STANDARD OPERATING FORM

Ref:	**SOP-0301-01-N-DEV**

Description:	**19RM – Starpoint Technical Information**

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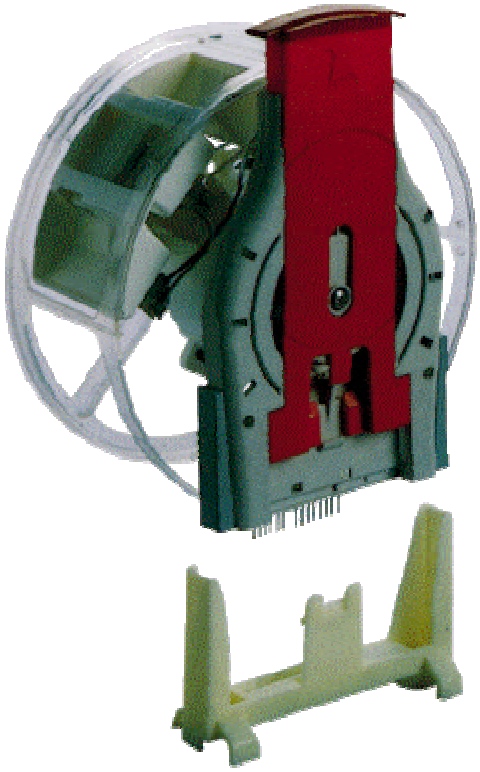
19RM Reel Mechanism



Starpoint Electrics Ltd.

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CONTENTS

INTRODUCTION

The 19RM is a compact modular reel product, which benefits from the same fixing system developed for the 20RM.

The 19RM is electrically and software compatible with the 17RM and 20RM, minor adjustment to the ramp tables for the motor may be necessary to allow for the smaller diameter reel drum.

The added features of the 19RM are:

i] Simple push-on/lift-off mounting to its base providing electrical and mechanical connection in one action.
ii] Dual purpose carrying locking handle.
iii] Reliable instant electrical connection.
iv] Modular mounting base.
vi] 360º illumination.
vii] Individual mounting foot for feature reel use, using the push-on/lift-off mounting and locking system.

The 19RM benefits also include:

i] Simple to drive stepper motors.
ii] Small reel drum width 66mm wide x 150mm diameter.
iii] Reel drum position detection by a single optic mounted on the lamp array. This provides easy field servicing and manufacturing adjustment without interfering with motor settings.

The unique 19RM base provides a number of functions:

i) Latch and guides for secure Reel Mechanism mounting. The mounting base unit holds the mating half of the Reel Mechanism connector and provides routing for cable management.

CONDITIONS OF USE

Temperature Range

The mechanism will operate satisfactorily in the temperature range from 0?C to 50?C, provided there is an unrestricted flow of air and proper motor control is exercised.

Humidity

The unit will operate in the range of 0% to 95% - relative humidity.

Continuous Use

There is no practical limit to continuous use assuming normal motor temperature control procedures are followed. It is expected that normal operation is a minimum 12-hour day.

Operational Environment

It is recommended that the unit is not operated in an exposed environment if the public are present. The most suitable method of operation should be behind a glass or screen with a shroud around the cup assembly to hide the mechanism and present the dice to the player.

Operational Life

The units have been subjected to various accelerated life tests and a minimum operational life in excess of one million cycles is assumed.

Tools & Installation

It is recommended that for ease of assembly and servicing, the Starpoint ‘Quick Release’ fixing feet are used when fixing the unit to a cabinet. Tools will therefore not be required for the installation or removal of the unit. For correct positioning of the fixing feet please refer to Starpoint Drawing G4G040-01-ZZZZ.

Handling

Whilst the 19RM is of a robust plastic construction it is not recommended that the mechanism be handled by the periphery of the reel drum, always use the stand assembly when handling the reel mechanism.

It is not recommended that the power connection be removed from the unit while the unit is in operation. Failure to remove power will most likely result in damage to the devices in the unit.

Warranty

A guarantee of 12 months from the shipment date is available for the reel mechanism, subject to Starpoint's standard terms and conditions. This guarantee is offered irrespective of the number of operations of the unit during this period, but subject to operation within the environmental conditions specified above.

A unit, which may require return under guarantee, should be returned directly to Starpoint or the local distributor.

MECHANICAL SPECIFICATIONS

Construction

The 19RM is one of a family of Reel Mechanisms, which are a complete unit of mechanism and mounting base. The mechanism and mounting base size and shape are shown in Drawing G4G040-01-ZZZZ

Cabinet Mounting

The 19RM benefits from the unique single fixing base, which incorporates the mating half connector, latching locking handle and mounting guides.

Lamp Array Adjustment

The lamp array is fully adjustable through 360? of movement. Drawing number G6D019-01-ZZZZ shows the graduated scale that is used to position the lamp array in the required position relative to the frame. Each graduation represents an angular movement of 1?. The scale is marked from 0 (at the bottom) to 180 (at the top) and the lamp array can be set in any position. The angle setting required can be specified by looking at the pointer on the lamp array/motor housing and noting its position. It is important that as well as stating the angular position, a positive or negative direction is stated when ordering units. When a positive value is given the lamp array will be in the reverse position. (See Drawing G6D019-01-ZZZZ).

Adjustment to the lamp array is made by releasing the centre screw, on Drawing number G4G040-01-ZZZZ, moving it to the desired position and then re-tightening the screw. This adjustment will not affect the motor phase setting.

Lamp Array

The lamp array has two fixed dividers with three lamp illumination for 3 symbols. The position of the dividers are suitable for both 12 or 16 symbol illuminations.

12 and 16 Stop Settings

The Reel Mechanism is set for 12 or 16 symbol reel bands by the position of the slip-in optic tab in the Reel Mechanism frame. Two clip-in positions are clearly marked on the frame and will normally be set at time of manufacture.

Lamp Array Adjustment

The lamp array may be adjusted between + or -180? as shown in drawing G6D019-01-ZZZZ to allow for the illumination of reel band symbols in line with the game wine line. Adjustment can be made by releasing the centre screw on drawing G4G040-01-ZZZZ and moving the lamp array to the desired angle and tighten screw. This adjustment will not effect the motor phase setting.

Reel Band Fixing Procedures

The design of the reel drum allows a choice for the method of fixing the reel band onto the drum. This can be achieved by the use of plastic rivets or double sided adhesive tape.

Method for fixing reel band using rivets

?? The reel band and artwork must be designed such that there is an overlap on the band as shown on Drawing G6D036-01-ZZZZ The area of band which is decided as being below the overlap should be clear of print.

?? Position the clear band with the two punched holes over the corresponding holes in the reel drum. Carefully bring the band round the drum so that the end of the band punch holes align with the drum.

?? Insert plastic rivets. Suitable rivets can be obtained from a number of suppliers. One such recommended supplier is Richo International, snap rivet part number SR 2632.

Method for fixing reel band using adhesive tape

?? The reel band artwork must be designed such that there is a small overlap sufficient to bond the two ends of the reel band together using double-sided adhesive tape.

?? A clear area of band must be on the under lap area of the band.

?? Carefully align the clear areas on the band with the centre line of the reel spoke as shown on Drawings G6D036-01-ZZZZ. Bond the end of the tape to the reel drum using double-sided adhesive tape.

?? Carefully bring the reel band round the drum until the end of the band for overlap is in position. Bond into position using the double-sided adhesive tape.

ELECTRICAL SPECIFICATIONS

Electrical Connections

Circuit diagrams for the unit is shown in drawings G5D040-01-ZZZZ & G5D041-01-ZZZZ and the unit is interfaced to a users product using a 15 way Molex connector type 7720S Series ?: 22-50 as 20RM IDC. The mechanism can be obtained in two lamp drive configurations - Sinking and Sourcing. See Drawings G5D040-01-ZZZZ & G5D041-01-ZZZZ. The lamps can also be diode connected. The diodes in series with the lamps provides the option of matrixing the lamps with other lamps in the cabinet thus reducing driver circuits and wire harness sizes.

Stepper Motor

The motor is available as 48 step 12 or 24 volt DC motor. See drawings A1C001-02-ZZZZ, A1C002-02-ZZZZ, the supplying company is - NMB of Japan.

Position Control Sensor

The position control sensor is a self-contained photo optic sub-assembly complete with built in schmitt trigger and open collector output. A high level denotes the optic is interrupted.

Stepper Motor Control

The reel drum is driven by a 48 step 12 or 24 volt DC motor which positions the reel band, and is available with either 12 or 16 symbols.
Recommended ramp tables are shown in Appendix A. If difficulty is experienced in achieving the required effect or speed of rotation, please call Starpoint on +44 (0)208 391 7700.
With the mechanism at rest and full power applied to the motor, it is possible for the motor temperature to rise unnecessarily causing a loss of torque and in exceptional circumstances overheating. To avoid this situation it is strongly recommended the following controls are applied. Failure to do this could invalidate the warranty.
To limit heating effect and maintain high motor torque, it is advised that the power applied to the motor at standstill be pulsed or turned on and off. The switched power should be in the ratio of 50:50 mark space, based on the running timing. This provides the required holding torque at standstill and will prevent inadvertent reel movement. It is also recommended that a short delay of 500ms be used before commencing this switching procedure after the reel has stopped and before starting the next spin cycle. The delays are to ensure that this on/off sequence does not influence the start and stop ramping.

Reel Band Illumination

The individual lamps can be straight link or diode configured. Diode connections allow matrixing possibilities thus saving on drive circuits power and wire harness size.

Motor Drive Software

a) **Reset Procedure**

This procedure is recommended at power on or on occasion when the software identifies that the reel band is out of step or in an incorrect position.

i] Drive the motor at approximately 50RPM.

ii] Every motor step change, monitor the optic output. Immediately the tab is detected by the optic cease driving the motor.

iii] Wait 500ms then power up the motor on the Black and Yellow windings.

iv] Wait 500ms, this allows the motor/reel band to settle in position. Check the tab is in the optic. If not repeat steps i] to iv], if the tab is still not in the optic, there is a fault.

v] The reel mechanism and software are now initialised.

vi] Now enter the standstill mode or resume the game in play, whichever is appropriate.

b) **Optic Tab Monitoring During Reel Spin**

During reel spin or game play it is important to monitor the optic tab to confirm it is at the expected position. This can be achieved during reel spin as long as a window is set around the time the tab is expected to be seen. This window is to allow for ramping up or down of the motor and variation in operational spin speeds. To confirm the reel band is in synchronisation carry out the following tests in software.

i] When the reel is to stop on the master symbol, ensure the step sequence stops with the black and yellow windings energised. The optic tab will be in the optic. If the optic tab is not in the optic enter the reset procedure.

ii] To monitor the optic during reel spins create a window of 6 motor steps, within which the optic tab should interrupt the optic. This window is dependant on users software and may need development to an optimum size. If difficulty is experienced with this monitoring please contact Starpoint on +44 (0)208 391 7700.

Adjustments and Calibration

The reel mechanism construction is such that adjustment of the motor mounting, or lamp array position do not interact with each other, therefore, secondary adjustments are not necessary.
The stepper motor has a cross pin in the shaft which is used to ensure consistent drive of the reel drum. This pin must be aligned to the optic sensor and this adjustment is called the “phase setting adjustment”.
The lamp array may be moved to a position between + or - 0? to 180° (see Drawing G6D019-01-ZZZZ) to align with game win line.
The optic tab position is fixed on the reel drum and directly relates to the reel band win line due to the physical position of the optic detector in the lamp array assembly.
The above settings are recommended to be carried out at the time of manufacture, if assistance is required in defining lamp array setting, please call Starpoint on +44 (0)208 391 7700.

Motor Phase Setting

This adjustment may be required when due to exceptional circumstances the motor requires replacement.

Tools required:- Crosshead Screwdriver
12vdc 1A Power Supply

Method:-

a) Loosen motor fixing screws in the motor housing moulding (screws can be seen on front view of unit on drawing G4G040-01-ZZZZ).
b) Ensure the lamp array adjustment screw is tight (Screw seen rear view on drawing G4G040-01-ZZZZ).
c) Apply OV to the Yellow and Black phases of the motor via pins 10 and 12 on the 15 way customer connector and +12v to pins 14 and 15.
d) Rotate the reel drum until the optic tab is near the optic detector.
e) Rotate the motor housing until the optic tab is central in the optic detector.
f) Maintain this position and tighten the two motor fixing screws.
g) Disconnect the 12v supply.
h) The motor is now phase set and the lamp array position may be adjusted as necessary.

ORDERING INFORMATION

This section deals with how to complete the Specification / Quotation sheet (see Appendix B) SOPF-0195-01-N-DEV. The document is unique for each application and the specification sheet identifier contains the configuration information, which Starpoint will use for manufacture of the 19RM. This ordering information covers the specifying of the 19RM, a separate order must also be placed for the mounting base, the part number is:-

18S017-01-AERD = Fixing Foot, 23S004-01-ANBK = Cable Cover

The Spec Sheet contains a series of options across the page with a corresponding clear box on the right hand side. Once the selection of option is made the letter corresponding to the required option should be entered in the right hand box. The total combination of completion of all the empty boxes creates a unique build standard coding.

THE FOLLOWING DEALS WITH EACH SECTION OF THE SPEC SHEET.

i) **CUSTOMER** – Fill in with Company Name

ii) **CUSTOMER PART NUMBER** -The Customer Part Number will be recorded in this area and within Starpoint cross-referenced to the customer's part number. Both numbers are included on the order and invoice documents.

iii) **DATE** – Date of completion

iv) **COMMENTS** – Space for any specific comments

v) **Motor -** Select the motor required, and enter the corresponding letter in the right hand box.

vi) **Lamp array -**

a) Number of Symbols

Select the required number of symbols required and enter the corresponding letter in the right hand box.

b) Wiring type

This option is shown on the Spec Sheet in the connection diagram and provides the option of which polarity the lamps are commoned together. Select the required option and enter into the right hand box

c) Lamp Type

Select the desired lamps from those available in the table. Care must be taken when selecting the higher wattage lamps, because if the lamps are illuminated for long periods when the reels have not moved, damage may occur to the reel band due to the heat. Enter the corresponding letter in to the right hand box.

d) Lamp Array Pointer Position

This selection is to define the win-line position either to the front or rear of the reel mechanism and is seen on drawing G4D019-01-ZZZZ. Enter the corresponding letter into the right hand box.

e) Top Lamp Position

This is to specify the position of the loom in the lamp array – See diagram at top of spec sheet. Enter the corresponding letter into the right hand box.

Vii **Handle -** This is to nominate the preferred size of handle required. Enter the corresponding letter into the right hand box.

Viii **Band -** This specifies the Reel Band requirement. Enter the corresponding letter into the right hand box.

CARRIAGE AND DISTRIBUTION

All Starpoint reel mechanisms are packed in custom designed individual packaging. These in turn are packed into corrugated cardboard outer boxes. The quantity in a box varies from 24 for UK deliveries and 30 or 36 for Export.

Appendix A

Ramp Table Examples

RECOMMENDED RAMPS FOR NMB 48 STEP MOTOR

Motor warm, supply ? 10%. All values in millisecs and are the delays between phase changes.

UP	35 - 22 - 12.5 - 16
RUN	12.5
DOWN	26

These Ramp Tables are nominal values, which should be optimised to meet individual requirements with regard to reel drive characteristics, such as soft stop or sharp stop of the reel drum. To obtain the required characteristics slight adjustments may be required.

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Appendix B

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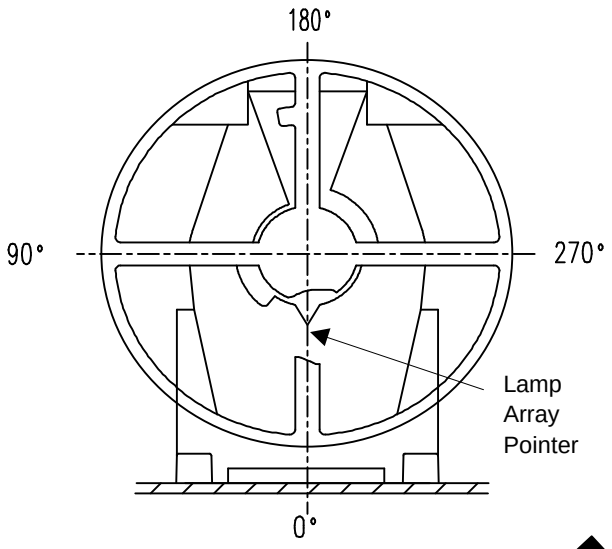
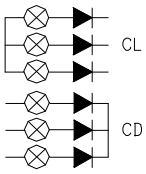
19RM SPECIFICATION / QUOTATION SHEET



CUSTOMER:	
CUSTOMER PART NUMBER:	
DATE:	
QUOTATION REQUIRED	YES/NO
QUANTITY REQUIRED	XXXX
COMMENTS:	

MECH	19RM REEL M… HA…					AG
REEL	REEL WIDTH	R				R
MOTOR	VOLTAGE/ STEP ANGLE	A		B	24V. 48 STEP NMB	
LAMP ARRAY	No. OF SYMBOLS	B	16		12	
	W…NG TYPE		…RCH…	P	3 LAMP SINKING COMMON LAMP (CL)	Z NON ILLUMINATED
	LAMP TYPE		…W	32	28V 1.12W	39 12V 1.2W
			6V 1W	ZZ	NO LAMPS REQUIRED	
	LAMP ARRAY **POINTER** POSITION	000 - 359 degrees (SEE PICTURE ABOVE)				
	TOP LAMP POSITION	A +		B -		Z NON ILLUMINATED
FRAME	TYPE OF FRAME	C	SHORT (STANDARD)			C
BAND	BAND FITTING	1	BAND FITTED	Z	BAND NOT FITTED	



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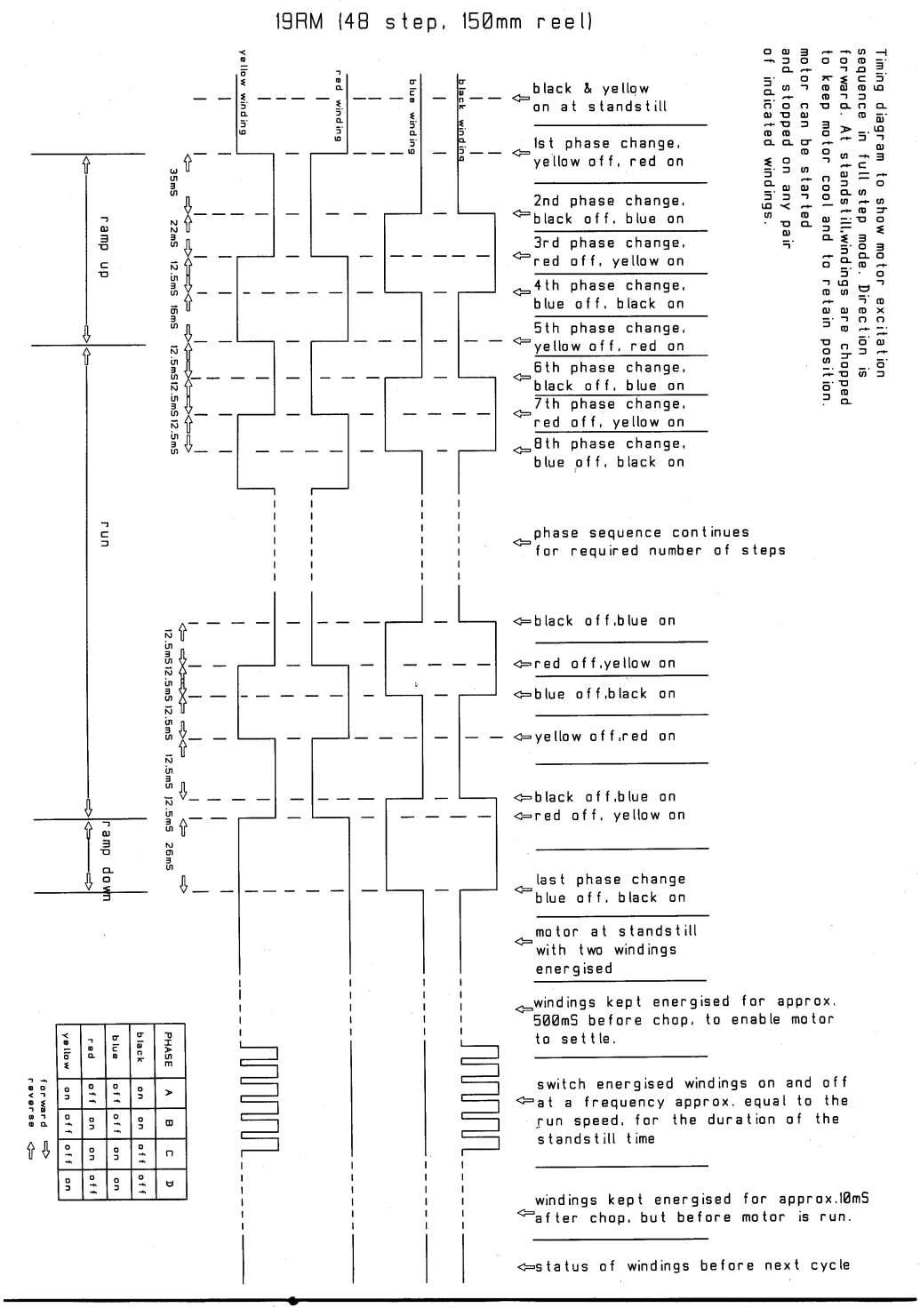
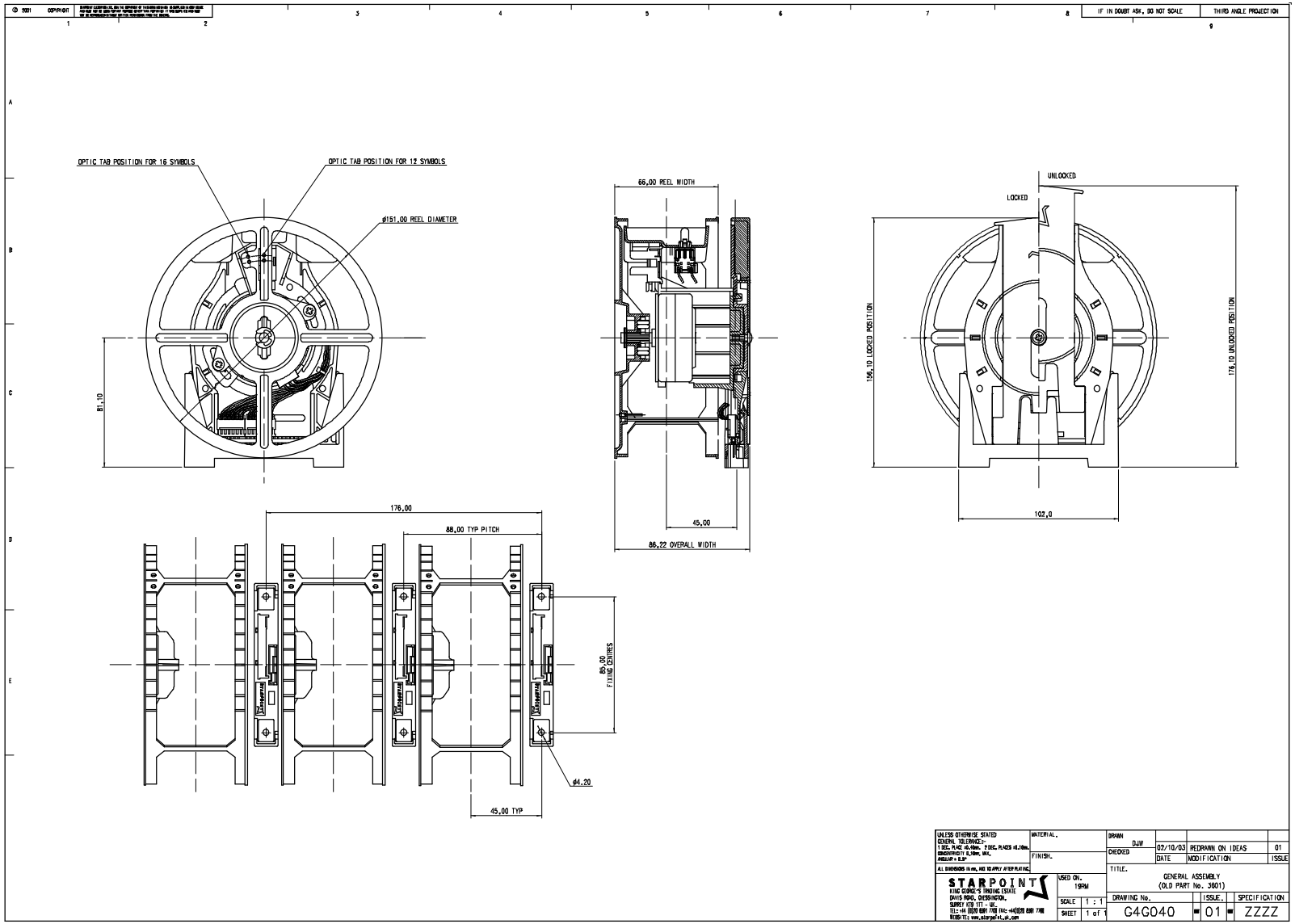
SOPF-0237-02-N-DEV

Appendix C

Timing Diagram




IF IN DOUBT ASK, DO NOT SCALE
THIRD ANGLE PROJECTION
OPTIC TAB POSITION FOR 16 SYMBOLS
OPTIC TAB POSITION FOR 12 SYMBOLS
ø151.00 REEL DIAMETER
81.10
66.00 REEL WIDTH
45.00
86.22 OVERALL WIDTH
UNLOCKED
LOCKED
156.10 LOCKED POSITION
176.10 UNLOCKED POSITION
102.0
176.00
88.00 TYP PITCH
65.00 FIXING CENTRES
ø4.20
45.00 TYP
UNLESS OTHERWISE STATED
LINEAR TOLERANCE=
1 DEC. PLACE ±0.10mm. 2 DEC. PLACES ±0.10m.
ANGULAR = ±.5°
MATERIAL.
FINISH.
ALL DIMENSIONS IN mm, AND TO APPLY AFTER PLATING.
STARPOINT
KING GEORGE'S TRADING ESTATE
DAVIS ROAD, DARTFORD.
SURREY KT9 1TT - UK
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WEBSITE: www.starpoint.co.com
USED ON.
19RM
SCALE 1 : 1
SHEET 1 of 1
DRAWN DJW
CHECKED
02/10/03 REDRAWN ON IDEAS 01
DATE MODIFICATION ISSUE
TITLE.
GENERAL ASSEMBLY
(OLD PART No. 3601)
DRAWING No. G4G040
ISSUE. 01
SPECIFICATION ZZZZ

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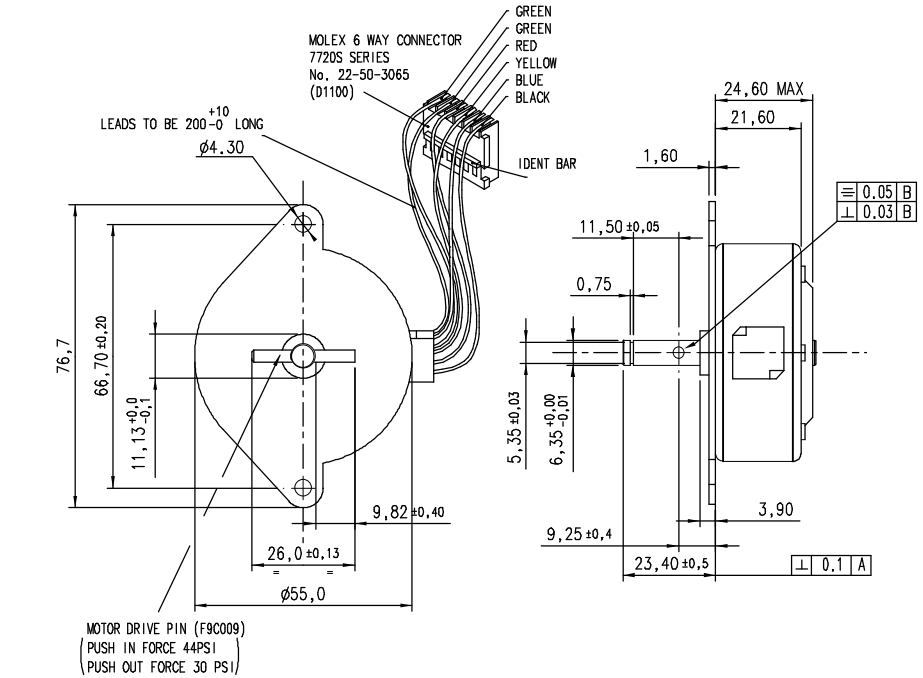
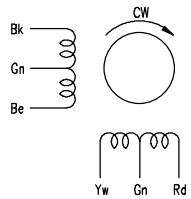


SPECIFICATION

STEP ANGLE	: 7.5°
POSITIONAL ERROR	: 0.5°
MAGNET	: MS70
WINDING RESISTANCE (OHMS/PHASE)	: 30 ±10%
WINDING INDUCTANCE (mH/PHASE)	: 27mH
HOLDING TORQUE (g-cm)	: 1530 MIN.
PULL OUT TORQUE (g-cm)at 80pps	: 800 MIN.
PULL IN TORQUE (g-cm)at 80pps	: 780 MIN.
DETENT TORQUE (g-cm)	: 190
MAX. NO LOAD RESPONCE (pps)	: 230
MAX. SLEW SPEED (pps)	: 260
PHASE ON METHOD	: 2-2
AMBIENT TEMP (OPERATING)	: -10° TO +50°C
AMBIENT TEMP (STORAGE)	: -30° TO +80°C
DRIVE VOLTAGE	: 12V.
CLASS OF INSULATION	: E
DIELECTRIC STRENGTH (V-AC)	: 500V-AC 60sec 5mA
INSULATION RESISTANCE (M-ohm)	: 500V-DC 100 MIN.
WEIGHT	: 275 g



EXCITATION SEQUENCE CW looking at output shaft

	1	2	3	4
BLUE	On	On		
BLACK			On	On
RED	On			On
YELLOW		On	On	

UNLESS OTHERWISE STATED GENERAL TOLERANCE:-
1 DEC. PLACE ±0.40mm. 2 DEC. PLACES ±0.10mm.
CONCENTRICITY 0.10mm. MAX.
ANGULAR ± 0.5°

ALL DIMENSIONS IN mm, AND TO APPLY AFTER PLATING.

MATERIAL.

FINISH.

USED ON. MECH'S

SCALE 1 : 1

SHEET 1 of 1

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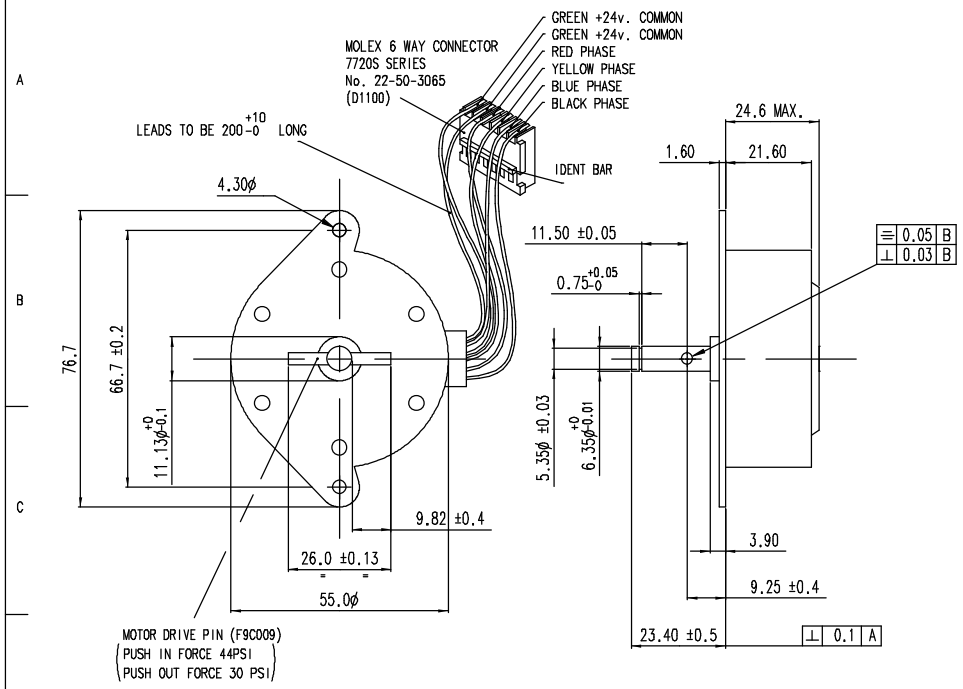
DRAWN	DATE	MODIFICATION	ISSUE
DJW	09/04/03	SEE EC 0000088	02
CHECKED	07/04/03	REDRAWN ON IDEAS	01

TITLE.
12v 48 STEP NMB MOTOR PM55L-048-SRA2
(OLD PART No. B988)

DRAWING No.	ISSUE.	SPECIFICATION
A1C001	02	ZZZZ

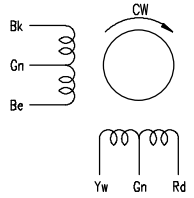
IF IN DOUBT ASK, DO NOT SCALE | THIRD ANGLE PROJECTION



SPECIFICATION

DRIVE VOLTAGE	:	24v.
PHASE ON METHOD	:	2-2 (PHASE ON)
MAGNET MATERIAL	:	MS70M
STEP ANGLE	:	7.5°
POSITIONAL ERROR	:	0.5°
MAX. HOLDING TORQUE	:	15.5cNm (1580g-cm)MIN. 176mA/PHASE
PULL OUT TORQUE	:	8.20cNm (836g-cm) MIN. 80 PPS
PULL IN TORQUE	:	8.0cNm (815.7g-cm) MIN. 80 PPS
MAX. NO LOAD RESPONSE	:	220 pps MIN.
MAX. SLEW SPEED	:	260 pps MIN.
WINDING RESISTANCE	:	133 ohms ±10%
WINDING INDUCTANCE	:	120mH REF. 1KHz, 1Vrms
INSULATION RESISTANCE	:	100 MOhms MIN. 500v.DC
DIELECTRIC STRENGTH	:	500 VAC. 1 MIN.
TEMPERATURE RISE	:	Δ T = -- ° MAX.
CLASS OF INSULATION	:	CLASS E
ROTOR INERTIA	:	33.2g-cm² REF.
DETENT TORQUE	:	1.70cNm (173g-cm) REF.
AMBIENT TEMP.(OPERATING)	:	-10°C TO +50°C
AMBIENT TEMP.(STORAGE)	:	-30°C TO +80°C
LIFE	:	3000 HOURS

EXCITATION SEQUENCE CW looking at output shaft



	1	2	3	4
BLUE	On	On		
BLACK			On	On
RED	On			On
YELLOW		On	On	

UNLESS OTHERWISE STATED
GENERAL TOLERANCE:-
1 DEC, PLACE ±0.40mm, 2 DEC, PLACES ±0.10mm.
CONCENTRICITY 0.10mm. MAX.
ANGULAR ± 0.5°

ALL DIMENSIONS IN mm, AND TO APPLY AFTER PLATING.

MATERIAL.

FINISH.

USED ON.
MECH'S

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SCALE NTS
SHEET 1 of 1

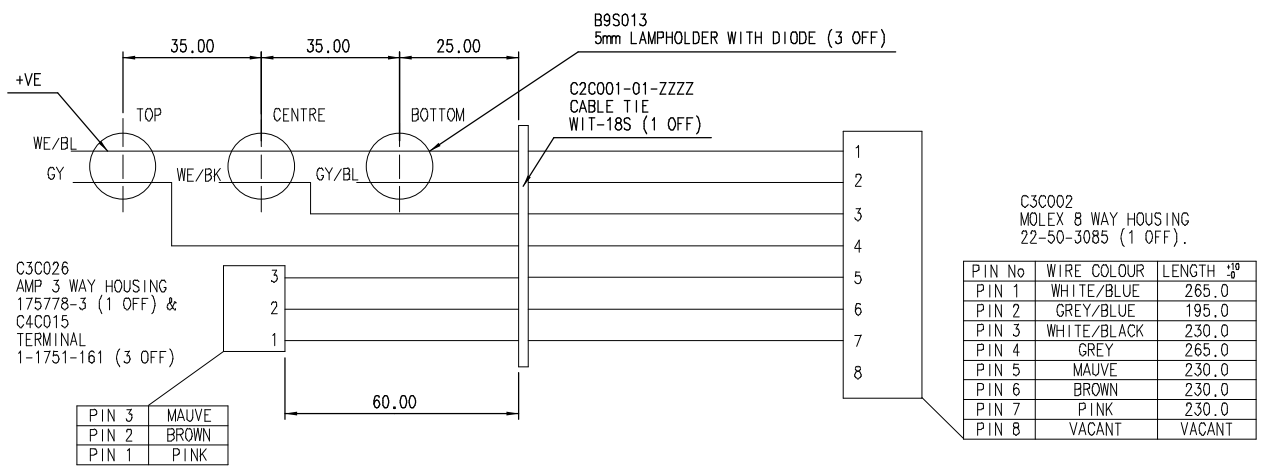
DRAWN DJW	9/04/03	SEE EC 0000088	02
CHECKED	9/04/03	REDRAWN ON IDEAS	01
	DATE	MODIFICATION	ISSUE

TITLE.
24V 48 STEP NMB MOTOR PM55L-048-SRB5
(OLD PART No. B997)

DRAWING No.	ISSUE.	SPECIFICATION
A1C002	02	ZZZZ

IF IN DOUBT ASK, DO NOT SCALE

THIRD ANGLE PROJECTION



PIN No	WIRE COLOUR	LENGTH +10 -0
PIN 1	WHITE/BLUE	265.0
PIN 2	GREY/BLUE	195.0
PIN 3	WHITE/BLACK	230.0
PIN 4	GREY	265.0
PIN 5	MAUVE	230.0
PIN 6	BROWN	230.0
PIN 7	PINK	230.0
PIN 8	VACANT	VACANT

PIN 3	MAUVE
PIN 2	BROWN
PIN 1	PINK

NOTE:-

1. ALL WIRES TO BE 7/0.2
2. ALL WIRES TO BE UL94 RATING SPECIFICATION UL1061

UNLESS OTHERWISE STATED
GENERAL TOLERANCE:-
1 DEC, PLACE ±0.40mm, 2 DEC, PLACES ±0.10mm.
CONCENTRICITY 0.10mm. MAX.
ANGULAR ± 0.5°

ALL DIMENSIONS IN mm, AND TO APPLY AFTER PLATING.

MATERIAL.

FINISH.

USED ON. 19RM

SCALE 1 : 1

SHEET 1 of 1

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KING GEORGE'S TRADING ESTATE
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WEBSITE: www.starpoint.uk.com

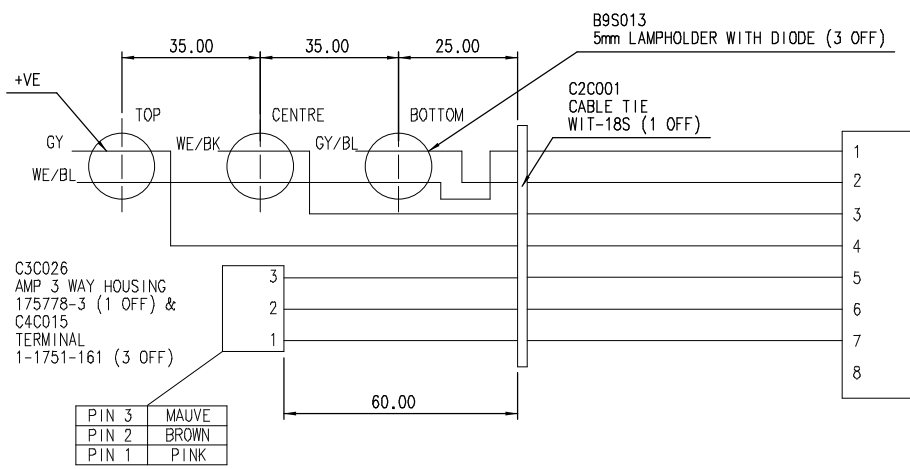
DRAWN DJW	19/08/03	SEE EC0000127	02
CHECKED TJ	09/05/03	DRAWN	01
	DATE	MODIFICATION	ISSUE

TITLE.
3 LAMP SINKING DIODE LOOM

DRAWING No.	ISSUE.	SPECIFICATION
A3C105	02	ZZZZ

IF IN DOUBT ASK, DO NOT SCALE

THIRD ANGLE PROJECTION



C3C002
MOLEX 8 WAY HOUSING
22-50-3085 (1 OFF).

PIN No	WIRE COLOUR	LENGTH +10 -0
PIN 1	WHITE/BLUE	265.0
PIN 2	GREY/BLUE	195.0
PIN 3	WHITE/BLACK	230.0
PIN 4	GREY	265.0
PIN 5	MAUVE	230.0
PIN 6	BROWN	230.0
PIN 7	PINK	230.0
PIN 8	VACANT	VACANT

PIN 3	MAUVE
PIN 2	BROWN
PIN 1	PINK

NOTE:-

1. ALL WIRES TO BE 7/0.2
2. ALL WIRES TO BE UL94 RATING SPECIFICATION UL1061

UNLESS OTHERWISE STATED
GENERAL TOLERANCE:-
1 DEC, PLACE ±0.40mm. 2 DEC, PLACES ±0.10mm.
CONCENTRICITY 0.10mm. MAX.
ANGULAR ± 0.5°

ALL DIMENSIONS IN mm, AND TO APPLY AFTER PLATING.

MATERIAL.

FINISH.

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USED ON. 19RM

SCALE 1 : 1

SHEET of

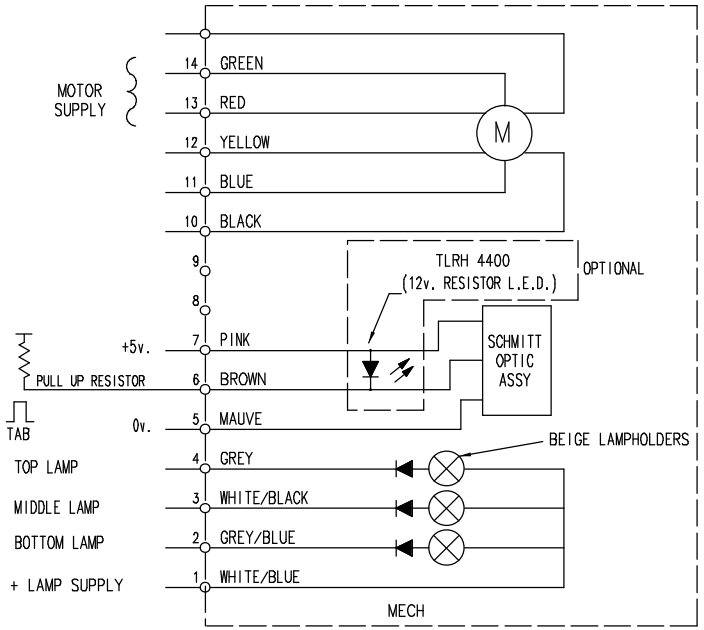
DRAWN AN	19/08/03	SEE EC0000127	02
CHECKED TJ	28/11/02	RENUMBER was A3C002-02	01
	DATE	MODIFICATION	ISSUE

TITLE.
3 LAMP SOURCING DIODE LOOM

DRAWING No.	ISSUE.	SPECIFICATION
A3C102	02	ZZZZ

IF IN DOUBT ASK, DO NOT SCALE

THIRD ANGLE PROJECTION



UNLESS OTHERWISE STATED
GENERAL TOLERANCE:-
1 DEC, PLACE ±0.40mm. 2 DEC, PLACES ±0.10mm.
CONCENTRICITY 0.10mm. MAX.
ANGULAR ± 0.5°

ALL DIMENSIONS IN mm, AND TO APPLY AFTER PLATING.

MATERIAL.

FINISH.

USED ON.
16/19/20RM FM3

SCALE NTS

SHEET 1of 1

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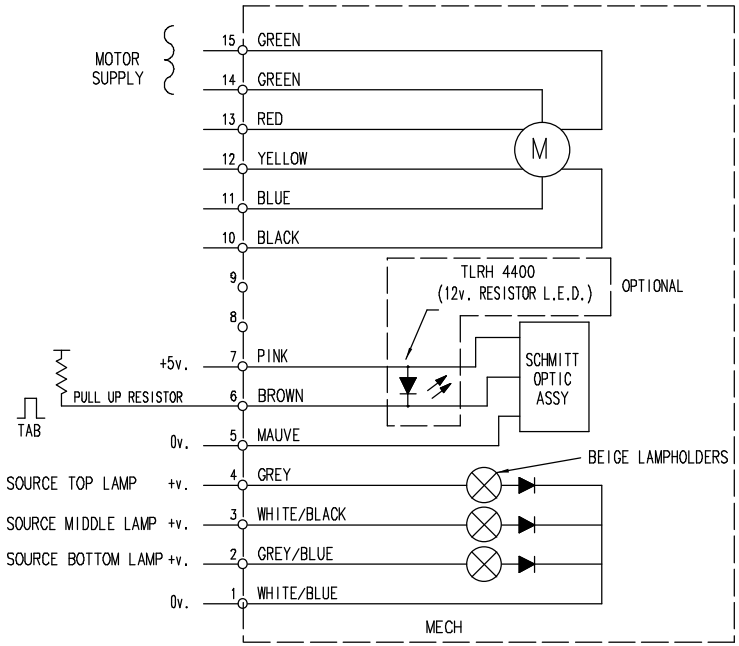
DRAWN SPP	26.08.03	APPROVED	01
CHECKED DJW	14.07.03	REDRAWN, WAS A2046	0A
	DATE	MODIFICATION	ISSUE

TITLE.
REEL MECH CIRCUIT DIAGRAM - SINK / DIODE
(OLD PT No A2046)

DRAWING No.	ISSUE.	SPECIFICATION
G5D040	01	ZZZZ

IF IN DOUBT ASK, DO NOT SCALE

THIRD ANGLE PROJECTION



UNLESS OTHERWISE STATED
GENERAL TOLERANCE:-
1 DEC, PLACE ±0.40mm. 2 DEC, PLACES ±0.10mm.
CONCENTRICITY 0.10mm. MAX.
ANGULAR ± 0.5°

ALL DIMENSIONS IN mm, AND TO APPLY AFTER PLATING.

MATERIAL.

FINISH.

DRAWN SPP
CHECKED

DATE	MODIFICATION	ISSUE
14/07/03	REDRAWN, WAS A2048	01

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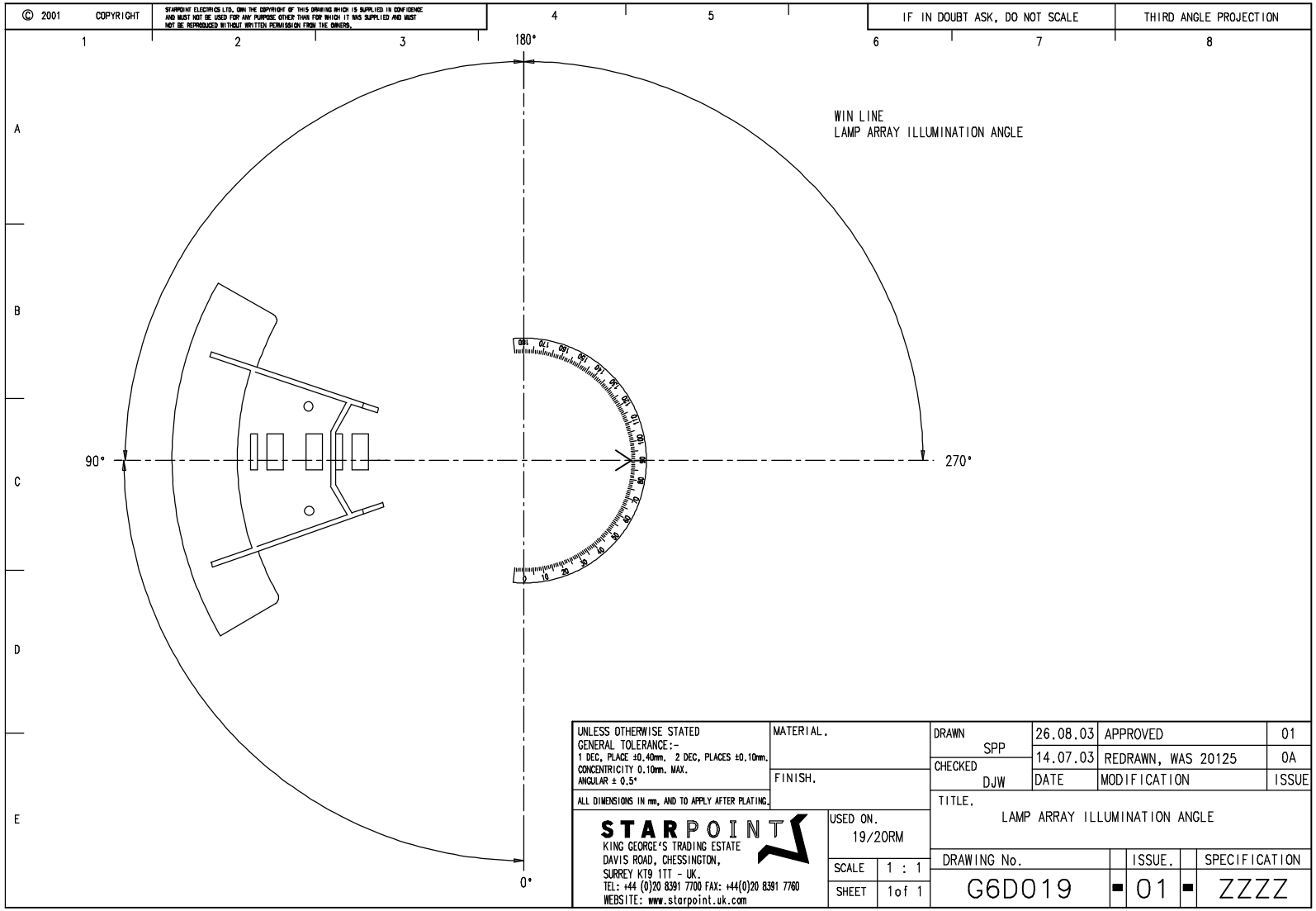
USED ON. 19/20RM FM3

SCALE NTS

SHEET 1 of 1

TITLE.
REEL MECH CIRCUIT DIAGRAM- SOURCE/ DIODE
(OLD PART No. A2048)

DRAWING No.	ISSUE.	SPECIFICATION
G5D041	01	ZZZZ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IF IN DOUBT ASK, DO NOT SCALE
THIRD ANGLE PROJECTION
1 2 3 4 5 6 7 8
A B C D E
180°
90°
270°
0°
WIN LINE
LAMP ARRAY ILLUMINATION ANGLE
UNLESS OTHERWISE STATED
GENERAL TOLERANCE:-
1 DEC, PLACE ±0.40mm, 2 DEC, PLACES ±0.10mm.
CONCENTRICITY 0.10mm. MAX.
ANGULAR ± 0.5°
ALL DIMENSIONS IN mm, AND TO APPLY AFTER PLATING.
MATERIAL.
FINISH.
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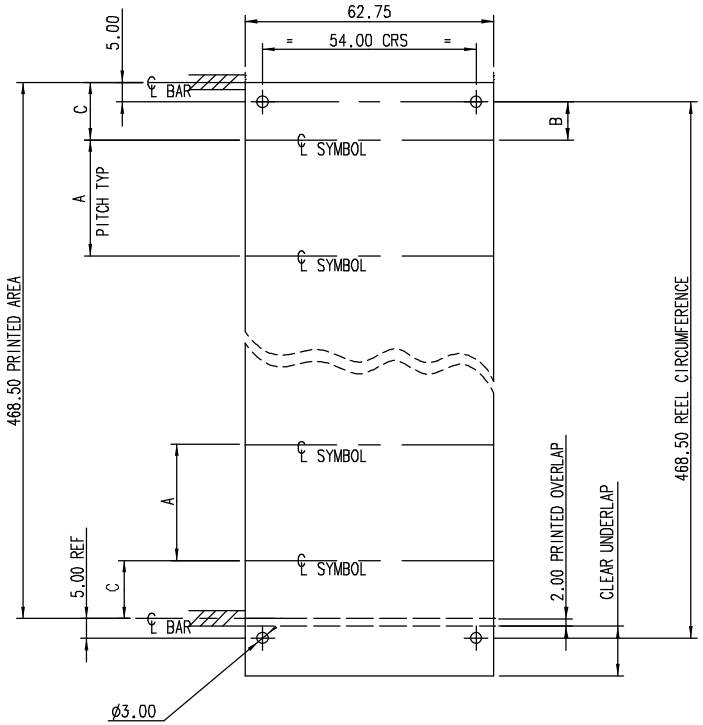
USED ON.
19/20RM
SCALE 1 : 1
SHEET 1of 1
DRAWN SPP 26.08.03 APPROVED 01
CHECKED DJW 14.07.03 REDRAWN, WAS 20125 0A
DATE MODIFICATION ISSUE
TITLE.
LAMP ARRAY ILLUMINATION ANGLE
DRAWING No. G6D019
ISSUE. 01
SPECIFICATION ZZZZ

IF IN DOUBT ASK, DO NOT SCALE

THIRD ANGLE PROJECTION



No. OF SYMS	DIM A	DIM B	DIM C
12	39.04	14.52	19.52
16	29.28	9.64	14.64

UNLESS OTHERWISE STATED
GENERAL TOLERANCE:-
1 DEC, PLACE ±0.40mm, 2 DEC, PLACES ±0.10mm.
CONCENTRICITY 0.10mm. MAX.
ANGULAR ± 0.5°

ALL DIMENSIONS IN mm, AND TO APPLY AFTER PLATING.

MATERIAL.
0.25 THK PVC INC INK

FINISH.

USED ON.
19RM

SCALE NTS

SHEET 1 of 1

DRAWN DJW 17/09/03 DRAWN 01

CHECKED DATE MODIFICATION ISSUE

TITLE.
REEL BAND DETAILS
(OLD PART No'S 10117 & 10118)

DRAWING No. G6D036 ISSUE. 01 SPECIFICATION ZZZZ

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