

sisis[®]

DART INSTRUCTION MANUAL



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

SP20015_REV_2
03/15

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.

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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

Important Safety Instructions

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 listings). 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 mechanism and an easily removable cover.

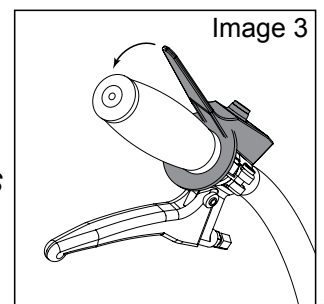
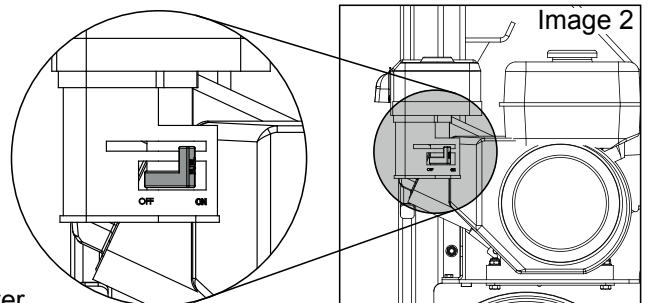
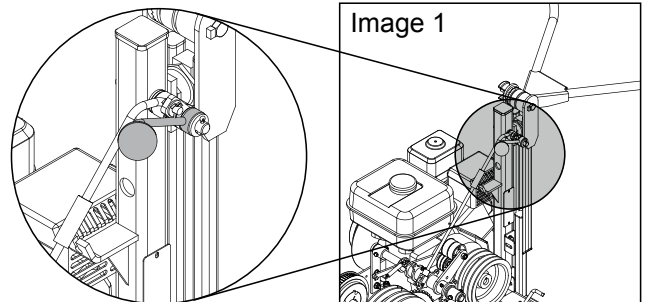
OPERATING



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.



CAUTION

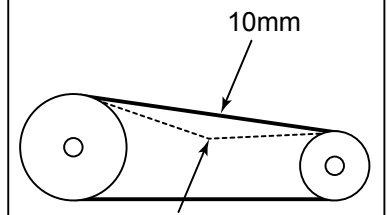
IF THE MACHINE BEGINS TO BOUNCE OR THE ENGINE TRIES TO STALL, THE GROUND IS TOO HARD FOR THE CHOSEN DEPTH. SELECT A SHALLOWER DEPTH AND TREAT THE GROUND AT THIS DEPTH UNTIL CONDITIONS ALLOW DEEPER PENETRATION.

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

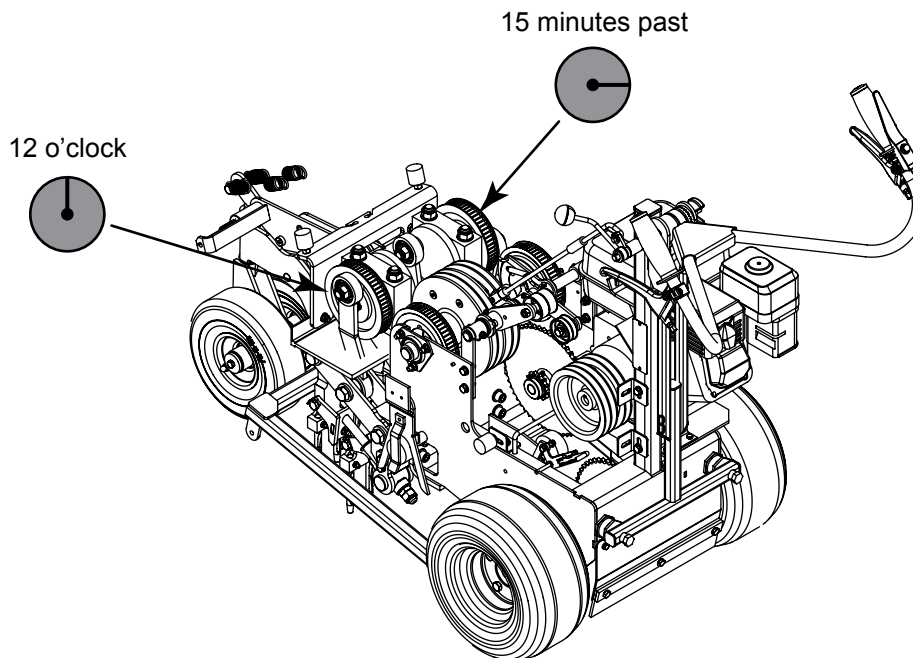


TIMING OF TOOTHED BELTS

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. 6728

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

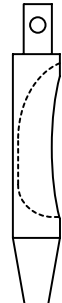


HOLLOW CORING TINES - REF. 2107 and 36447

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.



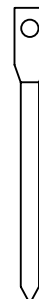
36447
Ø16mm

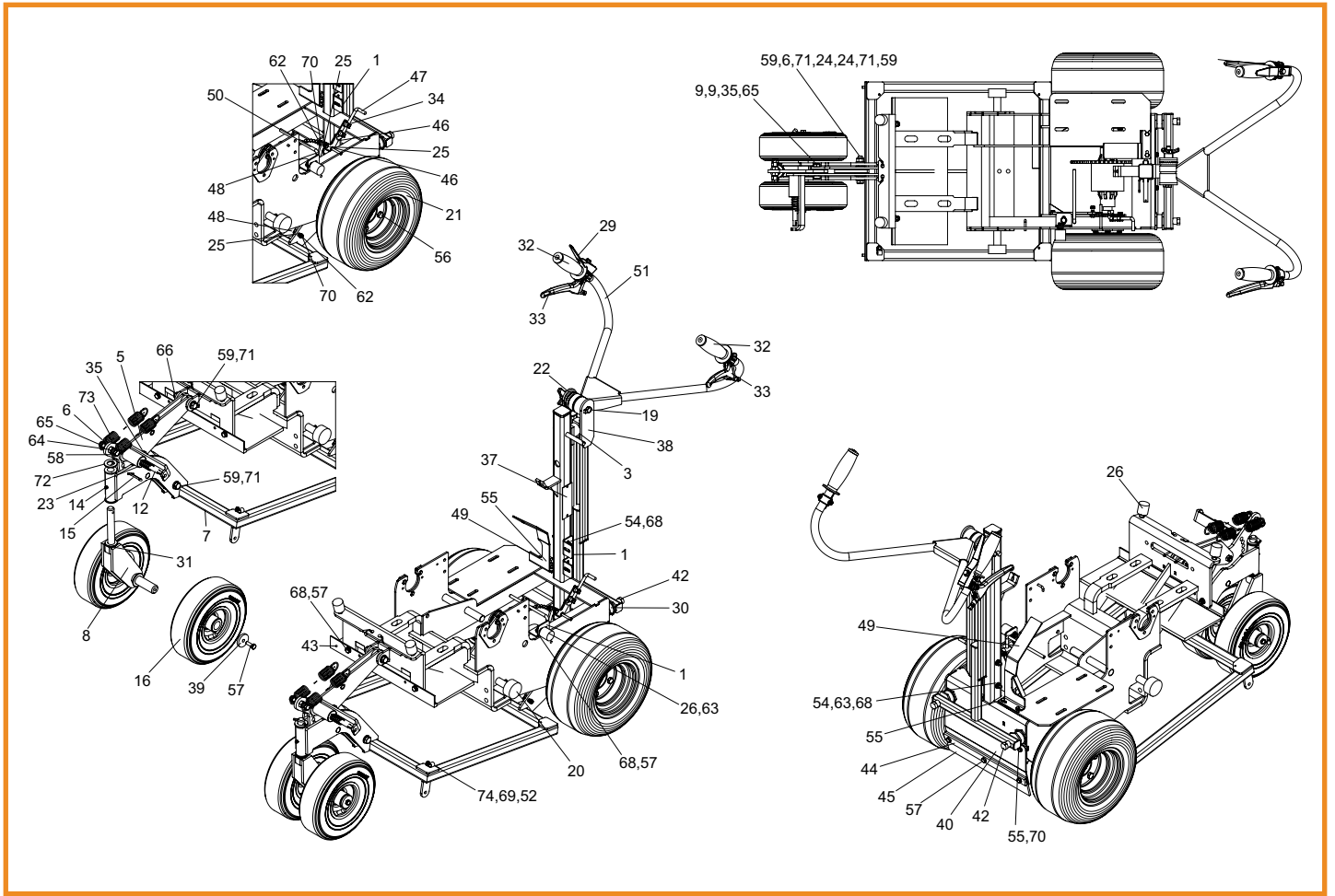


2107
Ø12.5mm

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.

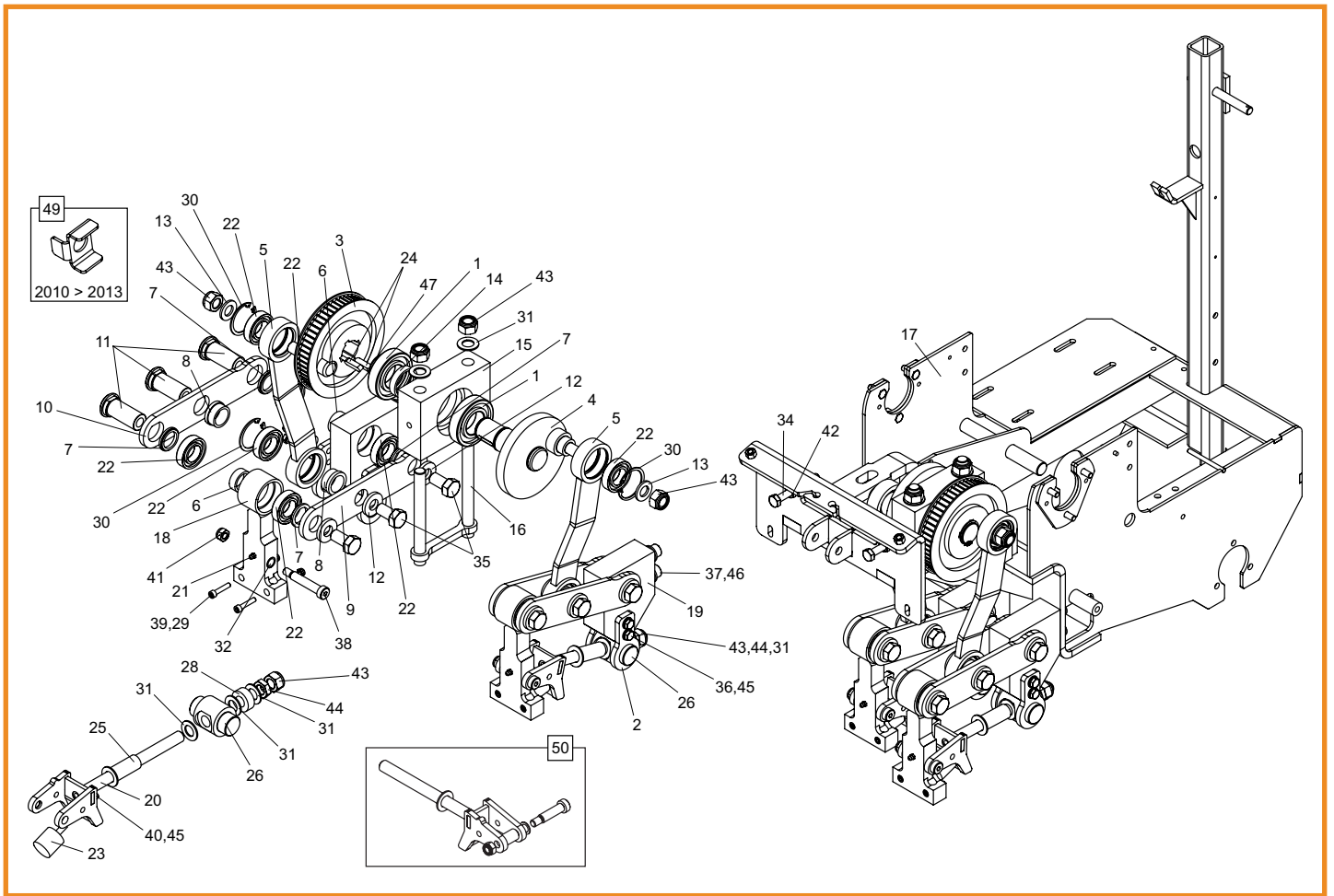




1.01

Main Assembly

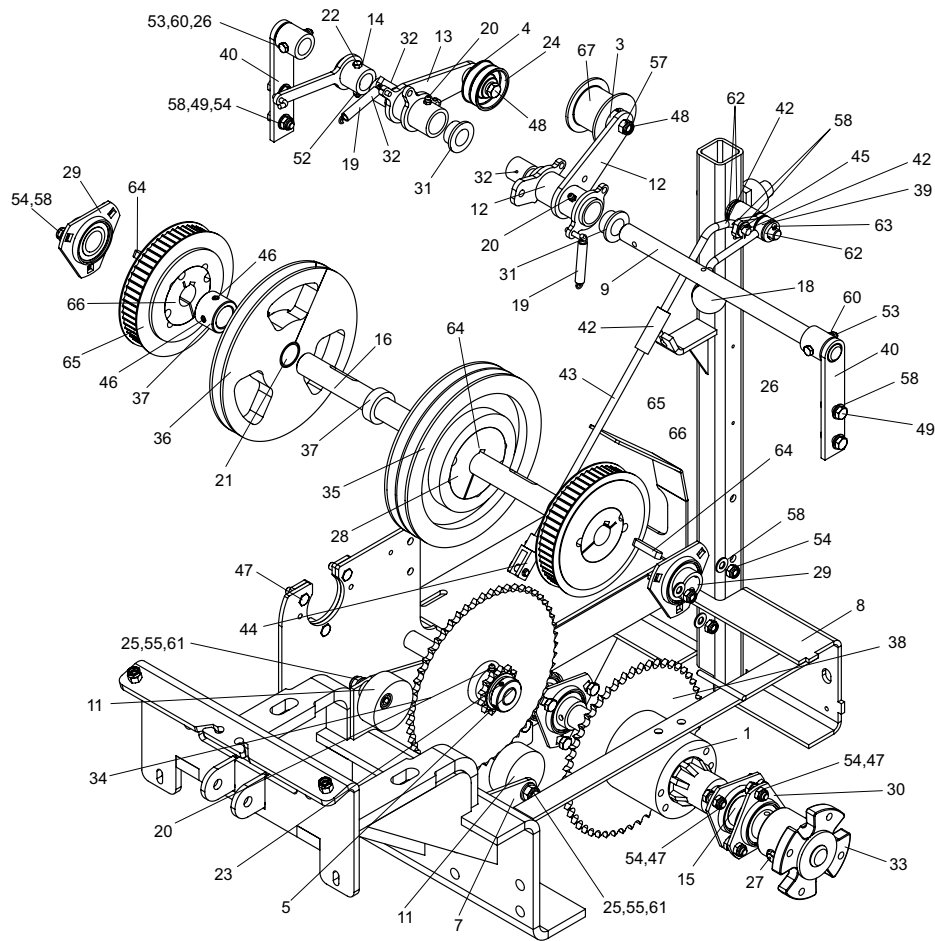
Item No.	Part No.	Description	Quantity	Item No.	Part No.	Description	Quantity
1	401646	Guard Bracket	3	42	F36474	Barrel Nut	2
2	401650	Axle Diff M/C	1	43	F36502	Bottom Brush	1
3	401820	Handle Spacer	1	44	F36669	Rear Guard Strip	1
4	402055	Axle Spacer	2	45	F36670	Rubber Strip	1
5	402086	Upper Link Arm	1	46	F37274	Connecting Rod	1
6	402089	Link Arm	1	47	F37275	Pointer	1
7	402096	Lower Frame	1	48	F37276	Link	1
8	402098	Front Wheel Shaft Assy	1	49	F37279	Guard Strip	1
9	402101	Bush	2	50	F37286	Belt Finger	1
10	402102	Main Frame (Dart)	1	51	F37288	Handle Bars	1
11	402125	Axle Spacer	2	52	SP01004	Hex Set Screw M5 x 20	1
12	402126	Plunger	1	53	SP01009	Hex Set Screw M8 x 20	12
13	403082	Spacer 25.4 x 38 x 12	1	54	SP01023	Hex Set Screw M8 x 60	2
14	D1947	Grease Nipple M6	1	55	SP01028	Hex Set Screw M6 x 20	6
15	D5622	Split Pin Dia 5 x 50	1	56	SP01034	Hex Set Screw M10 x 20	8
16	D8733	Wheel	2	57	SP01045	Hex Set Screw M8 x 25	8
17	D8955	Tube Bung 40 x 40	1	58	SP01047	Hex Set Screw M10 x 60	1
18	E1-1116	Hex Bolt M8 x 70	2	59	SP01102	Hex Set Screw M12 x 70	2
19	E1-1728	Hex Bolt M10 x 110	1	60	SP01130	Cap Head M12 x 45	1
20	F20080	Rubber Stop	2	61	SP02002	Nut M5 Nyloc (T)	1
21	F21061	Wheel	2	62	SP02004	Nut M6 Nyloc	4
22	F21063	Lock Knob	1	63	SP02006	Nut M8 Nyloc (T)	26
23	F21338	Spring	1	64	SP02007	Nut M10 Std	2
24	F21466	Bush	4	65	SP02008	Nut M10 Nyloc (T)	2
25	F21711	Bush	3	66	SP02010	Nut M12 Nyloc (T)	4
26	F21739	Rubber Buffer	3	67	SP02012	M8 Thin Lock Nut	3
27	F21872	Bearing	4	68	SP03008	Washer M8 Form A	12
28	F21885	Oilite	2	69	SP03009	Washer M5 Form A	1
29	F21905	Deadman Lever	1	70	SP03010	Washer M6 Form A	6
30	F21922	A.V. Mount	2	71	SP03012	Washer M12 Form A	6
31	F21928	Thrust Bearing	1	72	SP03022	Washer M20 Form A	1
32	F22019	Handle Grip	2	73	SP13006	Spring Extension	2
33	F22281	Clutch Lever	2	74	SP14019	P Clip 10mm Nylon	1
34	F22321	Clip	2				
35	F22432	Shoulder Bolt 12 x 20 M10	1				
36	F33607	Wheel Hub	2				
37	F36000	Serial No Plate (SISIS)	1				
38	F36320	Back Frame	1				
39	F36351	Washer	2				
40	F36369	Rear Guard	1				
41	F36375	50T Plate Sprocket	1				
				Not Shown			
				-	F37289	Cable Height Adjustment	1
				-	F37290	Cable Drive	1
				-	Sp12060	Cable Deadmans Dart	1



2.01

Drive Assembly 1

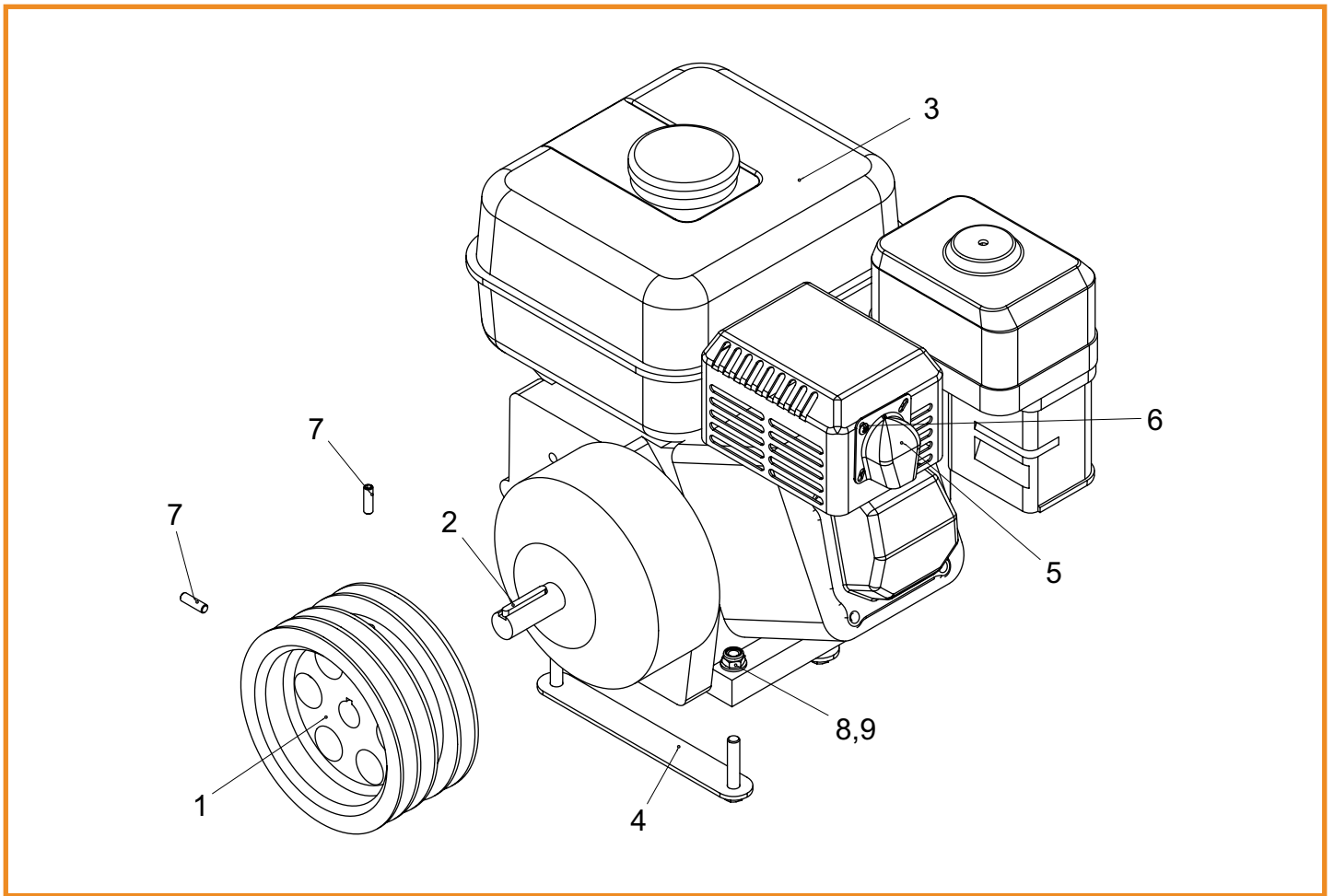
Item No.	Part No.	Description	Quantity	Item No.	Part No.	Description	Quantity
1	62276	Bearing 6207-2RS 3	4	38	SP01139	Shoulder Bolt 12 x 55 M10 (2014 >)	4
2	400496	Plate	8	38	SP01119	Hex Bolt M10 X 75 (8.8Ht) (2010 > 2013)	4
3	402022	Timing Crank	2	39	SP02004	Nut M6 Nyloc	8
4	402023	Drive Crank	2	40	SP02006	Nut M8 Nyloc (T)	4
5	402031	Crank	4	41	SP02008	Nut M10 Nyloc (T)	4
6	402034	Spacer	8	42	SP02013	Nut M10 Lock (Thin)	6
7	402035	Spacer	16	43	SP02028	Nut M16 Nyloc (T)	12
8	402036	Spacer	8	44	SP02029	Nut M16 Lock (Thin)	4
9	402037	Link Arm Plate	4	45	SP03008	Washer M8 Form A	20
10	402038	Link Arm Plate	4	46	SP03012	Washer M12 Form A	8
11	402039	Pivot Pin	12	47	SP07009	Circlip D1400 - 035	2
12	402040	Washer	12	48	SP07010	Circlip D1400 - 032	2
13	402075	Washer	4	49	401642	Tab Washer 2010 (> 2013)	4
14	402076	Spacer	2	50	800523	Spring Fork Kit (> 2010)	-
15	402080	Bearing Block	2	50	800524	Spring Fork Kit (2010 > 2013)	-
16	402081	Block Clamp	2				
17	402102	Main Frame (Dart)	1	Not Shown			
18	402111	Tine Holder	4	-	F21862	Timing Belt	2
19	402112	Bearing Housing	4				
20	402113	Spring Fork	4				
21	D1947	Grease Nipple M6	4				
22	D8259	Bearing 6005-2RS	24				
23	F21739	Rubber Buffer	4				
24	F21784	Key 8 x 7 x 30	4				
25	F21987	Compression Spring	4				
26	F35946	Shaft Swivel	4				
27	F36340	Duel Sprocket	1				
28	F36407	Spacer	4				
29	J20430	Cap Head M6 x 30	8				
30	J209006	Circlip 47 M1308-0470	8				
31	J209012	Washer M16 Form B	16				
32	J209085	Bush Oilite Am1216 - 20 (2014 >)	8				
32	F21232	Bush Oilite Am1016 - 20 (2010 > 2013)	8				
33	SP01009	Hex Set Screw M8 x 20	6				
34	SP01032	Hex Set Screw M10 x 80	2				
35	SP01037	Hex Set Screw M16 x 30	12				
36	SP01045	Hex Set Screw M8 x 25	16				
37	SP01120	Cap Head M12 x 35	8				



2.02

Drive Assembly 2

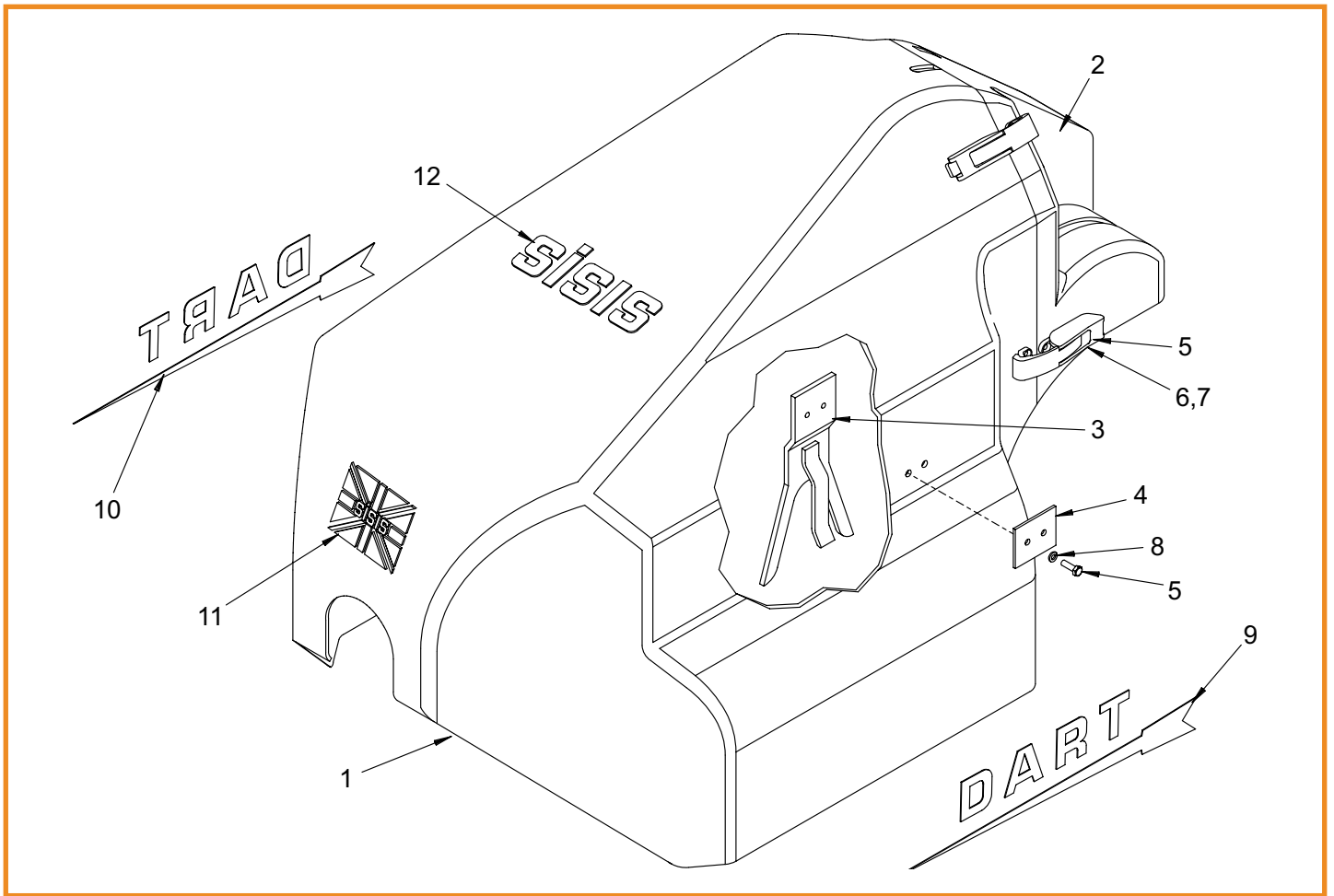
Item No.	Part No.	Description	Quantity	Item No.	Part No.	Description	Quantity
1	401650	Axle Diff M/C	1	40	F37184	Top Mount	2
2	401820	Handle Spacer	1	41	F37279	Guard Strip	1
3	402051	Spacer	1	42	F37284	Over Centre Rod	1
4	402052	Spacer	1	43	F37285	Rod	1
5	402054	Collar	2	44	HUGT108	Clevis	1
6	402055	Axle Spacer	2	45	J20406	Split Pin 3/32" x 1"	2
7	402077	Tensioner Arm	1	46	J20467	Grub Screw M8 x 8	2
8	402102	Main Frame (Dart)	1	47	SP01009	Hex Set Screw M8 x 20	18
9	402118	Top Shaft	1	48	SP01013	Hex Set Screw 3/8" UNF x 2"	2
10	402119	Spacer	1	49	SP01045	Hex Set Screw M8 x 25	4
11	402120	Tensioner Block	2	50	SP01105	Hex Set Screw M10 x 30	2
12	402121	Tension Pivot	1	51	SP01130	Cap Head M12 x 45	1
13	402122	Tension Pivot	1	52	SP02002	Nut M5 Nyloc (T)	1
14	402123	Spring Retainer	1	53	SP02004	Nut M6 Nyloc	2
15	402125	Axle Spacer	2	54	SP02006	Nut M8 Nyloc (T)	26
16	403080	Layshaft	1	55	SP02008	Nut M10 Nyloc (T)	4
18	D1015	Plastic Knob	1	56	SP02012	M8 Thin Lock Nut	2
19	D1792	Extension Spring	2	57	SP02018	Nut 3/8" Unf Nyloc (T)	2
20	D1947	Grease Nipple M6	4	58	SP03008	Washer M8 Form A	16
21	D1955	Oilite Bush 25ID, 30OD, 25LG	2	59	SP03009	Washer M5 Form A	1
22	D1986	Hex Set Screw M5 x 20	1	60	SP03010	Washer M6 Form A	2
23	D8068	Grub Screw M6 x 12	4	61	SP03011	Washer M10 Form A	2
24	D8295	Pulley	1	62	SP03012	Washer M12 Form A	3
25	D8522	Cap Head M10 x 35	2	63	SP05010	Split Pin 1/8" x 1"	1
26	E1-1100	Hex Set Screw M6 x 35	2	64	SP10002	Key 8 x 7 x 40 Rd End	3
27	E1-1116	Hex Bolt M8 x 70	2	65	SP11025	Pulley 56-8M-20 HTD (Tapered)	2
28	F20184	Taperlock 2517 25	1	66	SP11026	Tapered Bush 2012 - 25mm	2
29	F21150	Bearing Ref. BPFT-5 (25mm Bore)	2	67	SP11034	Pulley Idler 38mm	1
30	F21872	Bearing	4	Not Shown			
31	F21885	Oilite	4	-	F21890	V-Belt	3
32	F21923	Oilite	2	-	D1558	Chain To Axle	1
33	F33607	Wheel Hub	2	-	D1873	Chain To Layshaft	1
34	F36340	Duel Sprocket	1				
35	F36344	Pulley SPA2 Type 8	1				
36	F36345	Pully & Sprocket	1				
37	F36346	Spacer	1				
38	F36375	50T Plate Sprocket	1				
39	F36510	Drive Lever	1				



3.01

Engine Assembly

Item No.	Part No.	Description	Quantity
1	402069	Pulley	1
2	D1012	Key 3/16" x 3/16" x 1 1/4" Rd End	1
3	F21734	Engine Honda GX160 HX4-OH	1
4	F36323	Motor Mount	2
5	J20367	Exhaust Deflector	1
6	J20368	Screw M4 Exhaust Deflector	2
7	SP01114	Grub Screw M6 x 20	2
8	SP02006	Nut M8 Nyloc (T)	4
9	SP03008	Washer M8 Form A	4



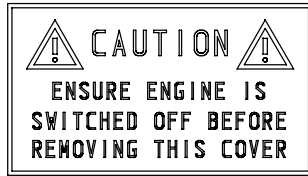
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Guard Assembly

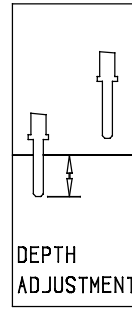
Item No.	Part No.	Description	Quantity
1	401680	Guard Front	1
2	F37278	Guard Rear	1
3	F36525	Guard Bracket	1
4	F36526	Guard Washer	1
5	E1/1096	Setscrew	4
6	D8774	CSK Setscrew	2
7	E1/1217	Nyloc Nut	2
8	E1/1061	Spring Washer	2
9	F36403	DART Decal LH	1
10	F36412	DART Decal RH	1
11	D4098	Union Jack Decal	1
12	F36332	SISIS Decal	1



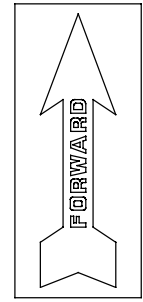
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2



3



4

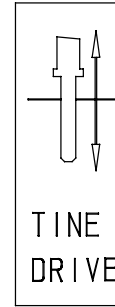
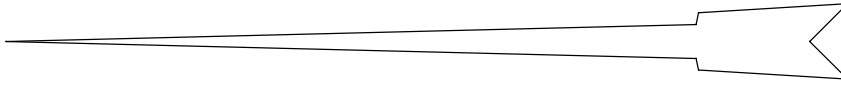
5

DART

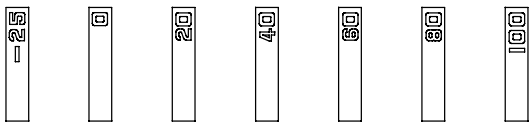


6

DART



7



8

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9

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®

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