COVER DESIGN BY : JOHN DAVIES. 1989 ©

SOCIETY NEWS

1 Next Committee Meeting

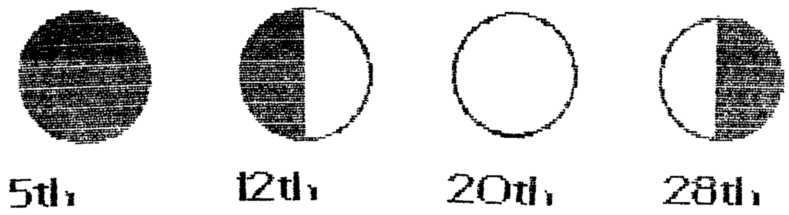
The next meeting will be held on Saturday 20th May at the observatory, starting at 7.30.This is open to all members.

NIGHT SKY

(ALL TIMES G.M.T.)

SUN Rises approximately between 04.30 to 03.50
Sets approximately between 19.30 to 20.10

MOON



MERCURY Mercury is at maximium eastern elongation on the 1st (21°).It will be setting 2 hours after the sun.Inferior conjuction is on the 24th.

VENUS Venus is will be very low down in the west this

MARS Mars will be setting between 24.00 & 23.00 this

JUPITER Jupiter will be setting at about 21.00 in mid month.Mag.-2.0

SATURN Saturn will be rising before midnight at the begining of the month.Mag 0.3 is visible in the morning sky, rising at about 01.00 in mid

URANUS Uranus rises about 30 minutes before Saturn.before Saturn.

NEPTUNE Neptune is located a 2 degrees to the west of Saturn.

R. GOODING

FIELD TRIP TO OBSERVE A GRAZING OCCULTATION

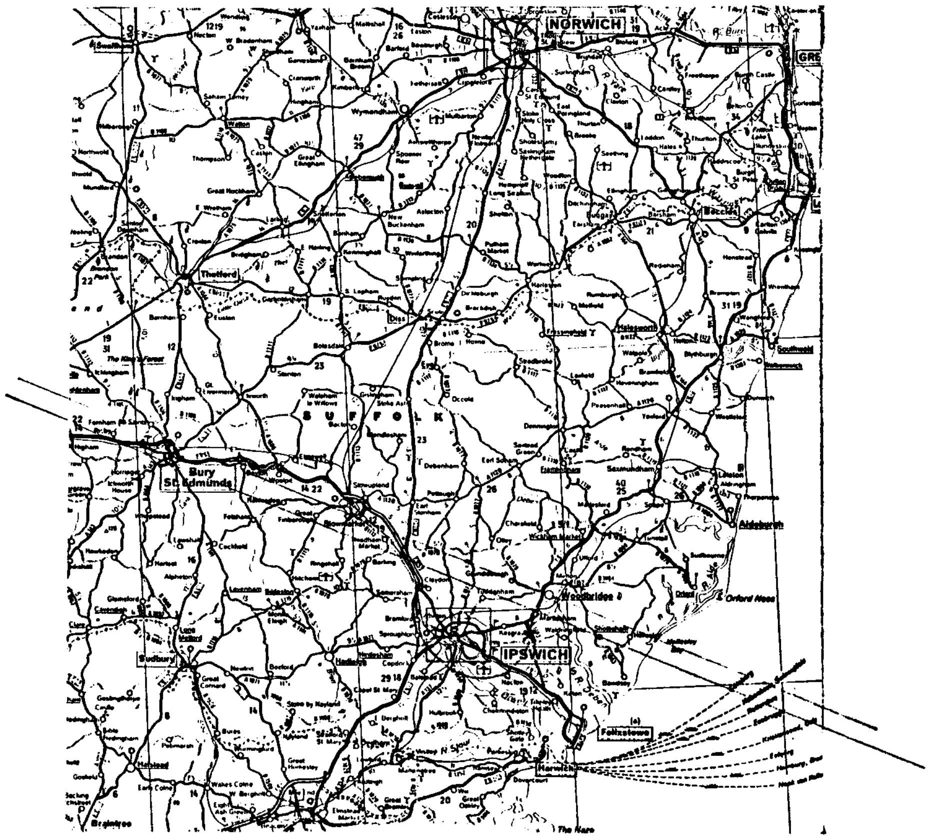
An occultation occurs when a "nearby" object moves in front of, or occults, a more distant object. This frequently occurs when the moon moves in front of stars. However, sometimes the position of the moon means that instead of completely covering the star a "near miss" occurs. The star will be seen to dodge behind the mountains on the edge of the moon only to reappear in the valleys. This is called a grazing occultation.

As the position of the star is for all intents and purposes fixed, a precise timing of the event can yield useful data as to the position of the moon. This data is analysised by the BAA and helps to refine our knowledge of the still not yet completely known lunar orbit.

In any one year there will be on average one grazing occultation of a "bright" star visible from East Anglia. This year the event will occur on May 12th and as usual a team from the OASI will attempt to observe this phenomenon.

The graze itself is very spectacular when observed through a reasonably high powered instrument (10X50 binoculars are probably NOT powerful enough). For the first time since the formation of the society the graze track will pass close to the observatory at Orwell Park (the actual track passes through Needham Market and Woodbridge). If anyone has a portable instrument and would like to take part in this years observation (weather permitting!!) please contact me at the observatory on any Wednesday evening before May 12th for precise details.

A.J.Smith



TELESCOPE MAKING SECTION

CONSTRUCTION OF A MOTOR DRIVEN EQUATORIAL MOUNTING

by Mike Harlow

There are many types of telescope mountings for the telescope maker to choose from, each of which has it's good and bad points. I'm not going to go into the merits of each design here, as that would take too long, but simply describe the Equatorial type mounting I made some years ago.

My main interest is in astrophotography so I wanted a mount that could be easily driven for time exposures. I also required a design that was relatively simple and straightforward to build as I didn't have access to any workshop equipment. The completed mount is shown in the photo opposite and although it may look quite complicated the only tools I used to build it were a file, a drill and a hacksaw (plus a little mathematics!).

TUBES, AXES AND BEARINGS

The mounting itself was designed from the bearings outwards. I bought four 2" I.D. bearings some time ago in Norwich. Unfortuneately the company has now closed so I can't give an address but it should be possible to find a local supplier via Yellow Pages. Having aquired the bearings I next bought some 2" O.D. steel bar from Macreadys of London (address at the end) for the Right Ascension (RA) and declination (dec) axes (1). This was as far as I got for some time until I found some 4.5" I.D. steel tube in a scrap yard. This I.D. was just big enough to take the bearings with a little room to spare.

The bearings were fitted into this tube using three equally spaced shims. If these shims are made thick and then gradually filed down a tight fit can be achieved. The bearings can be gently knocked into the tube and are held by the tight fit alone and if they are accurately the same thickness the tube and bearing will be concentric.

Having found a method for fixing in the bearings a way to join the tubes was needed. Cutting the tubes to give a flat end perpendicular to the tube axis is easy. Simply wrap a piece of paper, which has a straight edge, around the tube and carefully align the overlapping ends so that the straight edges meet. Cutting along the edge of the paper gives a straight end to the tube.

Cutting one tube to fit another at 90° (2) is a little more complicated. After a little thought and a lot of scribbling I came up with the following formula:-

$$y = r_b - (r_b^2 - r_a^2 \sin\Theta^2)^{0.5}$$

which is the general expression for joining two tubes of radii r_b and r_a at

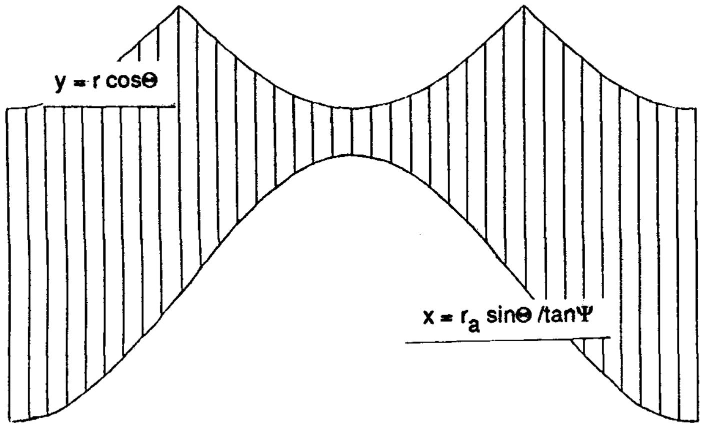
right angles. The term Θ is the angle around the axis of the smaller tube with radius r_a. If $r_a = r_b$, as is the case here, then the equation simplifies to:-

$$y = r\cos\Theta$$

Values of y are plotted on a paper strip that is wraped aroung the tube end. Cutting along this line gives the shape that will join the tubes together. (Note that the tube thickness has been ignored so a little filing is needed for a perfect fit). Joining the polar axis tube to the 1/2" steel baseplate requires a straight cut at an angle Ψ across the tube (3). The deviation, x, from a straight tube end in this case is:-

$$x = r_a \sin\Theta / \tan\Psi$$

The resulting paper strip used in cutting this piece is illustrated at reduced scale below.



When all the pieces have been cut they can be welded together. Obviously this can cause problems--you may have to find someone to do this for you.

The remaining problem is joining the 2" steel shafts into their respective housings (4)(5). Again the ideal way to do this would be to weld them but this requires a great deal of accuracy so I decided to cast them into place with concrete. I filed a flat onto the end, (side), of each shaft to prevent rotation. The shafts were held in place while the concrete set by their respective tubes with bearings in place, great care being taken in positioning.

This completed the parts of the mounting so next I turned to the concrete pier (6). For this a wooden box was made up to hold four 20mm x 300mm pieces of threaded rod to which the mounting would be bolted (7). Foundations were dug to give a deep, wide base from which the pier rises. The box for casting the pier was aligned north-south as follows. First, a stick is driven vertically into the ground, then, on a fine day, the shadow cast by the sun is observed near midday (GMT). As the sun crosses the meridian the shadow of the stick will point due north. Note however that the sun does not generally cross the meridian at 12.00; it can be up to 16 minutes fast or 14 minutes slow due to the equation of time. This will not be discussed here as it's covered in most good general astronomy books. Having found the north-south line the edge of the square box is alligned to it and the concrete can be poured.

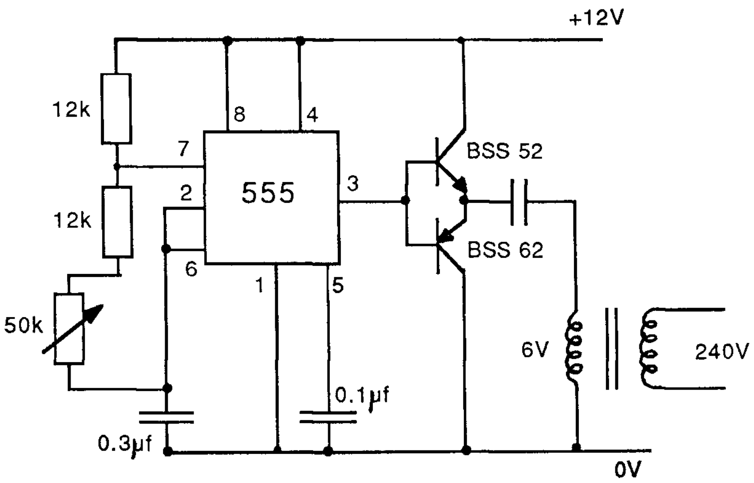
When the concrete is set and the mount is ready for assembly the polar axis (8) is roughly positioned on the pier. I aligned the polar axis to the pole by inserting a purpose made telescope into the bearings and sighting on Polaris. The mount was then offset by the correct amount in the right direction to the true pole. I should have said that the holes cut in the baseplate are elongated to allow a slight rotation about the vertical in the east-west direction. This allows for the small errors in the initial alignment of the concrete pier. The final touch in assembling the mount is to put spacer rings on the axes before they are slid into their bearings; this ensures that all the thrust is put onto the bearings giving a smooth motion.

THE COUNTERWEIGHT (9)

Clearly the mounting will not be balanced if the telescope is fixed to it at this stage so a counterweight is required. The actual mass required can be found by attaching an empty container half way along the dec. axis and gradually adding sand until the telescope is balanced--the weight of sand can then be measured. I made the counterweight from concrete which has a density of approx. 2500 Kg M^{-3}. Knowing the weight required the volume can be worked out. I made a mould from a ring of 10" plastic tubing with a 2.5" steel ring as the core which easily slides on the 2" axes. The weight is fixed on the axis using two further pieces of the steel tube with holes drilled and tapped to take a couple of bolts. With one each side of the counterweight it can be slid up or down until balance is found and then locked in place with the retaining rings.

THE DRIVE

Drives, comprising worm gears and synchronous motors, were bought for both axes. The declination drive (10) is not used at present but 'locks' this axis when observing. The RA drive (11) is supplied from a 12V battery via the simple circuit shown below which gives approx 240V output at 50 ± 10Hz. A hand held unit contains the potentiometer which controls the frequency output and hence the speed of the motor while guiding.

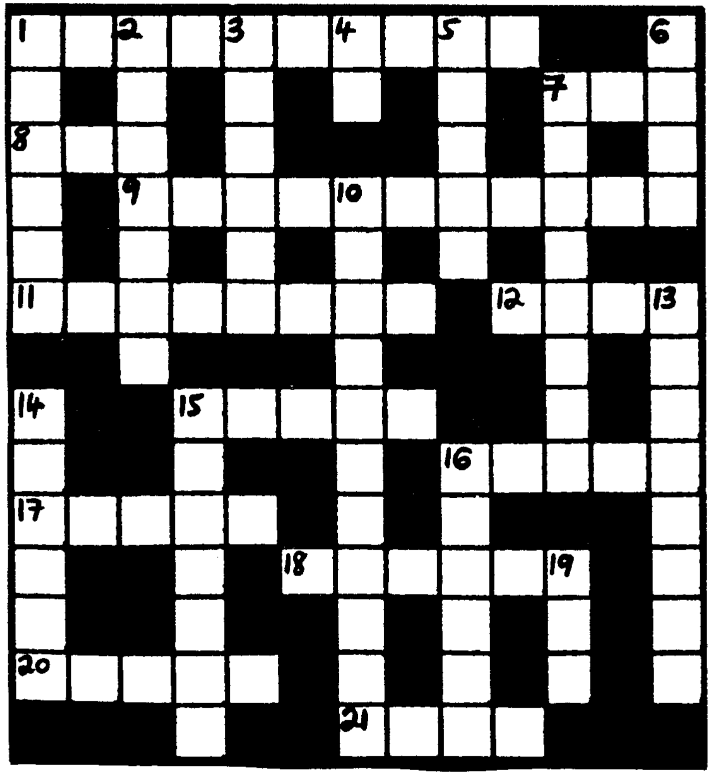


Address for suppliers

Steel Bars: Macreadys,
Glynwed Steel Stockholding Ltd.,
Usaspead Corner,
Pentonville Rd,
LONDON N1 9NE Tel. 01-837-7060

Drives: Dark Star Telescopes,
6 Pinewood Drive,
Ashley Heath,
Market Drayton,
SALOP TF9 4PA. Tel. 063-087-2958

XWORD 18



CROSSWORD 18 R.A. LOBBETT

ACROSS

1 THEY ORBIT AROUND A MUCH MORE MASSIVE BODY (10)
7 CAN REDUCE IMAGE QUALITY WHEN IT MOVES (3)
8 CONSTELLATION JUST NORTH OF LARGE MEGELLANIC CLOUD (3)
9 CRATER 24°N ; 48°W ON MOON (11)
11 "....... NEBULA", CONSISTING MAINLY OF HYDROGEN GAS (7)
12 M1 NEBULA (4)
15 COMPANION TO MIZAR IN THE PLOUGH (5)
16 TRIPLE STAR SYSTEM IN SCORPIUS (5)
17 PATH OF SPACE VEHICLE MOVING AROUND A PRIMARY BODY (5)
18 NOT DEIMOS (6)
20 MIDDAY POSITION OF SUN WITH RESPECT TO HORIZON (5)
21 STAR NEXT TO M15 IN CONSTELLATION PEGASUS (4)

DOWN

1 NINTH MOON OF JUPITER (6)
2 LARGEST MOON OF URANUS (7)
3 APRIL METEOR SHOWER (6)
4 MOON OF JUPITER WITH VOLCANIC ACTIVITY (2)
5 MOON OF JUPITER WITH A DIAMETER OF 80 Km (5)
6 "THE CRANE", SOUTHERN CONSTELLATION (4)
7 ONE OF BRIGHTEST STARS IN SOUTHERN SKIES — NAMED "RIVER'S END" IN THE CONSTELLATION ERIDANUS (8)
10 LOWER PART OF ATMOSPHERE (11)
13 ASTEROID 324 WHICH MAYBE LARGER THAN PALLAS (8)
14 OBSTRUCTS OBSERVATIONS, PARTICULARLY IN WET WEATHER (6)
15 COMPASS DIRECTION TOWARDS AN OBJECT AROUND HORIZON, STARTING AT NORTH (7)
16 "THE SWALLOWER", AN A1 STAR, MAGNITUDE 3·83 IN AQUARIUS (6)
19 NOT VISIBLE AT NIGHT (3)

SOLUTION TO CROSSWORD 17

ACROSS 1 GIOTTO; 8 BLUESHIFT; 9 ARIEL; 11 HYADES; 12 IONOSPHERE; 13 YERKES; 16 IZAR; 17 ANCHA; 19 VOLKOV; 21 MONOCEROS; 23 ECLIPSE; 24 GASEOUS; 25 ELECTRA.

DOWN 1 GRAVITY; 2 ORION; 3 O,B; 4 DUBHE; 5 ASPHERIC; 6 TITAN; 7 ATTENUATION; 10 LASSELL; 14 REVOLVE; 15 PAVO; 16 IAPETUS; 18 THEBE; 20 OMEGA; 22 OPEN.

Saturn Revisited.
by J.Walsh.

Far out into the Solar System we come to the Planet Saturn, which was the outermost Planet known until Herchell discvered Uranus in 1781.

Saturn takes 29½ years to orbit the Sun at a mean distance of 886,710,000 miles (1,427,000,000 KM.) and has the second shortest Rotation Period (10 hrs. 39mins. 24secs) in the Solar System. The differences in Polar Diameter which is 67,000 miles (108,000 KM.) and Equatorial Diameter 74,500 miles (120,000 KM.) makes Saturn the most Oblate Planet in the Solar System. Also Saturn has the least density of any of the other known Planets. With density lower than water, Saturn would float if we could find an ocean big enough !!.

Like Jupiter, Saturn gives out more heat than it receives from the Sun, and also seems to have an internal heat source of her own.

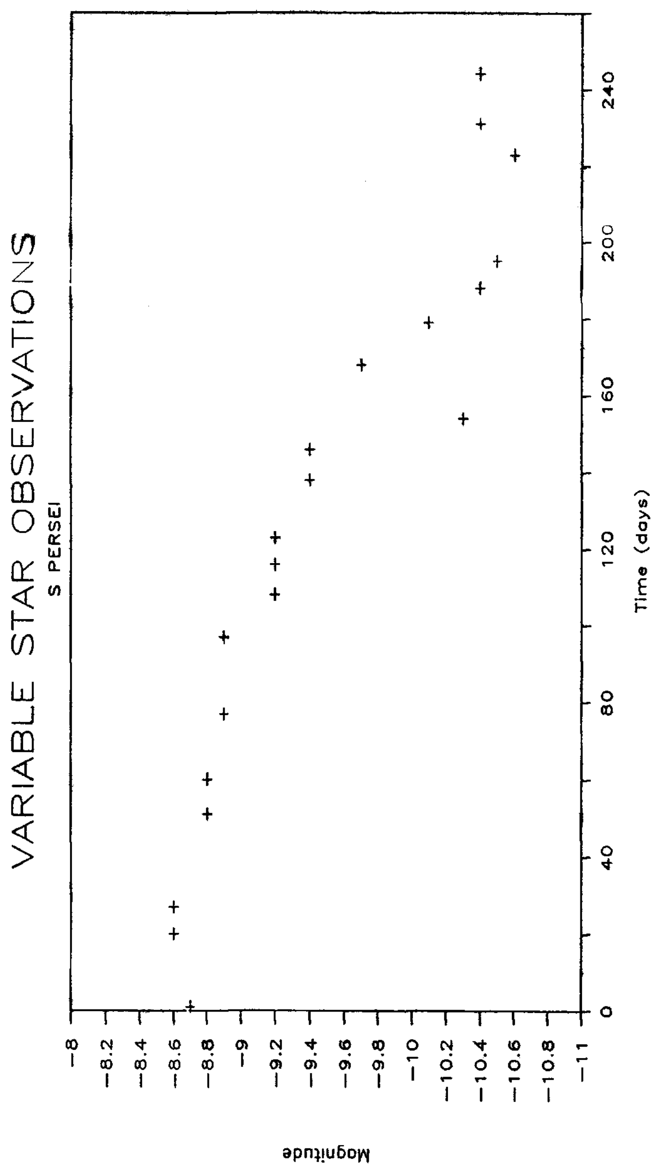
The most prominent feature of Saturn is undoubtably her magnificent ring system which lie around the plane of her equator and are thought to be particles of ice, rock and other debris left over from when her moons were formed millions of years ago.

Due to the planets orbital inclination of 26 Degrees and 44 Minutes, from Earth, (about 740, 000,000 miles (1,190,600 KM) away, at it's closest), Saturns rings seem to open and close, and this adds significantly to the brightness of the planet, even from the naked eye.

Saturns atmosphere is similar to Jupiters, consisting of Hydrogen Helium, Methane, Ammonia, Phosphine, Ethane, Acetyline, and Water Vapour. There seems to be not as much Helium gas present in Saturns atmosphere as there is in Jupiters atmosphere, this is probably due to Saturns much greater distance from the Sun, and hence, much cooler temperature.

Saturn has 23 known Moons, by far the planet with the most known satellites. 17 of the satellites are named, they are as follows, Titan, Rhea, Iapetus, Dione, Tethys, Euceladus, Mimas, Hyperion, Prometheus, Pandora, Phobe, Janus, Epimetheus, Helene, Telesto, Calypso and Atlas.

Of all the satellites of Saturn the one in the spotlight at the moment is Titan. The second largest known satellite in the Solar System with an equatorial diameter of 3,200 miles (5,150 KM). Titan is now known to have an atmosphere made up of mainly Nitrogen gas and could have the same gasses in her atmosphere as Earth had very early on in her history.



This light curve shows S Persei from August last year to April this year. It shows a fade of this semi-regular red giant from maximum to minimum.

Mike Nicholls

PROGRAMME FOR MAY

Mondays from 8pm GENERAL OBSERVATION SECTION

1-8-15 Mr R Newman [redacted] Felixstowe, IP11 9DY. Tel. Fel. [redacted]
22-29 Mr J King [redacted], Felixstowe, IP11 9LQ. Tel. Fel. [redacted]

Tuesdays from 8pm GENERAL OBSERVATION SECTION

2-9-16 Mr R Newman [redacted] Felixstowe, IP11 9DY Tel. Fel. [redacted]
23-30 Mr J King [redacted], Felixstowe, IP11 9LQ Tel. Fel. [redacted]

Wednesdays from 8pm NEBULA AND FAINT OBJECTS SECTION

3-10-17 Mr M Cook [redacted], Ipswich, IP4 5PZ Tel. [redacted]
24-31 Mr D Payne [redacted], Wickham Market, IP13 0SD. Tel.W [redacted]

Fridays from 8pm GENERAL OBSERVATION SECTION

5-12
19-26
Mr P R Richards [redacted], Ipswich, IP4 1QB. Tel. [redacted]
Mr M Harlow [redacted], Trimley IP10 0XB. Tel. [redacted]
Mr R A Lobbett [redacted], Felixstowe IP11 8UJ. Tel. [redacted]

All nights are open to all members, but, on nights other than Wednesday ring directors to confirm dates. [Directors will also be able to inform you of whether a group visit is taking place that evening.] All numbers, Ipswich (0473) unless otherwise indicated.

1989 COMMITTEE

CHAIRMAN	D Payne	(Address above)	Home: Work: [redacted]
VICE CHAIRMAN	D Barnard	[redacted], Ipswich, IP4 5PP	Home: Work: [redacted]
SECRETARY	R Gooding	[redacted], Ipswich, IP1 6AE.	Home: Work: [redacted]
TREASURER	M Nicholls	[redacted], Capel St Mary, Ipswich, IP9 2EX.	Home: Work: [redacted]
MAINTENANCE	M Cook	(Address above)	Home: Work: [redacted]
JOURNAL CO-ORD	E Sims	[redacted], Ipswich IP1 4HA	Home: [redacted]
LIBRARIAN	P Richards	(Address above)	Home: Work: [redacted]
EQUIPMENT CURATOR	J King	(Address above)	Home: [redacted]
SPECIAL EVENTS CO-ORD	A Smith	[redacted], Ipswich IP2 9ES	Home: Work: [redacted]