Chapter 3

A.C. MAIN DISTRIBUTION

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Introduction

1. This chapter deals with the general distribution of the 200-volt, 3-phase, 400 Hz supplies through the aircraft, from the main generation, emergency generation, and ground supply inputs to the distribution and sub-distribution panels, prior to step-down transformation and/or rectification.

2. The various panels will be referred to by the numerical notation given in Table 1 of Chap.1. A circuit diagram of the supplies is provided in fig.1. ▶◀

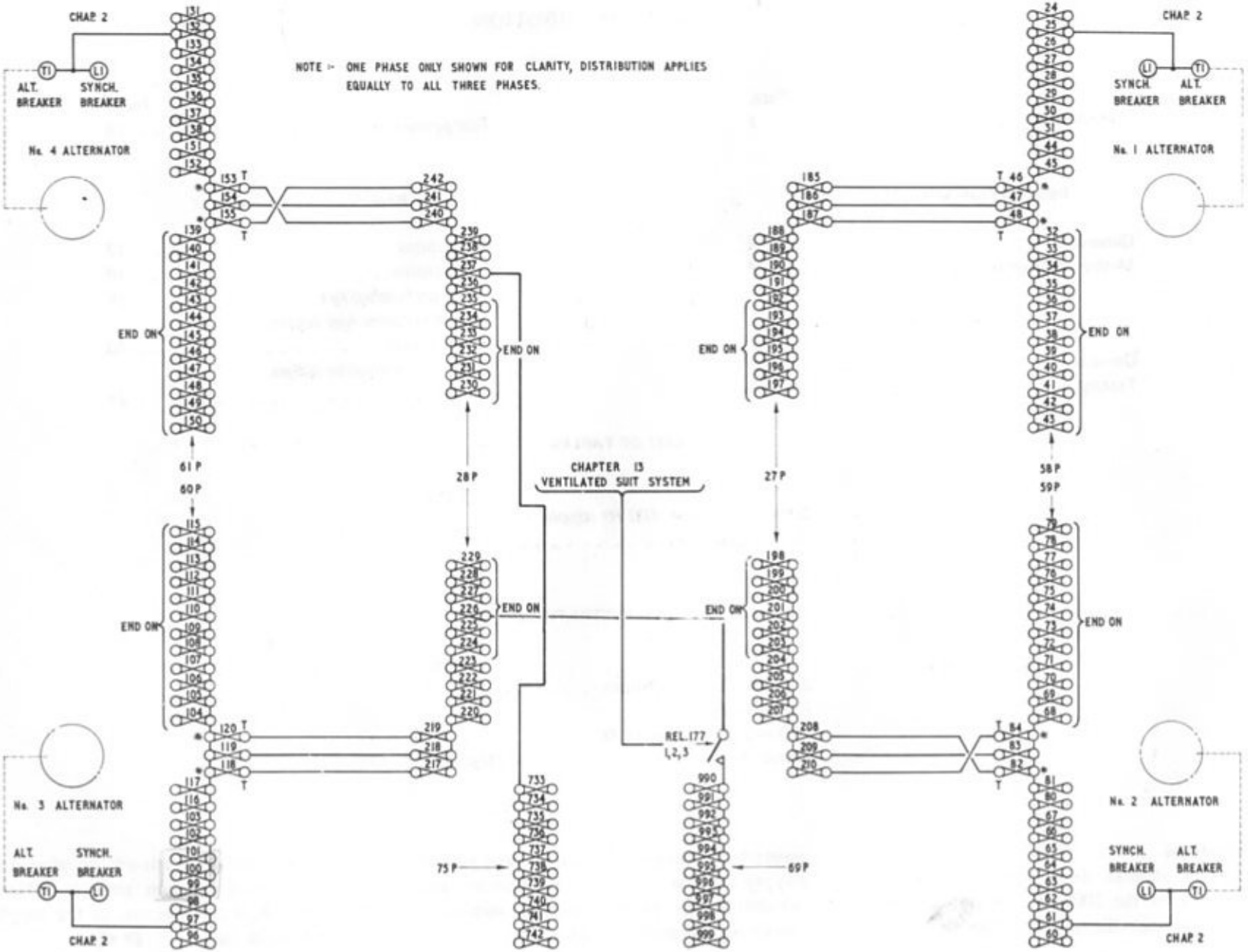

Fig. 1. 200-volt fuse distribution

DESCRIPTION AND OPERATION

General

3. In order to cut down the effects of hazards such as enemy 'strikes', a system of triple-feeding has been adopted. The method is to run each of the three feeders by differing routes between points, and insert fuses as near to the extremities as is practically possible.

4. In the event of an 'earth' fault on any line by any means, or a short circuit between phases, one or both of these protective fuses will rupture, thus clearing the fault and leaving the remaining lines to function.

5. In clarification of para.4, it is pointed out that the main alternators are star-connected with the neutral point 'earthed' to the aircraft frame.

6. Protection of personnel is assisted by this 'earthing' of the neutral point, as the maximum potential which can be obtained between any phase and the aircraft frame is 115-volt.

Method of distribution

7. The focal point of distribution is the power compartment, which is situated immediately aft of the bomb-bay. In the power compartment are four main power panels 58 to 61P. 58P and 59P are on the port side and in flight are normally fed from No.1 and No.2 alternators respectively. 60P and 61P are on the starboard side and in flight are normally fed from No.3 and No.4 alternators respectively.

8. The output cables from No.1 and No.4 alternators are routed via the inboard engine bays, and connect to heavy duty connectors at the bomb-bay wall. The output cables from No.2 and No.3 alternators being connected to similar connectors at the same station. From this point the cables for each alternator are duplicated and follow dissimilar runs along the bomb-bay to the power compartment. The runs then converge and each output reaches the respective power panel via its own Load-share Junction-box (Chap.2).

9. The centre of the system for each phase is the paralleling busbar, and the alternator outputs can be fed to this point. Flight conditions however, provide that each alternator carries its own load (Chap.2). Emergency supplies and ground supplies, are fed direct to this busbar.

10. In all normal conditions power is available at the four power panels (para.7). From these panels power is fed forward to two main sub-distribution panels 27P and 28P, situated on the aft face of the bomb-bay forward bulkhead, 27P on the port side handles supplies from 58P and 59P. 28P on the starboard side handles supplies from 60P and 61P. A neon lamp on each panel indicates that power is available.

11. From these two points sub-distribution panels are supplied, 75P on the port side of the nose-wheel compartment is fed from 28P, the supply originating at 60P. 69P on the aft face of the nose-wheel compartment is fed from 27P.

SERVICING

General

12. Very little servicing of this installation will be necessary.

13. In accordance with –4 of this publication, a periodic examination of the terminal points for security and cleanliness is to be carried out. Check all fuses, securing screws and shrouds, in the case of the bolted type, and a check for tightness of end-on fuses.

Testing

14. As H.R.C. fuses do not give any external indication of serviceability it is possible, due to triple feeding that the presence of voltage at both ends of a fuse will give a false impression; in the extreme case two-thirds of the feeder fuses can be ruptured with no apparent fault.

15. Details of fuse testing will be confined to the feeder fuses, and the following procedure is suggested where the regular removal and replacement of fuses is cut to a minimum.

Test procedure, refer to Fig.1

16. Testing is normally confined to the Power Compartment.

(1) Ensure that the ground supply is not connected to the aircraft.

(2) Remove all fuses marked with an asterisk on fig.1, twenty-four fuses in all.

(3) Connect ground supply and switch on.

(4) Using a neon tester, check for presence of voltage at points marked 'T'. Provided a serviceable indication is obtained at all points the system is complete. The removed fuses are to be checked for continuity by means of battery and filament lamp.

(5) Should a null indication occur at any point, the relevant associated fuse(s) at the sub-distribution panel is(are) suspect.

Precautions

17. Removal of the fuseholders used in this system is described in the following paragraphs. Important points to be borne in mind are:-

(1) Prior to the removal of any electrical equipment, ensure that ALL supplies are isolated.

(2) Always protect, insulate and stow any disconnected cables.

(3) Before re-connecting cables to equipment, check with the appropriate routing chart for correct terminal numbers and cable references.

Fuseholders

18. The assembly of fuseholders and Type H fuse pillars is similar in all panels. The assembly of Type H outgoing terminal pillars is also similar in all panels.

End-on fuseholders

19.

(1) Remove the particular busbar securing bolts, and retain, complete with washers. There should be sufficient length on connected cables to allow access to the rear of the busbar assembly.

◀(6) Switch off and disconnect ground supply. Remove and check individually the suspect fuse(s). Where necessary renew ruptured fuses. ▶

REMOVAL AND ASSEMBLY

(2) Disconnect the outgoing cable from the fuseholder. The rear insulating cap is cemented in position with Epoxy air drying compound, but the insertion of a knife blade, and a few sharp taps, should enable it to be unscrewed. Removal of this cap will expose the rear locking ring. With the locking ring unscrewed no difficulty should be experienced in unscrewing the component from the busbar.

(3) Fitting the new item can be accomplished by reversing the operations outlined in sub-paragraph (2). The final item, the insulating cap being cemented in position with Epoxy air drying compound, Ref. EHP/23 Ivory type.

(4) Re-connect the cable to the fuseholder. Replacement of the busbar is the reverse of operations outlined in sub-para. (1).

Type H fuseholder pillars - busbar end

20.

(1) For removal of the particular busbar refer to para.19 (1).

(2) The rear insulating cap is cemented in position with an Epoxy air drying compound, but the insertion of a knife blade, and a few sharp taps, should enable it to be unscrewed. Removal of this cap will expose the rear locknuts. With the locknuts removed no difficulty should be experienced in unscrewing the pillar from the busbar.

(3) Fitting the new item can be accomplished by reversing the operations outlined in sub-para. (2). The final item, the insulating cap being cemented in position with Epoxy air drying compound, Ref. EHP/23 Ivory type.

(4) Replacement of the busbar is the reverse of operations outlined in para.19(1).

Type H fuseholder pillars - outgoind end

21.

(1) For removal of the particular busbar refer to para.19 (1).

(2) The removal and replacement of these items raises no special problem.

(3) Replacement of the busbar is the reverse of operations outlined in para.19 (1).

(7) With ALL supplies disconnected, refit all fuses removed in accordance with sub-para. (2), ensuring that the securing screws are well 'home'.

TABLE 1

200-VOLT, 3-PHASE, 400 Hz SUPPLY

DISTRIBUTION FUSES

Fuse No.	Rating (amp.)	Service	Location	Type	Category
1	5	No.1 alternator voltage regulator	14J	E.O.	E
2	5	No 1 alternator control panel	14J	E.O.	E
3	5	No.1 alternator frequency control (R), Alt, selector switch (Y)	14J	E.O.	E
4	5	No.2 alternator voltage regulator	15J	E.O.	E
5	5	No.2 alternator control panel	15J	E.O.	E
6	5	No.2 alternator frequency control (R), Alt. selector switch (Y)	15J	E.O.	E
7	5	No.3 alternator voltage regulator	16J	E.O.	E
8	5	No.3 alternator control panel	16J	E.O.	E
9	5	No.3 alternator frequency control (R), Alt. selector switch (Y)	16J	E.O.	E
10	5	No.4 alternator voltage regulator	17J	E.O.	E
11	5	No.4 alternator control panel	17J	E.O	E
12	5	No.4 alternator frequency control (R), Alt. selector switch (Y)	17J	E.O	E
13					
14					
15					
16					
17					
18					
19					
20					
21	50		58P	H2	E
22	50	Triple feeders - No.1 alternator to synch. busbar	58P	H2	E
23	50		58P	H2	E
24	50		58P		
25	50	Triple feeders - main distribution 58P to sub-distribution 27P	58P	H2	E
26	50		58P		
27	30	Powered flying controls - No.8 elevon motor	58P	H2	E
28	30	Powered flying controls - No.1 elevon motor	58P	H2	E
29		Spare	58P		
30	20	E.W. feeder to 14P	58P	H2	NE
31			58P	H2	NE
32	7	Fuel pump - No.4 main port	58P	E.O.	NE
33	3	Fuel pump - No.4 secondary port	58P	E.O.	NE
34	7	Fuel pump - No.5 main port	58P	E.O.	NE
35	3	Fuel pump - No.5 secondary port	58P	E.O.	NE
36	7	Fuel pump - No.7 main port	58P	E.O.	NE
37	3	Fuel pump - No.7 secondary port	58P	E.O.	NE
38		Spare	58P		

TABLE 1 (cont'd)

200-VOLT, 3-PHASE, 400 Hz SUPPLY

DISTRIBUTION FUSES

Fuse No.	Rating (amp.)	Service	Location	Type	Category
39	3	Power on indicator red phase	58P	E.O	NE
40		Spare	58P		
41	5	Control unit (R.A.T.) blower	58P	E.O	E
42		Spare	58P		
43		Spare	58P		
44		Spare	58P		
45	50	Hydraulic motor new store	58P	H2	NE
46	50		58P	H2	E
47	50	Triple feeders to sub-distribution 27P	58P	H2	E
48	50		58P	H2	E
49					
50					
51					
52					
53					
54					
55					
56					
57	50		59P	H2	E
58	50	Triple feeders - No.2 alternator to synch. busbar	59P	H2	E
59	50		59P	H2	E
60	50		59P	H2	E
61	50	Triple feeders - main distribution 59P and sub-distribution 27P	59P	H2	E
62	50		59P	H2	E
63		Spare	59P	H2	
64	30	Powered flying controls - No.6 elevon motor	59P	H2	E
65	30	Powered flying controls - No.3 elevon motor	59P	H2	E
66	20	E.W. feeder to 14P	59P	H2	NE
67	60	E.W. freon pump supply	59P	H2	NE
68	7	Fuel pump No.3 main port	59P	E.O	NE
69	3	Fuel pump No.3 secondary port	59P	E.O	NE
70	7	Fuel pump No.6 main port	59P	E.O	NE
71	3	Fuel pump No.6 secondary port	59P	E.O	NE
72	3	Fuel sequency timer - No.1 and 2 group	59P	E.O	NE
73	5	E.W. cooling pump No.2	59P	E.O	NE
74	5	Fuel pump No.7 transfer port	59P	E.O.	NE
75	5	E.W. glycol cooling pump	59P	E.O.	NE
76	5	◀ A.R.I.18146 (S.O.O.) E.W. installation ▶	59P	E.O	NE

TABLE 1 (cont'd)

200-VOLT, 3-PHASE, 400 Hz SUPPLY

DISTRIBUTION FUSES

Fuse No.	Rating (amp.)	Service	Location	Type	Category
77	3	A.A.P.P. sump and cartridge heaters	59P	E.O.	E
78	7	Bomb bay fuel pump No.3 forward port	59P	E.O.	NE
79	3	Power on indicator red phase	59P	E.O.	NE
80	50	Powered flying controls - auxiliary rudder motor	59P	H2	E
81	50	Air brakes motor port	59P	H2	NE
82	50		59P	H2	E
83	50	Triple feeders to sub-distribution panel 27P	59P	H2	E
84	50		59P	H2	E
85					
86					
87					
88					
89					
90					
91					
92					
93	50		60P	H2	E
94	50	Triple feeders - No.3 alternator to synch. busbar	60P	H2	E
95	50		60P	H2	E
96	50		60P	H2	E
97	50	Triple feeders - main distribution 60P and sub-distribution 28P	60P	H2	E
98	50		60P	H2	E
99	50	Powered flying controls - main rudder motor	60P	H2	E
100	30	Powered flying controls - No.5 elevon motor	60P	H2	E
101	30	Powered flying controls - No.4 elevon motor	60P	H2	E
102	20	E.W. feeder to 14P	60P	H2	NE
103	10	◀ E.W. feeder A.R.I.5919 (Pre.Mod.2017) or A.R.I.5952 (Post Mod.2017) ▶	60P	H2	NE
104	7	Fuel pump supply No.3 main starboard	60P	E.O.	NE
105	3	Fuel pump supply No.3 secondary starboard	60P	E.O.	NE
106	7	Fuel pump supply No.6 main starboard	60P	E.O.	NE
107	3	Fuel pump supply No.6 secondary starboard	60P	E.O.	NE
108	3	Fuel sequence timer No.3 and 4 group	60P	E.O.	NE
109	3	Power on indicator R phase	60P	E.O.	NE
110	10	Window	60P	E.O.	NE
111	5	Fuel pump No.7 transfer starboard	60P	E.O.	NE
112	5	E.W. air intake de-icing	60P	E.O.	NE
113	7	Bomb bay fuel pump No.1 forward port	60P	E.O.	NE
114	10	Window	60P	E.O.	NE

TABLE 1 (cont'd)

200-VOLT, 3-PHASE, 400 Hz SUPPLY

DISTRIBUTION FUSES

Fuse No.	Rating (amp.)	Service	Location	Type	Category
115	7	Bomb bay fuel pump No.1 aft starboard	60P	E.O.	NE
116	50	Air brakes motor starboard	60P	H2	NE
117	20	◀ Feeders for fuses 1386 (A.R.I.18146, Post Mod.2024) ▶	60P	H2	NE
118	50		60P	H2	E
119	50	Triple feeders to sub-distribution panel 28P	60P	H2	E
120	50		60P	H2	E
121					
122					
123					
124					
125					
126					
127					
128	50		61P	H2	E
129	50	Triple feeders No.4 alternator to synch. busbar	61P	H2	E
130	50		61P	H2	E
131	50		61P	H2	E
132	50	Triple feeders main distribution 61P and sub-distribution 28P	61P	H2	E
133	50		61P	H2	E
134	30	Powered flying controls No.2 elevon motor	61P	H2	E
135	30	Powered flying controls No.7 elevon motor	61P	H2	E
136		Spare	61P		
137		Spare	61P		
138		Spare	61P		
139		Spare	61P		
140	3	Power on indicator R phase	61P	E.O.	NE
141	7	Fuel pump No.4 main starboard	61P	E.O.	NE
142	3	Fuel pump No.4 secondary starboard	61P	E.O.	NE
143	7	Fuel pump No.5 main starboard	61P	E.O.	NE
144	3	Fuel pump No.5 secondary starboard	61P	E.O.	NE
145	7	Fuel pump No.7 main starboard	61P	E.O.	NE
146	3	Fuel pump No.7 secondary starboard	61P	E.O.	NE
147		Spare	61P	E.O.	
148	7	Bomb bay fuel pump No.3 aft starboard	61P	E.O.	NE
149		Spare	61P	E.O.	
◀ 150	7	Feeder for fuse 1399R, A.R.I.18228 115 volt line supply (Post Mod.2304)	61P	E.O.	NE ▶
151		Spare	61P		
152		Spare	61P		

TABLE 1 (cont'd.)

200-VOLT, 3-PHASE, 400 Hz SUPPLY

DISTRIBUTION FUSES

Fuse No.	Rating (amp.)	Service	Location	Type	Category
153	50		61P	H2	E
154	50	Triple feeders to sub-distribution panel 28P	61P	H2	E
155	50		61P	H2	E
156					
157					
158					
159					
160					
161					
162					
163					
164	50		29P	H2	E
165	50	A.A.P.P. supply	29P	H2	E
166	50		29P	H2	E
167	5	Busbar instruments and V.P.U. R and B phases, synchronising Y phase	29P	E.O.	E
168	5	V.P.U. Y phase	29P	E.O.	E
169	50	Feeder to 61P	29P	H2	E
170	50	Feeder to 60P	29P	H2	E
171	50	Feeder to 59P	29P	H2	E
172	50	Feeder to 58P	29P	H2	E
173	50	Ram air turbine supply	29P	H2	E
174	50	Ram air turbine supply	29P	H2	E
175					
176					
177					
178					
179					
180					
181					
182					
183					
184					
185	50		27P	H2	E
186	50	Triple feeders from 58P	27P	H2	E
187	50		27P	H2	E
188		Spare	27P		
189			27P	H2	
190	30	3kVA transformer port	27P	H2	E
191	40	No.2 frequency changer	27P	H2	NE

TABLE 1 (cont'd.)

200-VOLT, 3-PHASE, 400 Hz SUPPLY
DISTRIBUTION FUSES

Fuse No.	Rating (amp.)	Service	Location	Type	Category
192	3	No.1 alternator watt/VAR meter and power on indicator R phase	27P	E.O.	E
193	7	Fuel pump No.1 main port	27P	E.O.	E
194	3	Windscreen de-mister supply	27P	E.O.	NE
195	7	Bomb bay fuel pump No.3 forward starboard	27P	E.O.	NE
196		Spare	27P		
197	7	N.B.S. transformer stand-by supply	27P	E.O.	NE
198	7	Fuel pump No.2 main port	27P	E.O.	E
199	10	Gold film windscreen	27P	E.O.	E
200	7	Bomb bay fuel pump No.3 aft port	27P	E.O.	NE
201	5	Fuel pump No.1 transfer port	27P	E.O.	NE
202	3	No.2 alternator watt/VAR meter and power on indicator R phase	27P	E.O.	E
203	3	Pitot head heater	27P	E.O.	E
204	30	7.5 kVA transformer/rectifier unit port	27P	H2	E
205		Spare	27P		
206	40	Emergency hydraulic power pack	27P	H2	NE
207		Spare	27P	H2	
208	50		27P	H2	E
209	50	Triple feeder from 59P	27P	H2	E
210	50		27P	H2	E
211					
212					
213					
214					
215					
216					
217	50		28P	H2	E
218	50	Triple feeder from 60P	28P	H2	E
219	50		28P	H2	E
220	30	7.5 kVA transformer/rectifier unit starboard	28P	H2	E
221		Spare	28P		
222		Spare	28P		
223		Spare	28P		
224	7	Fuel pump No.2 main starboard	28P	E.O.	E
225	7	Bomb bay fuel pump No.1 aft port	28P	E.O.	NE
226	15	Feeder to 69P – ventilated suits	28P	E.O.	NE
227	3	No.3 alternator watt/VAR meter and power on indicator R phase	28P	E.O.	E
228	5	Fuel pump No.1 transfer starboard	28P	E.O.	NE
229	7	Bomb bay fuel pump No.1 forward starboard	28P	E.O.	NE

TABLE 1 (cont'd.)

200-VOLT, 3-PHASE. 400 Hz SUPPLY

DISTRIBUTION FUSES

Fuse No.	Rating (amp.)	Service	Location	Type	Category
230	3	U.H.F.	28P	E.O.	E
231	3	No.4 alternator watt/VAR meter and power on indicator R phase	28P	E.O.	E
232	7	Fuel pump supply – No.1 main starboard	28P	E.O.	E
▶ 233	5	A.R.I.123134/5/4	28P	E.O.	NE
234	3	A.R.I.5972	28P	E.O.	NE
235	7	N.B.S. transformer normal supply	28P	E.O.	NE
236	40	No.1 frequency changer	28P	H2	NE
237	30	Feeder to 75 sub-distribution	28P	H2	NE
238	30	3kVA transformer starboard	28P	H2	E
239		Spare	28P		
240	50		28P	H2	E
241	50	Triple feeders from 61P	28P	H2	E
242	50		28P	H2	E
733	10	Ventilated suits	75P	E.O.	NE
734	7	H.2.S. amplidyne	75P	E.O.	NE
735	7	H.2.S. transformer rectifier – 112-volt	75P	E.O.	NE
736	3	ARI-18235 (Post Mod 2496)	75P		
737	5	G.P.I.6 and G.S.R. cooling	75P	E.O.	NE
738	3	Spare	75P		
740	3	Outside air temperature – heater element	75P	E.O.	E
741	5	Ventilated suits ◀	75P	E.O.	E
742	3	Transformer feed, Artificial Horizon	75P	E.O.	E
990	3	Ventilated suit supply – bomb aimer	69P	E.O.	NE
991	3	Ventilated suit supply – prone bomb aimer	69P	E.O.	NE
992	3	Ventilated suit supply – second pilot	69P	E.O.	NE
993	3	Ventilated suit supply – navigator	69P	E.O.	NE
994	3	Ventilated suit supply – first pilot	69P	E.O.	NE
995	3	Ventilated suit supply – air electronics officer	69P	E.O.	NE
996		Spare	69P		
997		Spare	69P		
998		Spare	69P		
999		Spare	69P		
1 112	10	A.R.I.18076 No.1 P.U.	14P	H2	NE
1 113	7	A.R.I.18076 No.1 TX	14P	E.O.	NE
1 114	7	A.R.I.18074 (Removed by Mod.2024) } E.W. installations	14P	E.O.	NE
1 115	10	A.R.I.18076 No.2 P.U.	14P	H2	NE
1 116	7	A.R.I.18076 No.2 TX	14P	E.O.	NE

TABLE 1 (cont'd.)

200-VOLT, 3-PHASE, 400 Hz SUPPLY
DISTRIBUTION FUSES

Fuse No.	Rating (amp.)		Service	Location	Type	Category
1 117	5	A.R.I.18075 No.1 TX	E.W. installations	14P	E.O.	NE
1 118	10	A.R.I.18076 No.3 P.U.		14P	H2	NE
1 119	7	A.R.I.18076 No.3 P.U.		14P	E.O.	NE
1 120	5	A.R.I.18075 No.2 TX		14P	E.O.	NE
1 328	10	Window		108P	E.O.	NE
1 329	10	Window		108P	E.O.	NE
1 330	5	Window		108P	E.O.	NE
1 331	5	Window		108P	E.O.	NE
1 332	10	Window		108P	E.O.	NE
1 333	10	Window		108P	E.O.	NE
1 386	15	A.R.I.18146 (S.O.O.)	E.W. installations	109P	E.O.	NE
1 387	5	A.R.I.18146 (S.O.O.)		109P	E.O.	NE
1 388	5	A.R.I.18146 (S.O.O.)		109P	E.O.	NE
1 389	5	A.R.I.18146 (S.O.O.)		109P	E.O.	NE
1 390	3	A.R.I.18146 (S.O.O.)		109P	E.O.	NE
1 391	3	A.R.I.18146 (S.O.O.)		109P	E.O.	NE
1 392	10	A.R.I.18146 (S.O.O.)		109P	E.O.	
1 393	5	A.R.I.18146 (S.O.O.)		26P	S	NE
1 394		Spare				
1 395		Spare				
1 396		Spare				
1 397		Spare				
1 398		Spare				
1 399	5	A.R.I.18228/1	E.W. installation	14P	E.O.	NE

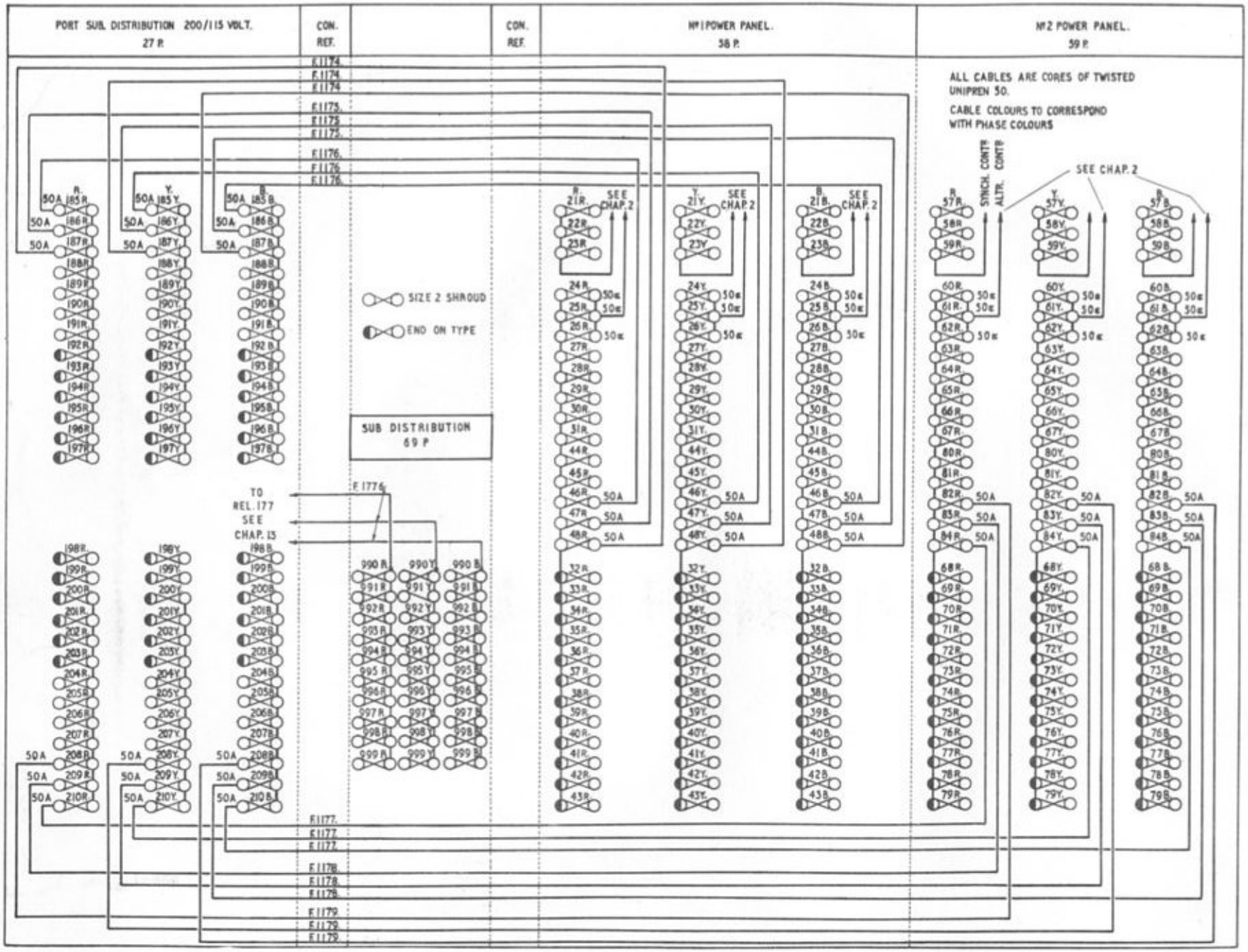

Fig.2(1) 200-volt, 3-phase, 400 c/s distribution
(S.T.I./Vulcan/282 satisfied)

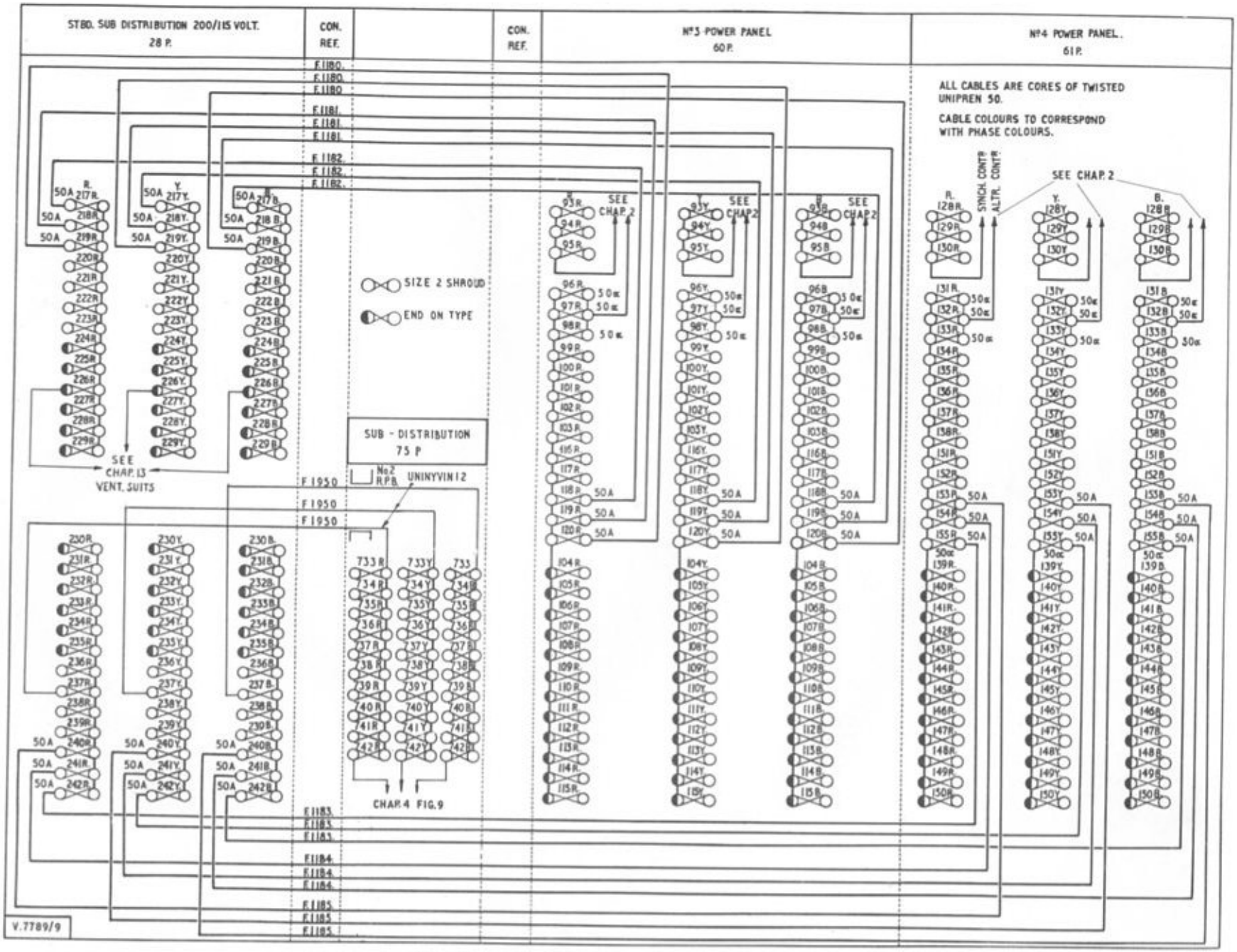

Fig.2(2) 200-volt, 3-phase, 400 c/s distribution
◀ (Mod.2182 incorporated) ▶