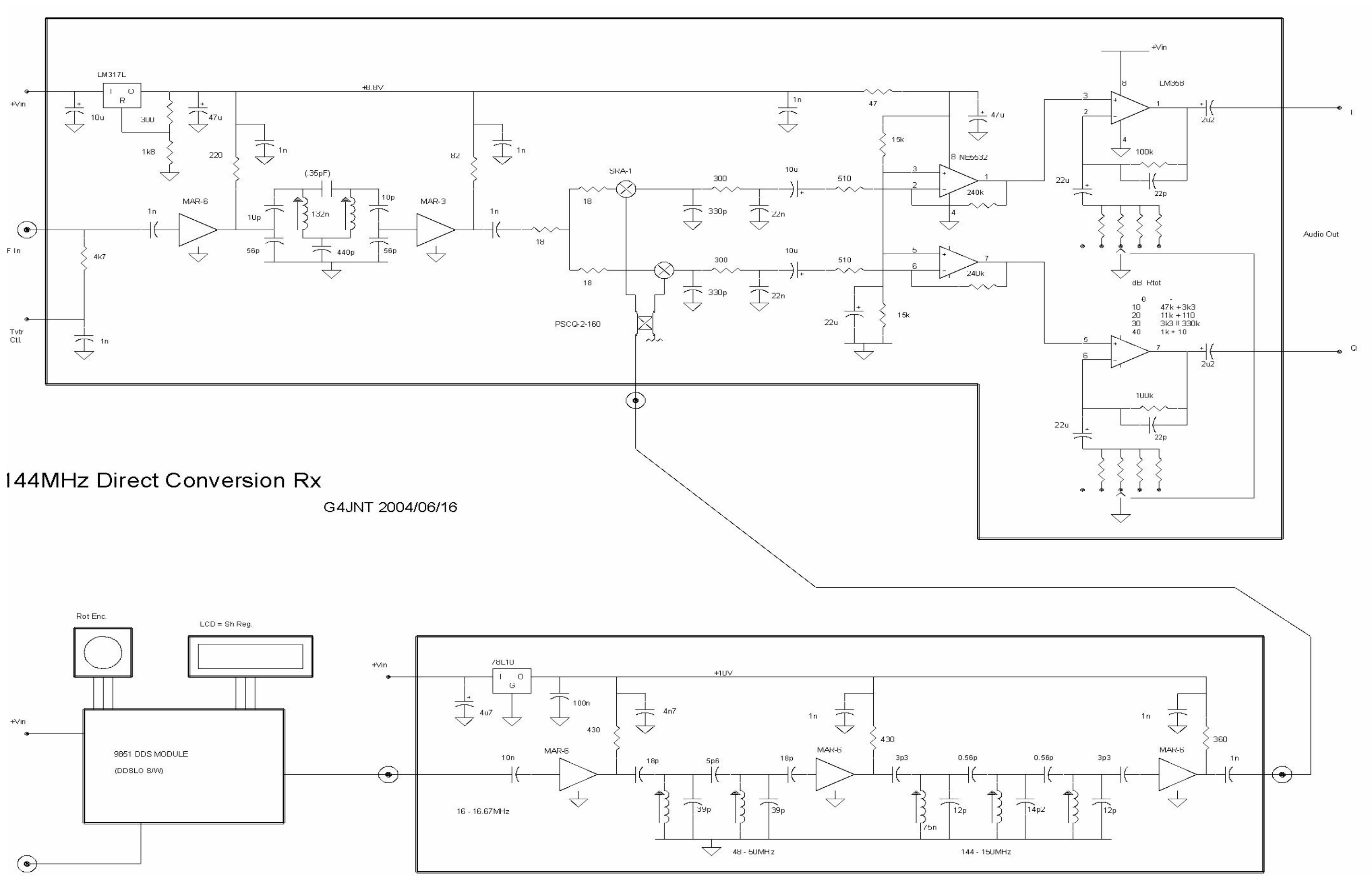
Construction

No attempt was made to put this on a proper PCB. The converter and audio stages were built birds-nest style on a piece of unetched copper clad PCB. Plenty of decoupling and short direct wires ensure stable performance. As there is a lot of gain - particularly at audio - the whole unit was built into a tinplate box for screening

Using parallel and series 1% resistors for the switchable gain stage, no especial trimming or adjustment was necessary. The traces looked well enough matched on a 'scope and, as I was only after 20 - 25dB sideband rejection to make opposite sideband noise insignificant, tweaking wasn't necessary. 3 degrees phase error will give 25dB rejection, assuming amplitude is correct, which is about equivalent to 5% amplitude imbalance. So, if I have a 'bit better' in each case, the 20dB plus is easily achievable. All power rails are regulated and well filtered for operation from a portable 12V supply.

The LO multiplier was made by cutting a 50 ohm microstrip line into a double sided PCB. To quickly make a 50 ohm line without etching, score two lines, 2.8mm apart, through the copper on the top face of the PCB for the full width. Use a Stanley knife or similar, making sure you penetrate the copper fully. 2.8mm width on normal 1.6mm thick fibreglass PBC gives about 50 ohms characteristic impedance. Then score two more lines about 1mm from each of these. Using a hot soldering iron, soften the adhesive and, with a pair of tweezers, lift up and remove the two 1mm wide strips.This will give a single 50 ohm line surrounded by copper groundplane. Drill a number of 0.8 to 1mm holes through the top ground plane to the underside and fit wire links to give a solid RF ground structure. Wire links are best fitted close to where grounding and decoupling components are connected.

Cut the 50 ohm line into segments with gaps for the modamps, DC blocking capacitors and filters. Other connections around the filters are made up birds nest style. When completed and aligned, coils can be held in place with glue.


144MHz Direct Conversion Rx
G4JNT 2004/06/16
LM317L
+Vin
+8.8V
MAR-6
MAR-3
SRA-1
PSCQ-2-160
NE5532
LM358
Audio Out
dB Rtot
0 -
10 47k +3k3
20 11k + 110
30 3k3 !! 330k
40 1k + 10
F In
Tvtr Ctl.
Rot Enc.
LCD = Sh Reg.
9851 DDS MODULE
(DDSLO S/W)
78L10
+10V
16 - 16.67MHz
48 - 50MHz
144 - 150MHz

AD9852 DDS Module Controller Software.

Andy Talbot G4JNT July 2004 (email: actalbot@southsurf.com)

This is a preliminary description of the software within the PIC controller to be supplied with my DDS kit (see June newsletter). It may (almost certainly will) change, and is being supplied to allow comments from potential users while I can still easily change things...

There is scope with the PIC for an LED to monitor programming progress - I haven't decided how to use this yet but it may prove useful when entering some of the 'blind' data manually.

The commands are broadly based on AD9850/51 module of a few years ago, but the address character within that protocol has been abandoned, This function had been added at the request of one user to allow multi-drop serial programming, but proved rather cumbersome when writing driver software.

If you want any additions to this, or think I've forgotten something vital, please shout now.! The PIC is only 66% full, so with all complicated routines already in place, there is plenty of space for added features - its just the time to add them!

Overview

The DDS module is supplied with a PIC microcontroller that contains code to allow the AD9852 to be controlled via an RS232 serial link from an ASCII terminal such as a PC running Hypertrm software. A further input to the PIC can be used for an external trigger, so the updating of the DDS output can be synchronised to an external even such as a UTC pulse from a GPS receiver.

Setting up the serial link

Set your terminal programme to 19200 baud, 8 data bits, no parity and 1 stop bit (19200 N81). Turn off local echo and do not enable CR-LF translation on receive. Connections between the PC and the DDS module are defined in Table 1:

Connection	9 Way Dtype Pin	PIC Connection
TXD	3	Port B0 (via resistor)
RXD	2	Port B3
Gnd	5	Gnd

Table 1: RS232 interface connections

Connect the serial link and switch on the DDS module. After about half a second delay, a display similar to that in Table 2 will appear.

All the registers in the AD9852 chip are loaded with the values stored in EEPROM, either the default initial values, or any that have been subsequently changed by the G command (see below). As supplied the default will result in an RF output at exactly 0.25 times the clock frequency, with no PLL multiplier in use. All other registers are the same as the manufacturers default start up settings.

Controller Software

The AD9852 DDS chip has got quite a comprehensive set of capabilities which are controlled by writing appropriate values to its working registers then triggering (updating) the device. The controller software has two main functional capabilities.

For simple frequency generation and phase shifting requirements, a straightforward command structure for quickly updating CW frequency or phase is implemented, with separate commands to update the DDS with these changes either immediately, or on an external pulse edge. The option of writing the current frequency to non-

volatile storage (internal EEPROM) for immediate start up next time the module is turned on is also possible.

The other mode of operation allows any of the internal registers to be written individually, giving full access to the chips functionality. All register contents altered using these commands are stored in EEPROM and loaded in the next time the module is turned on.

A final option is available to allow users to store a string of up to 15 characters in EEPROM for reading back on the serial link; they perform no action on the DDS chip itself. This can be used, for example, to store the clock frequency so any DDS driver software can read this value back, and so be used with several different modules, each with their own clocks.

9852 DDS Controller G4JNT

Qxxxxxxxxxxxx[cr] Pxxxx[cr] U W R V K R

0 = 00 00
1 = 00 00
2 = 00 00 00 00 00 00
3 = 00 00 00 00 00 00
4 = 40 00 00 00 00 00
5 = 00 00 00 00
6 = 00 00 00
7 = 10 64 01 20
8 = 00 00
9 = 00 00
A = 00
B = 00 00

K 240000000

Table 2

Commands

Immediate programming

Pxxxx[cr] Sets the phase of the RF carrier output. The format must be exactly as shown with xxxx replaced by hexadecimal ASCII characters. eg. P8000[cr]. The new phase is programmed into the AD9852 (although not into EEPROM) but does not take effect immediately.

The characters are not echoed back to the terminal, so when typing in by hand this has to be done blind. If the command is recognised, the controller responds with a single P followed by [cr][lf].This command controls the contents of DDS register 0

Qxxxxxxxxxxxx[cr] Sets a new frequency of the single carrier output.

The format must be exactly as shown with xxxxxxxxxxxx replaced by hexadecimal ASCII characters. eg. Q0280000000AF[cr]. The new frequency is programmed into the AD9852 (although not into EEPROM) but does not take effect immediately.

If the command is recognised, the controller responds with a single Q[cr][lf]. This command controls the contents of DDS register 2

U This command updates the DDS chip with the new P or Q values set in the above commands. When complete, the controller responds by sending Z[cr][lf] No carriage return is needed after any single letter commands

T Triggers the controller to wait for a positive edge on the external timing input (Port B2) before updating the values from the P or Q commands. 'Z'[cr][lf] is returned when the update is done. Note that while waiting for the positive timing edge, the controller will be deaf to any further serial commands and may have appeared to 'hang'. This situation has to be checked for in any driver software by looking for the acknowledgement Z before issuing any further commands.

W Writes the current frequency to EEPROM. This command will only be accepted immediately after a P command has initially been issued. If accepted, the controller responds with a 'Z'

Register Programming

The individual AD9852 registers can be updated one at a time and the values are always stored to EEPROM for immediate start up. The AD9852's registers have different lengths depending on their function, from one to six bytes in length. There is plenty of scope for incorrect operation and unexpected results, particularly when programming the control register. Read the data sheet carefully before changing registers!

The G command is used to update an individual register:

Type G and the controller responds with 'Reg No' No [cr] is needed after the G

Enter a value from 0 to 9, A or B. There is no need to enter a carriage return.

The controller responds with 'x bytes of Reg. Data' , where x is a number from 1 to 6.

Enter the data in hexadecimal (with no [cr]), and as soon as the final character of the requisite number is entered, the controller will respond with 'Z'. (Note, one byte of data requires two characters, 6 bytes requires 12 characters).

The new value is immediately written to both the AD9852 register and the appropriate EEPROM register

The V command is used to dump the entire EEPROM contents, in the format shown in the central portion of Table 2.

User Data

These two commands allow up to 15 characters of user data to be stored and read back from EEPROM.

The K command allows data to be entered.

Type K and the controller responds with 'Enter < 15 chars. of user data'

Enter the characters required, followed by a [cr] to terminate. Any ASCII character is accepted, and all letters are converted to upper case. If an attempt to enter more than 15 characters is made, the controller responds with 'Overflow' and the first 15 entered are accepted.

In the interests of conformity, if this data is used for clock frequency it is suggested this takes the form of , for example, '240000000.00Hz' so the readout is meaningful and can be easily read and interpreted by driver software.

The R command reads back the user data

Issue R (with no carriage return), and the controller responds with the stored string

G4JNT DDS KITSET

...an update by Andy Talbot [actalbot@southsurf.com]

I am intending supplying the PCB, AD9852 and programmed 16F84 PIC only Other components required will be a handful of decoupling caps (0805 SMT, 220p or thereabouts) a few Rs, 3.3V 1A voltage reg, 5V 100mA reg, a few other caps.

The RF output from the chip can be by a small tranformer, in which case you will need a suitable core for the frequency of interest, or a resistor giving less power output. Anti-alias filtering is up to you, but pads are included on the PCB for a 5 section (two inductor) elliptic design.

As 3.3V regulators are more expensive than 5V ones, I could be persuaded to include Vregs (both, even) within the kit to take advantage of purchase multiples - but please don't ask me to include Rs and Cs - everything else is easy to get hold of and I'm not prepared to start having to count out and bag up hundreds of tiny SMT components!

An advance copy of the circuit diagram can be supplied on request. PIC source code will be made available to kit purchasers for information and as a source of driver routines.

Andy G4JNT

STOP PRESS!

From: Andy [actalbot@southsurf.com] Sent: 13 July 2004 ....

Last night I got the PIC software driving the AD9852 under control from an ASCII terminal, and generating frequencies from DC to blue light (well, 80MHz actually) under simple keyboard control. There is still a bit of fine tuning to do on the PIC code to make it absolutely robust and lock-up free but that will be easy enough now the fundamentals have tested out OK.

I now need to make up at least one PCB just to prove it will go as designed and I can then start distribution. The cost will be £60 (60 GBP) including post and packing to the UK. Don't send anything yet! I will post on the UK Microwave Group Reflector when the first module has been made up and completed its tests.

Andy G4JNT

This bit goes in here ....

Lloyd Ellsworth, NE8I, shown on the left in the photo above, is demonstrating his 1296 to 47GHz "Sackrider Hill Special" portable microwave station to an interested onlooker at this year's Dayton Hamfest. He tuned into the nearby MVUS 10GHz beacon and had a contact with N8YWG/ **mobile** on 10GHz!

The onlooker could be a budding microwaver or a seasoned veteran, judging by the coils of Andrew Heliax around his neck!

Lloyd hopes to be at Martlesham later this year.

BEACON NEWS

OY6BEC, FAROE ISLANDS 23cm BEACON ...

FREQ: 1296,885
MODE: A1A
QTH: Sornfelli/Tórshavn
LOC: IP 62 MR
MASL: 700
ANT: 13 el. Yagi

QTF: 150 degrees true
EIRP: 150W
Beaconkeeper: OY9JD
Built by: PA5DD & OZ7IS
Keyer: OZ2M
Antenna: OZ1BGZ
QRV: since July 10th 2004.
Vy 73 de OZ7IS, Ivan.

The 23cm Farnborough Beacon

GB3FRS, 1296.850MHz, from IO91PH, is currently off the air. The beacon is owned by the Farnborough Radio Society of which I'm a member and the beacon keeper was/is Mike G8ATK. He has the TX & antenna at his home. I understand the company near the airfield where the beacon was based either moved or closed down.

The Farnham repeater is just a few miles away in IO91OF on 1297.050 operates in beacon mode (vertical polarisation) when not in use as a repeater- which is everytime I have listened to it! Check the following website for information:
http://www.avsi.co.uk/fvhfg/gb3fm.htm

By the way, there is no connection AFAIK between the Farnham repeater group and the Farnborough Radio Society.

Paul G4DCV

GB3SCX BELL HILL 10GHz BEACON

After seeing the June Microwave Newsletter, I need to make clear that the "Experimental 10GHz Beacon" has, by now, actually itself become GB3SCX and I no longer have it running from home.

From: Andy,G4JNT, [actalbot@southsurf.com]

Welcome to the first of the new Scatterpoint activity news. Overseas readers are very welcome to submit reports for this column. However, you folk will find it has a UK bias but this is not intentional! It's just that we get more reports from UK readers.

STARTING AT THE TOP ..... LIGHTWAVES

From Barry, G8AGN, we received this report of his recent initial experiments at this frequency:

I now have a G0MRF Rx board up and running with an OPT210 set up behind a 4 inch glass lens (a hand magnifier from Maplin). I found that B&Q (and other DIY stores presumably) sell a nice piece of black plastic tubing (by Marley?) which is meant for ventilation ducting through a brick wall. It's about 10-12 inches long and my lens is a reasonably snug fit inside. At present the tube is stuck on my cameral tripod with duct tape! For the Tx, I have a laser pointer driven by a square wave via an emitter follower.

I really have no idea what to expect in terms of sensitivity. I first carried out tests in the dusk by shining the laser beam down the garden (about 60 feet?) and reflecting the spot (1 inch diam ?) from some split bamboo fencing. I can hear the signal via reflection fairly weakly (S3-5) and find that the receiver alignment is very critical. On the 13th July, G3PHO and I did a test over a range of over 600 metres (a local reservoir) when S9+++ signals were received. By the time you read this we hope to have extended the range by a considerable amount.

I'm interested in the idea of electrical beam steering and have stripped down a scanner for the mirrors and a CD drive for the laser tilting assembly but haven't played with these yet.

Editor's note: Barry and I are hoping to develop more laser lightwave equipment over the coming months. We'd appreciate hearing from anyone else in or near the Sheffield region who is also interested or has working equipment.

JUNE 10 & 5.7GHz CUMULATIVE CONTEST REPORTS

This was another one of those weird days when conditions made some normally certain paths fail and other less reliable ones go easily! However most operators(apart from those under the electrical storms!) had a good day out as the conditions on both bands improved in the afternoon and early evening. It's estimated that over 30 UK stations were active in addition to our French and Dutch friends.

Peter, G3PHO/P (Houndkirk Moor, IO93EH98) made 24 contacts in 12 grid squares and 3 countries for an average score of 243km per contact. The best DX on 10GHz was F6DKW (JN18CS at 572km) with F1PYR/P (JN19BC next at 536km). F1PYR/P was also worked on 5.7GHz for best DX on that band. André seems to be workable everytime that Peter is out portable, regardless of location chosen! 5.7GHz produced a disappointing 12 contacts.

Steve G1MPW + Dave G6KIE worked from **Firle Beacon, JO 00 BU,** and managed 13 QSOs (8 grid squares and 3 countries) best Dx was Peter G3PHO/P at 298 km. They hope to be out in July from the same site.

Jonathan, G4KLX/P, went to **Bradwell Moor, IO93CH**, for the 6cm and 3cm contest on the 20th June and doubled up with Gordon, G0EWN,so as to check that the KLX system was operating correctly after being idle for a year.

The weather was wretched, drizzle and cold temperatures, but calm. The equipment worked well except that he had to borrow power from Gordon via a long length of cable which meant that there was quite a voltage drop on transmit. As a result, the quality of 3cm transmissions was awful, SSB being unusable and CW having a huge chirp! 6cm was OK .

Conditions were poor and the site not as good as his local Alport Height(IO93FB44). G4ZXO/P is usually 59+ at Alport but was only RST419 on Bradwell Moor. The only signals any stronger were G3PHO/P and G3LRP. GW4DGU was heard on rain-scatter but he disappeared due to technical difficulties at his end.

Jonathan says he won't use the site again, the the only thing in its favour compared to Alport being the lack of nosey visitors who come and ask about what you are doing! It also goes down as the only site in the UK (so far) where KLX's equipment hasn't fallen over and become damaged!

Total score was seven QSOs on 3cm and three QSOs on 6cm, not a classic. A number of well known portable stations were missing, but with the weather as it was, who could blame them!

Paul Marsh M0EYT /P Bell Hill (IO80UU) (pjmarsh@compuserve.com) sends the following report: Having just completed the building and installation of a DEMI LNA, I was keen to test this out. Listening around for beacons was a little more difficult than normal, due to the addition of the new 10GHz LNA to the transverter - GB3SCX was heard in a number of places around it's centre frequency - not too suprising as it was around 250 yards away! GB3CCX was heard though, and much better than before - it was peaking around s4 to s5 throughout the day - proving that the LNA is at least doing something right. The majority or reports I sent were 55 or above. We could certainly hear all stations easily.

The WX was variable during the day, with some very heavy rain coming down at times. Immediately after myQSO with G3PHO, I was called by G3VKV who was beaming North into a large rain cloud - we exchanged 5/4 bothways in SSB!

Best DX of the day was F6DKW near Paris at 397.7Km. We have worked this station before a few times as G4RFR/P. The other good DX was - G3LRP at 307Km. Overall, 19 stations were worked, so not a bad day.

Hopefully, by the July cumulative, I'll have 10 watts or so which help with the rain scatter.

From: Mike, G0JMI /P[mike.karen1@tesco.net] From Cheesefoot Head, IO91JA, with only 5.7GHz we had QSOs with:

STN	RST Rx	RST Tx	Loc	Mode	Distance
G4NNS	59	5/9	IO91FF	SSB	33km
G1JRU	59	5/9	IO90HU	SSB	22km
G4WYJ/P	55	539	IO90WV	CW/SSB	77km

My Tx power was only 45mW QRP to 1m dish.
We also heard GB3SCF at 5/9+ at 78km (IO80UU).
2m Talk Back was operated by Ken, G4FOY/P. We only could operate for a couple of hours on Sunday, so were pleased with the three stations worked.

From: Derek Atter G3GRO/P Ashdown Forest, JO01BB [derek.atter@btinternet.com]: This was the first /P outing on 10GHz that Lech(G3KAU) and I had had for a long time. Apart from a few initial teething problems with an almost a totally new system, things went reasonably well. We had only 3 hours on the site and lost around an hour of that in the middle due to heavy rain (we were operating from the tailgate of a 5-door Granada and had to take cover). Judging however by the black storm clouds and flashes of lightning visible in the distance over the South Downs and reports heard on 2m from Allan, G8LSD, at Chanctonbury of corona discharge from metalwork on his camper van roof, we probably missed the worst of it!

An FT817 was prime mover on 10GHz and a TS200X used for 2m talkback for the first time. Lech's 1W G3WDG system drove my new masthead power booster module behind the 85cm dish with a DB6NT 5W PA and home brew HEMPT LNA. We were also using a new precision rotator, made by AlfaSpid, with a digital readout with <1deg. resolution, bought at Dayton Hamvention. We were very pleased with the ease with which we found the distant station each time exactly at the predicted bearing, without any searching. We made 10 QSOs in total our QSO best being G3PHO/P 277km with a very easy 55 copy. We also worked Martin G3UKV/P at 247km in IO82QL at 59 both ways and 58 both ways with GW8AWM/P in IO81NV.

We had a few teething problems with the 2m talkback, stations reporting poor audio quality. This limited us to 35W RF out but we found later that it was due to a poor contact on the 0V return to the battery from the TS2000. We also had problems with the readability of the digital readout of the rotator in bright sunlight.
However, our session was brought to an abrupt end, just as we were finishing a QSO with G1JRU, by a sudden mini-tornado, out of what was by then a blue sky, accompanied by a loud rushing noise and clouds of dust from the car park! When we turned round to look at the tripod and dish, the whole thing had blown over and was lying in a near-by ditch! Fortunately the only damage appears to be to the edge of the dish which was somewhat buckled and probably will have to be replaced.

From: Paul Gaskin, G8AYY/P [p.gaskin@tiscali.co.uk] Merrytin Low, IO93AD Unfortunately, the weather delayed his start on 144 MHz and 10 GHz and he did not work any stations although heared some activity on 10 GHz. 144 MHz as unusable for part of the time due to rain static and Paul had to spend most of the time sheltering from the rain, but still managed to get soaked!

Paul reports that, according to Midlands TV, the Wrekin is up for sale at £500,000. This could be bad news for radio amateurs if the National Trust buys it! *(At that price there could be a few microwavers who might be thinking of buying it! ..editor)*

From: Allan Wyatt G8LSD/P [allan@r-type.org] Chanctonbury,IO90TV34: A memorable day but for the wrong reasons! Activity was slow at the start due to finger trouble with the bearing set-up on the computer. Then I could only just hear Brian G4NNS and he could only just hear me. At 91 km on a normally solid path this was strange. Another bearing check was indicated and all was well. Brian then worked G3PHO/P and validated his equipment and eventually I tried with G3PHO/P. This proved my RX but left a question mark on the TX side. Then I thought I saw lightning in the distance and at the time I dismissed it. Some minutes later the rain started, then the hail, then the torrential rain with bigger hail stones and finally the storm. I was trying to work Martin G3UKV at the time. The noise was so loud that I had to stop the QSO and then we decided to pull the

plug as the lighting was too close. Any lightning is too close when you are on the top of a hill with bits of metal in the sky! I disconnected all leads and tried to put them as far away as possible from the metal of the van. As the storm moved about a mile south of me the hail stopped and Mary and I could hear a faint and strange noise. It persisted and I investigated. The cause was sparks passing between the PL259 on the 144 MHz downlead and one of the plugs from the umbilical to the microwave head and rotator! The talkback and microwave systems are electrically isolated by virtue of clamping to the plastic covered roof bars. The static between them was producing 2 mm long sparks and when a lightning strike occured in the distance the spark sizzled. A security blanket seemed appropriate at that point. When the storm had passed completely I connected up again and hoped that the rain had not got into the connectors. All worked and on the calling channel was Martin so we picked up where we had left off. The gear worked but after the second contact the black clouds loomed up again and a lower altitude seemed most attractive.

NEW WORLD 10GHz ATV RECORD!

From: Ralph Bird [Ralph.Bird@btinternet.com]
Sent, on 02 July 2004, this email:

Michel, F6HTJ, announced on **www.on4kst.com** That A 3cm ATV contact between **EA7/F1URI** (in IM97CP) and **I8/HE5IBC** (in JM88AD) was over a record 1561km path! Apparently the previous record was 1300km. Just think that this was on ATV, not narrowband and that this distance ranks as one of the best ever, regardless of mode used. Congratulations to both stations.

THAT'S THE LOT FOR THIS MONTH. SEE YOU ALL AGAIN IN SEPTEMBER. PLEASE SEND YOUR NEWS TO G3PHO BY 12 SEPTEMBER 2004.

You live in a hole in the ground?

THEN REMOTE CONTROL YOUR MICROWAVE STATION THE 21st CENTURY WAY!

With the advent of Wireless LAN technology it's now even easier than ever before to have a remote transceiver and antenna system located on a high spot and operate it from below. We've not yet explored the restrictions set by the UK amateur radio licence in this respect but the idea is interesting anyway! With modern WLANs you can remote control over several kilometres, never mind hundreds of metres. We already know of at least one UK microwaver who has such a link back home from his portable site so he can access the **www.on4kst.com** microwave chat room and thereby have this additional "talkback" facility for arranging contacts on the microwave bands during contests. While this may not "go down" well with the purists among us, it is still worth exploring the way in which it's being done, Who know, maybe all of use wll be using www. on4kst.com for "talkback" one of these days! We'd like to hear from readers who have or who are doing similar things.

The following is an email sent to the USA Microwave reflector run by Tom Williams, WA1MBA....

Wireless station W0OHU

We moved to a condo in May 2003 and, by June, I was operational from the condo to my nearby wood private garage - using Wireless LAN as the connection between the condo and garage. I set up a Point-Point wireless LAN, and had PSK31 running on 20m in no time - then I added NetMeeting to bring the audio from the radio into the condo.

Since I needed internet access at the remote computer (to synchronize the clock for WSJT weak signal digital work - I activated ICS (internet connection sharing). So, at that point in time (Aug 2003), I had all working using a dial-up ISP connection from the condo computer. I use VNC to drive the remote computer desktop and I use TRX-mgr to drive the remote radio (was originally a Kenwood TS-690s), and now is a Yaesu FT-857.

2 weeks ago I switched from dialup to cable modem ISP and so now I am getting things going again - Have all working except the remote internet.

I mostly operate on 144MHz and 50MHz and 20m on digital modes. As for controlling antennas, I used X10 to control different power things in the garage (power supplies and blowers (for summer in MN). I am too "cheap" to purchase a computer controlled rotator - but could one easily be added.

I am also working on sending CW via my setup - I have the basic parts and know-how - I just need time, etc!