Chapter 21

RESISTANCE UNITS, ROTAX, ZA10100 SERIES

LIST OF CONTENTS

LIST OF APPENDICES

Introduction

1. The ZA 10100 series of resistance units are designed for use in engine starter systems, their purpose being to limit the armature current during the initial part of the starting cycle. Individual units within the series vary in the value and arrangement of the resistance elements; details will be found in Appendices to this chapter.

DESCRIPTION

2. The resistance element consists generally of Brightray strip folded in layers and rigidly supported between 'Sindanyo' insulators. The assembly of resistance element and insulators is clamped between metal side brackets which also serve as feet for mounting the unit.

Electrical connections

3. Terminal connections are made directly to the ends of the resistance element by means of $\frac{5}{16}$ in. bolts with nuts and washers.

Operation

4. When the starter button is pressed, a time switch diverts current momentarily from the main supply through the resistance unit before reaching the engine starter.

INSTALLATION

5. Reference should be made to the appropriate Appendix for installation details.

SERVICING

6. No servicing is possible, apart from a visual inspection for freedom from damage.

Testing

7. If the serviceability of the resistance unit is suspect, it may be tested as laid down in Appendix A.

Appendix A

STANDARD SERVICEABILITY TEST

FOR

RESISTANCE UNITS, ROTAX, ZA10100 SERIES

Introduction

1. The following tests may be applied to the unit before it is put into service or at any time when its serviceability is suspect.

Test equipment

2. The following test equipment is required:–

(1) Bridge-Megger tester, Type B (Ref. No. 5G/1708)

(2) Insulation resistance tester, Type C (Ref. No. 5G/152)

(3) Ammeter, with suitable shunts to read between 100 amp. and 1000 amp.

Testing

Resistance values

3. The values of the resistance elements, corrected to 20 deg. C, should be between the following limits:—

Code	*Measurement point*	*Resistance (ohms)*
ZA 10103	Terminals B and C	0·115–0·141
	,, A and B	0·007–0·009
ZA 10104	,, 1 and 2	0·031–0·037

Insulation resistance

4. The insulation resistance, when measured with a 250 volt megger between all live parts and frame, must not be less than 5 megohms.

Load test

5. (1) ZA 10103. This unit must satisfactorily perform 12 cycles of operation, each cycle being as follows:—

(*a*) 200 amp. applied between terminals B and C for 2 seconds immediately followed by . . .

(*b*) 900 amp. applied between terminals A and B for 6 seconds

(*c*) Allow to cool, in free air, for alternate periods of 30 and 20 seconds.

(2) ZA 10104. This unit must satisfactorily withstand three consecutive cycles of operation, with no interval between them and no forced cooling during the test, as follows:—

Cycle 1: 325 amp. applied between terminals 1 and 2 for 12 seconds, immediately followed by 100 amp. for 18 seconds.

Cycle 2: as above.

Cycle 3: 325 amp. for 12 seconds, immediately followed by 100 amp. for 5 minutes.

Check the Sindanyo insulation for cracks and the resistance elements for correct positioning and distortion.

Appendix 1

RESISTANCE UNIT, ROTAX, TYPE ZA10103

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

LEADING PARTICULARS

Resistance unit, Type ZA 10103	*Ref. No.*
Resistance value, maximum, terminals B–C	0·128 *ohms* (*at* 20 *deg. C*)
Resistance of lower element, terminals A–B	0·008 *ohms* (*at* 20 *deg. C*)
Resistance of top element, terminals A–C	0·120 *ohms* (*at* 20 *deg. C*)
Weight	14·5 *lb.*
Overall dimensions—	
Height	6·015 *in.*
Length (*including terminals*)	8·938 *in.*
Width	6·078 *in.*

Introduction

1. The ZA 10103 resistance unit is one of a series of units designed for time-switching into engine starter circuits to limit peak starting current.

DESCRIPTION

2. The ZA 10103 unit consists of two separate resistance elements formed from Brightray strip folded in layers and mounted in three banks side by side between twelve Sindanyo spacers. The spacers ar clamped between six side brackets by six through bolts, one end of each bracket being bent outwards at right angles to form a mounting foot. The high resistance element consists of three folded resistance strips, one strip being mounted at the top of each bank, all connected in series to form a continuous resistance with its ends brought out to terminals C and A. The low resistance element consists of three folded resistance strips, one strip being mounted at the bottom of each bank with both its ends brought out to junction strips, thereby forming three resistances in parallel. The two ends are brought out to terminals A and B, A being common to both resistance elements.

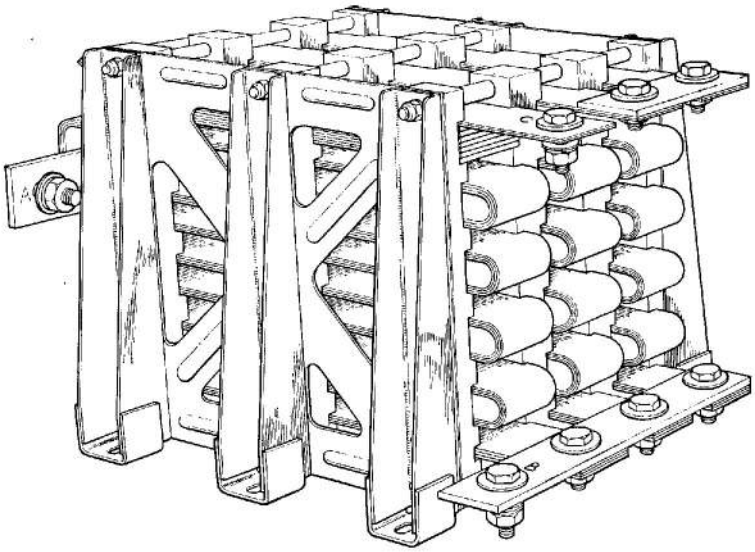

Fig. 1. General view of Type ZA 10103 resistance unit

Electrical connections

3. Terminal connections A, B and C are $\frac{5}{16}$ in. U.N.C. bolts, with associated nuts and washers, fitted directly to the ends or junctions of the resistance elements.

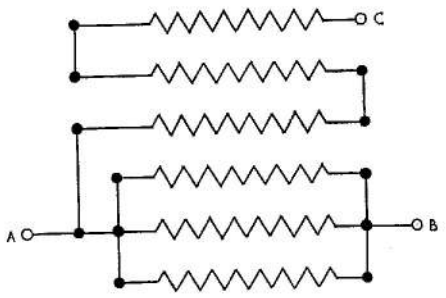

Fig. 2. Diagram of internal wiring

Operation

4. When the starter button is pressed, a time switch first interposes both elements of the resistance unit (terminals B and C) into the starter circuit. After two seconds the time switch operates to bypass the top resistance element so that the starting current is limited by the lower element only (terminals A and B). After a further six seconds the time switch again closes contacts which short-circuit the entire resistance unit.

INSTALLATION

5. The unit may be mounted in any position except with the base uppermost. The six mounting feet are in two rows 5·562 in. apart, with 0·203 in. wide fixing slots at 2·5 in. centres.

SERVICING

Testing

6. Details of tests applicable to this particular unit will be found in Appendix A of this chapter.

Appendix 2

RESISTANCE UNIT, ROTAX, TYPE ZA10104

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

LEADING PARTICULARS

Resistance unit, Type ZA 10104	*Ref. No.*
Resistance value	0·031 *to* 0·037 *ohm at* 20 *deg. C.*
Weight	4·75 *lb.*
Overall dimensions—	
Height	5·141 *in.*
Length (including terminals)	6·968 *in.*
Width	4·706 *in.*

Introduction

1. The ZA 10104 resistance unit is a simple series resistance designed for time switching into engine starter circuits to limit peak starting current.

DESCRIPTION

2. The unit consists of a single resistance element formed from two folded resistance strips mounted side by side and clamped between six Sindanyo insulators. The insulators are secured to four side brackets by four through bolts. One end of each side bracket is bent outwards at right angles to form a mounting foot. The lower ends of the two resistance strips are connected by a junction strip, thus forming one continuous resistance. The other ends of the two strips are brought out to form terminals 1 and 2.

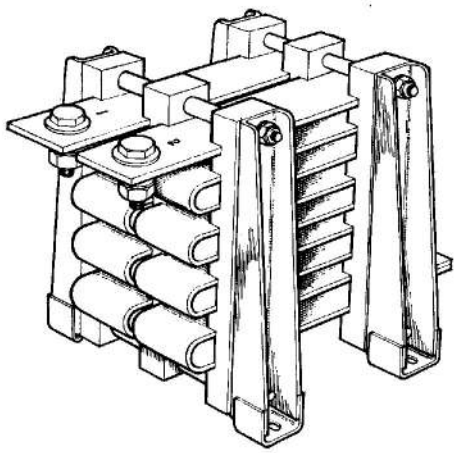

Fig. 1. General view of Type ZA 10104 resistance unit

Electrical connections

3. Terminal connections 1 and 2 consist of $\frac{5}{16}$ in. U.N.F. bolts, with associated nuts and washers, fitted directly to the ends of the resistance element.

Operation

4. When the starter button is pressed, a time switch interposes the resistance unit momentarily into the starting circuit, limiting the peak load current until the motor has begun to gather speed.

INSTALLATION

5. The unit may be mounted in any position except with the base uppermost. The four mounting feet have 0·203 in. wide slots at 2·625 in. x 4·206 in. centres.

SERVICING

Testing

6. Details of tests applicable to this particular unit will be found in Appendix A of this chapter.

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