DART

INSTRUCTION MANUAL

SISIS, Ashbourne Road, Kirk Langley, Derbyshire, DE6 4NJ, England.
Tel: +44 (0) 1332 824 777 | Fax: +44 (0) 1332 824 525 | Email: info@sisis.com | www.sisis.com

A division of Howardson Ltd. - a proudly British company
Company reg no 641526 - Vat No GB 345 9918 12

SP20015_REV_0
10/12

Certificate of Conformity

DART

Manufacturer:- Howardson Ltd, Howardson Works, Kirk Langley, Derby, DE6 4NJ. UK

Owner of Technical Document:- Mr I.D. Howard, Howardson Ltd, Howardson Works Kirk Langley, Derby, DE6 4NJ, UK

I the under signed Declare that these machines:-

Model	Operating Width	Power (Honda)	Measured Sound Power Level	Guaranteed Sound Power Level	Serial Number
DART	16.5" (420mm)	GX160	79dB Lwa	98dB Lwa	See Product ID range

Tested at:- Howardson Works test site September 2012

Complies with the applicable requirements of:-
- Machine Directive 2006/42/EC
- Noise Directive 2000/14/EC (Annex VI Procedure 1)

Managing Director

Ian Howard

Serial Numbers

NOTE *MAKE A NOTE OF THE SERIAL NUMBERS OF YOUR MACHINE & ENGINE AND ALWAYS QUOTE THEM IN ANY COMMUNICATION WITH PERSONNEL AT DENNIS.*

MACHINE SERIAL NUMBER

ENGINE SERIAL NUMBER

Introduction

The reliability and quality of performance of the **SISIS DART** depends upon some simple care maintenance carried out regularly. This manual has been prepared to allow the user to carry out all such work.

It is advisable to read the instructions carefully. Proper care and attention will enable the machine to give a continuous, satisfactory, and reliable service. Failure to carry out regular lubrication and maintenance as outlined in this manual may render any guarantee or warranty invalid.

In the case of any difficulty, or if further information or advice is required, our Service Department is always at your call. In the interests of speed and accuracy of information please quote the serial numbers of the machine and engine when making enquiries.

For the machine, this is to be found on a plate attached to the side frame. The engine number is stamped on either the crank case or the gear casing facing towards the front of the machine. We suggest you write the numbers on the front page of this book.

Contents

	Page
Declaration of Conformity	2
Serial Numbers	2
Introduction	2
Technical Data	3
Important Safety Instructions	3 - 4
Operating Instructions	5
Routine Maintenance	6
Tines	7
Parts Listings	8 - 12
Notes	13

Technical Data

Model	DART
Width (mm)	680
Length (mm)	1550
Height (mm)	1180
Weight (Kg)	217
Working Width (mm)	16” (430mm)
Engine	GX160
Wheels - Rear	(2) 13 x 6.50-6 slick
Wheels - Front	(2) 260 x 85-3.00-4 ribbed
Hand Arm Vibration (m/sec^2)	9.5
Measured Sound Power Level (dB(A))	80
Guaranteed Sound Power Level (dB(A))	98

Important Safety Instructions

CAUTION *READ THE INSTRUCTIONS CAREFULLY AND ALSO THE SEPARATE INSTRUCTION DETAILS ON THE ENGINE.*

NEVER

- carry out adjustments with the engine running.

ALWAYS

- Read the operating instructions carefully and understand the controls before commencing work.
- Be extra careful to avoid spillage, when using petrol or diesel fuel. **DANGER** no smoking or naked lights
- Use safety guards and make sure they are correctly in position. They are supplied for your protection
- Visually check machines before starting work for damage or wear to working parts such as blades,tines or loose fasteners
- Respect powered machines. Always keep hands and feet clear of moving parts and remember that tine cylinders or drums can continue to rotate even after the power unit is switched off
- Switch off the power before making adjustments or repairs and never lift or carry a machine whilst any parts are Moving

EYE PROTECTION

In dry, dusty or windy conditions it may be necessary to wear eye protection to protect your eyes from flying debris.

FIRE HAZARD

ALWAYS CLEAN THE MACHINE. REMOVE ALL DEBRIS FROM AROUND THE ENGINE. BLOCKED ENGINE COOLING FINS CAN CAUSE THE ENGINE TO OVERHEAT

In order to operate the machine safely please follow these Health and Safety guidelines.

TRAINING

CAUTION *READ THE INSTRUCTIONS CONTAINED IN THIS MANUAL WITH CARE. IF YOU ARE IN ANY DOUBT PLEASE ASK YOUR EMPLOYER OR CONTACT US DIRECT AT **SISIS**.*

- Be familiar with the controls and the proper use of the equipment.
- Never allow children or people unfamiliar with these instructions to use the machine. Local regulations or insurance may restrict the age of the operator.
- Never operate while people, especially children, or pets are nearby.
- Keep in mind that the operator or user is responsible for accidents or hazards occurring to other people or their property.

PREPARATION

- While operating always wear substantial footwear and long trousers. Do not operate the machine barefoot or in open sandals.
- Thoroughly inspect where the equipment is to be used and remove all stones, sticks, wire, bones and other foreign objects.

WARNING *PETROL IS HIGHLY FLAMMABLE AND WILL DAMAGE GRASS IF SPILT.*

A) Store fuel in containers specifically designed for this purpose.
B) Refuel out doors and do not refuel whilst smoking.
C) Add fuel before starting the engine. Never remove the cap of the fuel tank or add petrol while the engine is running or when the engine is hot.
D) If petrol is spilled do not attempt to start the engine but move the machine away from the area of spill and avoid creating any sources of ignition until the vapours have dissipated.

- Replace damaged or faulty silencers.
- Before using the machine always inspect the safety devices including the cut off switch and the blades for excessive wear or damage. Replace if necessary.

OPERATION

- Do not operate the engine in a confined space where dangerous **CARBON MONOXIDE** fumes can collect.
- Operate only in daylight or good artificial light.
- Always be sure of your footing on slopes.
- Walk. Never run.
- Exercise extreme care on slopes when changing direction.
- Do not operate excessively steep slopes.
- Use extreme caution when reversing or pulling the machine towards you.
- Stop the tines when transporting the machine.
- Never operate the machine with defective guards or shields or without the safety devices, for example without the deflector plate or grassbox in place.
- Do not change the engine governor settings or overspeed the engine.
- Disengage all blades and drive clutches before starting.
- Start the engine carefully following the instructions with feet well away from the blades.
- Do not tilt the machine when starting the engine.
- Do not put hands or feet near or under moving parts.
- Never pick up or carry the machine while the engine is running.

CAUTION *PLEASE READ THESE OPERATING INSTRUCTIONS CAREFULLY BEFORE COMMENCING WORK.*

We want you to obtain the best performance from this machine. If you have any difficulty in carrying out the following instructions please contact SISIS direct or your local SISIS Territory Manager or SISIS Dealer.

OPERATING PRINCIPAL

The **SISIS DART** is an engine driven vertical aerator for use on fine turf areas such as bowling greens, tennis courts and all areas of fine turf.

Offering clean vertical action of larger tractor mounted machines, the DART is easy to use and highly manoeuvrable. It has an effective working width of 42cm and is powered by a Honda GX160 5.5hp engine. A wide range of tines are available (see listsings). Maximum working depth is 10cm (4ins).

All controls, including the balanced depth control, are on the handles. The SISIS DART has been designed to require minimal maintenance with sealed bearings throughout the machanism and an easily removable cover.

OPERATING

WARNING *THE DEADMANS LEVER MUST BE KEPT DEPRESSED WHILST THE ENGINE IS RUNNING OR WHEN STARTING THE ENGINE. IF THE LEVER IS RELEASED THE ENGINE WILL STOP AND WILL NOT RESTART UNTIL THE LEVER IS DEPRESSED AGAIN.*

1. Firstly ensure that the over centre lever to the tine drive is disengaged and that the tines are clear of the ground (see Image 1).
2. Move the choke lever on the engine to start (see Image 2).
3. Ensure that the isolator switch on the engine is on.
4. Depress the deadmans handle lever. (See Image 3)
5. Set the revs to the engine to approximately half way and pull the recoil starter.
6. When the engine is running smoothly, keeping the deadmans lever depressed, line up the machine for the first run.
7. Engage the over centre lever so that the tines are in drive.
8. Pull the drive clutch lever into operation and with the machine moving forwards pull the depth selection lever until the desired depth is achieved. This is visible on the depth setting indicator.
9. When nearing the end of a run, lift the tines clear of the ground and take the tines out of drive with the tine drive over centre lever.
10. Manoeuvre the machine into position for the next run and continue to proceed as previously described.

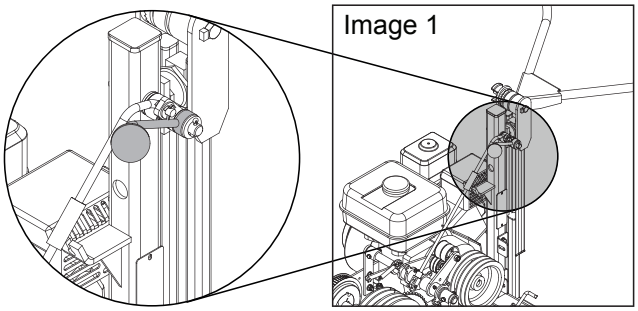


Image 1

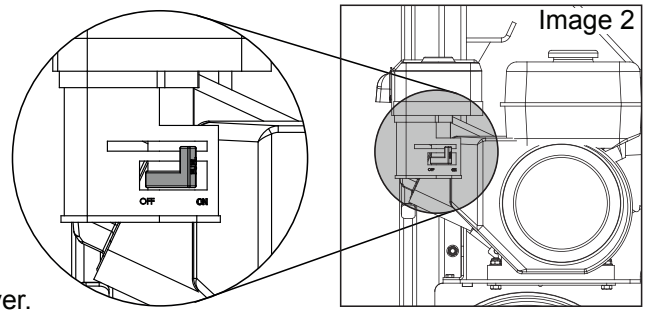


Image 2

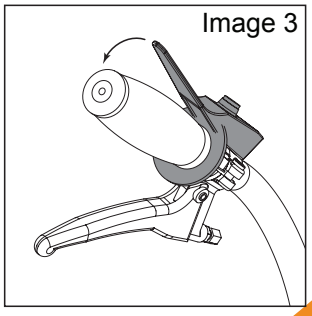


Image 3

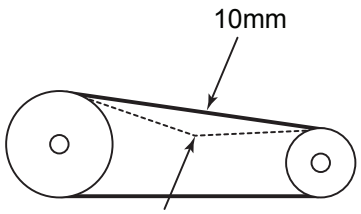
CAUTION *IF THE MACHINE BEGINS TO BOUNCE OR THE ENGINE TRIES TO STALL, THE GROUND IS TOO HARD FOR THE CHOSEN DEPTH. SELECT A SHALLOWER DEPTH AND TREAT THE GROUND AT THIS DEPTH UNTIL CONDITIONS ALLOW DEEPER PENETRATION.*

TO CHANGE A DRIVE BELT

Loosen the Nuts on Bearing Block and slide back until the Belt may be slipped over the edge of the Toothed Pulley.

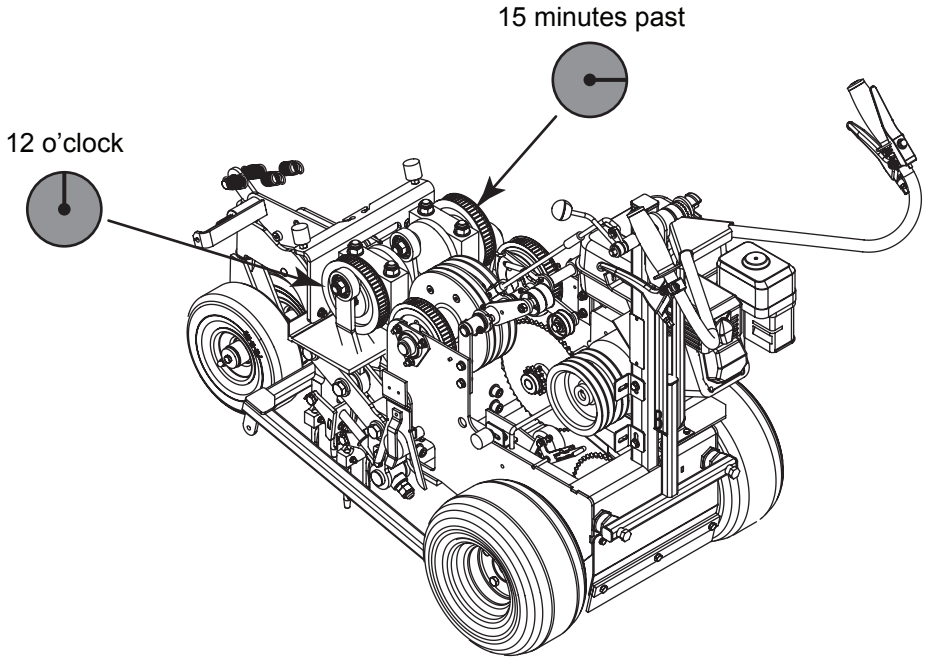
When fitting a new Belt do not over tension. 10mm of deflection should be left at the centre of the belt.

Image 4



TIMING OF TOOTHED BELTS

When fitting a new Belt it is important to reset the timing.
Looking from the front of the machine, the right hand cam should be at 12 o'clock.
The left hand cam should be at 15 minutes past the hour. (See Image below)



FOR ENGINE MAINTENANCE SEE MANUFACTURERS HAND BOOK WHICH IS SUPPLIED WITH THE MACHINE

NOTE *TINE SPACING = 50MM*

The following Tines are available for use with the Dart. Maximum depth for all tines is 100mm

CHISEL TINES - REF. 2109

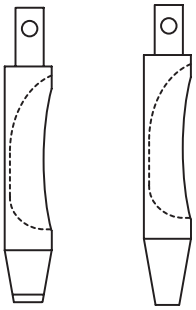
These encourage new root growth and permit the entry of fertilisers and dressing.

ROUND POINTED SOLID TINES - REF. 6278

Used to assist moisture and air getting to the grass roots during the growing season.

HOLLOW CORING TINES - REF. 2107 and 36447

These remove cores of soil to relieve compaction caused by play and rolling and to exchange soil. In areas where compaction is severe use round solid tine treatment - say 4-6 weeks before hollow tining to allow moisture to penetrate the compacted layer.

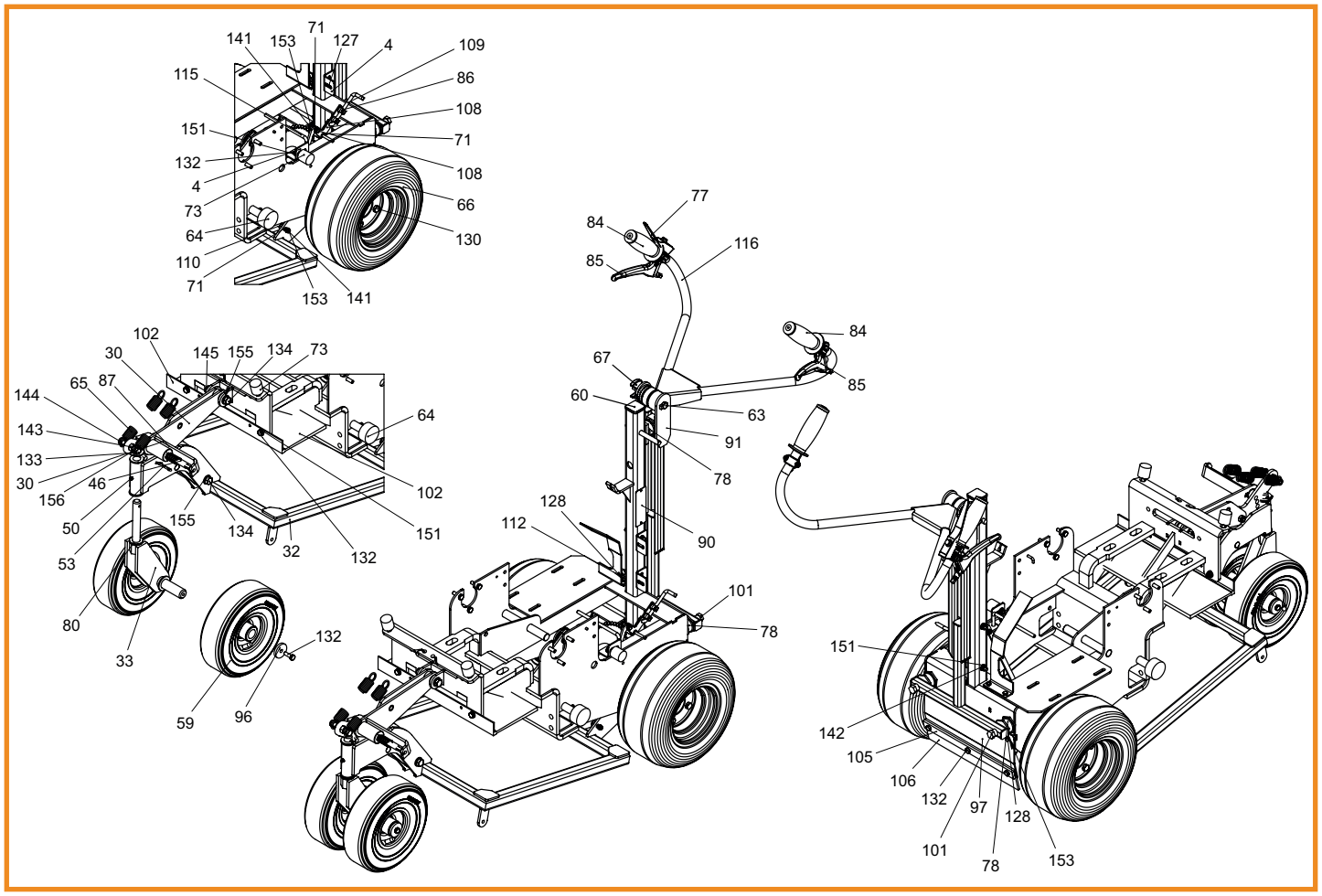


36447 Ø16mm

2107 Ø12.5mm

PENCIL TINE - REF. 34257

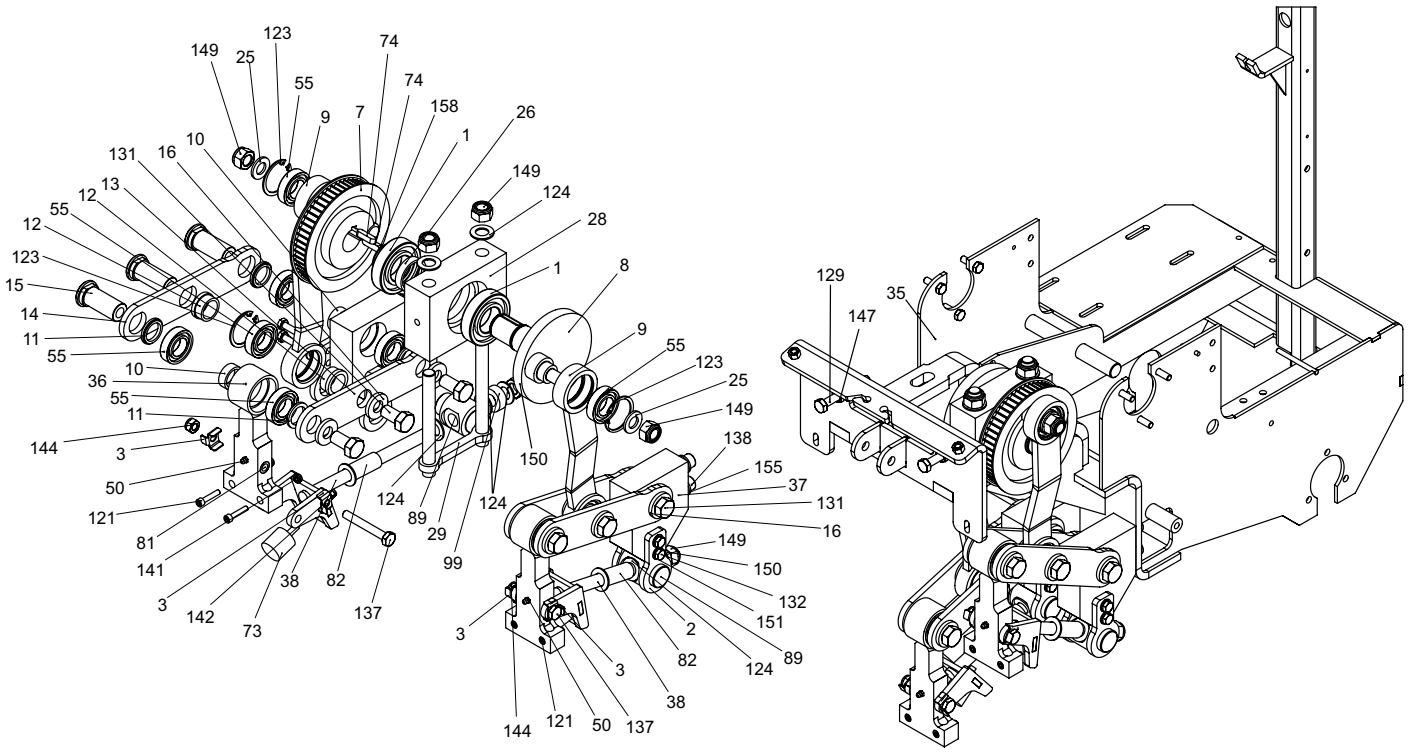
Has all the benefits of the solid tine, but is more acceptable on greens because of the smaller surface hole. These tines are not as strong as the tapered tine so care must be taken on outfield turf or where stony ground is prevalent.



1.01 Main Assembly

Item No.	Part No.	Description	Quantity
4	401646	Guard Bracket	3
30	402086	Upper Link Arm	1
32	402096	Lower Frame	1
33	402098	Front Wheel Shaft Assy	1
46	402126	Plunger	1
50	D1947	Grease Nipple M6	9
53	D5622	Split Pin Dia5 x 50	1
59	D8733	Wheel	2
60	D8955	Tube Bung	1
63	E1-1728	Hex Bolt M10 x 110	1
64	F20080	Rubber Stop	2
65	F20692	Extension Spring ETS 616	2
66	F21061	Wheel	2
67	F21063	Lock Knob	1
71	F21711	Bush	3
73	F21739	Rubber Buffer	7
77	F21905	Deadman Lever	1
78	F21922	A.V. Mount	3
80	F21928	Thrust Bearing	1
84	F22019	Handle Grip	2
85	F22281	Clutch Lever	2
86	F22321	Clip	2
87	F22432	Shoulder Bolt 12 x 20 M10	1
90	F36000	Name Plate SISIS	1
91	F36320	Back Frame	1
96	F36351	Washer	2
97	F36369	Rear Guard	1
101	F36474	Barrel Nut	3
102	F36502	Bottom Brush	1
105	F36669	Rear Guard Strip	1
106	F36670	Rubber Strip	1
108	F37274	Connecting Rod	1
109	F37275	Pointer	1
110	F37276	Link	1
112	F37279	Guard Strip	1
115	F37286	Belt Finger	1
116	F37288	Handle Bars	1
127	SP01023	Hex Set Screw M8 x 60	2
128	SP01028	Hex Set Screw M6 x 20	6
130	SP01034	Hex Set Screw M10 x 20	8
132	SP01045	Hex Set Screw M8 x 25	28

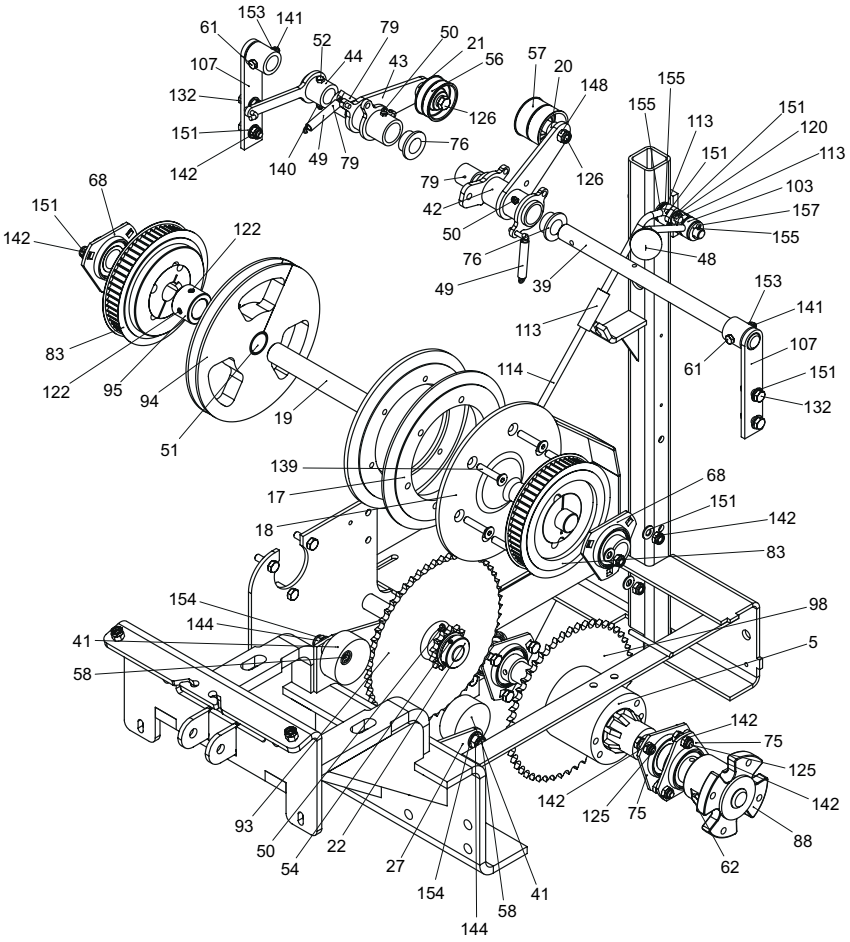
Item No.	Part No.	Description	Quantity
133	SP01047	Hex Set Screw M10 x 60	1
134	SP01102	Hex Set Screw M12 x 70	2
141	SP02004	Nut M6 Nyloc	14
142	SP02006	Nut M8 Nyloc (T)	44
143	SP02007	Nut M10	2
144	SP02008	Nut M10 Nyloc (T)	10
151	SP03008	Washer M8 Form A	54
153	SP03010	Washer M6 Form A	8
155	SP03012	Washer M12 Form A	17
156	SP03022	Washer M20 Form A	1
Not Shown			
-	F37289	Cable Height Adjustment	1
-	F37290	Cable Drive	1



2.01 Drive Assembly 1

Item No.	Part No.	Description	Quantity
1	62276	Bearing 6207-2RS 3	4
2	400496	Plate	8
3	401642	Tab Washer	8
7	402022	Timing Crank	2
8	402023	Drive Crank	2
9	402031	Crank	4
10	402034	Spacer	8
11	402035	Spacer	16
12	402036	Spacer	8
13	402037	Link Arm Plate	4
14	402038	Link Arm Plate	4
15	402039	Pivot Pin	12
16	402040	Washer	12
25	402075	Washer	4
26	402076	Spacer	2
28	402080	Bearing Block	2
29	402081	Block Clamp	2
36	402111	Tine Holder	4
37	402112	Bearing Housing	4
38	402113	Spring Fork	4
50	D1947	Grease Nipple M6	9
55	D8259	Bearing 6005-2RS	24
73	F21739	Rubber Buffer	7
74	F21784	Key 8 x 7 x 30	4
81	F21983	Bush	8
82	F21987	Compression Spring	4
89	F35946	Shaft Swivel	4
99	F36407	Spacer	4
121	J20430	Cap Head M6 x 30	8
123	J209006	Circlip 47 M1308-0470	8
124	J209012	Washer M16 Form B	16
131	SP01037	Hex Set Screw M16 x 30	12
132	SP01045	Hex Set Screw M8 x 25	28
137	SP01119	Hex Bolt M10 x 75 (8.8 HT)	4
138	SP01120	Cap Head M12 x 35	8
141	SP02004	Nut M6 Nyloc	14
142	SP02006	Nut M8 Nyloc (T)	44
144	SP02008	Nut M10 Nyloc (T)	10

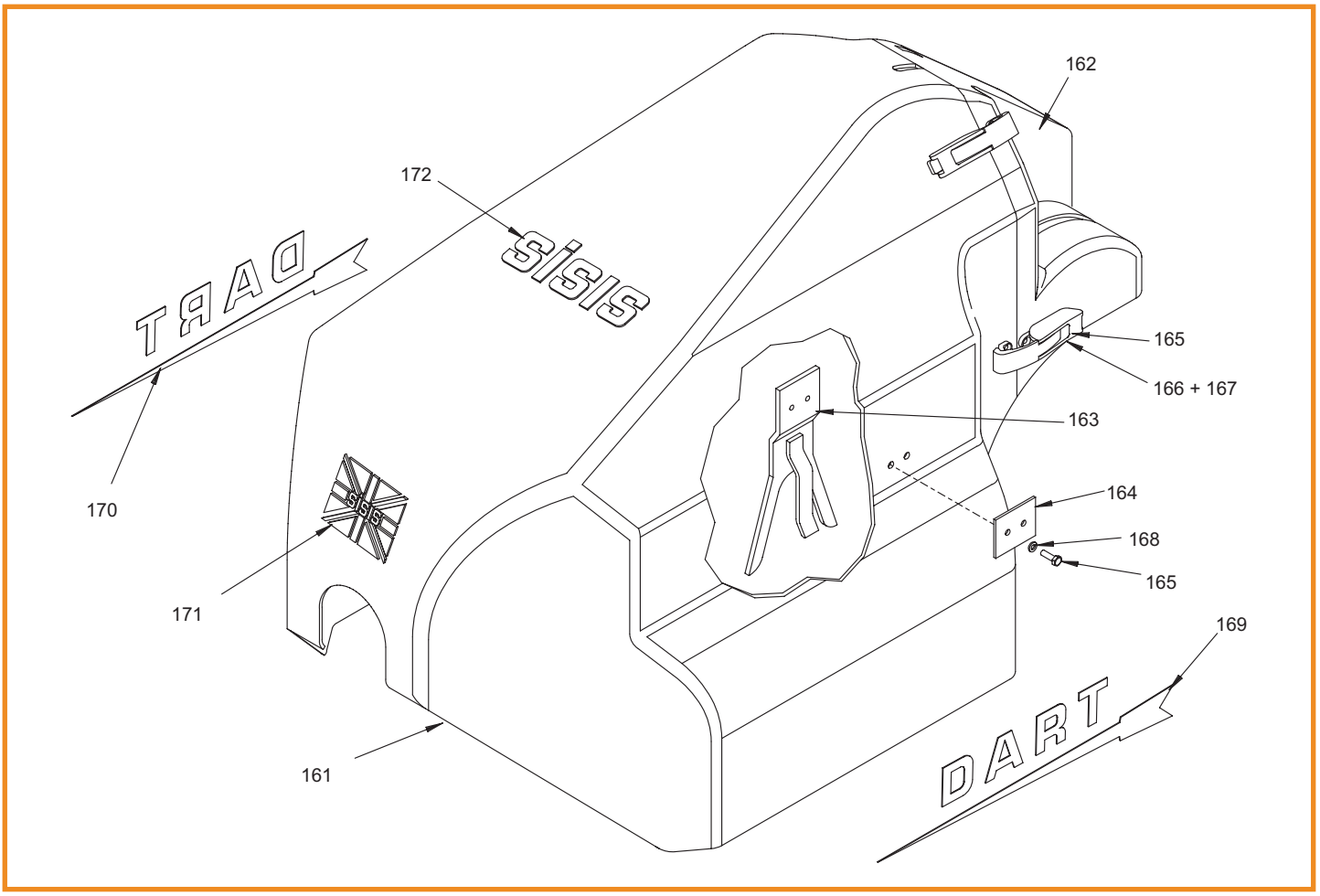
Item No.	Part No.	Description	Quantity
149	SP02028	Nut M16 Nyloc (T)	12
150	SP02029	Nut M16 Lock (Thin)	4
151	SP03008	Washer M8 Form A	54
155	SP03012	Washer M12 Form A	17
158	SP07009	Circlip D1400 - 035	2
Not Shown			
-	F21862	Timing Belt	2



2.02 Drive Assembly 2

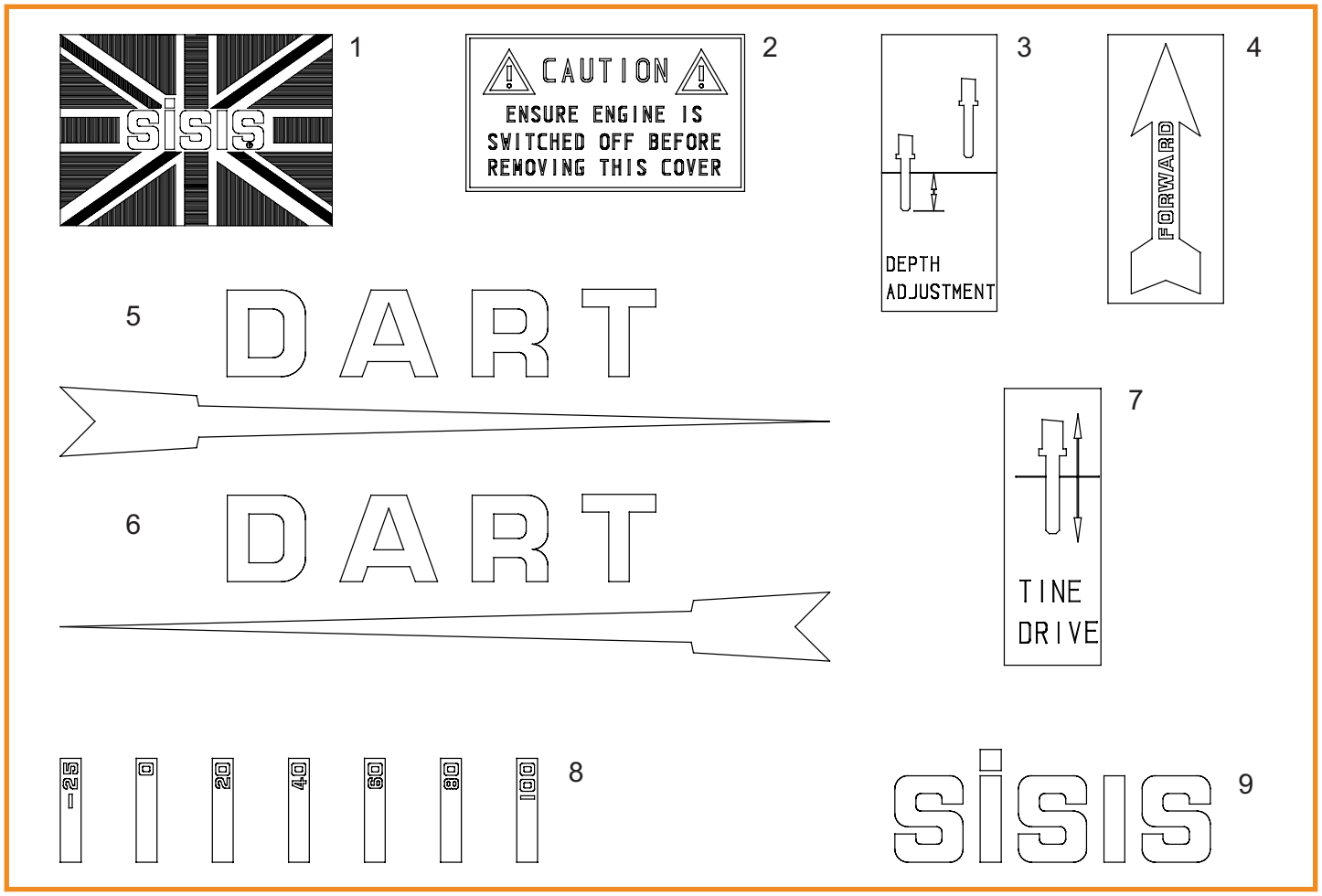
Item No.	Part No.	Description	Quantity
5	401650	Axle Diff M/C	1
17	402042	Pulley	1
18	402045	Pulley	1
19	402048	Pulley	1
20	402051	Spacer	1
21	402052	Spacer	1
22	402054	Collar	2
27	402077	Tensioner Arm	1
39	402118	Top Shaft	1
41	402120	Tensioner Block	2
42	402121	Tension Pivot	1
43	402122	Tension Pivot	1
44	402123	Spring Retainer	1
49	D1792	Extension Spring	2
50	D1947	Grease Nipple M6	9
51	D1955	Oilite Bush 25ID, 30OD, 25LG	2
52	D1986	Hex Set Screw M5 x 20	1
54	D8068	Grub Screw M6 x 12	4
56	D8295	Pulley	1
57	D8435	Pulley	1
58	D8522	Cap Head M10 x 35	2
61	E1-1100	Hex Set Screw M6 x 35	2
62	E1-1116	Hex Set Screw M8 x 70	2
68	F21150	Bearing	2
74	F21784	Key 8 x 7 x 30	4
75	F21872	Bearing	4
76	F21885	Oilite	6
79	F21923	Oilite	2
83	F21989	Pulley Assembly	2
88	F33607	Wheel Hub	2
93	F36340	Duel Sprocket	1
94	F36345	Pully & Sprocket	1
95	F36346	Spacer	1
98	F36375	50T Plate Sprocket	1
103	F36510	Drive Lever	1
107	F37184	Top Mount	2
113	F37284	Over Centre Rod	1
114	F37285	Rod	1
120	J20406	Split Pin 3/32" x 1"	2

Item No.	Part No.	Description	Quantity
122	J20467	Grub Screw M8 x 8	2
125	SP01009	Hex Set Screw M8 x 20	12
126	SP01013	Hex Set Screw 3/8" UNF x 2"	2
132	SP01045	Hex Set Screw M8 x 25	28
139	SP01121	Csk Cap Head M8 x 40	6
140	SP02002	Nut M5 Nyloc (T)	1
141	SP02004	Nut M6 Nyloc	14
142	SP02006	Nut M8 Nyloc (T)	44
144	SP02008	Nut M10 Nyloc (T)	10
148	SP02018	Nut 3/8" Unf Nyloc (T)	2
151	SP03008	Washer M8 Form A	54
153	SP03010	Washer M6 Form A	8
154	SP03011	Washer M10 Form A	2
155	SP03012	Washer M12 Form A	17
157	SP05010	Split Pin 1/8" x 1"	1
Not Shown			
-	F21890	V-Belt	3
-	D1558	Chain To Axle	1
-	D1873	Chain To Layshaft	1



3.01 Guard Assembly

Item No.	Part No.	Description	Quantity
161	*401680*	*Guard Front*	*1*
162	*F37278*	*Guard Rear*	*1*
163	*F36525*	*Guard Bracket*	*1*
164	*F36526*	*Guard Washer*	*1*
165	*E1/1096*	*Setscrew*	*4*
166	*D8774*	*CSK Setscrew*	*2*
167	*E1/1217*	*Nyloc Nut*	*2*
168	*E1/1061*	*Spring Washer*	*2*
169	*F36403*	*DART Decal LH*	*1*
170	*F36412*	*DART Decal RH*	*1*
171	*D4098*	*Union Jack Decal*	*1*
172	*F36332*	*SISIS Decal*	*1*



4.01 Labels

Item No.	Part No.	Description	Quantity
1	*D4098*	*Union Jack Decal*	*1*
2	*33384*	*Engine Caution Decal*	*1*
3	*36402*	*Depth Adjustment Decal*	*1*
4	*36405*	*Forward Arrow Decal*	*1*
5	*F36412*	*DART Decal RH*	*1*
6	*F36403*	*DART Decal LH*	*1*
7	*36404*	*Tine Drive Decal*	*1*
8	*36406*	*Depth Gauge Decal*	*1*
9	*F36332*	*SISIS Decal*	*1*

SISIS, Ashbourne Road, Kirk Langley, Derbyshire, DE6 4NJ, England.
Tel: +44 (0) 1332 824 777 | Fax: +44 (0) 1332 824 525 | Email: info@sisis.com | **www.sisis.com**

A division of Howardson Ltd. - a proudly British company
Company reg no 641526 - Vat No GB 345 9918 12