



**Stage 1 [ES24 - Programmer Extension Component Kit]**

Item	Description	Qty	Designator	Package
	<b>CAPACITOR</b>			
1	470pF 10% Ceramic	1	C101	RAD-0.2N
2	10nF 63V Polyester	1	C102	RAD-0.2
3	22nF 63V Polyester	1	C103	RAD-0.2
	<b>CONNECTOR</b>			
4	1x4 Pin 16mm Header	2	S102, S103	-
5	1x3 Pin 16mm Header	1	S101	-
6	IDC20 RA Box Header	1	J201	-
	<b>DIODE</b>			
7	1N4148	5	D101, D102, D104, D105, D106	DIODE-0.3
	<b>HARDWARE</b>			
8	SLEEVING - 2.4mm Heatshrink [@ 1cm]	3	D103^3	-
9	Ferrule Terminal - DUCE7575	6	S102^3, S103^3	-
10	Equipment Wire 7/0.2 Black [@ 1cm]	4	D103^4	-
11	Equipment Wire 7/0.2 Red [@ 1cm]	4	D103^4	-
	<b>OPTO-ELECTRONIC</b>			
12	3mm HE-Yellow LED	1	D103	-
	<b>POTENTIOMETER</b>			
13	100KB LIN - 18T Spline	3	P101, P102, P103	ALPHA 16MM
	<b>RESISTOR</b>			
14	1K0 1% 0.5W Metal Film	1	R112	AXIAL-0.4
15	1K2 1% 0.5W Metal Film	1	R110	AXIAL-0.4
16	1K3 1% 0.5W Metal Film	1	R111	AXIAL-0.4
17	47K 1% 0.5W Metal Film	3	R101, R102, R109	AXIAL-0.4
18	100K 1% 0.5W Metal Film	1	R104	AXIAL-0.4
19	150K 1% 0.5W Metal Film	3	R105, R106, R108	AXIAL-0.4



Bill of Materials for ES23 - Sequence Programmer Full Kit V0.3  
**Stage2 [ES24 - Programmer Extension Component Kit]**

Item	Description	Qty	Designator	Package
<b>CAPACITOR</b>				
1	470pF 10% Ceramic	1	C101	RAD-0.2N
2	10nF 63V Polyester	1	C102	RAD-0.2
3	22nF 63V Polyester	1	C103	RAD-0.2
<b>CONNECTOR</b>				
4	1x4 Pin 16mm Header	2	S102, S103	-
5	1x3 Pin 16mm Header	1	S101	-
6	IDC20 RA Box Header	1	J201	-
<b>DIODE</b>				
7	1N4148	5	D101, D102, D104, D105, D106	DIODE-0.3
<b>HARDWARE</b>				
8	SLEEVING - 2.4mm Heatshrink [@ 1cm]	3	D103^3	-
9	Ferrule Terminal - DUCE7575	6	S102^3, S103^3	-
10	Equipment Wire 7/0.2 Black [@ 1cm]	4	D103^4	-
11	Equipment Wire 7/0.2 Red [@ 1cm]	4	D103^4	-
<b>OPTO-ELECTRONIC</b>				
12	3mm HE-Yellow LED	1	D103	-
<b>POTENTIOMETER</b>				
13	100KB LIN - 18T Spline	3	P101, P102, P103	ALPHA 16MM
<b>RESISTOR</b>				
14	1K0 1% 0.5W Metal Film	1	R112	AXIAL-0.4
15	1K2 1% 0.5W Metal Film	1	R110	AXIAL-0.4
16	1K3 1% 0.5W Metal Film	1	R111	AXIAL-0.4
17	47K 1% 0.5W Metal Film	3	R101, R102, R109	AXIAL-0.4
18	100K 1% 0.5W Metal Film	1	R104	AXIAL-0.4
19	150K 1% 0.5W Metal Film	3	R105, R106, R108	AXIAL-0.4

Bill of Materials for ES23 - Sequence Programmer Full Kit V0.3  
**Stage2 [ES24 - Programmer Extension Component Kit]**

Item	Description	Qty	Designator	Package
	<b>RESISTOR - continued</b>			
20	220K 1% 0.5W Metal Film	3	R113, R114, R115	AXIAL-0.4
21	470K 1% 0.5W Metal Film	1	R107	AXIAL-0.4
22	1M0 1% 0.5W Metal Film	1	R103	AXIAL-0.4
	<b>SWITCH</b>			
23	SPDT PCB RA [ON-OFF-ON]	2	S101, S102	7103
			NB: 102 - Remove front tabs	
24	SPDT PB PCB RA [ON-MOM]	1	S103	-
			NB: Remove front tabs	
	<b>TRANSISTOR</b>			
25	BC547B NPN Transistor	1	Q104	TO-92
26	BC557B PNP Transistor	3	Q101, Q102, Q103	TO-92

**Stage3 [ES24 - Programmer Extension Component Kit]**

Item	Description	Qty	Designator	Package
	<b>CAPACITOR</b>			
1	470pF 10% Ceramic	1	C101	RAD-0.2N
2	10nF 63V Polyester	1	C102	RAD-0.2
3	22nF 63V Polyester	1	C103	RAD-0.2
	<b>CONNECTOR</b>			
4	1x4 Pin 16mm Header	2	S102, S103	-
5	1x3 Pin 16mm Header	1	S101	-
6	IDC20 RA Box Header	1	J210	-
	<b>DIODE</b>			
7	1N4148	5	D101, D102, D104, D105, D106	DIODE-0.3
	<b>HARDWARE</b>			
8	SLEEVING - 2.4mm Heatshrink [@ 1cm]	3	D103^3	-
9	Ferrule Terminal - DUCE7575	6	S102^3, S103^3	-
10	Equipment Wire 7/0.2 Black [@ 1cm]	4	D103^4	-
11	Equipment Wire 7/0.2 Red [@ 1cm]	4	D103^4	-
	<b>OPTO-ELECTRONIC</b>			
12	3mm HE-Yellow LED	1	D103	-
	<b>POTENTIOMETER</b>			
13	100KB LIN - 18T Spline	3	P101, P102, P103	ALPHA 16MM
	<b>RESISTOR</b>			
14	1K0 1% 0.5W Metal Film	1	R112	AXIAL-0.4
15	1K2 1% 0.5W Metal Film	1	R110	AXIAL-0.4
16	1K3 1% 0.5W Metal Film	1	R111	AXIAL-0.4
17	47K 1% 0.5W Metal Film	3	R101, R102, R109	AXIAL-0.4
18	100K 1% 0.5W Metal Film	1	R104	AXIAL-0.4
19	150K 1% 0.5W Metal Film	3	R105, R106, R108	AXIAL-0.4

### Stage3 [ES24 - Programmer Extension Component Kit]

Item	Description	Qty	Designator	Package
	<b>RESISTOR - continued</b>			
20	220K 1% 0.5W Metal Film	3	R113, R114, R115	AXIAL-0.4
21	470K 1% 0.5W Metal Film	1	R107	AXIAL-0.4
22	1M0 1% 0.5W Metal Film	1	R103	AXIAL-0.4
	<b>SWITCH</b>			
23	SPDT PCB RA [ON-OFF-ON]	2	S101, S102	7103
			NB: 102 - Remove front tabs	
24	SPDT PB PCB RA [ON-MOM]	1	S103	-
			NB: Remove front tabs	
	<b>TRANSISTOR</b>			
25	BC547B NPN Transistor	1	Q104	TO-92
26	BC557B PNP Transistor	3	Q101, Q102, Q103	TO-92

**Stage 4 [ES24 - Programmer Extension Component Kit]**

Item	Description	Qty	Designator	Package
	<b>CAPACITOR</b>			
1	470pF 10% Ceramic	1	C101	RAD-0.2N
2	10nF 63V Polyester	1	C102	RAD-0.2
3	22nF 63V Polyester	1	C103	RAD-0.2
	<b>CONNECTOR</b>			
4	1x4 Pin 16mm Header	2	S102, S103	-
5	1x3 Pin 16mm Header	1	S101	-
6	IDC20 RA Box Header	1	J201	-
	<b>DIODE</b>			
7	1N4148	5	D101, D102, D104, D105, D106	DIODE-0.3
	<b>HARDWARE</b>			
8	SLEEVING - 2.4mm Heatshrink [@ 1cm]	3	D103^3	-
9	Ferrule Terminal - DUCE7575	6	S102^3, S103^3	-
10	Equipment Wire 7/0.2 Black [@ 1cm]	4	D103^4	-
11	Equipment Wire 7/0.2 Red [@ 1cm]	4	D103^4	-
	<b>OPTO-ELECTRONIC</b>			
12	3mm HE-Yellow LED	1	D103	-
	<b>POTENTIOMETER</b>			
13	100KB LIN - 18T Spline	3	P101, P102, P103	ALPHA 16MM
	<b>RESISTOR</b>			
14	1K0 1% 0.5W Metal Film	1	R112	AXIAL-0.4
15	1K2 1% 0.5W Metal Film	1	R110	AXIAL-0.4
16	1K3 1% 0.5W Metal Film	1	R111	AXIAL-0.4
17	47K 1% 0.5W Metal Film	3	R101, R102, R109	AXIAL-0.4
18	100K 1% 0.5W Metal Film	1	R104	AXIAL-0.4
19	150K 1% 0.5W Metal Film	3	R105, R106, R108	AXIAL-0.4



### Stage 4 [ES24 - Programmer Extension Component Kit]

Item	Description	Qty	Designator	Package
	<b>RESISTOR - continued</b>			
20	220K 1% 0.5W Metal Film	3	R113, R114, R115	AXIAL-0.4
21	470K 1% 0.5W Metal Film	1	R107	AXIAL-0.4
22	1M0 1% 0.5W Metal Film	1	R103	AXIAL-0.4
	<b>SWITCH</b>			
23	SPDT PCB RA [ON-OFF-ON]	2	S101, S102 NB: 102 - Remove front tabs	7103
24	SPDT PB PCB RA [ON-MOM]	1	S103 NB: Remove front tabs	-
	<b>TRANSISTOR</b>			
25	BC547B NPN Transistor	1	Q104	TO-92
26	BC557B PNP Transistor	3	Q101, Q102, Q103	TO-92

### Back Board [ES24 - Programmer Extension Component Kit]

Item	Description	Qty	Designator	Package
<b>CONNECTOR</b>				
1	1x2 Pin 9mm Header	2	JP1, JP2	2.54MM
2	IDC20 Box Header	2	J5, J6	2.54MM
3	IDC20 Receptacle	4	J1, J2, J3, J4	2.54MM
<b>UNITS</b>				
4	Panther - IDC20 - 08cm	1	J5	-

Bill of Materials for ES23 - Sequence Programmer Full Kit V0.3  
**ES23 - Sequence Programmer Component Kit**

Item	Description	Qty	Designator	Package
<b>CAPACITOR</b>				
1	47pF 5% Ceramic	6	C201, C202, C211, C212, C221, C222	RAD-0.2N
2	10nF 63V Polyester	4	C101, C102, C103, C104	RAD-0.2
3	100nF Ceramic	6	C303, C304, C305, C306, C307, C308	RAD-0.2N
4	10uF 35V Electrolytic	2	C301, C302	RB-D5.0-P2.0
<b>CONNECTOR</b>				
5	8-pin IC Socket 0.3inch	2	U101, U202	DIP-8
6	14-pin IC Socket 0.3inch	1	U201	DIP-14
7	Jumper Shunt	2	JP1, JP2	2.54MM
8	1x4 Pin 9mm Header	3	J201, J202, J203	2.54MM
9	IDC16 Box Header	1	J301	2.54MM
10	1x4 Pin 16mm Header	2	J102, J104	-
11	IDC20 RA Box Header	1	J302	-
			NB: Do not solder pin 16	
<b>DIODE</b>				
12	1N4148	2	D101, D102	DIODE-0.3
<b>LINEAR</b>				
13	LM393 - Dual Comparator	1	U101	DIP-8
14	TL072 Dual JFET Opamp	1	U202	DIP-8
15	TL074 Quad JFET Opamp	1	U201	DIP-14
<b>INDUCTOR</b>				
16	Ferrite Bead - 0.45uH 7A	2	L301, L302	AXIAL-0.3
<b>RESISTOR</b>				
17	330R 1% 0.5W Metal Film	3	R204, R214, R224	AXIAL-0.4
18	1K0 1% 0.5W Metal Film	4	R108, R120, R125, R130	AXIAL-0.4
19	1K3 1% 0.5W Metal Film	2	R107, R119	AXIAL-0.4
20	2K2 1% 0.5W Metal Film	2	R124, R129	AXIAL-0.4

Bill of Materials for ES23 - Sequence Programmer Full Kit V0.3  
**ES23 - Sequence Programmer Component Kit**

<b>Item</b>	<b>Description</b>	<b>Qty</b>	<b>Designator</b>	<b>Package</b>
	<b>RESISTOR - continued</b>			
21	10K 1% 0.5W Metal Film	4	R110, R111, R112, R128	AXIAL-0.4
22	22K 1% 0.5W Metal Film	1	R113	AXIAL-0.4
23	33K 1% 0.5W Metal Film	1	R114	AXIAL-0.4
24	47K 1% 0.5W Metal Film	9	R103, R104, R106, R115, R116, R117, R118, R131, R132	AXIAL-0.4
25	100K 1% 0.5W Metal Film	10	R123, R201, R202, R203, R211, R212, R213, R221, R222, R223	AXIAL-0.4
26	150K 1% 0.5W Metal Film	1	R101	AXIAL-0.4
27	220K 1% 0.5W Metal Film	2	R122, R127	AXIAL-0.4
28	470K 1% 0.5W Metal Film	3	R102, R121, R126	AXIAL-0.4
29	1M0 1% 0.5W Metal Film	1	R105	AXIAL-0.4
	<b>TRANSISTOR</b>			
30	BC557B PNP Transistor	2	Q102, Q105	TO-92
31	BC547B NPN Transistor	3	Q101, Q103, Q104	TO-92
	<b>UNITS</b>			
32	Panther - IDC16 - 24cm	1	J301	-

**Stage 1 [ES24 - Programmer Extension Hardware Kit]**

Item	Description	Qty	Designator	Package
	<b>CONNECTOR</b>			
1	3.5mm Mono PCB Socket - Red	1	J101	-
2	3.5mm Mono PCB Socket - Yellow	1	J102	-
	<b>HARDWARE</b>			
3	KNOB - EuroSynth	2	P101, P102	18T SPLINE
	<b>OPTO-ELECTRONIC</b>			
4	3mm Clear Lens Mount	1	D103	-

**Stage2 [ES24 - Programmer Extension Hardware Kit]**

Item	Description	Qty	Designator	Package
<b>CONNECTOR</b>				
1	3.5mm Mono PCB Socket - Red	1	J101	-
2	3.5mm Mono PCB Socket - Yellow	1	J102	-
<b>HARDWARE</b>				
3	KNOB - EuroSynth	3	P101, P102, P103	18T SPLINE
<b>OPTO-ELECTRONIC</b>				
4	3mm Clear Lens Mount	1	D103	-

### Stage3 [ES24 - Programmer Extension Hardware Kit]

Item	Description	Qty	Designator	Package
<b>CONNECTOR</b>				
1	3.5mm Mono PCB Socket - Red	1	J101	-
2	3.5mm Mono PCB Socket - Yellow	1	J103	-
<b>HARDWARE</b>				
3	KNOB - EuroSynth	3	P101, P102, P103	18T SPLINE
<b>OPTO-ELECTRONIC</b>				
4	3mm Clear Lens Mount	1	D103	-







Bill of Materials for ES23 - Sequence Programmer Full Kit V0.3  
**ES23 - Sequencer-Programmer PCB/Panel Set**

Item	Description	Qty	Designator	Package
<b>PANEL</b>				
1	ES23 - Sequence Programmer Front Panel A	2		-
<b>PCB</b>				
2	ES24 - Programmer Extension BackBoard PCB V0.0	1		-
3	ES24 - Programmer Extension Stage PCB V0.2	4		-
4	ES23 - Sequence Programmer PCB V0.3	1		-
5	Panther Carrier PCB - JACK-SPDT V1.3	13	NB: Do Not Solder J302_16	-
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