P5

DECEMBER 1991

NEWSLETTER
OF THE
SEVERNSIDE
TELEVISION GROUP
EDITED BY
SHAUN O'SULLIVAN
G8VPG

IN THIS ISSUE

ANOTHER FIRST FOR GB3ZZ !
WEATHER SATELLITE SYSTEM NOW OPERATIONAL

As promised in the last issue of "P5", in early September GB3ZZ chalked up another first for an Amateur Television Repeater Station. The Repeater now features a 24 hour weather satellite picture service, which can be accessed by any user by means of the DTMF pad used for its other features. For the benefit of those who only watch the repeater, a 40 second slot of weather satellite pictures circulates with the normal testcard/text regime.

The somewhat delayed system (we have been working on it for 9 months) was finally commissioned on 2nd September 1991, and has been working reliably since then. The system currently monitors the European Space Agency Meteosat 4 satellite. The main aerial is a 3 m long 40 element G3JVL quad loop yagi, which is aimed more or less due south at an elevation of 30 degrees. A short length of low loss co-ax feeds the signal to the main downconvertor, which produces an output at 137.5 MHz. This signal is resolved by a standard crystal controlled weather satellite receiver.

This produces an audio signal, which has to be decoded to produce the picture. This is done in a digital framestore, to a design originally produced in the early 1980's by YU3UMV. The framestore produces a picture made up of 256 x 256 pixels with 64 levels of grey. This seems quite poor by some of todays high resolution PC computer type displays, but I think that most people that watch it are reasonably satisfied with the results. Some people have asked why isn't it in colour ?. The reason is that the satellite doesn't send colour, and those pictures that you may see in colour have had it added by artificial means on earth. It is possible that we could add a colouriser at a later stage, but I'm not sure that they are always an asset.

Many repeater users have been quite fascinated by the images produced by the system. It seems to be getting good use, especially when the forecasters say bad weather is on the way. As I write this, on 16-18th October, a very intense area of low pressure passed over Scotland, bringing a few days of unsettled weather. This showed up very well on the satellite, with the characteristic swirl of cloud around the depression. Those of you who are really interested in weather satellites may be interested in joining the Remote Imaging Group. RIG is an RSGB affiliated society that specialise in the reception of weather satellite images. They produce a very good magazine at roughly quarterly intervals, packed full of information on the latest equipment for better reception and picture decoding. I have been a member since it started, and found the newsletter invaluable for hints on debugging and modifying the framestore. Full details of membership are available from Des Watson G3YXO, Norton, Gote Lane, Ringmer, near Lewes, East Sussex BN8 5HX. Don't forget to include an SAE with your enquiry.

Finally, you may be interested in what we are planning to enhance the present system. We are certainly not going to rest on our laurels !. Firstly, Meteosat 4 transmits two channels of information, channel 1 on 1691 MHz (which we currently use) and channel 2 on 1694.5 Mhz. Our receive set up is equipped to monitor either channel, and changing channel simply involves flicking a switch. We hope to get the repeater logic to carry out this function soon. You will key *60# for channel 1

or *61# for channel 2. Of course if you change channel in mid-picture, you may get some funny effects until it re-initialises itself at the start of the frame.
This problem may be eased by the second modification. At present, the picture continuously scrolls at a slow rate. It is possible to freeze a frame, but whilst it is frozen all incoming data is lost. The addition of a second framestore working in tandem with the first would enable a frozen picture to be displayed at all times. Whilst one picture is being displayed, the other framestore would be building up the next pictures.
Another facility which the framestore has is to magnify or zoom a section of the picture. However, this is difficult to use because the section to be zoomed must be selected before the picture is built up. Our technical boys (G8KUW & GW6BWX) are going to see if there is a simple way of achieving this by remote control.
Finally, it was obvious to viewers after a day or so that the picture we get from Meteosat is not entirely noise free. When we were lining up the aerial, there was a little "smooth noise" on the signal. This shows itself as the odd white spot in the blackness of space, which some people thought were stars !. I don't think the problem is too serious, but we will be doing some experiments with a hot pre-amp to see if we can eliminate it. The use of a 1 m dish aerial would probably do the trick, but I don't think that our landlords would appreciate it !.

Now turn to pages 7-9 for full details of the Meteosat 4 picture schedule, including diagrams to show where all those picture segments fit into the globe.

DX TV NEWS

I am sure that many readers know about the DX TV signals that may be received from all over Europe on Band I. The frequencies used are mostly in the range 50 to 70 MHz. We abandoned these for TV broadcasts when our 405 line transmitters shut down in the 1980's, but most countries in Europe still use these frequencies for mainstream broadcasting (hence the initial reluctance to allocate us a 6 m amateur band). Although these signals can be seen throughout the year, the main "season" is during May to September, when intense layers of Sporadic-E form in the ionosphere. These produce very strong signals that may be received on simple equipment, even with an indoor aerial in some cases.
One of our members, Stephen Michie of Kingswood, Bristol, is a real DX TV expert. He has sent me a long list of the stations that he has logged this year, and there are some very rare ones amongst them. There are not too many countries that he has missed. Stephen would be interested to make contact with any other DX TV enthusiasts in the Group. I would be pleased to pass on any introductions.

Continued on Page 10 ...

NEXT SOCIAL EVENING - THE CHRISTMAS PARTY !
7.30 pm SUNDAY 8th DECEMBER 1991
ELM PARK PARISH PAVILION
ALL MEMBERS AND GUESTS WELCOME
DON'T FORGET TO BRING SOME REFRESHMENT !

A Guide to 23 cm Television
by Shaun O'Sullivan G8VPG

In this issue, the serialisation of "A Guide to 23 cm Television" is continued with Chapter 5. This tells you all you need to know about 23 cm FM TV transmitters.
Readers may be interested to learn that in 1992, we have plans to publish the entire series in book form, with suitable illustrations. Infact, the preparation of the illustrations is the main reason why this project has been delayed. Keep reading "P5" for further details.

5. TRANSMITTERS

5.1 WARNING - Before using any transmitter, you must be in possession of the appropriate licence, issued in the UK by the Department of Trade & Industry. For more information on how to obtain an Amateur Radio licence, which requires you to pass at least one examination, please write to the Radio Society of Great Britain, Lambda House, Cranbourne Road, Potters Bar, Herts EN6 3JE, enclosing a large SAE.
5.2 FUNDAMENTALS - By the time you reach this stage, you should have an operating ATV reception station. No doubt watching all the activity on your local repeater has whetted your appetite, and you have now decided that you would like to send some pictures back. To accomplish this you need a transmitter, and a source of video. Video sources will be considered in a separate chapter, so lets now look at 23 cm FM TV transmitters.
Unlike receivers and aerials which need to cover the whole band, the transmitter is usually centred around the lower end of the band. The most common repeater input channel is 1249 MHz, and 1255 MHz is often used for simplex activity. Hence the transmitter can be confined to a relatively small section of the band. The transmitter must be capable of accepting a standard composite video and audio signal, and using these to produce an FM modulated signal which is then amplified to the chosen level. Most transmitters produce an output in the range of 0.5 to 2.5 W. External power amplifiers are then used to boost this if necessary. It is quite easy and inexpensive to generate 15-20 W of RF on 23 cm with modern devices, and few Amateurs feel the need for any more power.
5.3 VARACTOR TRIPLERS - The first Transmitters for 23 cm used the varactor tripler. In a similar pattern to the early days of 70 cm Amateur activity, devices to produce any significant power at the desired output frequency were prohibitively expensive for most Amateur budgets. Hence a signal of up to 10-15 W power level was produced at one third of the required output frequency, which in the case of 23 cm ATV was around 417 MHz. This was then applied to a passive device, the varactor tripler. A varactor diode is a special type of solid state diode which when driven by a signal will produce various multiples of the input frequency. Tuned circuits either side of the diode match the input and select the required harmonic, whilst rejecting the undesired one. Most powerful amongst these is usually the second harmonic, the so called idler, which in our case is right in amongst the UHF TV channels, and hence must be well suppressed if TVI is to be avoided. Although well designed and built triplers could yield up to 60% efficiency, 30-40% is more typical. Thus a 15 W input signal will produce about 5 W out, the missing 10 W being mostly liberated as heat. Hence the varactor needed to be well heatsinked, because if it overheated or was driven with excessively high input levels, it would fail and varactor diodes capable of these power levels have never been cheap.

This method has now largely been superseded since devices capable of producing 5 W or more of RF at 23 cm are cheaper than the varactor diode. Varactors were never very popular, since they require very careful setting up to achieve good efficiency and adequate suppression of undesired harmonics. Ideally a spectrum analyser should be used, since if you "tweak for maximum smoke" alone, you are never sure if it is all on the right frequency. Varactors can be quite dirty devices. Wood & Douglas did produce in the early 1980's a 420 Mhz power oscillator, a series of amplifiers to boost the signal level to 10-15 W, and a ready assembled and aligned varactor tripler, and you may see the odd one on the second hand market. As long as they were properly set up, they worked quite well, and served to get many of the first generation of 23 cm FM ATVers on the air, including me !.

5.4 TRANSVERTERS - Another method not often seen today is the transverter. Here, the FM TV signal was generated at a low frequency, in the region of 100 MHz. This was mixed with a local oscillator operating at 1152 MHz. This frequency was chosen since it is used by narrow band 23 cm users, who transvert their 144 MHz signals up to 1296 MHz. There is a wide choice of high quality 1152 MHz sources published in various magazines and books, aswell as some commercially produced types. In our case, the resulting signal at about 1250 MHz was then amplified to the desired level. The principle advantage of this method is that it makes use of some well known and published designs for 23 cm transverters, which can usually be tweaked down from 1296 to about 1250 MHz. However, the resulting assembly is more complex than the currently most favoured method, and hence comparatively few people have made use of it. None the less, it is capable of first class results if properly made and aligned.

5.5 SIGNAL FREQUENCY GENERATION - The most popular method of generating an FM TV signal on 23 cm is to produce an oscillator which runs directly on the required frequency. Using a varicap diode, a modulating signal can then be applied to it, thus generating an FM modulated carrier. This is then amplified to the required level. This method has the advantage of being simple and reliable, although getting an oscillator to run consistently and stably at 1250 MHz requires very careful design and construction. None the less, it has been done and there are some very good examples on the market. Perhaps the most well known of these is the Solent Scientific kit, now marketed by the Worthing & District Video Repeater Group. Once the free running oscillator in this unit is aligned, it works very well and is surprisingly stable. After the first 10 minutes or so of drift as it warms up, it stays quite stable. With the wideband signals that we send, together with AFC which will track an incoming signal in most receivers, the Worthing kit gives good results. The standard amount of pre-emphasis is built into the circuit, as is a 6 MHz inter-carrier sound oscillator. The built in audio amplifier has enough gain to accept a microphone as input device. The design will produce an output level of about 1 W, with the odd one good for 1.5 W. I have also known some that will not produce more than about 0.75 W, although I suspect that much of this is down to the quality of individuals construction.
The power amplifier stages use transistors originally developed for the 900 MHz range, for use in mobile telephones. These can still be successfully used at 1250 MHz with reduced performance, and it must be said that the availability of these devices at reasonable prices has produced a major fillip for 23 cm Amateur Radio equipment. Unfortunately the Worthing transmitter is only available as a kit, and it is certainly not suitable for beginners. Never the less, this kit has become so popular that assembled versions are often seen for sale secondhand, and in many parts of the country, one of the local ATV

experts will happily put one together for you. The kit represents good value for money, and it fits into a medium sized die cast box that is supplied.

5.6 PHASE LOCKED LOOPS - A further enhancement of the Worthing kit is the addition of the optional Phase Locked Loop (PLL) board. This locks the free running oscillator to one of two crystal references, which are selected by a small switch. The option is retained to free run the oscillator using the normal variable control. The PLL works by sampling the output of the oscillator, and dividing it by a factor of 256. Thus an output frequency of 1249 Mhz will produce a divided signal of 4.8789 MHz. This is compared with a crystal oscillator, which is kept working accurately at 4.8789 MHz. Any difference between the two generates an error correction voltage, which is applied to the varicap diode which controls the main transmitter oscillator at 1249 MHz, and thus the transmitter output frequency is kept under control. All of this circuitry is contained in just one chip, the Plessey SP5060. Very few external components are needed to complete the PLL board, and it is capable of very good frequency stability and control. This is particularly useful when working through repeaters, which look for a fairly stable signal on the input.

These principles of a PLL controlled oscillator operating at the output frequency form the basis of all the commercially produced 23 cm FM TV transmitters. The first of these on the market was the Wood & Douglas 1240TVT. This is a fully built and aligned single frequency transmitter source, contained in a small tinplate case. It features a built in 6 MHz inter-carrier sound generator, but no video pre-emphasis. The output level is very low at only 20 mW, and it therefore needs to be followed by several stages of amplification to produce any meaningful power. Although it produces good results, some of the more recent products are probably better value for money.

Another low power transmitter module is produced by Camtech Electronics, although the output in this case is a more respectable 0.5 W. Pre-emphasis is built in but there is no internal inter-carrier sound generator. This facility can be added by an optional PCB from Camtech. The sound PCB is available as a kit or fully assembled, unlike the main transmitter module which is available only as boxed and assembled item. This is probably a wise move, since the use of miniature surface mounting components and the care needed with any form of microwave equipment construction means that this is a job for the experienced constructor. The Camtech equipment works well, and represents fair value for money.

The latest transmitter on the market is the AZTEX Electronics TVTX24. This very high quality unit has received very favourable reviews in the Amateur Radio press, and it is currently very much the "Rolls Royce" of 23 cm FM TV transmitters. It is a fully assembled unit, with a smart control panel, only needing you to plug in a camera, microphone and aerial to be on the air. It operates on two switchable channels, 1249 and 1255 MHz are standard but others are available to order. It includes video pre-emphasis and a 6 MHz inter-carrier sound generator, although this can be set to 5.5 or 6.5 MHz for continental use. The unit incorporates two sound channel inputs which are internally mixed. This is very handy for use with repeaters such as GB3ZZ, which can accept DTMF tones for additional control functions. The RF output is 2.5 W, which is a useful level by itself, but is also convenient for driving more powerful amplifiers. AZTEX produce a suitable companion amplifier to boost this up to 18-20 W.

Front panel controls are available for video and audio drive levels, and these operate very smoothly. The internal construction of the unit is to a very high level, with all the RF circuitry contained in a

separate screened box, utilising high quality surface mount components. The performance of this transmitter is very good, with a stable, clean output and particularly good handling of colour video signals. This transmitter is highly recommended and although it is not exactly cheap, its completeness, top quality performance and construction make it an item to treasure and use for many years to come.

5.7 POWER AMPLIFIERS - In this chapter, we have seen that many of the transmitters on the market have quite low power outputs which may need boosting to more useful levels. One of the advantages of FM is that linear amplifiers are not necessary, and simpler Class C items will suffice. For really high powers at 23 cm, valves such as the 2C39A are the most economical method of generation. However, many such amplifiers with the valve(s) mounted in resonant cavities have quite small bandwidths, often insufficient for a 17 MHz wide FM TV signal. This matter needs careful checking before making your choice. Needless to say, a valve amplifier will involve lethal voltages and currents, often over 1000 V. If you are careless, you may not get a second chance at these levels !. Some very fine 23 cm amplifiers using the 2C39A are produced by the German company EME, available in this country from Piper Communications. There are also a number of designs published in the UHF Compendium and the RSGB VHF/UHF Handbook. These are for the experienced constructor, since great care must be taken with the EHT voltages.

Solid state amplifiers are much easier to make and handle, and some of the power amplifier modules now on the market from Japan make the production of 20 W 23 cm PA's almost childs play. The AZTEX transmitter uses an SC1043 power module, manufactured by Mitsubishi but commonly available in the UK from Icom, the well known Amateur Radio equipment suppliers. This small innocent looking plastic covered module will boost a 20 mW signal up to over 3 W. Its big brother, the SC1040 will develop up to 20 W, and is used by AZTEX in their companion PA. These modules are not too expensive considering the simplicity of their use, which requires only a handful of external components. They are very rugged and stable, and do not exhibit any of the sensitivity to handling of some PA's. However, they are only about 25% efficient and must therefore be very well heatsinked if overheating is to be avoided. The SC1040 at full output will liberate about 50-60 W of heat, which all helps to keep the shack warm in winter!. However, if kept cool by adequate heat sinks (fan cooled if necessary) they will operate at these power levels for literally years, as the operators of GB3ZZ will testify.

Higher outputs can be achieved by paralleling up the output of 2 or 4 such modules. The G7ATV/P ATV contest team have four SC1040 modules producing a very reliable 75 W, which has contributed to their frequent victories in recent years in the 23 cm section of ATV contests. These Icom power modules are really ideal for ATV PA's and are highly recommended.

Alternative sources for 23 cm PA's include SSB Electronics and the British company LMW Electronics of Leicester. A variety of designs have been published in the UHF Compendium.

One final note ; as mentioned in the chapter on receivers, it is essential that your transmitted signals use pre-emphasised video. All UK repeaters are set up to expect this, and the use of pre-emphasis will get the best out of your 23 cm FM TV equipment.

In the next issue, we will take a look at Video Sources and the various means available to generate a picture to transmit.

METEOSAT satellites are controlled and operated from ESOC in Darmstadt on behalf of EUMETSAT. A variety of brochures available includes the "Introduction to the METEOSAT system" and Volumes 1 - 11 of the "METEOSAT System Guide". For further information contact EUMETSAT; Am Elfengrund 45; D-6100 DARMSTADT; Federal Republic of Germany.

The dissemination programme is predominantly concerned with the relay of image data of METEOSAT and the GOES-E satellite, but also includes the transmission of conventional meteorological charts and of meteorological parameters extracted from the basic image data. The main transmissions originate in the ESOC at Darmstadt, Federal Republic of Germany. Relay transmissions of GOES-E images via METEOSAT in standard METEOSAT formats are formatted in the CMS at Lannion, France. From time to time transmissions from other spacecraft are included in the schedule on an experimental basis.

Transmission frequencies are

- 1691 MHz (channel A1): DCP retransmissions and WEFAX transmissions consisting of METEOSAT image data.
- 1694.5 MHz (channel A2): Digital broadcasts for primary data user stations (A, B and X formats), GOES relay transmissions from CMS Lannion (identified by "L" in the schedule), WEFAX retransmissions of aviation charts originating in Europe and Africa, and transmissions of CTH formats.

WEFAX formats (see figures 39, 40 and 42) disseminated in analogue form are

Format	Source	Channel	Resolution	Transmission interval
C02+C03	METEOSAT	VIS	2.5 km*	every half hour (during daylight periods)
C1D-C9D**	METEOSAT	VIS	2.5 km*	every 3 hours (during daylight periods)
CTH***	METEOSAT		20 km	every 6 hours
D1-D9	METEOSAT	IR	5.0 km	every 3 hours (selected images are more regular)
D2	METEOSAT	IR	5.0 km	every half hour
E1-E9	METEOSAT	WV	5.0 km	twice daily (selected images are more regular)
M	weather charts originated in the NMCs in Bracknell, Nairobi, Offenbach and Paris			
R	GOES-E	IR	7.0 km	every 3 hours
Y	GOES-E	IR	7.0 km	every 3 hours
Z	GOES-E	IR	1.0 km	every 3 hours

* (or 5 km if only one VIS channel)
** visible formats identical to D1-D9 formats
*** cloud-top height charts originated in the Meteorological Information Extraction Centre

Further formats transmitted on a test basis are C1H and C2H (visible formats displaying half of the globe), D1H and D2H (infrared formats displaying half of the globe), and CTOT/DTOT/ETOT (formats covering the complete globe where C indicates VIS, D indicates IR and E indicates WV).

High-resolution dissemination formats (see figures 38 and 41) are A (transmission interval every half hour), B (every half hour), and X (every 3 hours). The formats can include one or more spectral bands. These are identified in the dissemination schedule by I (infra-red), V (visible), VH (visible half-resolution) and W (water vapour).

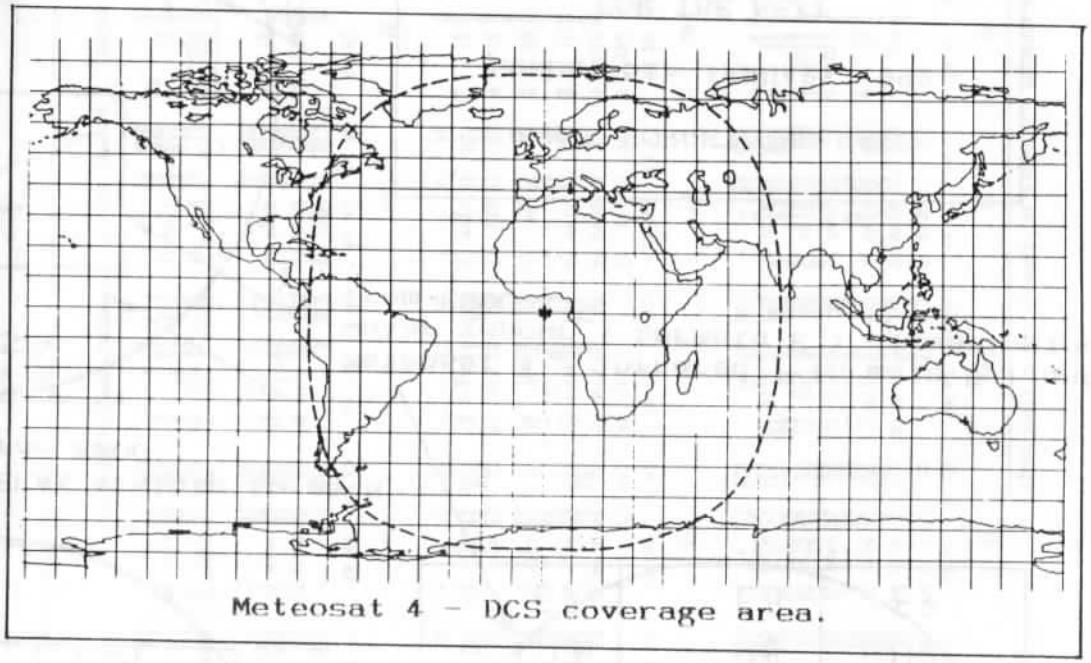
Transmission times for WEFAX formats are 3.6 min. WEFAX transmissions are formats compatible with the APT system. For digital formats the times depend on the sector and the spectral channels used. Thus, the time for dissemination of high-resolution formats varies between 0.9 min (for format B1) and 29.3 min (for AIV). In order to standardize the start times of individual formats, slots of four-minute transmission times have been introduced in the dissemination schedule, starting at nominal times H+02, H+06, H+10, etc.

The current schedule S8906M01 was introduced on 0002 UTC 01 June [illegible] reprinted in figure 44 on page 104 and lists for each time slot and channel
- the format as described above;
- the time to the nearest half hour of the end of the image transmitted (e. g. indicates image ending near to 1930 UTC).

Examples:

"0618 AIVH 12" means "start of transmission 0618 UTC; full disk; full-resolution infra-red and half-resolution visible information; image ending near to 0600 UTC";

"1834 LY 37" means "start of transmission 1834 UTC; GOES-E image relayed via CMS Lannion; North and Central America; image ending near to 1830 UTC".



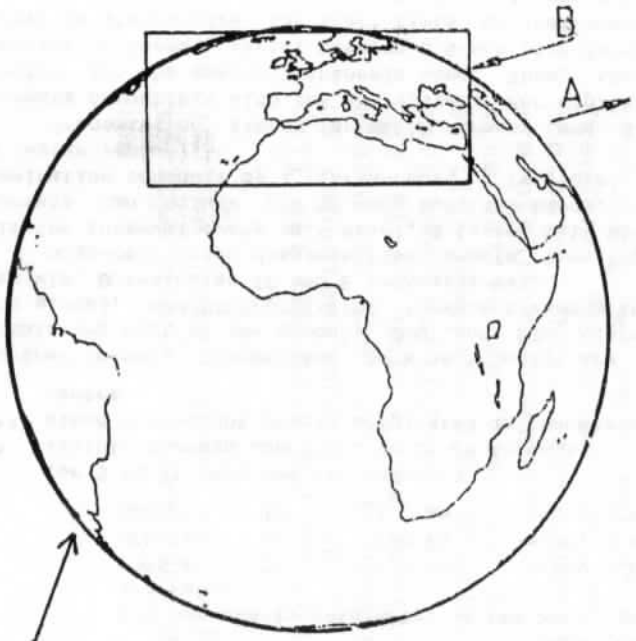
Meteosat 4 - DCS coverage area.

PLEASE DON'T FORGET
WHEN USING GB3ZZ

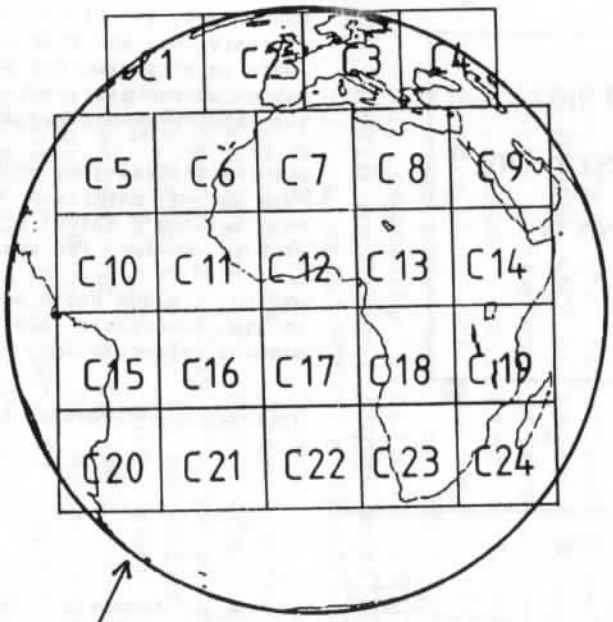
ALWAYS IDENTIFY YOUR VISION CARRIER

AND LISTEN ON 144.750 BEFORE TRANSMITTING

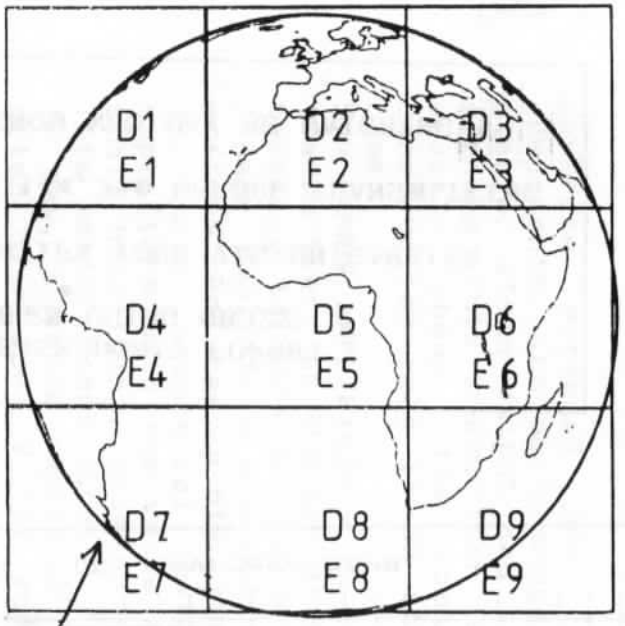
YOU NEVER KNOW WHO MAY BE WATCHING !



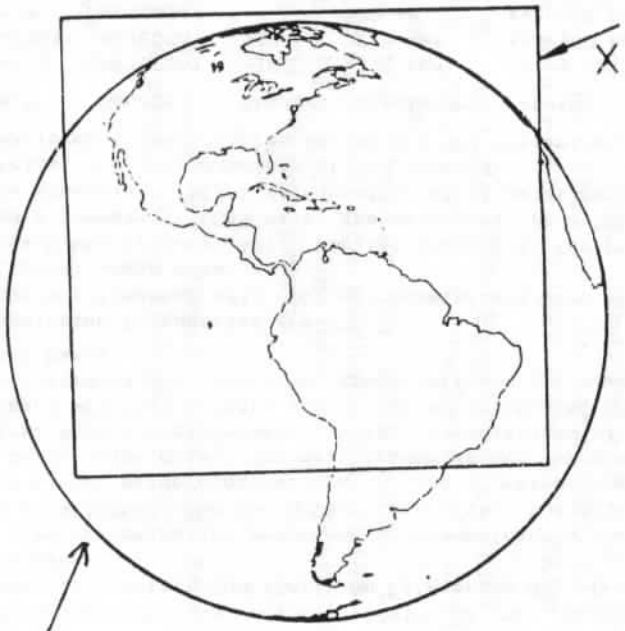
Meteosat 4 - high resolution (digital) formats disseminated from ESOC.



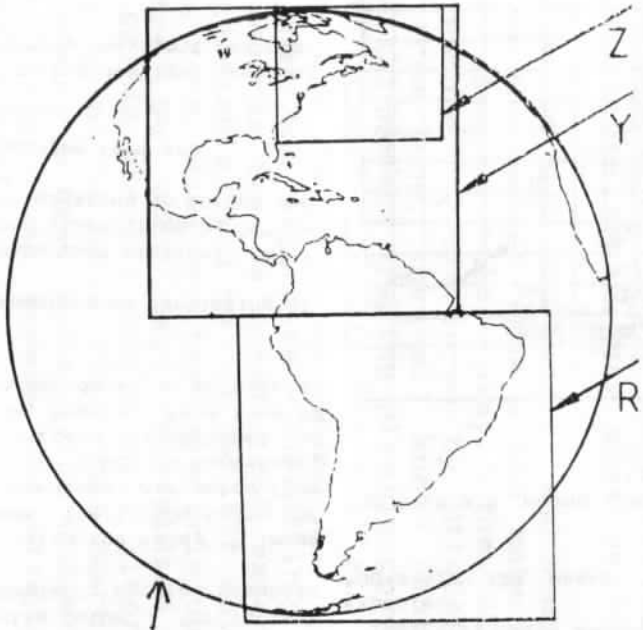
Meteosat 4 - WEFAX visible formats disseminated from ESOC.



Meteosat 4 - infrared (formats D) and water vapour (formats E) disseminated from ESOC.



Meteosat 4 - high resolution (digital) format disseminated from CMS Lannion.



Meteosat 4 - WEFAX infrared (formats R & Y) and visible (format Z) disseminated from CMS Lannion.

DON'T FORGET THE DATE

SUNDAY 5th JANUARY 1992

FOR THE NEXT

FANCY DRESS ON THE AIR NIGHT

EOSAT DISSEMINATION SCHEDULE S8906M01 - CHANNELS A1 (1691MHz) AND A2 (1694.5MHz)

VALID FROM 01 JUNE 1989

GMT HH 00

MM	CH A1	CH A2
2	E3 47	
6		
10	D2 48	BIW 48
14	D1 48	" "
18	D3 48	AI 48
22	" 48	" "
26	D5 48	
30	D6 48	DTOT 48
34	D7 48	LY "
38	D8 48	ETOT 48
42	D9 1	BIV 1
46	D0 1	LR "
50	D1 1	AI "
54	D3 1	" "
58		

GMT HH 03

MM	CH A1	CH A2
2		
6	CTH 0	
10	D2 6	BIW 6
14	D1 6	" "
18	D3 6	AI 6
22	" 6	" "
26	D5 6	
30	D6 6	DTOT 6
34	D7 6	LY "
38	D8 6	ETOT 6
42	D9 7	BIV 7
46	D0 7	LR "
50	D1 7	AI "
54	D3 7	" "
58		

GMT HH 06

MM	CH A1	CH A2
2	E3 11	WEFA 2
6	" "	" "
10	D2 12	BIVW 12
14	D1 12	" "
18	D2 12	AIVH 12
22	D3 12	" "
26	D5 12	
30	D6 12	DTOT 12
34	D7 12	LY "
38	D8 12	ETOT "
42	D9 13	BIV 13
46	D0 13	LR "
50	C02 13	" "
54	C03 13	AIVH 13
58	C2D 13	" "

GMT HH 09

MM	CH A1	CH A2
2	C7D 17	
6	CTH 0	
10	D2 18	BIVW 18
14	C02 18	" "
18	C03 18	AIVH 18
22	D1 18	" "
26	D3 18	" "
30	D5 18	
34	D6 18	DTOT 18
38	D7 18	LY "
42	D8 18	ETOT "
46	D9 18	BIV 18
50	D0 19	LR "
54	C02 19	" "
58	C03 19	AIVH 19
	C36 19	" "
	C90 19	" "

GMT HH 12

MM	CH A1	CH A2
2	E3 23	" "
6	" "	" "
10	D2 24	BIVW 24
14	C02 24	" "
18	C03 24	AIVH 24
22	D1 24	" "
26	D3 24	" "
30	D5 24	
34	D6 24	DTOT 24
38	D7 24	LY "
42	D8 24	ETOT "
46	D9 25	BIV 25
50	D0 25	LR "
54	C02 25	" "
58	C03 25	AIVH 25
	C36 25	" "
	C2D 25	" "

GMT HH 15

MM	CH A1	CH A2
2	C7D 29	WEFA 4
6	CTH 0	" "
10	D2 30	BIVW 30
14	C02 30	" "
18	C03 30	AIVH 30
22	D1 30	" "
26	D3 30	" "
30	D5 30	
34	D6 30	DTOT 30
38	D7 30	LY "
42	D8 30	ETOT "
46	D9 30	BIV 31
50	D0 31	LR "
54	C02 31	" "
58	C03 31	AIVH 31
	C36 31	" "
	C90 31	" "

GMT HH 18

MM	CH A1	CH A2
2	E3 35	
6		
10	D2 36	BIVW 36
14	D1 36	" "
18	D3 36	AI 36
22	" 36	" "
26	D5 36	
30	D6 36	DTOT 36
34	D7 36	LY "
38	D8 36	ETOT "
42	D9 37	BIV 37
46	D0 37	LR "
50	D1 37	AI "
54	D3 37	" "
58		

GMT HH 21

MM	CH A1	CH A2
2		WEFA 6
6	CTH 0	" "
10	D2 42	BIW 42
14	D1 42	" "
18	D3 42	AI 42
22	" 42	" "
26	D5 42	
30	D6 42	DTOT 42
34	D7 42	LY "
38	D8 42	ETOT "
42	D9 42	BIW 42
46	D0 43	LR "
50	D1 43	AI "
54	D3 43	" "
58		

GMT HH 01

MM	CH A1	CH A2
2		LXI 1
6		
10	D2 2	BIW 2
14	D1 2	" "
18	D3 2	AI 2
22	" 2	" "
26		
30		AW 2
34		" "
38		
42	D2 3	BIW 3
46	D1 3	" "
50	D3 3	AI 3
54	" "	" "
58		

GMT HH 04

MM	CH A1	CH A2
2		LXI 7
6		
10	D2 8	BIW 8
14	D1 8	" "
18	D3 8	AI 8
22	" 8	" "
26		
30		AW 8
34		" "
38		
42	D2 9	BIW 9
46	D1 9	" "
50	D3 9	AI 9
54	E6 9	" "
58	E7 9	

GMT HH 07

MM	CH A1	CH A2
2	C1D 13	LXI 13
6		
10	D2 14	BIVW 14
14	C02 14	" "
18	C03 14	AIVH 14
22	D7 14	" "
26	D8 14	" "
30	D9 14	AW 14
34	D3 14	" "
38		
42	D2 15	BIV 15
46	C02 15	" "
50	C03 15	AIVH 15
54	" "	" "
58	D3 15	" "

GMT HH 10

MM	CH A1	CH A2
2		LXI 19
6		
10	D2 20	BIVW 20
14	C02 20	" "
18	C03 20	AIVH 20
22	D7 20	" "
26	D8 20	" "
30	D9 20	AW 20
34	D3 20	" "
38		
42	D2 21	BIV 21
46	C02 21	" "
50	C03 21	AIVH 21
54	" "	" "
58	D3 21	" "

GMT HH 13

MM	CH A1	CH A2
2	C1D 25	
6		
10	D2 26	BIVW 26
14	C02 26	" "
18	C03 26	AIVH 26
22	D7 26	" "
26	D8 26	" "
30	D9 26	LXIV 25
34	D3 26	" "
38		
42	D2 27	BIV 27
46	C02 27	" "
50	C03 27	AIVH 27
54	" "	" "
58	D3 27	" "

GMT HH 16

MM	CH A1	CH A2
2		
6		
10	D2 32	BIVW 32
14	C02 32	" "
18	C03 32	AIVH 32
22	D7 32	" "
26	D8 32	" "
30	D9 32	LXIV 31
34	D3 32	" "
38		
42	D2 33	BIV 33
46	C02 33	" "
50	C03 33	AIVH 33
54	" "	" "
58	D3 33	" "

GMT HH 19

MM	CH A1	CH A2
2		WEFA 5
6		" "
10	D2 38	BIVW 38
14	D1 38	" "
18	" 38	AI 38
22	" "	" "
26		
30		LXIV 37
34		" "
38		
42	D2 39	BIV 39
46	D1 39	" "
50	D3 39	AI 39
54	" "	" "
58	E6 39	
	E7 39	

GMT HH 22

MM	CH A1	CH A2
2		LXI 43
6		
10	D2 44	BIW 44
14	D1 44	" "
18	D3 44	AI 44
22	" 44	" "
26		
30		AW 44
34		" "
38		
42	D2 45	BIW 45
46	D1 45	" "
50	D3 45	AI 45
54	" "	" "
58		

GMT HH 02

MM	CH A1	CH A2
2		WEFA 1
6	E8 9	" "
10	D2 10	BIW 10
14	D1 10	" "
18	D3 10	AI 10
22	" 10	" "
26		
30		
34		
38		
42		
46		
50		
54		
58		

GMT HH 05

MM	CH A1	CH A2
2	E8 9	
6		
10	D2 10	BIW 10
14	D1 10	" "
18	D3 10	AI 10
22	" 10	" "
26		
30		
34		
38		
42		
46		
50		
54		
58		

GMT HH 08

MM	CH A1	CH A2
2	C1D 15	WEFA 3
6	C2D 15	" "
10	D2 16	BIVW 16
14	D1 16	" "
18	C02 16	" "
22	C03 16	AIVH 16
26	" 16	" "
30	C36 16	
34	C4D 16	
38		
42		
46		
50		
54		
58		

GMT HH 11

MM	CH A1	CH A2
2	C1D 21	
6	C2D 21	
10	D2 22	BIVW 22
14	D1 22	" "
18	C02 22	" "
22	C03 22	AIVH 22
26	" 22	" "
30	C36 22	" "
34	C4D 22	
38		
42		
46		
50		
54		
58		

GMT HH 14

MM	CH A1	CH A2
2	C1D 27	
6	C2D 27	
10	D2 28	BIVW 28
14	D1 28	" "
18	C02 28	" "
22	C03 28	AIVH 28
26	" 28	" "
30	C36 28	" "
34	C4D 28	
38		
42		
46		
50		
54		
58		

GMT HH 17

MM	CH A1	CH A2
2	C1D 33	AW 33
6	C2D 33	" "
10	D2 34	BIVW 34
14	D1 34	" "
18	C02 34	" "
22	C03 34	AIVH 34
26	" 34	" "
30	C36 34	" "
34		
38		
42		
46		
50		
54		
58		

GMT HH 20

MM	CH A1	CH A2
2	E8 38	AW 39
6	E6 38	" "
10	D2 40	BIW 40
14	D1 40	" "
18	D3 40	AI 40
22	" 40	" "
26		
30		
34		
38		
42		
46		
50		
54		
58		

GMT HH 23

MM	CH A1	CH A2
2		
6		
10	D2 46	BIW 46
14	D1 46	" "
18	D3 46	AI 46
22	" 46	" "
26		
30		
34		
38		
42		
46		
50		
54		
58		

GMT HH	02		05		08		11		14		17		20		23	
MM	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2
2		WEFA 1	E8 9		C1D 15	WEFA 3	C1D 21		C1D 27		C1D 33	AW 33	E8 38	AW 39		
6		" "	E6 9		C2D 15	" "	C2D 21		C2D 27		C2D 33	" "	E6 38	" "		
10	D2 4	BIW 4	D2 10	BIW 10	D2 16	BIVW 16	D2 22	BIVW 22	D2 28	BIVW 28	D2 34	BIVW 34	D2 40	BIW 40	D2 46	BIW 46
14	D1 4	" "	D1 10	" "	C02 16	" "	C02 22	" "	C02 28	" "	C02 34	" "	D1 40	" "	D1 46	" "
18	D3 4	AI 4	D3 10	AI 10	C03 16	AIVH 16	C03 22	AIVH 22	C03 28	AIVH 28	C03 34	AIVH 34	D3 40	AI 40	D3 46	AI 46
22	" 4	" "			" 16	" "	" 22	" "	" 28	" "	" 34	" "	" 40	" "	" 46	" "
26					C36 16		C36 22		C36 28		C36 34					
30					C4D 16		C4D 22		C4D 28		C4D 34					
34																
38	TEST 0	ADMIN 0	ADMIN 0	TEST 0	TEST 0	ADMIN 0	ADMIN 0	TEST 0	TEST 0	ADMIN 0	ADMIN 0	TEST 0	TEST 0	ADMIN 0	ADMIN 0	TEST 0
42	D2 5	BIW 5	D2 11	BIW 11	D2 17	BIV 17	D2 23	BIV 23	D2 29	BIV 29	D2 35	BIV 35	D2 41	BIW 41	D2 47	BIW 47
46	D1 5	" "	D1 11	" "	C02 17	" "	C02 23	AV 23	C02 29	" "	D1 35	" "	D1 41	" "	D1 47	" "
50	D3 5	AI 5	D3 11	AI 11	C03 17	AIVH 17	C03 23	" "	C03 29	AIVH 29	D3 35	AI 35	D3 41	AI 41	D3 47	AI 47
54	" "	" "	E6 11	" "	" 17	" "	" 23	" "	" 29	" "	E1 35	" "		" "	E1 47	
58			E2 11		C36 17	" "	E2 23	" "	C36 29	" "	E2 35				E2 47	

SOME VISIBLE IMAGE FORMATS ARE SUBJECT TO SUPPRESSION DUE TO SEASONAL UNDERILLUMINATION

STG CHRISTMAS PARTY
SUNDAY 8th DECEMBER 1991

Our Grand Christmas Party will take place this year on Sunday 8th December 1991, starting at 7.30 pm. As usual, the venue will be the Parish Hall, Elm Park Parish Pavilion, Elm Park, Filton, Bristol. All members and their guests/families are welcome.
Members are asked to bring along something to drink, and also perhaps some items of food for the buffet. Last time we were rather short of soft drinks and low alcohol ones for the drivers. As many of you will remember, the idea of our socials is to have a good time, keeping the Group together, without digging into funds. Group funds are used for the serious business of developing the repeater, and hence we rely on people bringing along some food and drink for the parties.
At the end of the party, there will be an auction in aid of Group funds. Items may be donated entirely, or a commission may be agreed beforehand. Any bottles left over after the party are usually auctioned off at this time also.
Finally, the draw will take place for our annual grand raffle. The top prize will be £50 cash. Tickets are on sale before the party from any committee member. The raffle is in aid of further developments for GB3ZZ. In previous years, this has been a very successful fund raiser for the Group, and so members are asked to be as generous as possible. Of course, if you can sell some tickets to family, friends or work colleagues, then we will be very pleased to hear from you.

... Continued from Page 2 ;

I have had to edit his log somewhat, but I list below some of the highlights ;
MAY 1991 : 21st, CST Czechoslovakia : 22nd, TSS EESTI TV Tallinin, ch.R2, Estonia : 26th, MTV Hungary, ch.R2.
JUNE 1991 : 2nd, RTP1 Portugal, ch.E3 : 5th, SVT Sweden : 16th, TVP Poland, ch.R3 : 30th, a very strong all day opening, which included amongst many : TSS Mongolian, ch.R2 : HTV Croatia, ch.E4 : TVS Slovenia, ch.E3 : RTS Albania : RAI ONO Torino, ch.1C.
JULY 1991 : 8th, SVT Sverige Sweden, ch.E2&3 : NRK Norway, ch.E2 Melhus & Ch.E3 Gamlen : 27th, SRG Switzerland.
AUGUST 1991 : 7th, RUV Iceland, ch.E4.
If anyone is interested in the full list, I would be pleased to pass it on. Thanks for your letter, Stephen, and please keep us in touch with your DX TV activities.

SEVERNSIDE DIARY 1991/2

SUNDAY **1st DECEMBER** "P5" December issue published.
SUNDAY **8th DECEMBER** STG Christmas Party.
SUNDAY **5th JANUARY** Fancy Dress on the Air evening.
SUNDAY **28th JUNE** Longleat Amateur Radio Rally.
SUNDAY **6th SEPTEMBER** Bristol Radio Rally.

Please advise the Secretary G8VPG of any changes, additions etc.

 "P5" is published quarterly for the Severnside Television Group by S.P.O'Sullivan, 15,Witney Close, Saltford, Bristol BS18 3DX, and is sent free of charge to all members.