

## Part 7: Supply cables



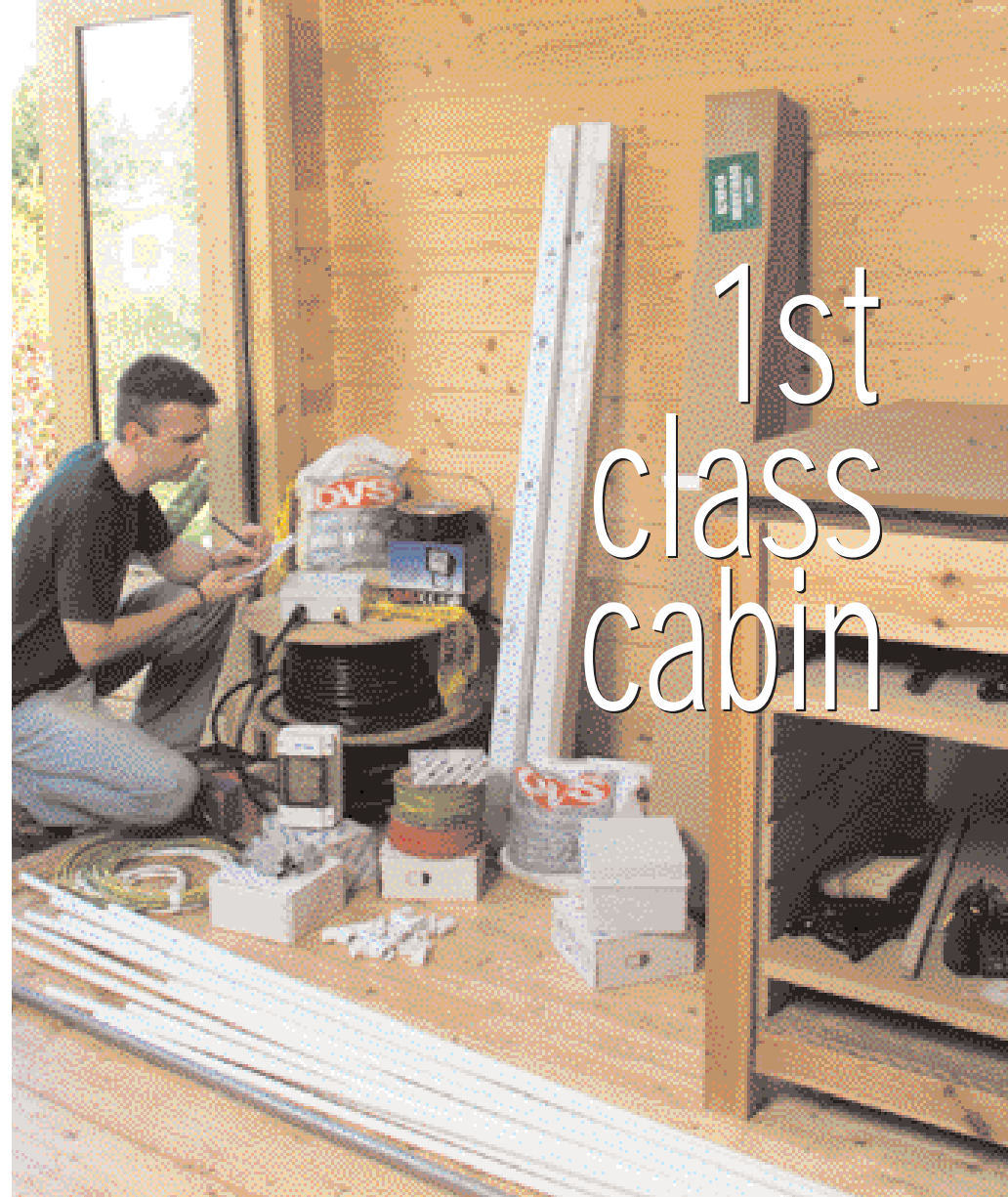
Once you've planned your workshop lay-out and power needs, the fitting can begin. Jim Watney shows how to save money by tackling the hard work yourself

Last time we talked about the design and the method of getting power to the workshop. Now, the hard work begins. The Steel Wire Armoured (SWA) cable consists of an outer sheath of waterproof plastic, the armoured cable (strands of steel wire) and the outer insulation protecting the individually insulated cables. This cable must be installed properly in order that the mechanical and electrical properties are properly utilised.

The cable has two main functions. To protect the conductors from mechanical damage and to prevent the ingress of moisture. To do this effectively the continuity of the protection must be maintained at the connection points. It is better to make one continuous run of cable from the house to the workshop. If you do need to make a joint in the cable

### Ingress protection

Socket and switch enclosures intended for use outdoors, and in other potentially hazardous positions, are marked with an IP (Ingress Protection) code. These codes are moulded into the front of the equipment and usually take the form of two numbers. The first number indicates the degree for protection against the ingress of solid objects. The second number refers to the ingress of liquids. Most 'outdoor' equipment will be marked IP55 or IP56. The higher the number the better the protection. Full explanations of these numbers can be found by typing 'IP Codes' into your search engine.



underground there are special junction boxes and 'potted' (resin filled) joint kits available

Connection to the house and workshop can be made internally. However this may cause an access problem if any maintenance or modification to the connections is required at a later date. In our workshop we have decided to terminate the SWA cable externally at waterproof boxes. To maintain the continuity of the Ingress Protection (IP), Exterior-grade glands must be fitted where the SWA cable enters the boxes.

We are going to run two separate cables to the workshop. One will be the power supply and the other is a two way switch cable. This second cable will enable us to control the exterior lighting from the house or the workshop.

As always, never tackle any electrical work unless you are confident. Always call in a qualified electrician to make the connection to the house supply and inspect and test the system.

### Handling, cutting and jointing SWA

By the nature of its intended use, cutting SWA is not just a case of getting out the wire cutters. The cable is tough, rigid and heavy. If you are using a reasonable length of cable it is better to buy it by the reel. There's an economy in doing this, as cut lengths are always sold at a premium. However, the big advantage is that the cable is supplied on a drum. ALWAYS unroll cable even if it is not on a drum. Pulling out the wire, like a spring, from a coil will result in the cable becoming twisted. This will make the job of handling it even harder.

The easiest way to do this is to make a 'dispenser' This can be as simple a piece of wood clamped onto the jaws of a portable work bench or a stake in the ground with a block fixed just above ground level to stop the drum from binding. The cable is simply unwound as required.

Make the connection to the workshop first, and then work down the garden

### The colours are a changin'

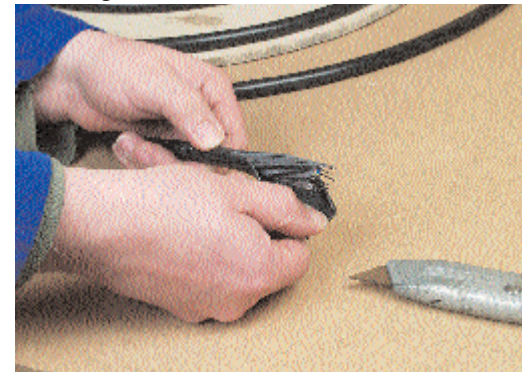
Just when you think you're safe, along comes a man from Europe and tells us that something else isn't right. Okay, before you all write in, it's our regulations people that are changing things, but they are doing it to fall in line with Europe.

This change is applicable to all new and temporary electrical installations. The new colours can be used immediately but become code in April 2006. Up until that date either system can be used. From the domestic viewpoint, the wires in the wall, the 'distribution system' or 'hard wiring' within the house will follow the colour coding now used for flexes. In short what is now red and black will become brown and blue. From the domestic point of view this is not too much of a problem. It is in industry where this is going to make the news as the three phase wiring colours change...if you are not an electrician, you may not have known about this until you read this...but you will.

fixing or burying the cable as you go. when you get back to the house cut the cable with half a metre or so extra, ready to make the connection to the house. Do not connect it at this stage. This should not be done until the shed connection has been made. The simplest way to cut SWA is with a hacksaw. Again, the jaws of a portable work bench come in handy for holding the cable for cutting. Always check and double check your measurements - a mistake will be costly.

Stripping and fitting the glands can be fiddly but correct installation is important if continuity of protection is to be maintained. For the connection to the shed. The inner part of the cable needs to be long enough to pass through the plastic box and into the small consumer unit via a short length of plastic conduit that has been welded into its box adaptors using the appropriate solvent adhesive. The wire armour and the outer sheath are cut back far enough to enable this to happen.

### Trimming the outer sheath of the cable



## WORKSHOP



Mark the wire for cutting



Don't forget the sleeve

### Step-by-step gland fitting

1 When fitting the glands, the first thing to do is to trim the outer sheath of the cable back using a Stanley knife. At this stage, trim the end off the outer rubber sleeve, and slide this onto the cable. It's so easy to get the rest of the job done and find the sleeve still in the packet, of course, I never do that!

2 Once the sleeve is fitted over the cable, and the outer sheath has been trimmed back, the steel wire can be marked and cut to length. Use a pair of heavier duty wire cutters. The purpose-made cutters have much harder cutting jaws and are usually configured with a mechanical advantage over their more delicate cousins. Electrical cutters are designed to cut non-

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Snip the wires one at a time

Fit the components to the waterproof box



The parts ready for assembly



Snip the sleeve tip



Above and below: Fitting the sealing components and wire clamping nut



ferrous metals and would be damaged if used for cutting the steel.

**3** Assemble the fittings into the waterproof box. The holes are drilled using a 20mm hole saw. The brass 'banjo' has its tag bent up, as can be seen in the photograph, in order that an earth connection can be made to the fitting, which in turn, connects to the armour of the cable, more about earthing next time.

**4** Pass the inner cable through the fitting and into the box. The steel wire is opened out around the cone-shaped section of the fitting and the nut, washer and waterproofing collar are tightened securely.

## WW EXCLUSIVE DISCOUNT OFFER!

We have got together with Garden Affairs, the suppliers of our log cabin, to offer WW readers the chance to buy their own workshop at a discount price. These buildings come in three sizes and are all made from 44mm planed softwood with 19mm T&G roofs and floors, double glazed doors and windows.

<b>Option 1</b>	4 x 5m cabin	£4200
<b>Option 2</b>	4 x 4 cabin	£3450
<b>Option 3</b>	4 x 3 cabin	£3150

Please contact Garden Affairs direct for more information:  
 ☎ 01225 470372  
 fax: 01225 442855  
[www.gardenaffairs.co.uk](http://www.gardenaffairs.co.uk)

**5** Three core armoured cable is colour coded in the three (phase) colours, Red (L1), Yellow (L2) and Blue (L3). In this application the conductors are being used as Phase (red) Neutral (black) and Earth (green/yellow) and therefore should be flagged as such in order to avoid any confusion with this installation or with any future alterations. The switch cable is, however, coloured correctly as the wires are all phase conductors.

**6** Drill a hole through the wall of the workshop, large enough for the conduit to pass through, and fix the consumer unit in position. Seal around the hole with silicon sealer.

## Book offer

WW readers can buy **Workshop Electrics** by Alex Weiss for the discount price of £6.95, including P&P. Offer closes 16th June 2004.

Please contact the Customer Services Department, HIGHBURY LEISURE, Berwick House, 8-10 Knoll Rise, Orpington, Kent, BR6 OPS Tel: 01689 886 660 or 01689 886 661 Fax: 01689 886 666 Email: [customerservices@highburyleisure.co.uk](mailto:customerservices@highburyleisure.co.uk)



Using insulation tape to 'flag' the conductors to indicate their use



The thinner wires on the left are switch wires and are all phase conductors and therefore do not need flagging



The neat garage/shed consumer unit, from QVS with RCD is ideal for this project



## Wiring kit list

Obviously this is a comprehensive but it should give you some idea of the parts required for any workshop set-up. All parts supplied by QVS.

### Cable

CCSW43	4mm 3 Core SAW	Power to workshop	50m
CCSW153	1.5mm 3 core SAW	2 way lighting cable	50m
CAS15R	1.5mm Single core cable	Workshop lighting	50m
CAS15B	1.5mm Single core cable	Workshop lighting	50m
CAS15GY	1.5mm Single core cable	Workshop lighting	50m
CAS25R	2.5mm Single core cable	Workshop power	100m
CAS25B	2.5mm Single core cable	Workshop power	100m
CAS25GY	2.5mm Single core cable	Workshop power	100m
CA CW20SK	C type Gland Packs	For SAW Cable	2
A CUT	Cable marker tape	Underground marking	50m
CA CC5	Armoured cable cleats	For power cable[*]	100
CA CC6	Armoured cable cleats	For lighting cable[*]	100
CCS6GY	6mm Single core cable	Earthing	10m
CCF13	Round white PVC flex	Lighting	6m

### Connection to house

VX9713	45 amp DP switch	Workshop isolator	1
VX1020	1 gang, 2-way switch	Exterior lighting	1
VX9415	Dual accessory box	To mount switches	1
BX223L	IP65 Enclosure	For main connection	1
BX222L	IP65 Enclosure	For switch extension	1
SCOW 25G	Conduit	For switch wiring	3.75m
SCOW 25CPG	Couplers	For conduit	5
SCOW 25MBB	Brass bushes	For conduit	5

### Exterior lighting

LF TH500	500W Floodlight	Outside of workshop	1
BALD TH500	500W Lamp	Plus one as spare	2
CA CW20SK	C-type gland pack	Connections	2

SCOW 20BX1G	Terminal box	Connection to workshop	1
SCOW BILGE	Box lid	For terminal box	1
SCOW BURG	Gasket	For terminal box	1
SCR M4X10	10mm M4 screws	For terminal box	2

### Power connection to workshop

P GU240A326	IP65	Insulated consumer unit	1
A EB4	Earth block	For bonding	1
A ER4	Earth rod	For additional safety	1
A EBB	Clamp	For rod	1

### Workshop Internal Power and Lighting

PECO 20HGTW	Conduit	Power and light	45m
PECO 20IEW	Elbows	For conduit	7
PECO 20ITW	Tees	For conduit	4
PECO 20FAW	Female adaptors	For conduit	14
PECO 20MAW	Male adaptor	For conduit	1
PECO AD	Solvent weld	For conduit	1
PECO 20BSB	Spacer saddles	For conduit	50
SCOW 20BX2G	Through box	For lighting	3
SCOW 20BX1G	Terminal box	For lighting	1
PECO RAG	Gaskets	For lighting	4
SCR M4X10	10mm M4 screws	For boxes	8
SCOW HP	Hook plates	For hanging lights	4
SCOW JOCK	Jack chain	For hanging lights	10m
SCOW SC	Suspension clips	For hanging lights	4
CL PB52	Twin 5ft fittings & lamps	Main lighting	2
CLPO52	Diffusers	For lamps	2
QA132SM	Metal clad twin socket	For power	6
QA12SM	Metal clad 2way 2gang	For lighting	1

### Miscellaneous

Earth tags, ring terminals, banjo's, terminal blocks, insulation tape, grommets, fixing screws and washers.

Marking the position of the box



A long drill bit will help keep those holes straight and prevent the conduit from binding



## NEXT MONTH

Next time we get wiring - and it's amazing how much wire you can use...