

# Kestrel

*Timer and Radio Control-activated  
bird scarer*

## *User Manual*

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***“Thank you for choosing BirdDeter’s pest control program!”***

**Please read this page**

This Kestrel User Manual has been compiled to save you time and to help you get the best possible results. It is based on years of practical experience with the BirdDeter program and we therefore strongly recommend that you take the time to at least browse through it before you set up your Kestrel system!

**BirdDeter Customer Support**

Our company is dedicated to customer service. We provide a full range of consulting services and our experienced staff are happy to advise on the selection, installation, deployment and commissioning of BirdDeter systems. If urgently needed, our Customer Services Manager, Gavin Lake, can be contacted after hours at 0407 150 227.

You can also obtain comprehensive technical support by contacting John Muehlebach, our Technical Manager, at the Customer Hotline numbers shown below, between 8.30 am and 5.30 pm, Monday to Friday. Your request for technical assistance will be serviced within 24 hours. For technical assistance after hours, call John at (07) 4661 9416.

**Customer Hotlines**

**Tel (650) 610-7900  
Fax (650) 593-0118**

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## INTRODUCTION

1

### ***A Unique Approach to Pest Control***

Your Kestrel system is part of a unique *control program* for managing pest birds and flying foxes. It has been developed in Australia and many local growers have already used Kestrel to achieve excellent savings by minimising pest damage to their crops.

In a nutshell, the BirdDeter program consists of the world's most advanced equipment combined with deployment know-how. The *Kestrel* model incorporates the latest breakthroughs in deterrent technologies. Of course to produce the best results possible, the equipment has to be properly set up. This means it must be deployed strategically and, importantly, at the right time. BirdDeter advisers have gained this *deployment know-how* over years of fine-tuning the total program in a very wide range of situations.

Kestrel's method of deterring pests consists of scaring them away using their own alarm and distress calls, together with calls of predators. Visual deterrents can also be added if needed. Pests soon learn that flying into the protected area causes them distress and repeated stressful experiences train them to avoid such an area completely.

In summary, the Kestrel system offers these unique features:

- 1 Computer controlled deterrents
- 2 Digital quality recordings of natural bird or fruit bat calls
- 3 Remote Control Unit for remote activation
- 4 VHF radio link (for remote control or to upgrade to radar activation)
- 5 Habituation less likely than continuous sounds
- 6 Solar power panel
- 7 Easily transportable
- 8 Low maintenance
- 9 Robust Construction

## HOW THE SYSTEM WORKS

# 2

### ***Overview***

A standard Kestrel system consists of one major component: namely the Deterrent Module. It is powered by a twelve-volt battery and an optional solar panel. The deterrent module can deliver up to 120 watts of audio power thus providing coverage of at least four hectares (ten acres), depending on pest pressure. One person can normally install this system in approximately one hour. The performance of Kestrel units can be enhanced by the addition of optional visual deterrents such as an electro-mechanical hawk effigy, or strobe lights.

### ***Kestrel Deterrent System***

The deterrent or scaring system provides two ‘scaring’ strategies. The main one uses sounds recorded from nature (technically known as bioacoustics). The other scaring methods are visual and rely on the pests’ sense of sight. Here is a detailed explanation of both strategies.

The *acoustic* or sound deterrent strategy utilises an electronic sound playback unit which is controlled by computer. Three audio amplifiers drive the outdoor-type loudspeakers. The miniature computer and electronic sound system are housed in the weatherproof Control Box, as are memory ‘chips’ which contain recordings of appropriate birdcalls. The chips are attached to a ‘sound card’ which can be changed over if necessary (for example, if new birds arrive later in the season).

Each Kestrel module is switched on by computer-controlled electronic timer or by hand-held remote control. Every time the deterrent system is activated, the sounds are played for thirty seconds. The group of calls selected for playback is also varied at each activation.

### ***Remote Control***

The hand-held remote control unit can also be used to activate Kestrel modules. It operates using a radio-link so there are no messy connecting wires. The ‘radio link’ operates in the Very High Frequency (VHF) band at 40.68 mHz and does not need to be licensed. For best performance, the remote controller and Kestrel module should be able to “see” each other. In other words, there should be ‘line-of-sight’ between each of them.

(NB The remote control can be used in conjunction with, or instead of, radar equipment if the Kestrel system is upgraded at a later date).

### ***Optional Electric Hawk***

Certain excitable bird species, such as rosellas and lorikeets, may need *visual* deterrents to supplement the birdcalls: the ‘Electric Hawk’ option was especially developed for use against these particular members of the parrot family.

The Electric Hawk device consists of a plastic imitation hawk which is raised into the air and remains visible for a short time. The hawk effigy is bolted to the end of a fibreglass rod and this assembly is raised and lowered by an electric motor and gearbox: hence the name “Electric Hawk”.

### ***Optional Electric Hawk (cont'd)***

Whenever Kestrel is activated, the sounds are played and then the rod plus hawk is raised from a horizontal resting position to vertical. As a result, the hawk appears to 'hover' over the crop for approximately two minutes, then it is smartly lowered back to the horizontal position, where it stays - virtually invisible - until it is raised again when the deterrent system is re-activated.

### ***Optional Strobe Lights***

Powerful strobe lights are also available as an optional visual deterrent. These can be particularly effective against dawn- and dusk-feeders, as well as flying foxes (fruit bats) which are normally most active after dusk. A minor modification to the deterrent's computer program is needed for operation at night and this is performed at the factory prior to despatch.

### ***Where and when to install***

The Kestrel module should be placed either in the centre of the crop, or at another place within the crop to which birds are most likely to fly if they are disturbed at their first feeding point.

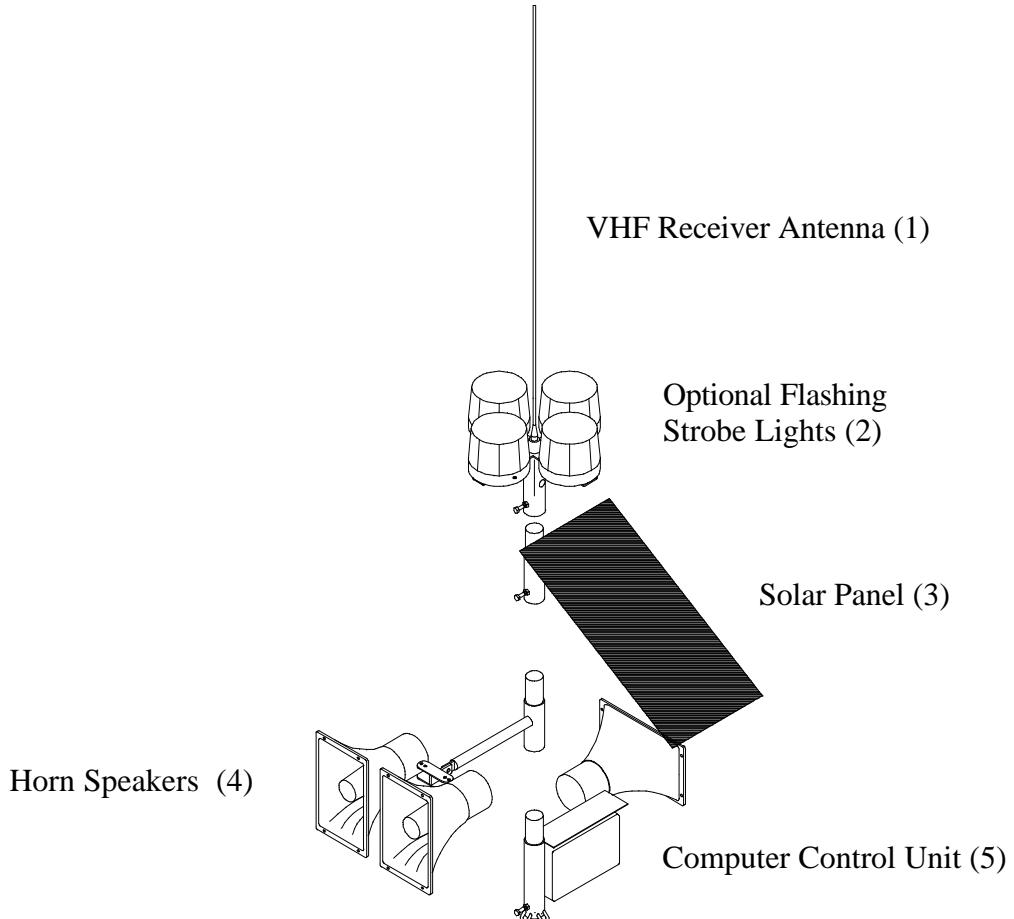
There is another issue which is so crucial to success that its importance can hardly be over-emphasised. Here it is: *make sure the equipment is 'up and running' **before** pests arrive in numbers*. If the system is installed at the right time (so that all the 'early birds' are deterred), your whole pest management program will have the best possible start. However, if installation is left too late, it will be very difficult to achieve a satisfying result.

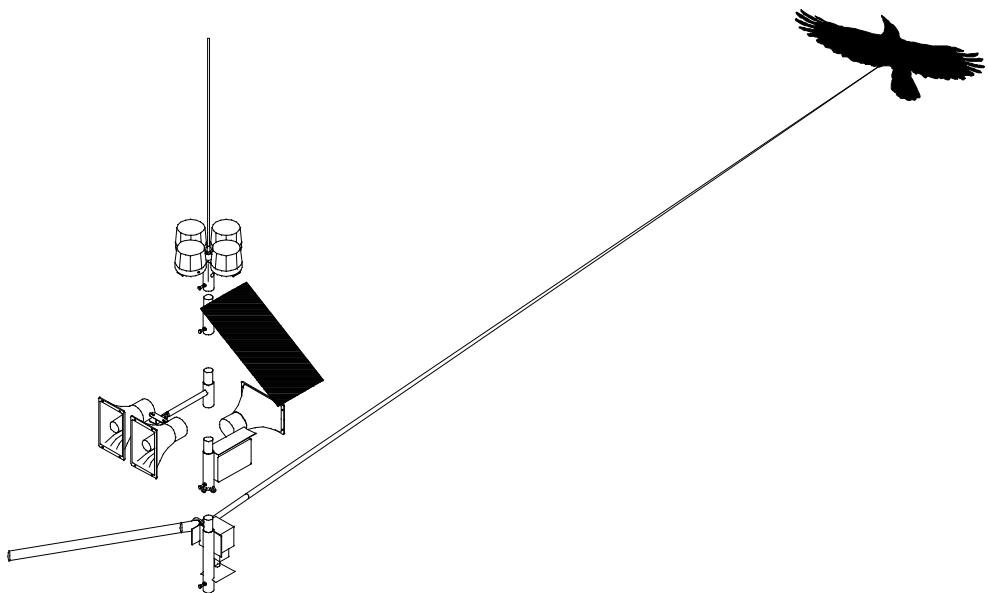
## SYSTEM COMPONENTS

# 3

The following diagrams are provided to allow you to easily *identify* the various pieces and to *understand* how the Kestrel system components function and fit together. The pieces are numbered and their related 'Key to System Components' can be found on Page 6.

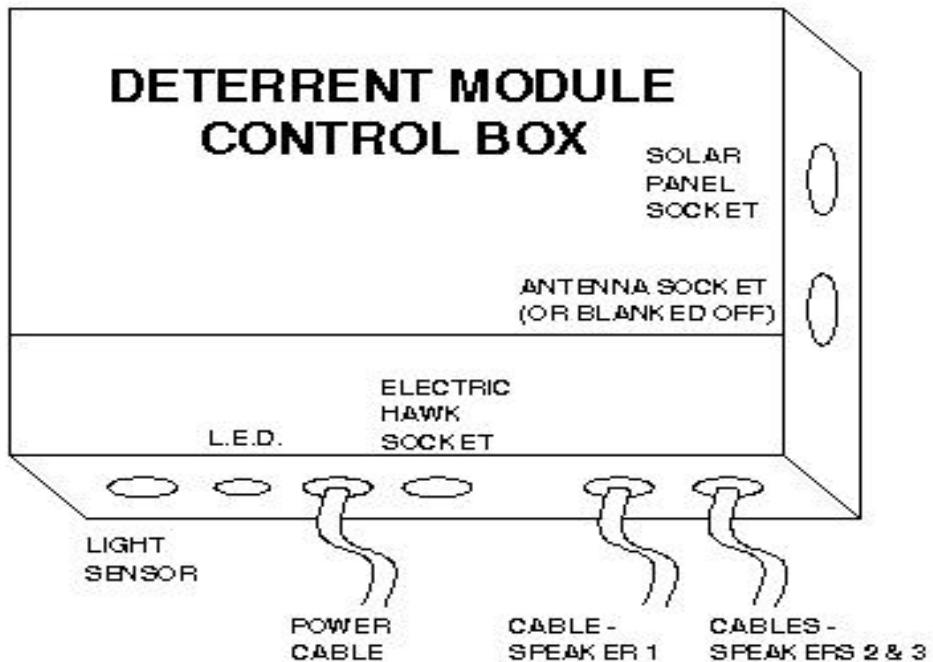
### ■ Kestrel Deterrent Module (with inbuilt VHF radio receiver)





### ***Key to System Components***

1. **VHF (Radio-link) Receiver Antenna**
2. **Flashing Strobe Lights** (optional) Between 1 and 4 lights are needed per system if it is configured to control flying fox or other nocturnal species.
3. **10 watt Solar Panel** – This higher powered panel is needed for the heavy demand of the Deterrent module. Power rating is visible on rear of panel.
4. **Horn Speakers** – three 40 watt horn speakers are supplied with each system.
5. **Computer Control Unit** – this is the ‘nerve centre’ of each Kestrel system as it controls all operations. Includes VHF radio receiver, miniature computer, electronic timer and audio equipment.



### **Control Box for 3000 Series Deterrent Modules**

#### ***Note for 4000 Series Deterrent modules***

1. The cables for all three loudspeakers are joined together in one plug. This is plugged into the speaker socket located in the position previously used for "Cables - Speaker 2 & 3" (as shown above).
2. The two cable "glands" to the left of the speaker socket are provided for accessory cables, such as strobe lights.

## PARTS LIST

# 4

The Kestrel system consists of the components listed below and these are packed and despatched in one carton (plus a separate plastic tube for the VHF antenna). If you have ordered additional components, they will be packed separately, as will optional equipment such as the Electric Hawk.

Please use the parts list during unpacking and set-up to ensure all pieces have been included. If you find that pieces are missing or damaged, please notify our staff immediately and we will rectify the situation as quickly as possible.

Please refer as needed to the 'Notes' which are included on Page 9.

### Kestrel Deterrent Module (includes Control System & VHF radio receiver)

Qty	Description
1	Base Plate
1	Electronic Controller
1	Solar Panel 10 watt with bracket
2	Solar panel/Speaker mounts
1	2 Speaker Assembly
1	Single Speaker
1	VHF Antenna Mount
4	Ropes (Note A)
1	Accessories Bag
1	<i>Remote Control Unit (if ordered)</i>
2	<i>Remote VHF Antenna (Despatched in separate tube) (if remote control ordered)</i>
1	Manual

### Contents of Accessories Bag

Qty	Description
1	"R" Clip
1	Optional angle bracket for positioning solar panel.
7	M8 x 20 Hex Bolts
2	M8 Flat Washers
2	M8 Spring Washers
1	M6 x 45 Hex Bolt (& Optional nut if attaching single speaker to antennae mount instead of control box).
1	M6 Flat Washers
1	M6 Spring Washers
4	"D" Shackles

1	PVC Tape for taping cables neatly away
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### ***Optional Equipment***

#### **Electric Hawk**

BirdDeter's Electric Hawk is available as an option for use with the Kestrel Module to provide additional visual deterrence for problem birds. The following items are provided:

Qty	Description
1	Electric Hawk Mechanism
1	4.5 m Fibreglass Rod
1	M8 x 20 Hex Bolt

#### **Strobe lights**

Flashing strobe lights are available as an option and they are highly recommended to control night-active species such as flying foxes (fruit bats). You will be supplied with between one and four strobe lights, depending on your order, and they are packed in the Kestrel Module carton.

Qty	Description
1 - 4	Flashing Lights

#### ***Items to be supplied by you***

To minimise freight costs, you will have been requested to obtain certain items yourself such as batteries, star pickets and steel poles. Here are further details about these items:

##### **For tree crops**

5	Star pickets	
1	12 volt 17AHr sealed lead acid battery	(Note B.)
1	Std length of 32 mm NB galv. steel tubing (maximum outside diameter = 42 mm)	(Note C.)

##### **For other crops**

1	12volt 17AHr Sealed Lead Acid Battery	(Note B.)
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## NOTES

**Note A** For tree crops, the Kestrel module should be installed on a pole at tree-top height. (See Note C below for pole specifications).

**Note B** BirdDeter recommends using 'deep cycle' 12 volt batteries such as: 'CSB' brand, Part No. EVX-12170, available from YHI Australia Pty Ltd

Sydney              Tel. (02) 9756 6688  
Melbourne        Tel. (03) 9545 6288

**Note C** The length of steel pole required depends on tree height. The maximum height is one standard length (approximately 6.5 m) of 32 mm NB steel pipe (maximum OD = 42 mm). Guy ropes are supplied according to the requirements shown in your order.

For low non-tree crops, deterrent modules can be set up on tripods.

## UNPACKING AND ASSEMBLY

# 5

### *Introduction*

**IMPORTANT – We recommend that you store the carton and all internal packaging in a safe place so it is available for repacking the components at the end of the season.**

*Please note that it is easiest to erect the pole with the Kestrel Module already attached.*

The following section details how the components are best removed from their packaging and assembled onto their poles. Part numbers given throughout these instructions refer to diagrams on Page 20 (packing for storage or return).

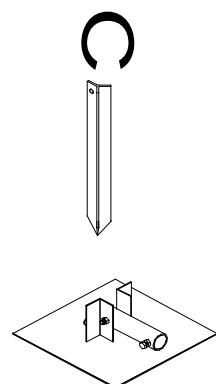
**Note: Timer based systems will not start normal operation until the morning after they are connected to the battery.** Black insulating tape over the light sensor for a period of 10 minutes then removing it will cause the system to start operating 10 minutes after the tape has been removed. This may cause the unit to operate during the night, however day only operation will resume the next day.

### ***How to erect pole-mounted components***

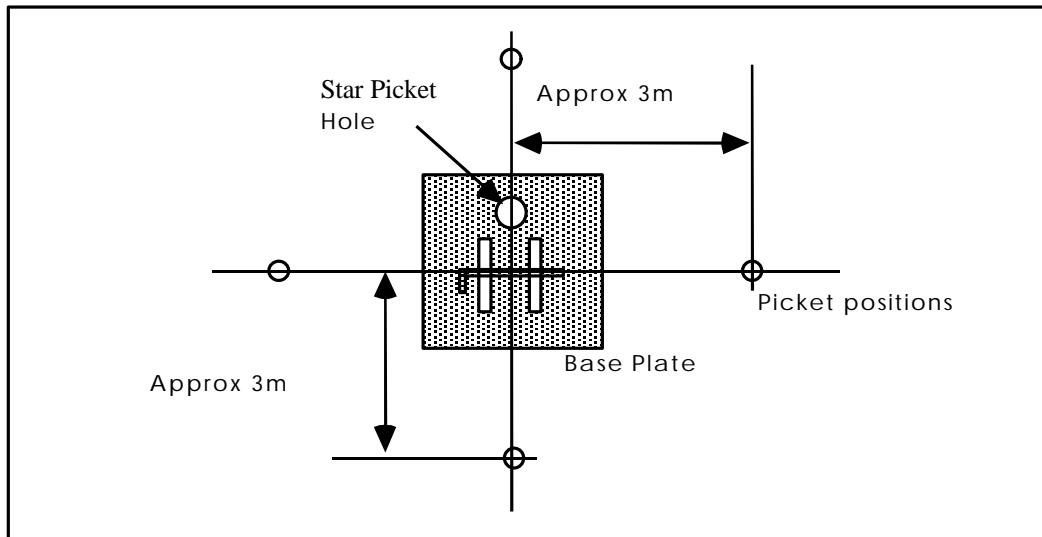
#### **1. The base plate should be removed from the carton and set up on the ground.**

- Open the box and remove the top layer of foam rubber (Part 15) and put aside. Remove and set aside the solar panel (Part 14). Remove the next foam assembly (Part 9). This will allow the base plate (Part 2) to be lifted from the box.

#### **2. Place a star picket through the hole provided in the base plate (see below). Remove the “R” clip from the accessories bag and push the “R” clip through one of the holes near the centre of the star picket. Hammer the star picket in until the “R” clip is flush with the top of the base plate.**



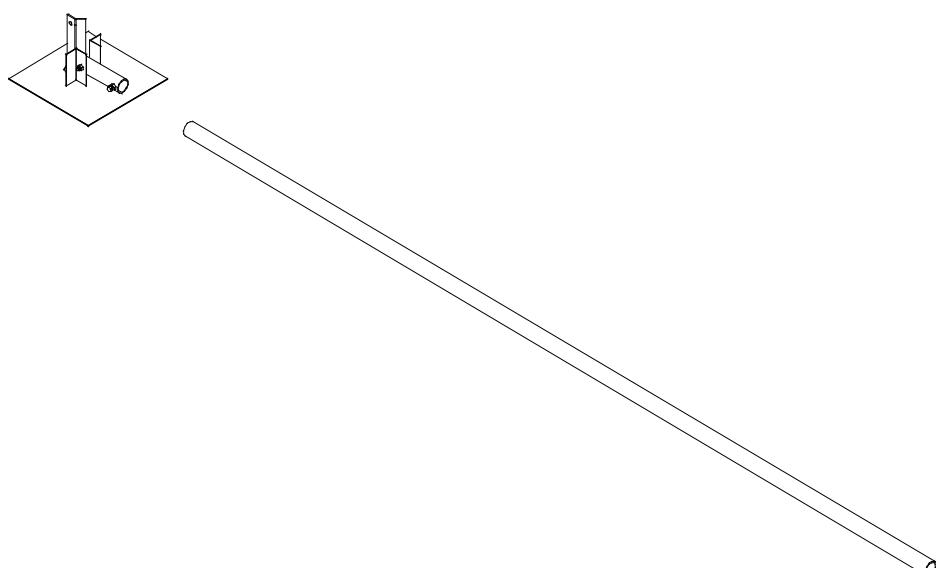
3. Four star pickets are used to anchor guy-ropes (for holding the pole in position). Locate these around the base plate and drive them into the ground. See Fig. 12 below.



4. If an Electric Hawk is included in your system, it will need a counter balance made from pipe. Cut a 1.2m length from the deterrent module's mounting pole. (If the pipe gauge is 'heavy', the counter balance arm will need to be only 1.1 m long). The mounting pole should then be cut to size to ensure that the speakers will sit just above the upper most level of the crop.

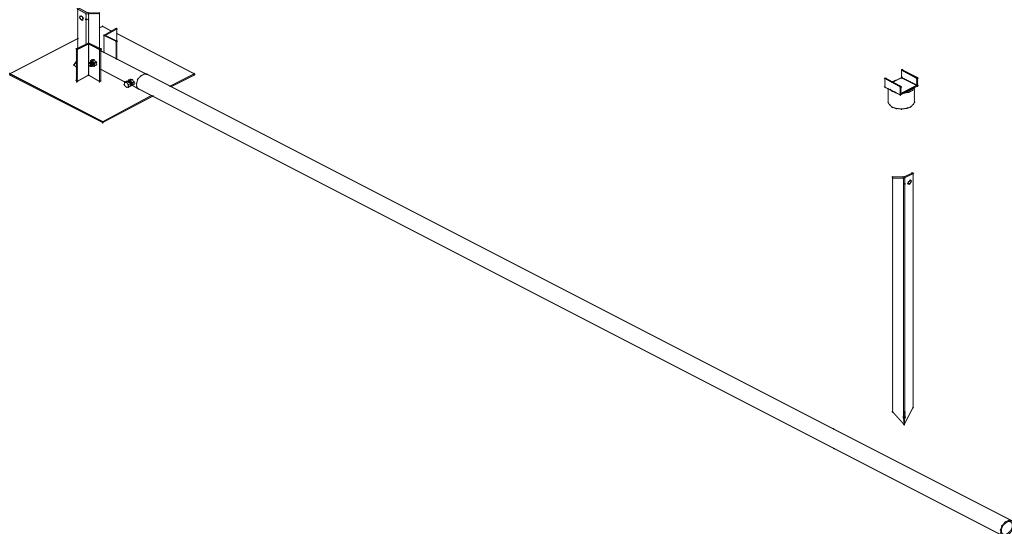
**NB** Poles for mounting the radar components should not be cut.

Slide the pole into the base plate tube and tighten the mounting bolt. Refer Figure below. Mounting bolts M8 x 20 can be found in any of the accessories bags.

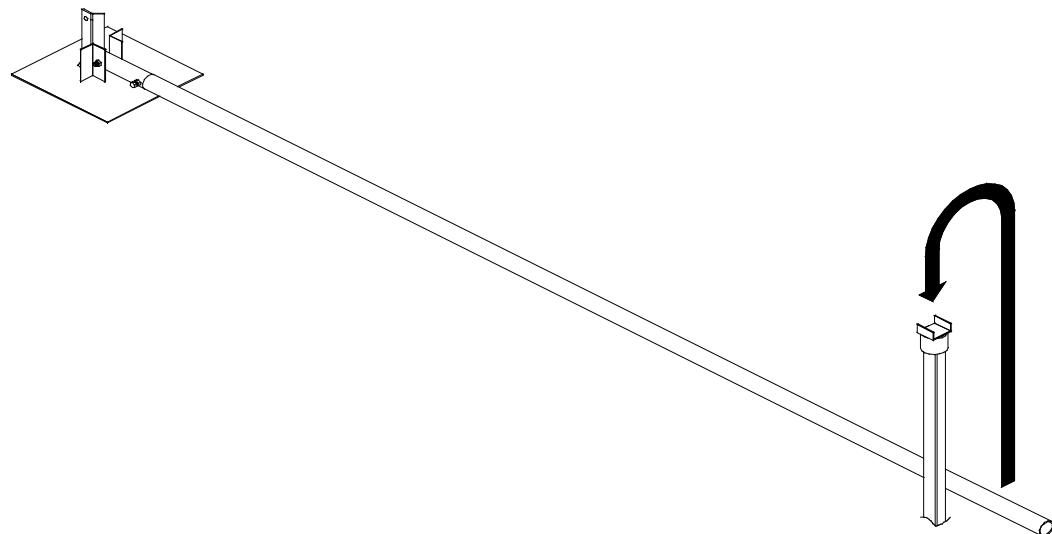


5. The following three drawings illustrates the remaining sequence of steps required to prepare the pole to receive the Kestrel Module.

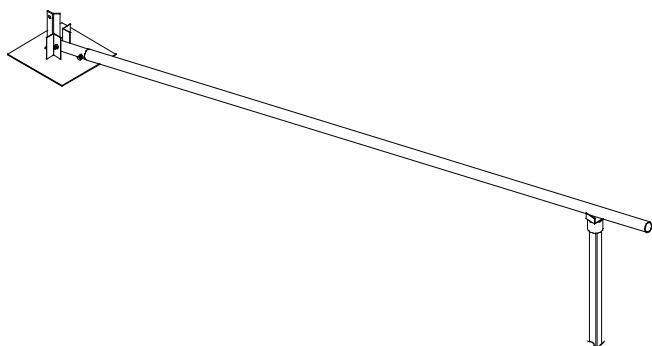
If needed, a shortened star picket is driven into the ground and the optional 'assembly aid' placed on top.



The pole is lifted and placed on the assembly aid.



The pole is now ready to receive the Kestrel module.

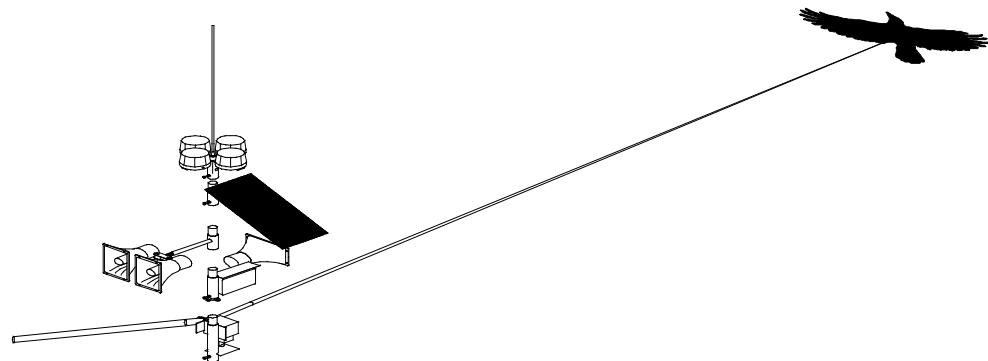


6. **Unpack the Kestrel module and assemble onto the pole, referring to the instructions below. It is best to place the packing carton close to the end of the pole before proceeding.**

## **Kestrel Deterrent Module**

If an Electric Hawk is to be fitted as part of the deterrent system, it should be fitted prior to installing the Kestrel Module. (Part numbers below refer to illustration on Page 5).

- Position the unpacked carton under the end of the pole so that the computer control unit (Part 5) can be lifted directly into position.
- Lift the computer control unit into position with the VHF receiver antenna mount and lights (2) if fitted attached.
- Lift single speaker from box and attach in position on the computer control unit mount using the M6 x 45 bolt with flat and spring washers.
- Remove the antenna mount and fit both the speaker mount and the solar panel mount (Part 3). Replace the antenna mount.
- Lift the two speaker assembly from the box and attach to the lower of the two mounts using the M8 x 20 with flat and spring washers.
- The solar panel is now attached to the remaining mount again using an M8 x 20 bolt with flat and spring washers.
- If lights are part of the deterrent options and are fitted to the antenna mount, they should now be removed one at a time and re-affixed to the top of the mount. Having done this the VHF antenna can be screwed on to the base.
- The components of the unit should now be adjusted to their correct orientation. The solar panel must face north and be angled at the appropriate angle for maximum sunlight. The speakers must be directed toward the area where the birds are expected. The orientations of the control unit and the VHF antenna mount are not important unless an electric hawk is fitted and then due care must be exercised.
- Connect the solar panel lead to the socket in the control unit.
- The unit is now ready to be erected on the pole unless an Electric Hawk is fitted.



Kestrel fitted with Electric Hawk

### **Electric Hawk**

- Remove the Electric Hawk from its box and fit to pole.
- Ensure orientation is correct and tighten to pole securely.

**NB The Kestrel module should be assembled on to pole above Electric Hawk with reference to instructions above, before proceeding with the following steps.**

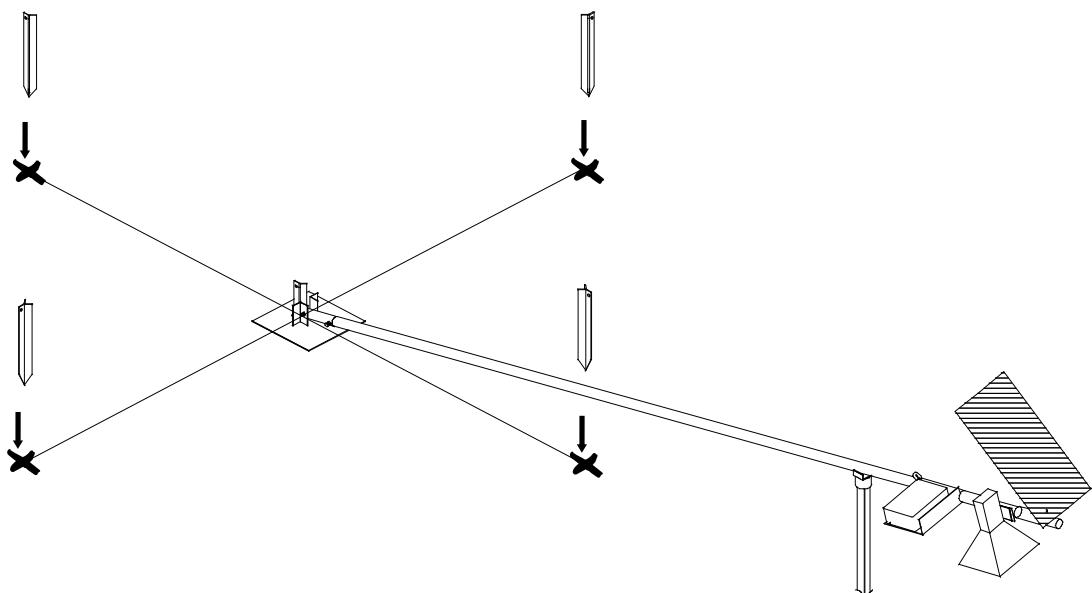
- Fit boom into socket and fix in place with clamp.
- Fit 1.2 metre length of pole into counterbalance socket end lock in position.
- Fit hawk effigy to other end of pole.
- Plug hawk lead into control unit.

The complete assembly is now ready to be erected.

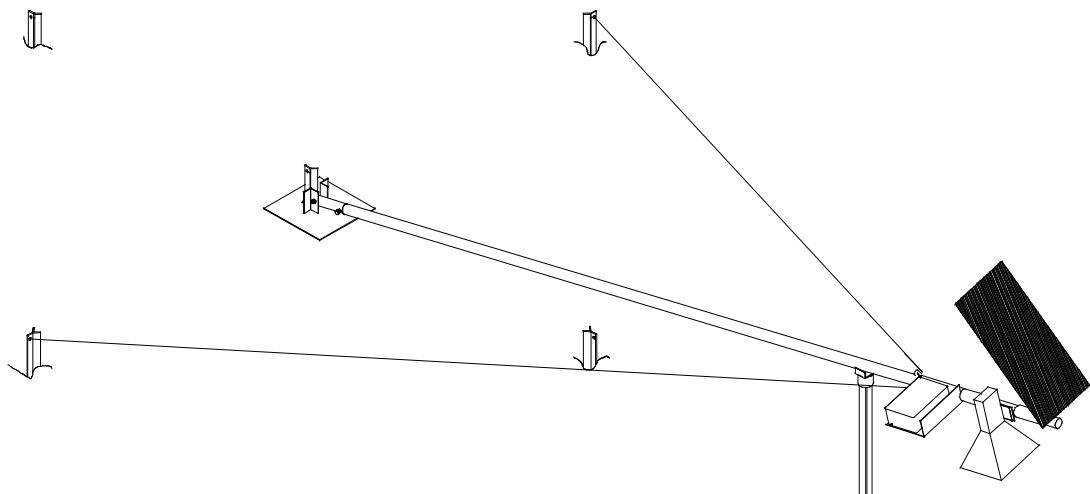
**NB The counter balance arm will need to be shortened if the pole wall thickness is heavier than 'light' gauge. Medium gauge pipe will need to be shortened to 1.1m.**

### **How to erect complete assembly on poles**

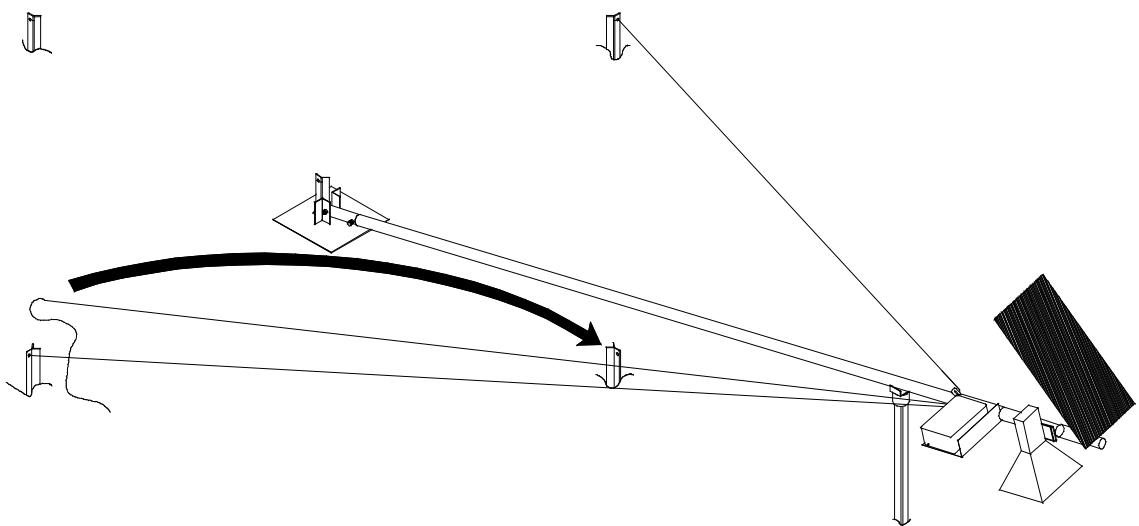
NB The following diagrams show a pole with a BirdDeter radar unit fitted and ready to be erected. The same set-up principles apply for the Kestrel system.



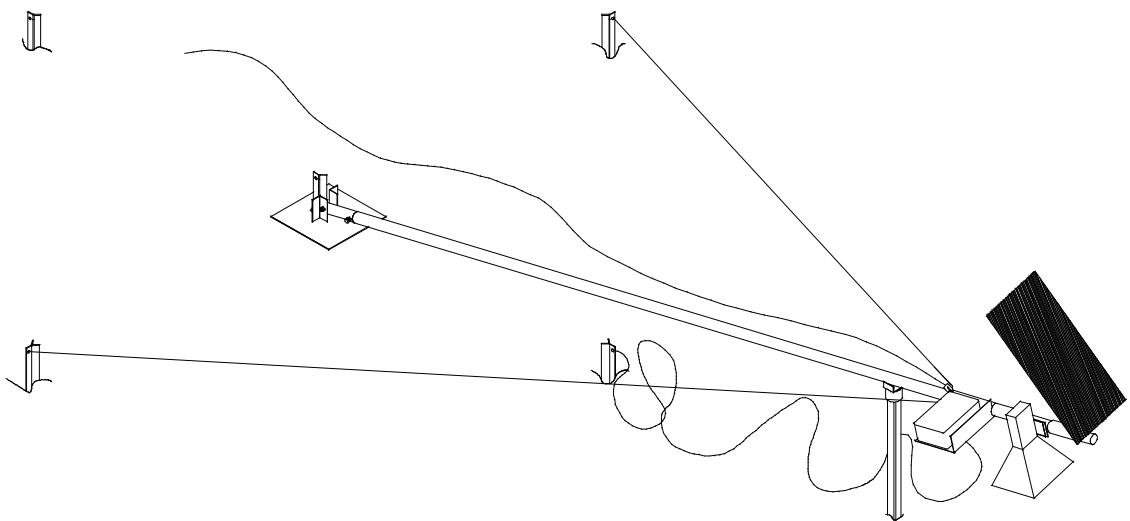
**7. Tie two ropes (supplied) from the rope collar at the base of the head to the two side star pickets as shown below in Fig 19. Ropes are usually supplied with loops in one end. These loops should be slipped through the metal loops on the rope collar. The remaining rope can then be slipped through the protruding end of the loop. No knot tying is therefore necessary. Tension these two ropes.**



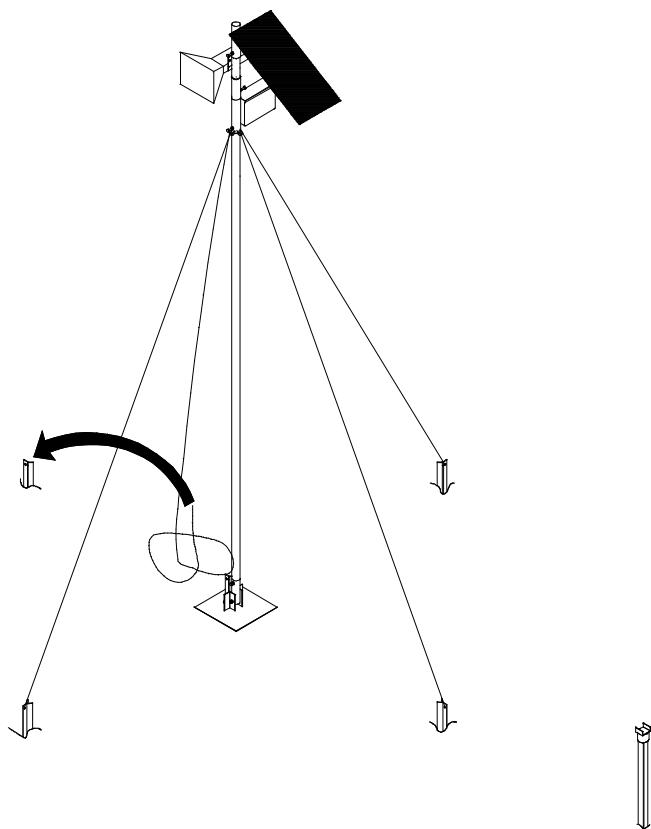
**8. Tie a third rope to the star picket as shown below. Find the length of rope required between the pole and star picket when the unit is fully erect by measuring the length from one of the side ropes. Then tie the rope to the star picket as shown below at this length.**



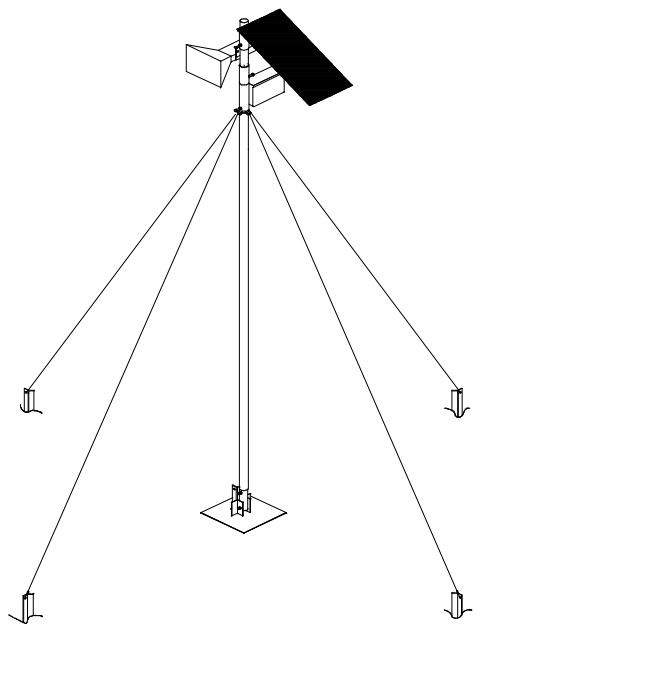
**The fourth rope is attached to the unit in preparation for raising the pole**



**9. Using the tape supplied, tape the battery cable down the pole, ready for connection to the battery. Ensure that the R-clip has been placed through the star picket in the base plate. This is an important safety feature to ensure that the base plate does not slip off the star picket as the pole is raised. The pole can then be raised as illustrated below.**



**10. Tie-off the remaining guy rope. Tension all the remaining guy ropes so that the unit is vertical as shown below.**



The Kestrel module may require two people to raise it. If your system also contains an Electric Hawk, at least three people will be required to lift the unit.

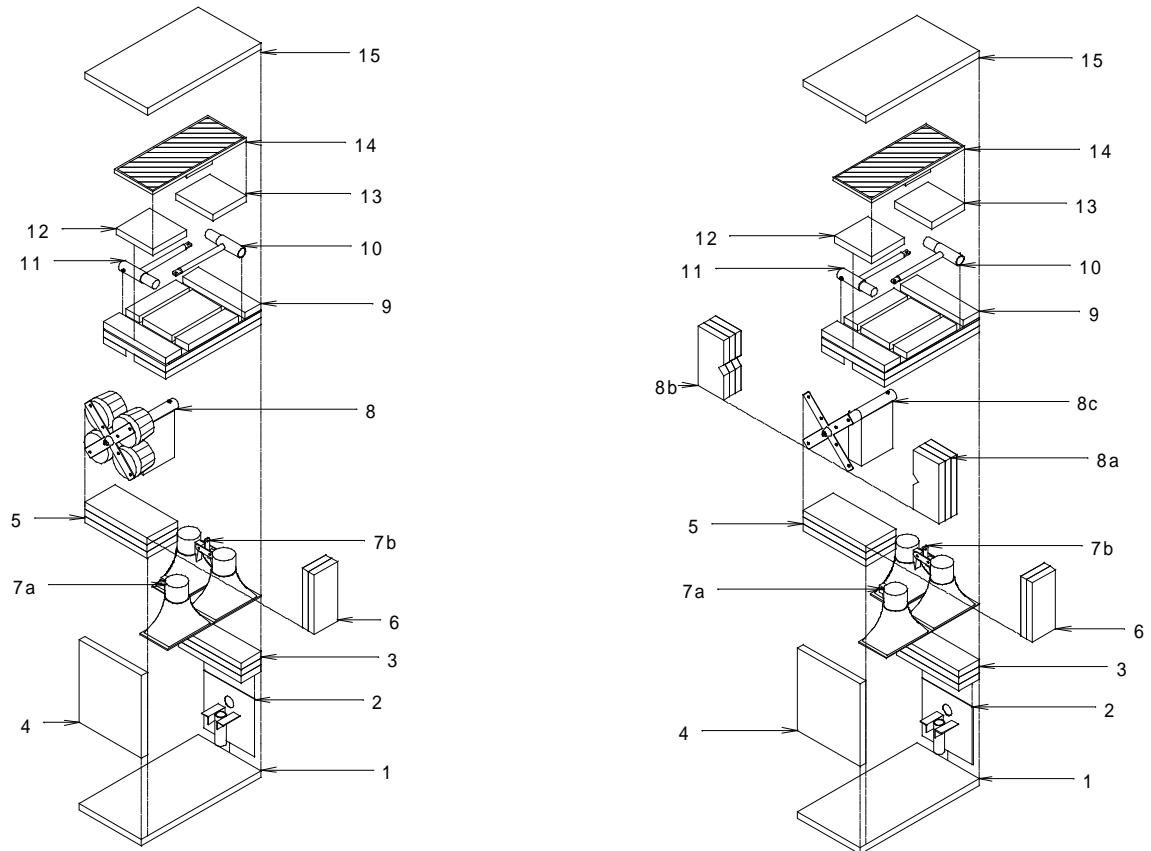
### ***Battery Connection***

The battery should be placed at the bottom of the pole and connected to cable terminals with the correct polarity. (Please note that connection with the incorrect polarity will not destroy the component being connected).

The battery management systems require that the voltage of any battery connected initially must be in excess of 12.0 Volts. If the battery voltage drops below 12 volts, the unit will shut down. This will be indicated by the 'battery status light' (please refer to Section 8: Solving Technical Problems).

The following diagrams illustrate how your Kestrel system should be packed in the original cartons for storage or return to BirdDeter Pty Ltd.

Exploded view of Kestrel packaging.



Part Number	Description
1	Foam Piece
2	Base Plate
3	Foam Assembly
4	Foam Piece
5	Foam Assembly
6	Foam Assembly
7a	Single Speaker
7b	Two Speaker Assembly
8	Control Unit with Antenna Mount and Lights
8a	Foam Assembly
8b	Foam Assembly
8c	Control Unit with Antenna Mount
9	Foam Assembly
10	Solar Panel / Speaker Mount
11	Solar Panel / Speaker Mount
12	Foam Piece
13	Foam Piece
14	Solar Panel
15	Foam Piece

### **Dismantling Kestrel module mounted on pole**

The pole should be lowered to the ground and the unit dismantled and packaged as follows:

While maintaining tension, untie the guy rope which was the last to be tied during erection of the pole.

Lower the pole to the ground.

Dismantle the unit from the pole, unplugging all electrical connectors.

(Note Antenna and Speakers are hardwired and remain attached to the Control Unit.)

Remove pole and star picket from the base plate.

Untie and coil ropes neatly.

Unscrew Antenna from Base.

Unbolt the Solar Panel from its mount.

Unbolt the Radar Horn from its mount.

Remove all bolts as fitted during assembly.

Remove all the packaging from the box except the foam assembly (Part 1).

Replace all components into the box in the order indicated in Figure 30 above.

Package Antenna in tube as supplied.

Loose bolts etc should be placed in the plastic bag before packing with ropes.

## SOLVING TECHNICAL PROBLEMS

### ***Check the system daily***

The following information is provided to help you diagnose and solve any problems of a technical nature. Remembering the old maxim that “prevention is better than cure,” we strongly recommend that all components of the system are checked daily. The aim here is to ensure that if a problem arises, it is found and rectified as quickly as possible.

If at any stage you find the system is not working properly, whether during installation or at some later date, please contact our office immediately if you are unable to solve it yourself. Early attention will help to minimise crop exposure to pests and also shorten downtime while a solution is being found. Contact telephone numbers are (07) 4667 0491 during business hours and 0407 150 227 or (07) 4661 9416 for technical assistance after hours.

Diagnosing faults requires careful observation of the little lights or LED's (Light Emitting Diodes) which are found on the base of Kestrel's Control Box. When any of these LED's is 'on', it glows a bright red colour. This glow can be continuous, flickering or intermittent. Details of correct functioning of each component are provided below.

### ***Control Box***

For details of the Control Box, refer to illustration on page 7. The deterrent module Control Box has one LED on its base to indicate the 'status' of the unit. If the unit is operating correctly, this LED should flash on briefly once every two minutes. If the LED does not flash at all, this indicates that the battery is not connected or requires recharging. When the unit is initially connected to the battery the following sequence of events should occur.

1. The LED at the base of the unit should flash once. This indicates that the battery has been connected. The LED will then continue to flash once per second a number of times depending on the battery voltage. Each flash after the first represents 0.25 Volts. E.g. if after the first flash there are two more flashes, the battery voltage is approximately 12.5V.
2. The deterrents will now activate in the following order :
  - 2.1 Hawk (if fitted) will be raised
  - 2.2 Speakers will each activate in sequence for two seconds
  - 2.3 Hawk will be lowered
  - 2.4 Strobe lights (if fitted) will flash

This is a self-test of the system and checks that all deterrents are functioning.

### ***System Test***

The LED on the underside of the deterrent unit will then come on within 5 seconds of receiving the radio signal. The system will then start a sequence of events including speakers, hawk and flashing light. The order in which deterrents are activated will vary in a seemingly random fashion from one activation to another. The entire sequence will however not last for more than 30 seconds.

The LED at the base of the deterrent control unit will turn itself off after the deterrent sequence has finished.

### ***Speakers Not Operating***

If the LED at the base of the deterrent unit comes on, (indicating that the deterrent unit has been activated) and yet no deterrent sounds are heard, this indicates that either the volume control has been set too low or the speakers are faulty. Check this by disconnecting the unit, briefly shorting together the positive and negative terminals on the power cable and then reconnecting the unit to the battery. If the unit unsuccessfully completes its start up test sequence, then the unit is faulty.

## **FCC COMPLIANCE STATEMENT**

Note : This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures :

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/ TV technician for help.

Warning: Any changes or modifications not expressly approved by the party responsible for compliance (Grantee), could void the user's authority to operate this equipment