

## Chapter 2

## SELENIUM RECTIFIERS, STANDARD TELEPHONE TYPE

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## Introduction

1. The selenium rectifiers described in this chapter are used in a wide variety of systems. Some are Standard "Sen Ter Cel" units and others are special units; details of individual types are given in appendices to this chapter. Selenium rectifiers are used in a.c. circuits to provide a rectified output and in d.c. circuits where advantage is taken of the wide difference in resistance of the discs in the forward and reverse direction.

2. The principles of rectification are given in A.P.4343, Vol. 1, Sect. 10, Chap. 1, to which reference may be made.

of the connecting tags is clearly marked and is as follows:—

Positive	...	...	Red or +
Negative	...	...	Black or —
A.C.	...	...	Green or ~

## Reverse voltage

5. It should be noted that the nominal reverse voltage of 18 volts (r.m.s.) per plate applies only when the rectifier is being used in an a.c. circuit; the reverse voltage rating for rectifiers used in d.c. circuits being 12 volts per plate. When considering the reverse voltage applied to a rectifier plate, it is essential to take into

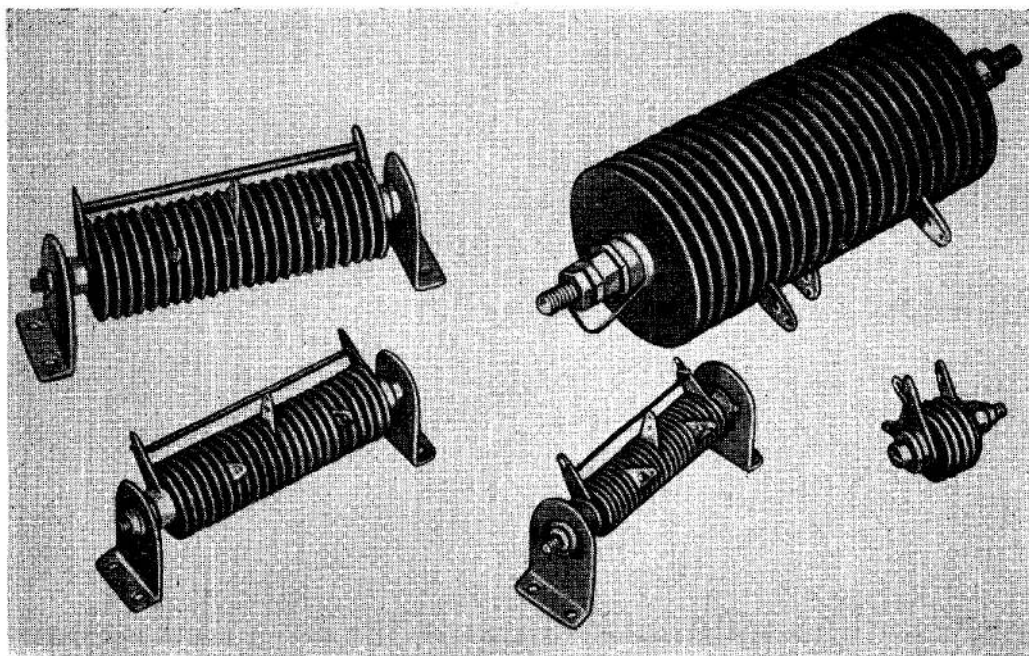


Fig. 1. Typical examples of rectifier assemblies

## DESCRIPTION

3. The basic rectifier element is known as a plate and a rectifier stack consists of one or more plates; that part of the stack between adjacent contacts from the external circuit is known as an arm of the rectifier.

4. Rectifier stacks comprise an appropriate number and size of plates on an insulated spindle, connections to the stacks being made by means of tags and connections between plates by metal spacing washers. The polarity

account the rectifier arrangement being used and the type of load.

## SERVICING

6. Little servicing is practicable in the case of these rectifiers, and if dismantling is attempted or tags moved from their original position, there will be damage to the damp proof or tropical finish rendering the rectifier unserviceable. Consequently a faulty rectifier must be removed and a serviceable unit fitted in its place.

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**TESTING****Insulation resistance test**

7. No insulation resistance test should be made to the following rectifiers:—

- (1) When the spindle is purposely connected to the electrical circuit.
- (2) When the spindle forms one of the terminals of the rectifier.

When the spindle is intended to be insulated from the rectifier, the insulation resistance shall not be less than 5 megohms (R.A.F.) or 0.5 megohms (R.N.) when measured with a 250V insulation resistance tester applied between each terminal and the spindle.

**Forward test**

8. Whenever possible, any busbars or wires connecting two or more tags together should be disconnected so that only one path is tested. The number of plates between adjacent tags should be counted. If the aforementioned condition cannot be complied with, the number of paths which are in parallel across these tags (each path having the same number of plates in series as the path directly between the tags) shall be counted.

9. The testing supply can be one of the following:—

- (1) A battery.
- (2) The output from a three-phase rectifier.
- (3) The output from a single-phase rectifier, smoothed to reduce the ripple to not more than 5% when delivering the testing current.

- (4) A d.c. generator with a ripple not exceeding 5%.

10. A voltage equal to the product of the voltage in Table 1 and the number of plates in series between adjacent tags should be applied to these tags, and the current flowing measured. The polarity of the supply should be reversed and again the current flowing measured. If this current is greater than the current previously measured, the supply polarity is now correct for the low resistance (forward) test. If it is less, revert to the polarity used previously.

11. Using the voltage called for in the preceding paragraph, the measured current divided by the number of parallel paths should not be less than the current in Table 1. The tests should be repeated with differing pairs of tags until all the plates in the stack have been tested.

**Reverse test**

12. The testing supply shall be as called for in para. 9 and the polarity of the voltage applied between adjacent tags shall be the opposite of that used for the forward test.

13. A voltage equal to the product of the voltage in Table 2 and the number of plates in series between adjacent tags should be applied to these tags. The reverse current should be measured after it has become stable. This current divided by the number of parallel paths should not be greater than the current in Table 2. These tests should be repeated with differing pairs of tags until all the plates in the stack have been tested.

**Table 1****Forward test**

Plate size	...	...	17	18	25	40	45
Applied voltage per plate			1	1	1	1	1
Minimum current (amp)			6	0.036	0.072	0.22	0.4

**Table 2****Reverse test**

Plate size	...	...	...	17	18	25	40	45
Applied voltage								
Normal voltage plates	...			19	19	19	19	19
High voltage plates		...		27	27	27	27	27
Reverse current (mA)								
Normal voltage plates	...			300	4.8	10	17	24
High voltage plates		...		300	4.8	10	17	24

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## Appendix 1

### STANDARD UNITS

#### LEADING PARTICULARS

Table 1

Type	Ref. No.	Circuit arrangement	No. of plates in series per arm	Size of Plate	No. of electrical paths per arm	Remarks
H.17.3/2/WZ	5CZ/5382	Single-phase, half-wave	3	3.75 x 12.38in. (17)	2	Normal voltage plates. Tropical finish.
H.25.3/1/WZ	5CZ/5350	Single-phase, half-wave	3	25 mm. dia.	1	Normal voltage plates. Tropical finish.
H.35.12/1/B2WZ		Single-phase, half-wave	12	35 mm. dia.	1	Normal voltage plates. Two mounting brackets. Tropical finish.
H.45.3/1/L	5CZ/5351	Single-phase, half-wave	3	45 mm. dia.	1	Normal voltage plates.
H.45.3/1/WZ		Single-phase, half-wave	3	45 mm. dia.	1	Normal voltage plates. Tropical finish.
HA40.12/1/B2WZ	5CZ/5498	Single-phase, half-wave	12	1.38 x 1.38in. (40)	1	Normal voltage plates. Two mounting brackets. Cooling funnel. Tropical finish.
V25.3/1/RWZ	5CZ/5353	Single-phase, push-pull	3	25 mm. dia. *	1	Normal voltage plate. Close spacing between plates. Tropical finish.
MDA.18.2/1/RGZ		Single-phase, voltage doubler	2	18 mm. dia.	1	High voltage plates. Close spacing between plates. Cooling funnel. Tropical finish.

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**Table 2**

Type	Nominal output Current (amp./path)	Nominal reverse voltage per plate (volts r.m.s.)	(volts d.c.)	Overall dimensions (in.)	Approx. weight
H17.3/2/WZ	5	18	12	12.38 x 5.25 x 3.75	4 lb. 9 oz.
H25.3/1/WZ	0.075	18	12	1 x 1.5 x 1.6	0.75 oz.
H35.12/1/B2WZ	0.15	18	12	1.38 x 1.88 x 3.81	5.75 oz.
H45.3/1/L	0.3	18	12	1.75 x 2.25 x 1.75	2 oz.
H45.3/1/WZ	0.3	18	12	1.75 x 2.25 x 1.75	2 oz.
HA40.12/1/B2WZ	0.15	18	12	1.38 x 1.88 x 3.81	4.25 oz.
V25.3/1/RWZ	0.15	18	12	1 x 1.5 x 1.88	1.5 oz.
MDA18.2/1/RGZ	0.04	18	12	1.75 x 1.28 x 1.31	0.75 oz.

These are standard units as described and illustrated in the main chapter.

The circuit arrangement of each model can be obtained from Table 1.

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## Appendix 2

## SPECIAL TYPES

## LEADING PARTICULARS

Table 1

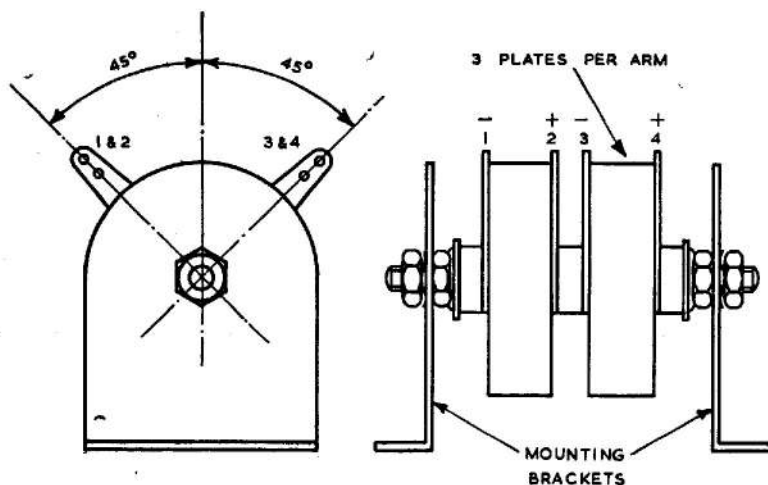
Type	Ref. No.	Circuit arrangement	No. of plates in series per arm	Size of Plate	No. of electrical paths per arm	Remarks
FAX 7344A		2 x Single-phase, half-wave	3	45 mm. dia.	1	Normal voltage plates. Two mounting brackets. Tropical finish.
FAX 7371A		4 x Single-phase, push-pull	3	25 mm. dia.	1	Normal voltage plates. Tropical finish.
FAX 7385A		Single-phase, push-pull	3	25 mm. dia.	1	Normal voltage plates. Two mounting brackets. Tropical finish.
FSW 7184A	5CZ/5239	5 x Single-phase, push-pull	3	25 mm. dia.	1	Normal voltage plates. Positive outer connecting tags. Tropical finish.
FSW 7184B		5 x Single-phase, push-pull	3	25 mm. dia.	1	Normal voltage plates. Tropical finish.
FSW 7188B		Single-phase, push-pull	3	25 mm. dia.	1	Normal voltage plates. One mounting bracket. Tropical finish.

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**Table 2**

Type	Nominal output current at 35 deg. C. (amp./path)	Nominal reverse voltage per plate		Overall dimensions (in.)	Approx. weight
		(volts r.m.s.)	(volts d.c.)		
FAX 7344A	0.3	18	12	3 x 2 x 2.32	5 oz.
FAX 7371A	0.15	18	12	5 x 1.13 x 1.5	6 oz.
FAX 7385A	0.15	18	12 </td <td>2.38 x 1 x 2.06</td> <td>2 oz.</td>	2.38 x 1 x 2.06	2 oz.
FSW 7184A	0.15	18	12	6.5 x 1.5 x 1.5	7 oz.
FSW 7184B	0.15	18	12	6.5 x 1.5 x 1.5	7 oz.
FSW 7188B	0.15	18	12	2 x 1.5 x 2.06	2 oz.

The special stacks are units which depart from the standard assembly to meet special electrical or mechanical requirements.



**Fig. 1. Rectifier, Type FAX 7344A**

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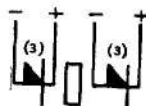


Fig. 2. Rectifier, Type 7344A

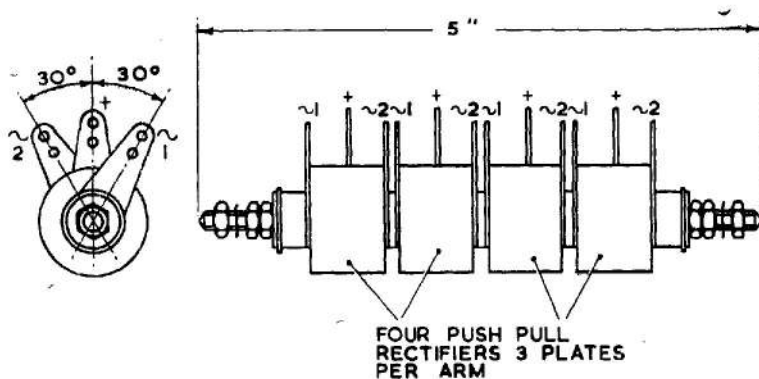


Fig. 3. Rectifier, Type FAX 7371A

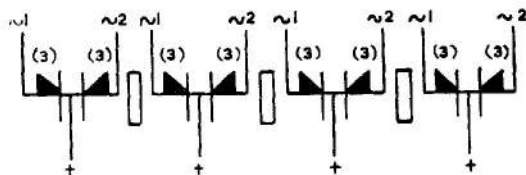


Fig. 4. Rectifier, Type FAX 7371A

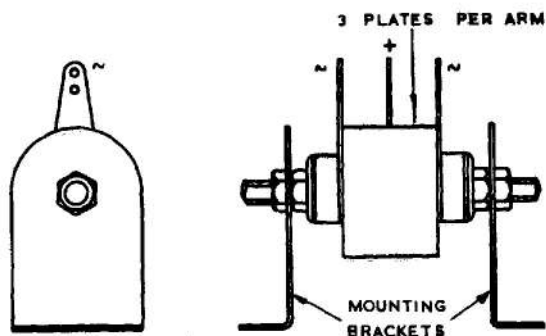


Fig. 5. Rectifier, Type FAX 7385A

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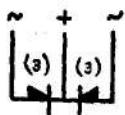


Fig. 6. Rectifier, Type FAX 7385A

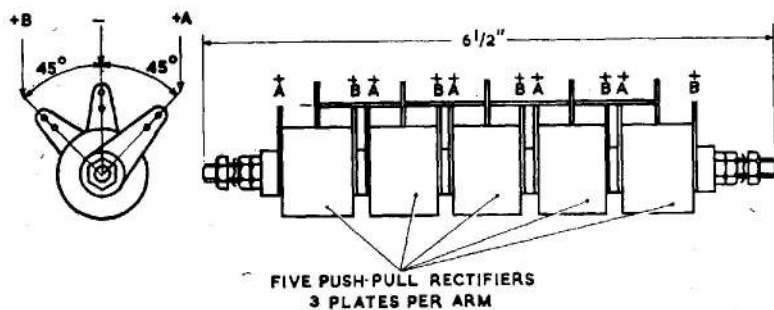


Fig. 7. Rectifier, Type FSW 7184A

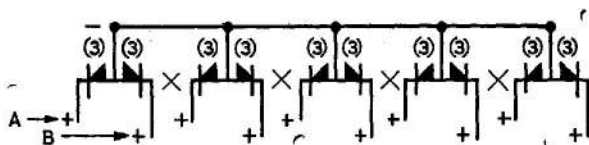


Fig. 8. Rectifier, Type FSW 7184A

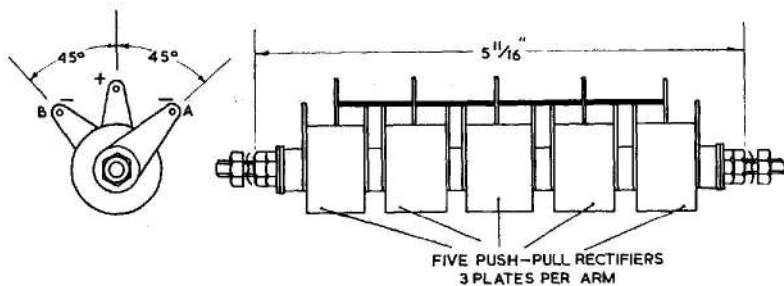


Fig. 9. Rectifier, Type FSW 7184B

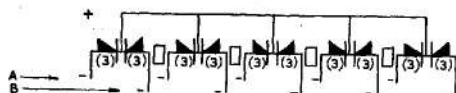


Fig. 10. Rectifier, Type FSW 7184B

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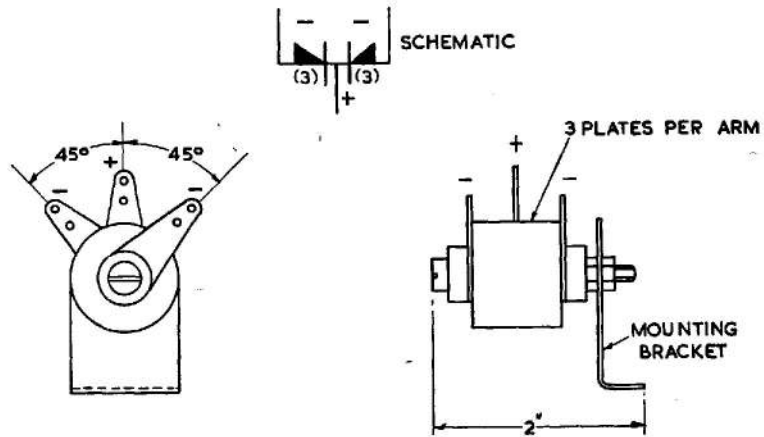


Fig. 11. Rectifier, Type FSW 7188B

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