User Guide

ECTechnics

Revision 25th October 2012
Page 9 new FAQ section

Unis

Horticultural CO_2 Controller

Introduction

Thank you for purchasing the **Ecotechnics Unis CO_2 Controller**. In order to take full advantage of your new controller, please read this manual carefully and use the product as directed.

Carbon dioxide (CO_2) is a colourless, odorless gas that occurs naturally in our environment. It is normally present in the atmosphere at a concentration of approximately 0.036% or 360 PPM.

Carbon dioxide in our atmosphere is known as a "greenhouse" gas. This naturally occurring gas, along with hydrogen vapor, methane, nitrous oxide, and ozone act something like the glass walls and ceiling of a greenhouse. It lets sunlight in to keep things warm, but it doesn't let the heat escape. That's why scientists began to call gases "greenhouse" gases because of their warming effect on the earth. If it were not for these greenhouse gases, scientists predict that our planet would be un- inhabitable with an average temperature of about -23°C.

Although it comprises a very small percentage of our atmosphere, it is vital for nearly all forms of life. Without CO_2 we would probably not exist because carbon dioxide is the principle inorganic compound that plants use to construct their tissues. Consequently, we derive our energy resources by either consuming plants directly, or indirectly when we eat the animals that consume the plants. Therefore, it is clear that carbon dioxide enhances and makes possible the very existence of life on earth. As a vital atmospheric ingredient, CO_2 makes our planet a place where all forms of life may flourish.

Many growers fail to recognize the importance of Carbon Dioxide in their growroom. most plants grow faster and larger with enhanced CO_2 levels because of more efficient photosynthesis and a reduction in water loss. There are also many other benefits for plants, among them greater resistance to temperature extremes and other forms of stress, better growth at low light intensities, improved root/top ratios & less injury from air pollutants.

Photosynthesis is the term used to describe the process by which plants combine CO_2 molecules with water molecules to form complex sugars, there is a resultant spare oxygen atom which is released back into the air, the sugars being further processed by the plant to form natural polymers for growth. The ambient level of CO_2 in air is 300-400 PPM, fast growing plants in your growroom or glasshouse can use all the available CO_2 in less than an hour slowing photosynthesis and therefore growth to a virtual halt.

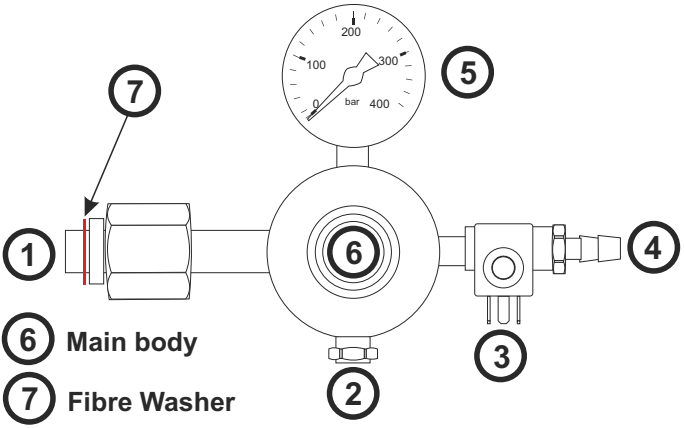
It can be seen that the rate at which plants are able to grow is relative to the availability of photosynthesized complex sugars. Raising the ambient CO_2 level in your growroom causes more sugars to be produced allowing the plant to grow bigger and faster. The optimum level of CO_2 for plant growth is generally accepted at 1200-1600 PPM, plants grown in this environment can grow up to 40% faster thus shortening crop times and increasing yields. This is of course assuming no other limiting factors such as lack of available light etc.

It should be noted that there is no advantage to increasing CO_2 levels beyond 2000 PPM for most greenhouse plant species. It should also be noted that there is generally no advantage to raising CO_2 levels during dark hours.

Unis CO_2 Regulator Diagrams

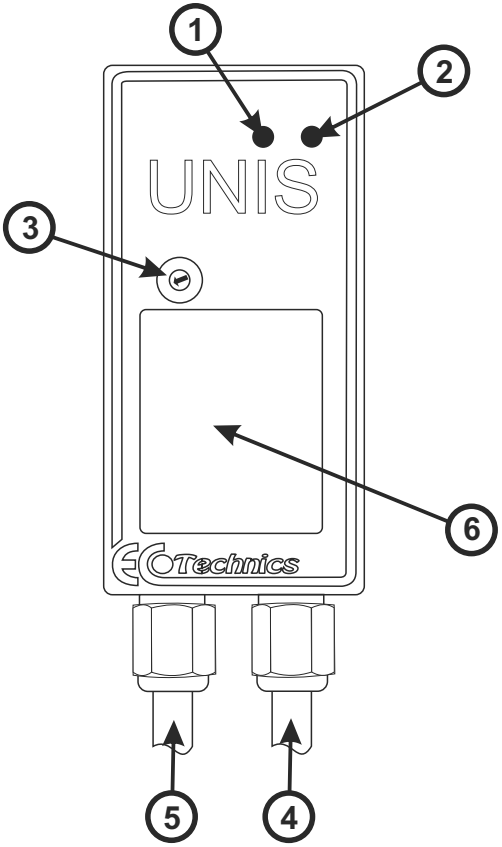
Unis Regulator

1. To Gas Bottle
2. Safety Valve
3. Solenoid Valve
4. Output
5. Pressure Gauge
6. Main body
7. Fibre Washer



Note: The Regulator is preset to deliver 17 litres per minute (no need to adjust)

Unis Controller



1. Power LED
2. Dose LED
3. Room Size Setting Dial
4. Power Input
5. Output to CO^2 Regulator
6. Room Calculation Chart

Setting up the Unis CO_2 System

Preparations

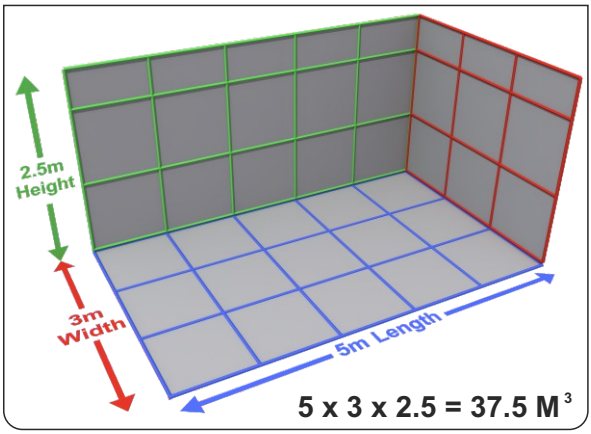
Before you set up your UNIS CO_2 controller you will need to find out the cubic volume of your growing area. Once calculated and set this will enable the Unis CO_2 Controller to introduce the optimum amount of CO_2 for your plants.

Use the example below as a guide on how to measure, calculate and then adjust the controller to the appropriate setting needed for your room using a small screw driver.

length x width x height = internal cubic volume of the room

Example Room Volume Calculation

The illustration below shows a typical example of a room, in this case the room measures **5M** in **length, 3M** in **width** and **2.5M** in **height**.

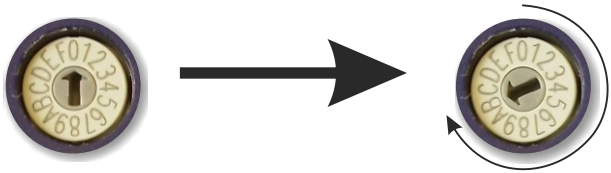


Setting	Growroom Volume
0	1 Cubic metre
1	2 Cubic metres
2	4 Cubic metres
3	6 Cubic metres
4	8 Cubic metres
5	10 Cubic metres
6	15 Cubic metres
7	20 Cubic metres
8	25 Cubic metres
9	30 Cubic metres
A	35 Cubic metres
B	40 Cubic metres
C	45 Cubic metres
D	50 Cubic metres
E	75 Cubic metres
F	100 Cubic metres

1. To calculate your grow room volume, measure your room in length width and height in metres, then multiply the length width and height measurements to obtain the cubic volume of your room.
   Example: 5 x 3 x 2.5 = 37.5 M^3

2. Once you have your room volume, use the **Unis CO_2 chart** to find the nearest corresponding setting.

3. Dial in the required setting on the **Unis CO_2 Controller** using a small screw driver,
   Example: You would turn the arrow clockwise to line up with 'B' as seen in the diagram below as 40 cubic metres is the nearest setting.



Initial factory setting

Set arrow to point toward 'B' for ***example*** room above

Easy Setting chart for Secret Jardin Grow Tents

Choose your Secret Jardin tent from the list, then simply dial in it's setting

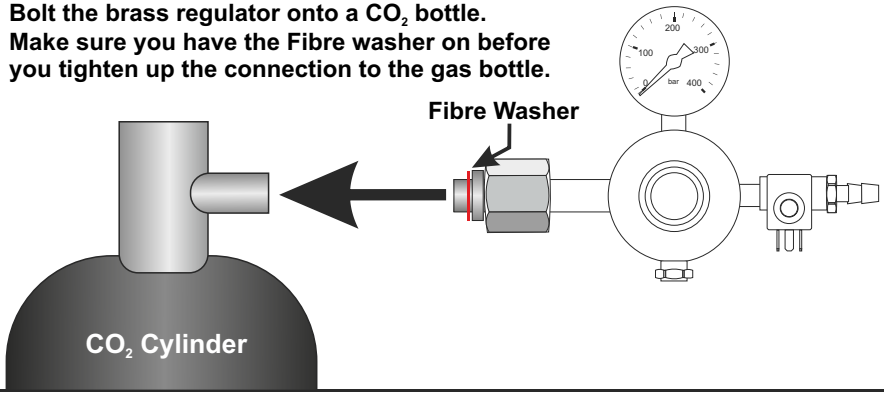
Setting	Volume m^3	Nearest Secret Jardin Tent Volume m^3
0	1 m^3	DS60, DS90, DR60 , DR60Twin
1	2 m^3	DS120, DR90, DR120, DR120Twin
2	4 m^3	DS150, DR150
3	6 m^3	DR240w, INT120
4	8 m^3	
5	10 m^3	DR300w, INT150
6	15 m^3	DR240, INT240
7	20 m^3	DR300, INT300
8	25 m^3	INT480
9	30 m^3	
A	35 m^3	
B	40 m^3	INT600
C	45 m^3	
D	50 m^3	
E	75 m^3	
F	100 m^3	

Secret Jardin Grow Tents Volume

Dark Street II	
DS60	0.5m^3
DS90	1.29m^3
DS120	2.59m^3
DS150	4.56m^3
Dark Room II	
DR60	0.57m^3
DR90	1.46m^3
DR120	2.88m^3
DR150	4.5m^3
DR240	11.52m^3
DR300	18m^3
DR240w	5.76m^3
DR300w	9m^3
Dark Room Twin	
DR60T	1.25m^3
DR120T	2.16m^3
INTense	
INT120	6.19m^3
INT240	12.38m^3
INT480	24.76m^3
INT150	9.67m^3
INT300	19.34m^3
INT600	38.6m^3

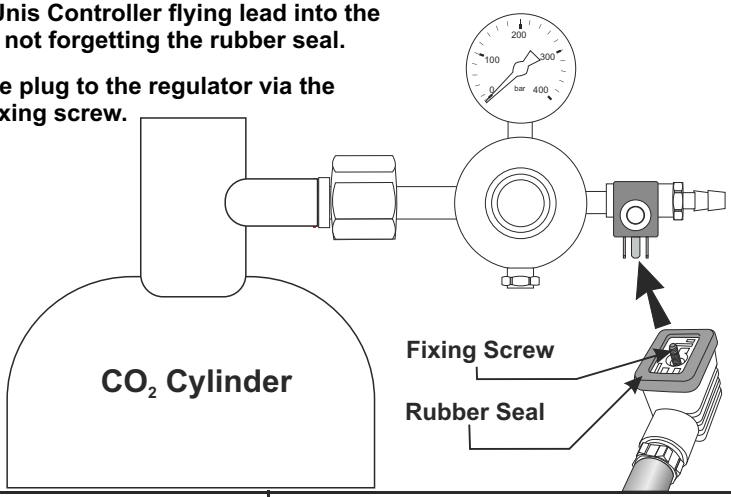
Connecting up the Unis CO_2 Controller

1 **Bolt the brass regulator onto a CO_2 bottle. Make sure you have the Fibre washer on before you tighten up the connection to the gas bottle.**

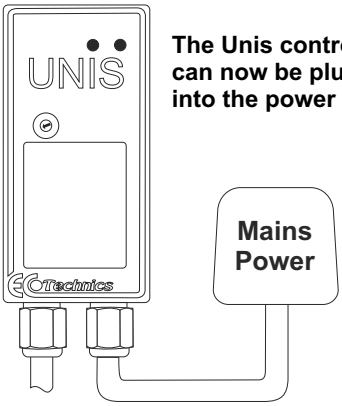


2 **Plug the Unis Controller flying lead into the regulator, not forgetting the rubber seal.**

3 **Secure the plug to the regulator via the internal fixing screw.**



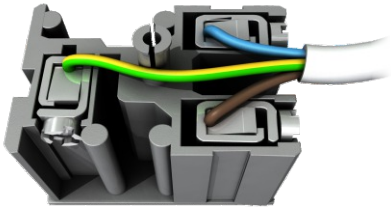
4



The Unis controller can now be plugged into the power source.

Wire connection diagram for angled plug on Regulator

Brown: Live
Blue: Neutral
Green/Yellow: Earth



Grow Room Usage

Generally for indoor grow room usage the Unis CO_2 controller would be plugged in with the lighting system supply so that it only works when the lights are switched on.

Glass House Usage

For glass house use the Unis CO_2 controller should be connected to a 24 Hour timer in order to turn it off during dark hours as there is no benefit to raising CO_2 levels during darkness.

Unis CO2 with 24 hour Timers and Contactors

Once you have set your Unis CO_2 Controller with the appropriate room size, connected the Regulator and CO_2 gas bottle you can now connect the Unis to the power supply..
The Unis controller should only be dosing CO_2 during the day cycle when using lighting (plants do not process CO_2 at night/when lights are off)

To control your Unis and your lighting setup for day cycle use we recommend the Ecotechnics Powerstar Pro range as they have a easy to use 24 hour timer and a suitable heavy duty contactor combined.

Carbon Dioxide Safety

Exterior Levels of Carbon Dioxide:
Ordinary outside air normally contains CO_2 at a concentration of about 300 to 400ppm (300 parts of CO_2 gas per million parts of air.)

Interior Levels of Carbon Dioxide:
Indoors, however, whether we're at home, office, or traveling in a confined space like a plane, the CO_2 content can vary considerably.
Usually in a home, the CO_2 levels can vary from 300 up to 2000 ppm.

Several studies have indicated that CO_2 does not seriously impact human health until levels reach approximately 15,000 ppm. This level is more than 40 times greater than the normal concentration of atmospheric CO_2. At extremely high levels, i.e., 30,000 ppm, (these concentrations are usually never be reached in a standard home) the symptoms can include nausea, dizziness, mental depression, shaking, visual disturbances and vomiting.

At extremely high levels, loss of consciousness may occur. The seriousness of the symptoms is dependent on the concentration of Carbon Dioxide and the length of time the individual is exposed.

CO_2 - Denser Than Air
Gaseous Carbon Dioxide is 1.5 times denser than air. Therefore, it will be found in greater concentrations at low levels.

High concentrations of CO_2 can displace oxygen, and can subsequently cause death especially if allowed to accumulate in open pits and other areas below ground. Carbon Dioxide acts upon our vital bodily functions in a number of ways, including stimulating respiration, regulation of blood circulation, and the acidity of body fluids.

Common complaints from increases in CO_2 levels include difficulty in breathing, increase in the breathing rate and/or pulse rate, headaches, sweating, shortness of breath, abnormal fatigue and a feeling of "stuffiness". Introduction of fresh air can assist in eliminating these problems.
Finally, CO_2 is an asphyxiate, a condition in which an extreme decrease in the amount of oxygen in the body, accompanied by an increase of carbon dioxide, leads to loss of consciousness or death. Concentrations of 100,000 ppm or more of CO_2 can produce unconsciousness or death.

STANDARDS AND RECOMMENDATIONS FOR CO_2 EXPOSURE
The Occupational Safety and Health Administration (OSHA) has set a standard for the maximum allowable concentration of carbon dioxide in the air of 0.5% (5000 ppm) for eight continuous hours of exposure. The maximum time weighted average exposure to carbon dioxide in the air is set at 1.0% (10,000 PPM) for a ten hour shift in a 40 hour week.

Understanding how the Unis controller works:

Let's take a closer look at understanding how the UNIS operates in delivering Carbon Dioxide into your Grow room.

Example Grow Tent:
For this example we'll choose a Secret Jardin DR240 as the Grow Tent we wish to use Our Unis CO_2 controller in.

Grow Tent size?
DR240 has a cubic capacity of 15m^3. Looking on the chart on page 4 we see that we need to choose setting 6 on the Unis controller .
Choosing setting 6 means that the Gas Regulator will dose each time for apx. 6 seconds.

How much CO_2 per dose?
The Gas regulator has a preset Gas delivery rate of 17ltrs per minute.
Setting number 6 on the Unis doses for 6 seconds, that's 1 tenth of a minute.
So the amount of CO_2 released per dose is 1.7ltrs of CO_2 Gas into your grow tent.

How often does the UNIS dose?
The timer in the Unis is preset to make a dose every 240 seconds (4 minutes)
You can further regulate this by plugging the Unis into a 24hour timer so that it is only powered **ON** in the DAY cycle for example.

When should the UNIS dose?
The Unis is designed to ideally dose CO_2 into a grow tent **after** an air extraction.
The new air introduced after an extraction event will fill the room with clean fresh air that should have a background level of around 300 to 400ppm.

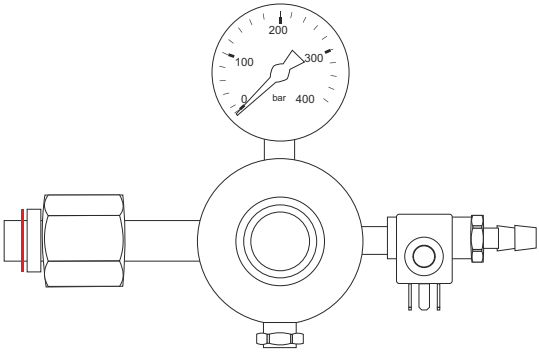
What will the CO_2 PPM level in the grow tent be using a UNIS?
Using our example grow tent:
Dosing CO_2 for 6 seconds in a grow tent of around 15m^3 volume should raise the CO_2 ppm up from a background level of apx. 400ppm up to around **1600ppm** and so give your plants a excellent boost of Carbon Dioxide.

Things to take into account:

- **The optimum time to dose is after an air extraction event during the day cycle.**
- **How air tight is the grow tent?**
- **Please Note: A leaky tent or open zips will allow the CO_2 to exit the tent**
- **How many plants are in your grow tent?**
- **1 plant will use a small amount of CO_2 but 40 plants will use much more CO_2**
- **What stage of development are your plants?**
- **How are you distributing the gas from the regulator (perforated hose for example)**
- **Do you have a small fan (not extraction) to stir the air in the grow tent to mix the CO_2 evenly**
- **What height do you release the CO_2 in the tent?**
- **CO_2 is heavier than Air: so will tend to sink to the lower part of the grow tent in "still air" conditions.**
- **Having an extraction event shortly a dose: This will drop the level of CO2 in the tent.**
- **No need to dose during the night cycle of the plants.**
- **Plants do not take up CO_2 in the night cycle**

<u>What the UNIS Carbon Dioxide Controller does NOT do!</u>
- **Unis does do not constantly measure/control the level of carbon dioxide. (no analyser)**
- **If you wish to monitor and control the levels of CO_2 use our Evolution CO_2 Controller**

Gas Regulator Safety Advice



Only experienced and properly trained persons should handle compressed gases, they should be conversant with relative safely instructions including the current British compressed Gases Association code of practice CP7 and the gas safety instructions from the gas supplier.

Markings
The regulator is marked with the following:-
- Maximum inlet pressure (pressure service)
- Rated outlet pressure
- Gas (only use for gas shown)

Fitting to the cylinder
Before fitting the regulator, ensure both the cylinder outlet valve and the regulator inlet are clean and free from contaminants including dirt, oil and water. If fitted, fully release the regulator adjusting knob by winding anticlockwise prior to fitting to the cylinder. Right hand thread is employed for oxygen and permanent gases and left hand thread is used for fuel gases. Use only the correct size spanner and finally tighten by applying 2 blows to the end of the spanner with the heel of the hand.

Operating
After fitting of the downstream equipment, open the cylinder valve slowly, this is a critical operation and must be done slowly to be safe. If fitted, adjust the regulator knob to the required outlet pressure and purge hoses, make the final adjustment when gasses are flowing. It is vital to ensure that any audiable vibration or freezing of the regulator is avoided during operation. Check for leaks at all joints with a leak detection spray. On completion of use, close the cylinder valve and exhaust gas from lines.
If fitted, fully release regulator pressure adjusting knob.

Safety points
Carefully inspect the regulator for oil, grease and damaged or dirty parts. Oxygen vigorously supports combustion, never use the regulator if oil, grease or damaged parts are detected.

Never:
Never use a regulator showing any signs of damage
Never allow cylinders to become heated
Never use pressure gauges that are damaged, not smooth in operation or not zeroing
Never remove or change any component parts of a regulator.

Always:
Always check the whole system for damage and leaks at frequent intervals
Always work to BCGA codes of practice (to purchase copies, telephone 01491 825533)
Always fit a flashback arrestor to the outlet of an oxygen or fuel gas cylinder.

Jan 2012 document revision

---- ALWAYS OBSERVE THE FOLLOWING ----

- When connecting / disconnecting all cables, grasp the connector itself—never pull on the cable. This way you will avoid causing shorts, or damage to the cable's internal elements.
- Do not excessively twist or bend the power cord, or place heavy objects on it. Doing so can damage the cord, producing severed elements and short circuits. Damaged cords are fire and shock hazards!
- In households with small children, an adult should provide supervision which is essential for the safe operation of any electrical appliances in the home.
  All cords and cables should be placed so they are out of the reach of children.
- Try to prevent cords and cables from becoming entangled.
- Before moving the unit, disconnect the power cable from the mains supply and any cords coming from external devices.
- Never handle an AC adaptor or electrical plugs with wet hands when plugging into, or unplugging from, an outlet or this unit.
- Before cleaning the unit, turn off the power and unplug the AC adaptor from the outlet.
- Do not force the unit's power-supply cord to share an outlet with an unreasonable number of other devices.
- Be especially careful when using extension cords—the total power used by all devices you have connected to the extension cord's outlet must never exceed the power rating (watts/amperes) for the extension cord. Excessive loads can cause the insulation on the cord to heat up and eventually melt through.
- Protect the unit from strong impact.(Do not drop it!)
- Before using the unit in a foreign country, consult with your retailer or an authorized distributor.
- Whenever you suspect the possibility of lightning in your area, disconnect the unit from the power outlet.
- Do not attempt to repair the unit, or replace parts within it. Refer all servicing to your retailer or an authorized distributor.
- When moved from one location to another where the temperature and/or humidity is very different, water droplets (condensation) may form inside the unit. Damage or malfunction may result if you attempt to use the unit in this condition. Therefore, before using the unit, you must allow it to stand for several hours, until the condensation has completely evaporated.

Please note you will find the latest revision of any of our
User Guides on the Ecotechnics website located in the downloads area below:

http://www.ecotechnics.co.uk/downloads.htm

SAFETY CONSIDERATIONS

- Always make sure the unit is unplugged before attempting to connect the fan and/or heater to the unit.
- Always check that all cables are correctly and securely connected and that the cover is securely screwed on before plugging the unit in and turning the power on.
- Always Remember that Electricity and Water is an Extremely Dangerous Combination. Electricity can be fatal especially in the presence of water.
- It is strongly recommended that any electrical equipment used in the growing environment is mounted above ground level, on a shelf or if possible wall mounted so that in the event of water spillage or flooding the two remain separate.

POWER CONSUMPTION 15 WATTS MAX
SUPPLY VOLTAGE 230-240V AC

ECOTECHNICS PRODUCT GUARANTEE

Thank you for choosing an Ecotechnics product for use in your growroom. As leading manufacturers of horticultural equipment and accessories we are committed to providing a range of innovative products to enhance your garden. Our commitment to quality is second to none, however if you do experience any problem all our products are covered with a full 1 year parts & labor guarantee and should be returned to the retailer along with the original purchase receipt .
Ecotechnics UK Ltd is not liable for labor costs involved in the installation or removal of the product, lost profits, incidental or consequential loss, injury to property or persons or any other consequential loss however caused.

Shop / Dealer

Purchase Date

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Serial Number U C • • •