



THE DANAGE SHOOT CONTROL SYSTEM

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Archery GB is the trading name of the Grand National Archery Society, a company limited by guarantee no. 1342150 Registered in England.

INTRODUCTION

1. The Danage Archery Electronic Shoot Control System provides, traffic lights, time display and sound signals to archers under the control of the Director of Shooting (DoS) at an archery shoot run under World Archery (WA) rules.
2. In addition to the standard setup controlling all archers (normal shooting), the system can be used to control a pair of archers or teams shooting a head-to-head match.
3. The equipment requires 240V mains, although this is immediately stepped down to 24V dc for distribution to user elements.
4. The system was purchased in 2006 by Archery GB for use at National Tournaments. Additional equipment was added in 2007. Performance also purchased equipment.
5. The system was manufactured by

Danage of Scandanavia
Industrivej 13
6310 Broager
Denmark
Tel.: +45 74 44 26 36
Fax: + 45 74 44 26 24
E-Mail: danage@danage.dk
Websites: www.danage.dk & www.domino-target.com

Our contact was Erik Kornbeck

6. The system was provided by the UK agents:

Clickers Archery Ltd
29a Belsize Road
Norwich
Norfolk
NR1 4HU
Tel: (01603) 300490
Email: sales@clickersarchery.co.uk
Web site: www.clickersarchery.co.uk

Our contact was Graham Harris

SAFETY

7. Electrical Safety. 240V mains is present in the 240V ac/24V dc power supply.
8. Manual Handling. Individual units are easily manageable. When it is necessary to move a box containing several units, the move should be carried out by 2 people.

EQUIPMENT DESCRIPTION

9. Composition. The national tournament equipment comprises the following items:

TITLE	QUANTITY	
Timer Controller	2	One spare
Power Supply & mains cable	2	Built-in low voltage cable
Timer Display with stand	7	
ABCD Board with stand	2	
Sounder Unit with stand	2	
Battery Power lead	1	
Cable 30m	6	
Cable 20m	5	
Cable 10m	3	
Cable 2m	4	
Cable Connector	5	
Wooden Box, Displays	3	
Wooden Box, Cables etc	2	

10. Timer Controller. The Timer Controller is designed to be placed on a table and to be used by the DoS to control the shoot. This unit contains a factory-programmed micro-processor which provides all required signals to the display and sounder units. All time periods and certain other aspects are user-programmable, which means that changes to WA rules can be easily accommodated and special sequences can be set up. Connections are made to the rear of the Timer Controller and are as follows:

- a. 24V dc power supply - takes power from power supply
- b. 5-pin data plug (2 off) - distributes power and data to all other units

11. Power Supply. The power supply is a standard module which will accept 100 - 240 V ac 50/60 Hz and produces 24 V dc on a standard free jack socket. The +ve is the centre connector, the -ve is the outer shell.

12. Timer Display with stand. The Timer Display has 3 LED light panels (red, amber and green) and 3 LCD alpha-numeric panels which are used to display the time. The unit is fitted with 2 x 5-pin data plugs. The stands (one each side) are of heavy construction. To fit the stand, partly unscrew the top securing knob on the side of the unit, locate both securing knobs into the stand, tilt the Display if required, then allow the display to drop into the relevant slots in the stand. Tighten the top securing knob. Stands should be fitted with the bottom plate facing away from the unit, allowing it to be pegged down if necessary. On the back of the unit, at the top right hand corner (as seen from the rear) is a press button switch which is used to program the Timer Display for alternate shooting. There are 3 positions:

- a. Left-hand timer/lights
- b. Right hand timer/lights
- c. A – B archer indicator

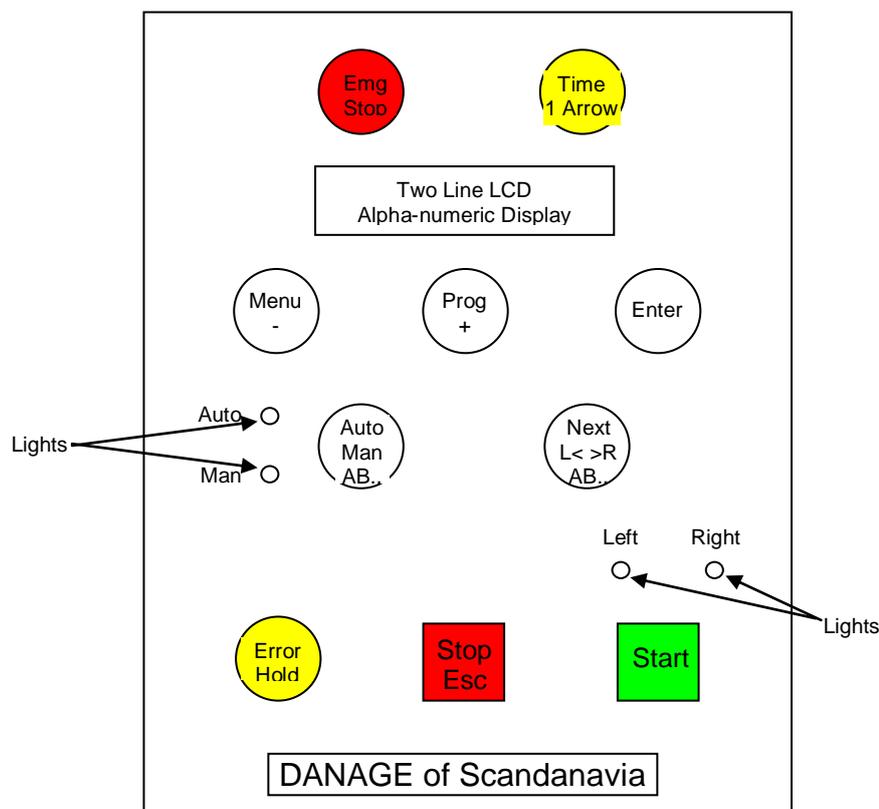
However, the system only works properly if a timer display is set to Left or Right, and the ABCD board is set as an Archer Indicator.

13. ABCD Board with stand. The ABCD Board is of similar size and construction to the Timer Display units but has 4 LCD alpha-numeric panels which are used to show which detail is due to shoot first at each end, and other information. The unit is fitted with 2 x 5-pin data plugs. It is supplied with stands similar

to the Timer Display; however, if required, an ABCD Board can be fitted below a Timer Display using the same stand. The 3-position press button, as fitted to the Timer Display, is also fitted to the ABCD Board.

14. Sounder Unit. The Sounder Unit is fitted with 2 loudspeakers to transmit the sound signals to the archers. The unit is fitted with 4 x 5-pin data plugs. One unit has been modified locally to accept the supplied stands into a fixed position. To fit the stand to this unit, undo and remove and retain the wingnut from the bottom securing bolt, slot the stand into the fixed Phillips-headed bolt, fit the stand over the bottom securing bolt and replace and tighten the wingnut. Stands should be fitted with the bottom plate facing away from the unit, allowing it to be pegged down if necessary.
15. Battery Power Lead. The battery power lead allows the system to operate from 2 x 12V dc batteries, eg car batteries. The lead is fitted with 4 large clips to connect to the battery terminals and a standard data plug to connect to any convenient system unit.
16. Cables. All cables are fitted with 5-pin data sockets.
17. Cable Connector. The Cable Connector comprises 2 x 5-pin data plugs connected by a short length of cable. They are used to join 2 cables together.
18. Wooden Box, Displays. The Wooden Box, Displays is purpose built as a transit box for 4 Timer Displays/ABCD Boards.
19. Wooden Box, Cables etc . The Wooden Box, Cables etc is a general-purpose transit box for display stands and cables.

FIGURE 1. TIMER CONTROLLER



THE TIMER CONTROLLER CONTROLS AND INDICATORS

20. The layout of the Timer-Controller is shown at Figure 1. The basic functions of each control are given below. There may be additional functions in certain circumstances.

<u>Control/Indicator Name</u>	<u>Action/Function</u>
Emg Stop.	Emergency Stop. Stops time, lights to red, time frozen, 5 beeps. To restart the time, press Start; there will be one beep.
Time 1 Arrow	When sequence running - Prepares for make-up arrows. When sequence not running – prepares special sequence. See detailed description.
Two Line LCD Alpha-numeric Display	Displays instructions and timing etc details
Menu -	Move through Menu system In programming mode, reduces selected digit by 1 per press. When time frozen – reduces time by 1 second When a sequence is selected but not running, two presses will exit the sequence back to the Menu Group, displaying the previously selected option.
Prog +	Move from Menu into Programming mode for displayed option In programming mode, increases selected digit by 1 per press. When time frozen – increases time by 1 second
Enter	Selects displayed Menu option
Auto Man AB..	Switches from Auto to Manual and vice versa.
Auto Light	Indicates Auto mode. When in Auto mode, system will automatically progress from one detail to the next. Thus an entire shooting end will occur following the initial press of the Start button.
Man Light	Indicates Manual mode. When in Manual mode, system will stop after each detail shooting time has finished. The next detail will only start after the Start button is pressed again.
Next L< >R AB..	In normal shooting modes, selects the detail sequence, eg AB or BA When alternate shooting, switches between left or right archer to shoot first
Left Light	When alternate shooting, indicates left archer to shoot first
Right Light	When alternate shooting, indicates right archer to shoot first
Error Hold	Stops time, lights to red, time frozen, no sound. To restart the time, press Start; there will be one beep.
Stop Esc	When sequence running – stops time and moves to next stage. In this respect, the action is the same as the Start button. When sequence not running – acts as an escape key. Two presses exits to Menu Group 1 starting option – Test Sequence.
Start	Starts a shooting sequence. When sequence running – stops time and moves to next stage.
<u>Combination Settings</u>	
Error Hold & Enter together	Toggles sound on/off. Used when sequence is not actually running, ie when the clock is stopped. Even if sound is off, Emg Stop sounds (5 beeps) will still be made.
Error Hold & Prog + together	Makes a standard length beep. Used when sequence is not actually running, ie when the clock is stopped.
Error Hold & Enter together	System Reset. Used when sequence is not actually running, ie when the clock is stopped. Exits any shooting sequence and resets to Menu Group 1 starting option – Test Sequence.

21. General Techniques.

- a. Be firm and positive with key presses. Too light and it will not work; alternatively, the buttons may “bounce” to give 2 key presses when one was intended.
- b. During a shooting sequence, if a time period is about to end, (say within 5 secs) let it run out; except in cases of emergency, do not try and impose an end with so little time left.

TIMER-CONTROLLER SOFTWARE OPERATION

22. The Timer Controller contains a factory-programmable micro-processor which stores a number of shooting sequences and equipment settings. Each shooting sequence can be modified by the user to meet specific shoot requirements or to accommodate rule changes which affect shooting times. The system has an in-built menu system. The System offers prompts to the user as to the button that might should be pressed to activate the displayed function; the prompt is in the form “<ENTER>”

23. The Menu System

- a. There are three Menu Groups. To move through the menu options, press **Menu**. The display for each option will prompt with <ENTER>. To select a displayed menu option, press **Enter**. The Menu Groups are:
 - (i) Menu Group 1, which contains the following menu options
 - (a) Test Sequence. Press and hold **Enter** and the equipment will cycle through a test procedure, checking all lights, numbers and the sounder unit.
 - (b) Selected shooting sequences. See below
 - (c) Menu Group 2. Move to Menu Group 2
 - (d) Set up Menu Move to Set up Menu
 - (ii) Menu Group 2, which contains the following menu options:
 - (a) Shooting sequences not in Menu Group 1. See below
 - (b) Menu Group 1. Move to Menu Group 1
 - (c) Set up Menu. Move to Set up Menu
 - (iii) Set Up Menu, which contains the following menu options:
 - (a) Options to set general equipment operating parameters. Press **Prog+** to change the setting.
 - (b) Menu Group 1. Move to Menu Group 1
 - (c) Menu Group 2. Move to Menu Group 2
- b. When the equipment is switched on, it displays details of the software version installed and then settles in the first item of Menu Group 1: Test Sequence.

24. The Shooting Sequences. Each shooting sequence has a name which cannot be changed by the user. The name reflects to the manufacturer the purpose of the sequence when set to its factory default timing settings. However every shooting sequence can be re-programmed within certain limits. Whilst

the name may be useful, remember that it is just a name. The actual timing etc settings are much more important. The shooting sequences can be grouped into 4 types:

- a. General sequences to control a complete line, eg a WA 70m round. These can be shot in 1, 2 or 3 details. This will be referred to as Normal shooting
- b. Sequences to control one individual or team head to head match. The name of such a sequence has an extra letter A at the end. This will be referred to as Alternate shooting
- c. Sequences used, with additional equipment, to control two individual or team head to head matches. The names of these sequences ends with the letters DA. Archery GB does not have this additional equipment, so these options will not be considered in detail. This will be referred to as Double Alternate shooting
- d. Miscellaneous sequences, eg Stopwatch.

25. Time Periods. Most sequences show the time periods they are set up for. There are generally 3 numbers, eg 10-240-30. The numbers represent:

- a. T1 -The get-ready time: archers move to the line.
- b. T2 -The complete shooting time: the green + amber time.
- c. T3 -The warning time: the amber light time.

26. Sound Signals. The WA sound signals are generated:

- a. 2 beeps for archers to get ready. For individual events archers move to the shooting line.
- b. 1 beep for the archer to shoot
- c. The sequence continues for each detail.
- d. 3 beeps for shooting to stop and for the arrows to be scored and collected.
- e. 5 Beeps as an Emergency Stop signal.

27. The Shooting Sequences – Factory Default Settings. Each shooting sequence name and default timings etc settings are given below, with a simplified description of its use. It is expected that users of the equipment will be aware of the timing requirements and can select the appropriate sequence for their event. It must be stressed that every sequence can be programmed to meet the user’s specific needs.

LINE	SEQUENCE NAME AND TIMING	POSSIBLE USE
1	RANKING ROUND 1: 10-120-30 A/B	Normal shooting, ends of 3 arrows, 1, 2 or 3 details
2	RANKING ROUND 2 10-240-30 A/B	Normal shooting, ends of 6 arrows, 1, 2 or 3 details
3	ELIMINATION RD. 1 10-120-30	As RANKING ROUND 1 but 1 detail. Initial stages of match play events
4	ELIMINATION RD.2 10-240-30	As RANKING ROUND 2 but 1 detail. For match play events
5	FINAL 10-120-30	Match play finals, simultaneous shooting
6	FINAL A 10-020 - 3 Series	Match play finals, alternate shooting
7	FINAL DA 10-020 - 3 Series	Match play finals, alternate shooting, two matches side by side.
8	FINAL MULTI 10-000	Match play alternate shooting, several

LINE	SEQUENCE NAME AND TIMING	POSSIBLE USE
		matches each with own DoS. 10 secs lead-in then timing passed to match DoSs.
9	SET SYSTEM 1 10-120-30	Match play in sets, simultaneous shooting
10	SET SYSTEM 2 10-240-30	Match play in sets, simultaneous shooting
11	SET SYSTEM A 10-020 - 3 Series	Match play in sets, alternate shooting
12	SHOOT-OFF 10-40-30	Single arrow shoot-off after Normal or match play shooting simultaneous.
13	SHOOT-OFF A 10-20 - 1 Series	Single arrow shoot-off after match play alternate shooting.
14	TEAM FINAL 10-120-30	Team Matchplay simultaneous shooting
15	TEAM FINAL 1 A 10-120-30 - 2 Series	Team Matchplay alternate shooting
16	TEAM FINAL DA 10-120-30 - 2 Series	Team Matchplay alternate shooting two matches side by side.
17	SHOOT-OFF TEAM 10-60-30	Team Shoot-off after match play simultaneous shooting.
18	SH-OFF TEAM A 10-60-30 1 Series	Team Shoot-off after match play alternate shooting.
19	MIX TEAM FINAL 10-80-30	Mixed Team match play finals simultaneous shooting.
20	MIX TEAM FIN. A 10-80-30 - 2 Series	Mixed Team match play finals alternate shooting.
21	SH-OFF MX TEAM 10-040-30	Mixed Team Shoot-off after match play simultaneous shooting.
22	SH-OFF MX TEM A 10-040-30 - 1 Series	Mixed Team Shoot-off after match play alternate shooting.
23	TEAM FINAL 2 A 10-120-30 - 2 Series	As TEAM FINAL 1 A
24	FREE 10-120-30	To be programmed as required
25	STOPWATCH	Count up timer. Use as required eg training
26	STOPWATCH A	Alternate count up timers. Use as required eg training

28. The Shooting Sequences – Menu Groups 1 and 2. The design concept is that the shooting sequences required for a day or event are placed in Menu Group 1. All other shooting sequences are put in Menu Group 2. This makes it quicker and easier to move between shooting sequences during the day.

29. Programming the Shooting Sequences. Each shooting sequence can be programmed. Users should identify a named shooting sequence that is close to the requirement and then to program it to meet the exact needs. To program a shooting sequence:

- a. Cycle through Menu Group 1 and/or 2 to display the shooting sequence required.
- b. Press **Prog +** to enter programming mode. The display will change to show, for example:

T1	T2	T3	SER	M
20	240	30	3	2

Note that the cursor is highlighting the first digit.

- c. Press Enter to move the cursor across the display from left to right.
- d. When the selected digit to change is highlighted, press Menu - or Prog + to change the digit.
- e. Press Enter sequentially to exit the programming mode, or press Stop/Esc to exit immediately.

- f. If necessary, press Prog + again to return to the programming mode left hand digit.
- g. Note the settings shown are:
- (i) T1 is the get-ready time.
 - (ii) T2 is the complete shooting time, green and amber time.
 - (iii) T3 is the amber light time.
 - (iv) SER means Serial. It means:
 - (a) When normal shooting - the number of details.
 - (b) When Alternate Shooting:
 - i The number of arrows to be shot by each archer in an individual head to head match
 - ii The number of team sessions per end in a team head to head match.
 - (v) M is the Menu Group, 1 or 2.

30. The Set-Up Menu. _The Set-up Menu is used to set various non-shooting sequence parameters. The options are:

LINE	SET-UP MENU OPTION	COMMENT
1	TIME 1 ARROW T1	Sets the get-ready time for the Time 1 Arrow function
2	TIME 1 ARROW T2	Sets the full shooting time for the Time 1 Arrow function
3	TIME 1 ARROW T3	Sets the amber light time for the Time 1 Arrow function
4	SOUND VOLUME	Sets the sound volume
5	SOUND TONES	Sets the sound tone
6	SOUND ON TIME	Sets the length of the beep
7	SOUND OFF TIME	Sets the no-sound time (ie the time between two beeps)
8	FLASH ON TIME	Sets the LED light ON time when a red flashing light is shown
9	FLASH OFF TIME	Sets the light off time (ie the interval between times when the light is ON) when a red flashing light is shown
10	LED BRIGHTNESS	Sets the brightness of the red, yellow and green LEDs on the Timer Displays
11	DISPLAY LCD	Sets the contrast of the LCDs (the numbers and/or letters) on the Timer Display
12	CONTROLLER LCD	Sets the contrast of the LCDs on the Timer Controller Display.
13	0.1 SEC ON/OFF	Toggles the Timer Control System between showing the time to whole seconds or to 1/10 sec.

LINE	SET-UP MENU OPTION	COMMENT
14	LANGUAGE	Selects the language used by the Timer Controller
15	DEFAULT GROUPS	Resets the shooting time sequences stored in the Timer Controller to the factory settings
16	DEFAULT SET-UP	Resets the sound, light and display settings stored in the Timer Controller

To change a setting, display the option within the Set-Up Menu and press **Prog+** to enter the Program Mode. Then use **Menu-** and **Prog+** to vary the setting. Press **Enter** to leave the programming mode.

TIMER CONTROLLER ADVANCED FUNCTIONS

31. The Timer Controller functions have been described in the previous section. However, further information is relevant to certain aspects and is given below.
32. The Emg Stop Function. A press of the **Emg Stop** button (Emergency stop) when a shooting sequence is running stops the clock, puts all lights to red and gives 5 sound signals. Whilst the clock is stopped, the time may be adjusted using the **Menu -** and **Prog +** buttons. To restart the clock, press **Start**. There will be one sound signal.
33. Time 1 Arrow. This developed facility allows full control of an archer who has to make up arrows after a bouncer, passthrough or equipment failure. There are 2 modes of use, dependent on whether a shooting sequence is running.
- a. During a Shooting Sequence. The function would only be used during normal shooting (under WA rules, match play shooting is not stopped for bouncers etc).
- (i) When told during shooting that an archer needs to make up arrows at the end of the detail, the operator presses the **Time 1 Arrow** key once. The Timer Controller display will indicate "1 ARROW". (If the information was wrong, press the **Time 1 Arrow** key once more and the setting will be cancelled.)
 - (ii) At the end of that shooting period, there will be 5 Beeps and the timer will stop. If the archer has more than one arrow to make up, press the **Time 1 Arrow** key once more for each additional arrow. The TIMER Controller will indicate the number of arrows and the time available. If required, adjustments to the overall time can be made now by using the **Prog+** key and the **Menu-** key. (If the make-up time is not now required, press the **Time 1 Arrow** key until the number of arrows counts up to 6 and then to 0. The make-up time is now 0, that is, the make-up will be cancelled.) When the time is correct, press the **Enter** key, and the TIMER Controller is prepared.
 - (iii) When ready, press the **Start** key. There will be the chosen "get-ready" time, followed by the required shooting time, with the normal sound, light and timer signals. (If the make-up time was cancelled, there will be the required signal to continue the shoot using the normal shooting sequence.)
 - (iv) When this make-up shooting time has finished, the program will automatically return to the main shooting sequence, moving to the next detail with 2 Beeps, or completing the shooting with 3 Beeps (for the scoring to begin) as required.
- b. Shooting Sequence Not Running. When there is a shooting sequence name displayed on the Timer Controller, but the sequence is not running. This might be when the end has finished for scoring or a distance change and an archer has some arrows to make up, possibly after an equipment failure. The DoS will be required to run a special end.

- (i) The DoS presses the **Time 1 Arrow** key the appropriate number of times, once for each arrow to be shot, 3 or 6 for a full end. the TIMER Controller shows the number of arrows and the time. If required, adjustments to the overall time can be made now by using the **Prog+** key and the **Menu-** key. When the time is correct, press the **<Enter>** key. The TIMER Controller is now prepared. (If the information was wrong, now press the **<Stop Esc>** key and the Time 1 Arrow function will be cancelled.
 - (ii) When ready to shoot the special end, press the **Start** key. There will be the normal sound, light and timer signals for an end of arrows shot in one detail, but the actual shooting time will depend on the number of arrows to make up.
 - (iii) When this make-up shooting time has finished, the Time 1 Arrow function will finish with 3 Beeps and the program will go back to the shooting sequence displayed before the function was used.
- c. Note that the Time 1 Arrow function T1, T2 and T3 times can all be programmed in the SET-UP menu

34. The Next L<>R AB.. Function to Select the Detail/Archer

a. Normal Shooting Sequences

- (i) If the system is set for normal shooting with one detail, the ABCD Boards will be blank and this control will have no effect..
- (ii) If the system is set for 2 details, this could reflect either: 2 archers per target, A and B; or 4 archers per target, AB and CD. It follows that there are 4 possible shooting arrangements:
 - (a) A then B.
 - (b) B then A
 - (c) AB then CD
 - (d) CD then AB
- (iii) If the system is set for 3 details, there are 3 possible shooting arrangements:
 - (a) ABC
 - (b) BCA
 - (c) CAB
- (iv) After the shooting sequence has been selected (Controller prompts with the word <START>) pressing the **Next L<>R AB..** cycles the detail selection through the available options. Note that the shooting order may have to be set at the start of practice/sighters and also before the first scoring end.

b. Alternate Shooting Sequences

- (i) When an alternate shooting sequence is selected, the system needs to know which archer/team is to shoot first. The display prompts for this information by:
 - (a) Display flashes <NEXT> and the letters L and R alternating.

- (b) The Left and Right lights flash together
- (ii) Press the **Next L<>R AB..** once or twice to select the appropriate archer to shoot first, as indicated on the Controller display and by the appropriate light being lit.
- (iii) When the end is complete the system again prompts for the user to select which archer is to shoot first in the same way.
35. The Auto/Man AB.. Function . This function allows pauses in the sequence after each shooting period. It was designed so that during alternate shooting, announcements could be made after each arrow.
- On the Auto setting (Auto light lit – no pauses), once started the system will progress through the selected sequence automatically. The end of one detail initiates the start of the next detail. Hence, an entire shooting end with all details will be followed through after one press of the **Start** button.
 - On the Manual setting (Manual light lit – paused enabled), the system will stop at the end of each shooting period waiting for a button press.
 - To switch between Auto and Manual, press the **Auto Man AB..** button. Note that the setting only has an effect at the end of a shooting period. Therefore, whilst the setting would usually be made when the required shooting sequence is first selected, in practice the **Auto Man AB..** button can be operated actually during a shooting period to change the setting.
36. The Error Hold Function. A press of the **Error Hold** button when a shooting sequence is running simply stops the clock and puts all lights to red. There is no sound signal given at this time. Whilst the clock is stopped, the time may be adjusted using the **Menu** - and **Prog +** buttons. To restart the clock, press **Start**. There will be one sound signal.
37. Combination Settings. There are 3 combination settings available when the timing sequence is not running. Press the **Error Hold** button and, whilst down, press another button:
- Error Hold/Menu - together**. Used at any time when the clock is stopped. This combination causes the Timer Controller to exit any shooting sequence in use, and resets as if the unit had just been switched on, ie to the TEST SEQUEnCE option of Menu Group 1. This can be useful if there is a malfunction of the system (or the operator!)
 - Error Hold/Prog + together**. Used at any time when the clock is stopped. This combination gives one sound signal. Note that both buttons must be released before a subsequent sound signal can be given. The signal duration is as programmed; it is not dependent on the length of the press.
 - Error Hold/Enter together**. Used at any time when the clock is stopped. This combination toggles the sound on or off. With the sound off, the top line of the display alternates with the words SOUND OFF. Even with sound off, the Emg Stop function will cause 5 sound signals to be given.

CONNECTING THE SYSTEM

38. Introduction. The system is particularly flexible and can be assembled in various ways. In fact, detailed description is not required. Simply connect the units together! Generally, as most units have 2 data plugs, units will be daisy-chained. Note however the Sounder Unit has 4 data plugs, so it can be used as a splitter. Thus, on grounds where the DoS (and hence the Timer Controller) is in the centre of the field, one cable can be taken from the Timer Controller to the Sounder Unit, and then separate cables taken to feed ABCD boards and Timer Displays on each side of the field.

39. General Connection Method.

- a. Identify the sources of 240V mains power in the area, and arrange for power to be available at the DoS position.
- b. Site the major assemblies.
- c. Connect the data cables, starting at the Timer Controller and using the Sounder Unit as a splitter if there are Units to left and right of the DoS position. As the maximum cable length is 30m, either keep units less than 30m apart or use Cable Connectors and additional cable to connect them.
- d. Connect the Power supply and test the system.

40. Layout for Normal Shooting. The layout for normal shooting will be generally as shown in Figure 2 or Figure 3, dependent on the size of the field and the location of the DoS. Connect the Units, test and go!

41. Layout for Alternate Shooting. The layout for alternate shooting will be generally as shown in Figure 4. However, there is an additional setting to be made. Install the equipment and apply power. Go to each of the 2 Timer Display units in turn and locate the press button switch on the rear of the unit. Successive presses of the switch cycles the unit through 3 configurations:

- a. A left hand unit, shown by left pointing chevrons. This setting is used for the display in front of the left hand archer.
- b. A right hand unit, shown by right pointing chevrons. This setting is used for the display in front of the right hand archer.
- c. An A/B unit shown by the letters ABC. This setting is not used in our configuration.

Select the appropriate setting. The 2 Timer Display units will then show different information, ie that relevant to the left and right hand archers.

42. Operating on Battery Power. Using the special lead, the system can operate on battery power. Two 12V dc batteries, eg car batteries are required. The battery power lead can be connected to any unused socket on any unit within the system; it can be connected by a cable connector and another cable, allowing the batteries to be at some distance from various points. The most likely location for the batteries are:

- a. Adjacent to the Timer Controller
- b. Adjacent to the Sounder Unit
- c. Adjacent to the last Timer Display in the connection chain.

POWERING THE SYSTEM

43. The system is usually powered from normal 240V mains. However, battery power can be used.

44. Connecting to Mains Power.

- a. Connect the mains power supply to the Timer Controller.
- b. Connect the Power Supply to a mains socket and switch on at the socket.

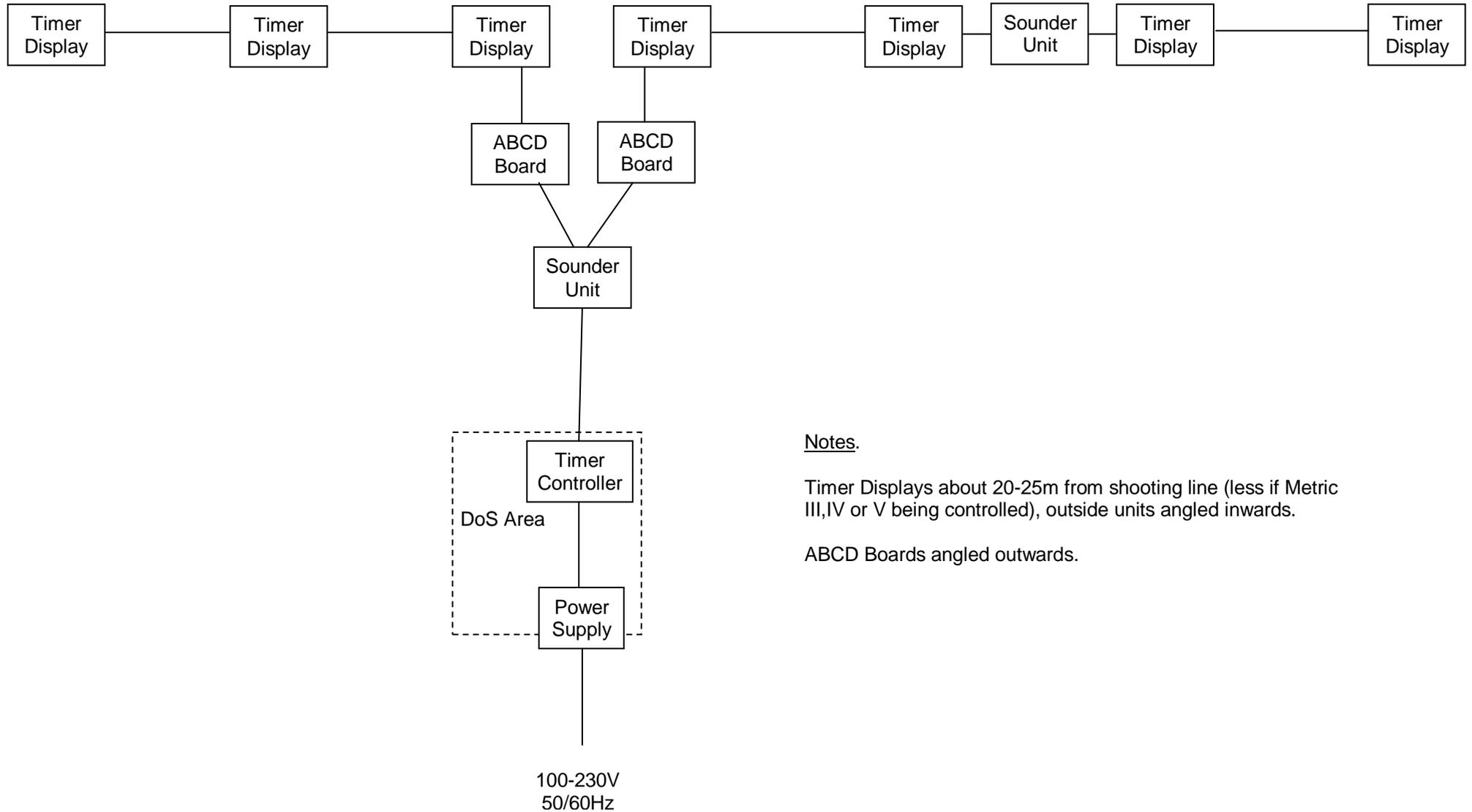
45. Connecting to Battery Power. **CAUTION**, observe the procedure given:

- a. Position 2 x 12V dc batteries, eg car batteries near or within connecting distance of a unit with an unused socket.
- b. Separate the 4 battery clips; do not allow the clips to touch each other at any time. Connect one pair of red and black leads to the +ve and –ve terminals of one battery respectively. Then connect the second pair of red and black leads to the +ve and –ve terminals of one battery respectively.
- c. Fit the data socket into an unused socket on one of the system units.

46. Disconnecting from Battery Power. **CAUTION**, observe the procedure given:

- a. Disconnect the data socket from the system units.
- b. Disconnect the clips from the battery terminals, keeping the clips electrically separate

FIGURE 2. EXAMPLE LAYOUT NORMAL SHOOTING - OUTDOOR EQUIPMENT SETUP- FULL FIELD, CENTRAL DOS

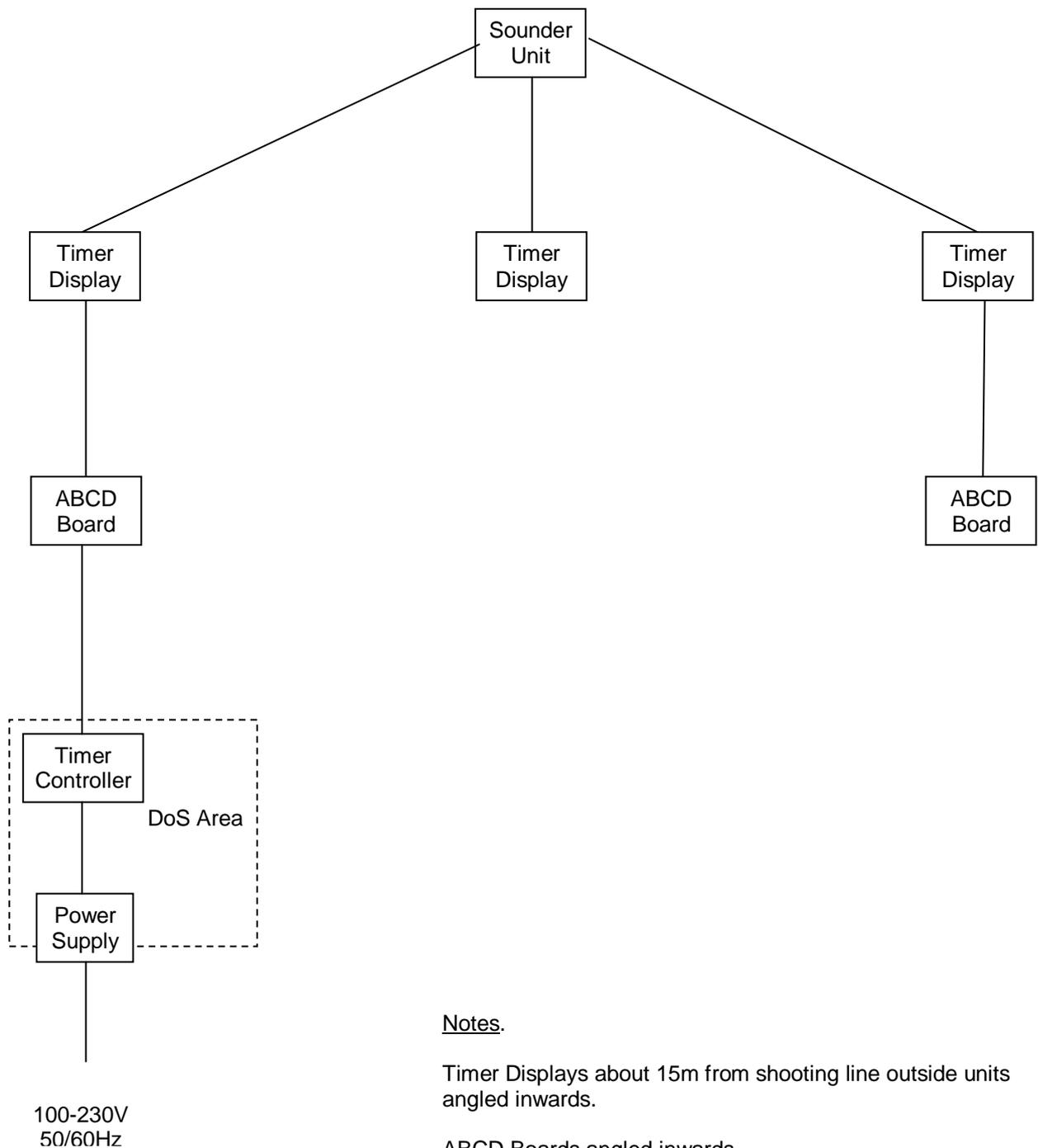


Notes.

Timer Displays about 20-25m from shooting line (less if Metric III,IV or V being controlled), outside units angled inwards.

ABCD Boards angled outwards.

FIGURE 3. . EXAMPLE LAYOUT NORMAL SHOOTING - INDOOR EQUIPMENT SETUP- , DOS TO SIDE



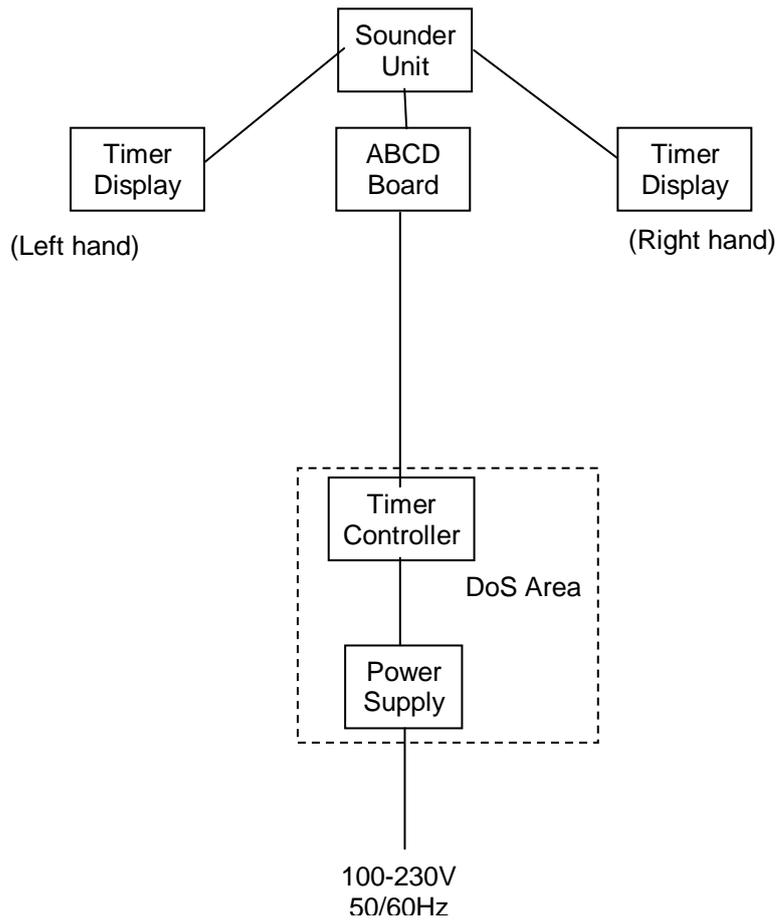
Notes.

Timer Displays about 15m from shooting line outside units angled inwards.

ABCD Boards angled inwards.

If Sounder Unit is placed behind bosses/backstop net, cabling in area where archers walk is minimised.

FIGURE 4. . EXAMPLE LAYOUT ALTERNATE SHOOTING - SINGLE HEAD TO HEAD MATCH



Notes.

Timer Displays about 15m from shooting line.

The set-up shown is used to control one head to head match. With a duplicate set of equipment, plus an additional special control box, two matches can be controlled.

The two Timer Displays and the ABCD display must be set to the correct configuration using the button on the back of the unit.

CONTROLLING A SHOOT

47. Before the shoot

- a. Identify the shooting sequences that will be used on the day and make sure that they are set for the correct times and for the correct number of details.
- b. Ensure that these shooting sequences are programmed into Menu Group 1.
- c. Check Menu Group 1; if there are any shooting sequences that will not be used on the day, move them into Menu Group 2.

48. Normal Shooting

- a. Use the Menu system to show the required shooting sequence. Press **Enter** to select this sequence. The display will show which detail is to shoot first and how many details there are to shoot. The display will also prompt you with the word <START>.
- b. If the sequence has 2 or 3 details, ensure that the correct detail will shoot first. Use the **Next L<>R AB..** button to change the setting. As the system will alternate first details automatically, this setting may have to be adjusted manually before the first scoring end.
- c. Press **Start** to begin shooting. If there are 2 or 3 details, the letters in upper case should be shooting, those in lower case should be waiting.
- d. If you choose, when all archers have finished shooting and there is still time to run, press **Stop** (or **Start**) to jump to the end of the time.
- e. When all details have shot there will be 3 beeps to signal that the archers should advance, score and collect their arrows. If there are 2 or 3 details, the Controller display and the ABCD boards will change to show the next shooting detail order.

49. Alternate Shooting.

- a. Use the Menu system to show the required shooting sequence. Press **Enter** to select this sequence.
- b. Press **Next L<>R AB..** to select which archer/team shoots first, left or right. The Controller display will show how many arrows (individual) or sessions (teams) will be shot per side, and which side is about to shoot. The ABCD Board will also show how many arrows/sessions there will be, which arrows/sessions is about to be shot and a chevron will point to the side about to shoot. Both Timer Displays will show a red light, but the side about to shoot will show the time as 0. The time on the other Timer Displays will be blank.
- c. Press **Start** to begin shooting. Assuming Auto operation, the time program will run completely through the required sequence, lights and displays giving the required information to the archers. If an archer/team completes their arrow(s) early, then a press of the **Stop** or **Start** button will move the system to the next timing interval.
- d. With Manual operation, the system will stop at the end of each shooting period (whether because time has run out or because the time has been cut short by the DoS. A further press of the **Start** button is required to start the next time. Thus, at high grade events, there can be a pause to allow the provisional score for each arrow to be announced.
- e. When the end has finished, there will be 3 beeps to signal that the arrows can be scored and collected. The system will prompt the user to re-select which side is to shoot first.

PROBLEMS – AND HOW TO DEAL WITH THEM

50. This section suggests ways that the DoS might deal with problems during shooting.

51. Problem on Field, shooting to be stopped.

a. **During A Lead-In Time.** It is suggested that archers are cleared from the line and start again.

Press Error Hold. Make announcement if appropriate to remove archers from the line.	Time will stop. Red lights stay on. No beep. (As they are not shooting, no beep is required. If you do not like this, the alternative is to press Emg Stop. There will be 5 beeps, but other aspects are the same.)
Use Prog+ key to increase lead-in time back up to 10 secs (or as required)	
When field clear, press Start.	2 Beeps and timing/lights continue as normal.

b. **During Shooting – Archers Remain At Shooting Line.** This would apply for a short-term problem. The procedure will restart the clock (with any additional time added)

Press Emg Stop. Make announcement if appropriate	5 Beeps and time will stop. Red lights Archers stay on line
If appropriate, use Prog+ key to increase remaining time.(Bylaw 7.5.5.7)	
When field clear, press Start.	1 Beep, then timing and lights continue as normal.

c. **During Shooting Detail – Archers To Come Off The Line.** This would apply for a problem that will take longer to resolve. Although not ideal, the procedure will give a 10 sec lead-in followed by the outstanding time.

Press Emg Stop. Make announcement if appropriate	5 Beeps and time will stop. Red lights. Archers leave line.
If appropriate, use Prog+ key to increase remaining time.(Bylaw 7.5.5.7)	Display shows ERROR and remaining shooting time
When field clear, make announcement if appropriate. Press and release Error Hold and Prog + twice, start stopwatch	2 manual Beeps. Red lights still on
Ten secs later, press Start.	1 Beep, then timing and lights continue as normal.

- d. **Bouncer/Passthrough (or Equipment Failure)**. A Bouncer or Passthrough will lead to make-up arrows being required at the end of the detail. So may equipment failure.

During Shooting, when told of need for make-up arrows, press Time 1 Arrow. (if call was in error, press Time 1 Arrow again and function will be cancelled)	1 ARROW will flash in Controller display
At end of shooting time (of if curtailed by DoS).	5 Beeps. Time stops. Red lights. Line judge visits targets and resolves situation.
DoS presses Time 1 Arrow to increase number of arrows to be shot. * See note 1 Time may be fine tuned by Menu- and Prog+ keys, although it is hard to see why you would do this. When time is right, press Enter	Prepares Timer for make-up
When make-up archers are ready, press Start	Normal lead-in and lights for an end, shooting time as set.
When make-up time is complete (or if curtailed by DoS).	2 beeps to move to lead-in for next detail OR 3 Beeps for scoring to commence.

Notes

1. If there are 2 or more archers to make up different numbers of arrows, set time to highest number of arrows. A line judge then guides archers with fewer arrows to shoot, letting them go to the line but not start shooting until the appropriate time is left.
2. The Time 1 Arrow lead-in time (T1), shooting time (T2) and amber light time (T3) are previously set in the Set-up Menu.

52. **Make-Up Arrows Required Outside A Shooting Sequence**. The Time 1 Arrow function can be used outside a shooting sequence to control a special sequence of 1 detail, with a shooting time that can be set precisely. One use is if an archer has had an equipment failure and the DoS decided to continue the tournament, leaving a requirement for make-up arrows later. The make-up arrows can be shot during a natural break or at a distance change. No doubt there are other occasions when this may be useful.

With no shooting sequence running, press Time 1 Arrow the required number of times to give the required make-up time. (If the call was in error, press Time 1 Arrow a total of 7 times and the display will show 0 time, which will lead to the function being cancelled. Time may be fine tuned by Menu- and Prog+ keys	Programs the special sequence
When time is correct, press Enter	Special sequence ready
When archers are ready to shoot, press Start	A normal 1-detail sequence will follow, the shooting time to be as set.

53. **HELP. Stop and Start Again.** Sometimes, you just need to get out of a running sequence as quietly and easily as possible.

When a shooting sequence is running, press Error Hold	No sound, red light, time stops.
Press Stop/Esc, then confirm by pressing Menu-	No sound, flashing red light, no time display. Previous sequence shown in Controller display
If required, use menu system to find desired sequence	
With desired sequence shown in Controller display press Enter to select sequence and then Start to run the sequence.	

54. **Power Failure.** If power is lost, all sound and light signals will be lost and no time will be shown on the displays. A DoS will be ready to deal with this, but their immediate actions are outside the scope of these notes.

Note that if power is lost during shooting there may be unwanted indications when the power is returned. The Timer Controller will remember where it was when the power went off and will settle at that point. A red light will show, with the time remaining displayed. If the power is returned when the archers are shooting under manual control, the return of power may cause more problems than it solves.

a. **Loss of Power.**

If shooting is to continue under manual control – Disconnect power from Timer Controller by removing the mains plug or disconnecting the power lead from back of unit.	Power can then be restored under controlled conditions, eg during scoring.
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b. Restoration of power.

(i) Shooting Has Continued Under Manual Control

During scoring, reconnect mains.	Timer Controller will settle at point of failure
<p>If part way through sequence press</p> <p>Stop/Esc</p> <p>Menu (to confirm exit)</p> <p>Enter</p> <p>Check that correct detail is selected to shoot first, adjust with Next L< >R AB.. key</p> <p>When ready, press Start to begin next end.</p>	<p>To exit the sequence</p> <p>To confirm exit</p> <p>To select sequence</p>

(ii) Shooting Has Stopped

Reconnect mains.	Timer Controller will settle at point of failure, showing red lights and the unexpired time
If appropriate, increase the time remaining by pressing Prog+ key as required	
<p><u>If 10 sec lead-in required:</u></p> <p>Press and release Error Hold and Prog + twice start stopwatch</p> <p>Ten secs later, press Start.</p>	<p>2 Beeps. Red lights still on</p> <p>1 Beep, Timing/lights continue as normal.</p>
<p><u>If lead-in time not required:</u></p> <p>Press Start</p>	<p>1 Beep, Timing/lights continue as normal.</p>