ACOM International, Inc.

Exhibit 11: Tuning Procedure and Parts List

External Radio Frequency Power Amplifier ACOM 1010

Model 1010

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4-5. Tuning

Tuning is possible only in the **OPER** mode.

a) Preliminary information.

Tuning the amplifier involves a procedure of matching the impedance of the antenna and transmission line to the amplifier tube's characteristic load resistance. This will ensure maximum plate efficiency and RF gain at nominal output power, with minimal distortion and spurious output. Note that **REFLECTED POWER** readings depend on the antenna and transmission line impedances only, and not on amplifier tuning. If the load impedance is not a nominally resistive 50-Ohms, the **REFLECTED POWER** reading will always show a reading, no matter what the tuning settings. Proper tuning is always necessary, however, and will allow you to operate at a high power level, without distortion or any danger to the amplifier. Note also that the real **OUTPUT POWER** presented to the load (the antenna and transmission line) is equal to the difference between the **FORWARD** and **REFLECTED** power readings. For instance, with a 2.5:1 VSWR, readings of 800 W and 150 W **FORWARD POWER** and **REFLECTED POWER**, respectively, the real **OUTPUT POWER** is 650 W. At very high VSWR levels, such as when no antenna is connected or a badly mismatched antenna is used, the **FORWARD** and **REFLECTED** readings will be almost equal, while the real **OUTPUT POWER** (the difference between them) will be nearly zero. The amplifier can operate safely as long as the **REFLECTED POWER** is LESS THAN 250 W. Matching is assured for loads presenting a VSWR of up to 3:1. Nevertheless, for some loads and bands, matching is possible at even higher VSWR levels, but the drive power must be reduced to prevent the **REFLECTED POWER** from exceeding 250W. Failure to comply with these guidelines will cause the protection circuits to trip. For example, if the antenna VSWR were 5:1, the maximum attainable forward power would be 540 W, 240 W of reflected power and real output to the antenna and transmission line of only 300 W. In the event your antenna cannot be adjusted to produce a lower VSWR, an external antenna tuner may be deployed.

CAUTION

At elevated VSWR levels, high voltages and high currents are distributed along the coaxial cable to the antenna, risking internal arcing and heat generation, and likely damage to the cable and any antenna switches that may be used. It is recommended that VSWR levels of more than 3:1 not be permitted with coaxial cable above 14 MHz.

It is advisable to adjust amplifier tuning when antennas have been changed, snow has fallen, new objects are in the near field of the antenna, etc. Such changes may affect antenna impedance.

NOTE

If you use more than one antenna on a band, the proper antenna must be selected prior to performing the tuning procedure outlined below.

CAUTION

To avoid damage not covered under warranty, do not switch the **BAND** switch knob while transmitting. As discussed above, hot switching will damage the amplifier's band switch!

CAUTION

Also, never apply drive longer than one minute continuously without pausing for at least one minute to allow the tube to cool.

It is recommended that for initial tuning a frequency in the middle of the band be used. First, with no transceiver power applied, select the band. Then use Table 4-1 to achieve an approximate preset for both TUNE and LOAD capacitor knob settings:

Band MHz	LOAD Knob Dial	TUNE Knob Dial
1.800 - 2.000	42 - 71	55 - 28
3.500 - 4.000	32 - 57	52 - 31
7.000 - 7.300	29 - 40	36 - 27
10.100 - 10.150	59 - 66	50 - 44
14.000 - 14.350	33 - 39	42 - 30
18.068 - 18.168	17 - 35	60 - 50
21.000 - 21.450	50 - 60	15 - 10
24.890 - 24.990	38 - 42	80 - 72
28.000 - 29.700	51 - 64	41 - 24

Table 4-1. Approximate tuning preset

b) Tuning Procedure.

(1) Once the antenna and band have been selected (and the **TUNE** and **LOAD** adjustments have been initially set as indicated in Table 4-1), apply between 10 and 20 W of continuous (key down CW) signal.

(2) Look at the upper LED bar-graph (**FORWARD POWER**) and adjust the **TUNE** (right hand) capacitor for maximum indication.

(3) Watch the TRI indicator above the **LOAD** (left hand) capacitor and turn the **LOAD** capacitor in the indicated direction to center the green LED indicator light.
(4) Increase the drive power to get the desired nominal output; then repeat steps (2) and (3), always peaking output with the **TUNE** adjustment.

NOTE
No light on the TRI indicator means that the tuning is too far off. To correct this, turn the **LOAD** and **TUNE** knobs around the table-suggested positions until the TRI indicator illuminates.

no light: use **TUNE** knob for max. Power to get any marker	tuning is far left: turn **LOAD** knob to the right to get the inside markers	tuning is far right: turn **LOAD** knob to the left to get inside markers	marker inside: turn **LOAD** knob slightly left to center it	**LOAD** is tuned: turn **TUNE** knob to peak Forward Power

Fig. 4-1. Using **TRI** tuning aid

The TRI indicator will not illuminate until at least 20 W of forward power (output) is achieved. In the event successful matching cannot be accomplished, check the **BAND** switch position and antenna selection. Then check the antenna VSWR at the same drive frequency.

d) Tuning hint. A benefit of TRI is that the knob positions are virtually independent. The plate-load resistance decreases to the right and increases to the left of the TRI center. A centered tuning indication corresponds to the proper LOAD capacitor tuning, which presents an optimum load resistance to the tube. If the LOAD knob is turned to the left with a centered TRI, there will be more gain, but less linearity. When available drive power is insufficient or when less output but better efficiency are needed, *e.g.*, for RTTY and SSTV, this may be desirable. Tuning to the right of the center would lead to the opposite result, *i.e.*, less gain and more power attainable. Of course, this requires more drive power, more plate current, and more plate heat, which shortens tube's-expected life. Off -center tuning may also be used to compensate for line (mains) voltage variations in order to maintain tube efficiency. In that case, tune to the left when line (mains) voltage is high, or tune to the right if it is low. However, where there is more than a 10% difference from the nominal line (mains) voltage, the voltage selector inside the amplifier should be changed. See Section 2-2 (Line Voltage Selection).

ACOM1010 PARTS LIST

Nr.	Code ACOM		Description	Qty.	Delivery
1	CEH	107M	Cap el. Alum. 100uF 450V snap in 10mm; max Φ25mm h35mm; Panasonic EET-UQ2W101BA; Hitano ELP series	7	Digi-Key P11933-ND; Hitano - MT1
2	CEH	226M	Cap el. Alum. 22uF 160V 5mm (max Φ13x25mm); Panasonic ECA-2CM220; Hitano - ECR series	1	Panasonic - Digi-Key P5323-ND; Hitano - MT1
3	CEL	105M	Cap el. Alum. 1uF 16V 2mm (max Φ6,5mm); Panasonic ECE-A1HKS010; Hitano - ECR series	4	Panasonic - Digi-Key P993-ND; Hitano - MT1
4	CEL	106M	Cap el. Alum. 10uF 10V 2mm (max Φ7mm); Panasonic ECA-1CM100; Hitano - ECR series	1	Panasonic - Digi-Key P5134-ND; Hitano - MT1
5	CEL	107M	Cap el. Alum. 100uF 16V 2,5mm (max Φ6,5mm); Panasonic ECA-1CM101; Hitano - ECR series	2	Panasonic - Digi-Key P5138-ND; Hitano - MT1
6	CEL	338M	Cap el. Alum. 3300uF 25V 7,62mm (max Φ17x38mm); Panasonic ECA-1EM332; Hitano - ECR series	1	Panasonic - Digi-Key P5158-ND; Hitano - MT1
7	CKD	100J	Cap cer. disc type I 10pF ±5% NPO 500VDC; 5mm; CONIS CD-IB NPO 10pF ±5% 500V; HITANO TCH2H100JK555B; AVX 5AQ100JOAQE; Philips (BC) 2222 653 10 109; Murata DD05-63CH100D500; Philips D100D20COGLAAAA; Panasonic ECC-D2H100DC5	3	CONIS Kyustendil; HITANO - MT1; AVX - KOMET, ALTRONICS; BC - Altronics; Murata - CODICO; Philips - Digi-Key 1355PH-ND; Panasonic - Digi-Key P4400A-ND
8	CKD	103M	Cap cer. disc type II - 10nF ±20% Z5U/E2 500VDC; ф 12mm max; 5mm; HITANO HE2H103ML516B; AVX 5SQ103MAHQD; CERA-MITE 5GASS10; BC Components D103K69Y5PL63L0	12	HITANO - MT1; AVX - KOMET, ALTRONICS; CERA-MITE; BC - Digi-Key 1424PH-ND
9	CKD	131J	Cap cer. disc type I NPO 130pF±5% 2kV/2kVA	4	CONIS Kyustendil
10	CKD	221J	Cap cer. disc type I N750 220pF±5% 500V; BC Components D221J59COGLABAA; Hitano TUJ2H221KK56B; Samsung CCUJ2H221JD; AVX 5GQ221JNHAE	4	CONIS Kyustendil; BC Components - Digi-Key 1370PH-ND

11	CKD	222K	Cap cer. disc type II 2,2nF ±20% 3kVDC ф22mm 10mm Russia K15-5 2200pF H20 3kV; HITANO KB3F222MK058B; MURATA DE1307B222K3K; Panasonic ECKD3F222KBP; CERA-MITE 30TSD22	2	Russia; HITANO - MT1; Murata - CODICO; Panasonic - Farnell 578-666; CERA-MITE Digi-Key P4512A-ND
12	CKD	222M	Cap cer. disc type II 2,2nF ±20% 6kV 10mm; Panasonic ECKD3J222MDU; HITANO KB3I222M-L018B; Murata DECE33J222ZC48	5	HITANO - MT1; Panasonic - Farnell 578-769; Murata - CODICO or Farnell 498-506
13	CKD	470J	Cap cer. disc type I NP0 47pF ±5% 500V 5mm; HITANO TCH2H470J-K556B; CONIS CD-IB NP0 47pF±5% 500VDC; Panasonic ECC-D2H470JC5; BC Components 470J29COGLAAAA	1	HITANO - MT1;Panasonic - Digi-Key P4408A-ND; BC - Digi-Key 1362PH-ND
14	CKD	5E6J	Cap cer. disc type I - 5,6pF ±0.25pF NPO 1kV 5mm; Hitano TCH3A5P6CK556B	2	Hitano - MT1
15	CKD	821M	Cap cer. disc type II 820pF ±10% 1kV ф9x4mm spec. CONIS	12	CONIS Kyustendil
16	CKS	102K	Cap cer multilayer 0805 1nF ±10% 50V X7R; Kemet C0805C102K5RACTU; BC Components 0805B102K500BT	14	Kemet - Digi-Key 399-1147-1-ND; BC - Digi-Key BC1284CT-ND
17	CKS	103K	Cap cer multilayer SMD 0805 10nF ±10% 50V X7R; AVX 08055C103KAT2A	8	AVX - Digi-Key 478-1383-1-ND
18	CKS	104M	Cap cer multilayer SMD 1206 100nF ±20% 50V X7R; Kemet C1206C104M5RACTU; BC Components 1206B104K500BT	7	Kemet - Digi-Key 399-1248-1-ND; BC - Digi-Key BC1326CT-ND
19	CKS	270J	Cap cer multilayer SMD 0805 NPO 27pF ±5% 50V; Panasonic ECJ-2VC1H270J; BC Components 0805N270J500NT	2	Panasonic - Digi-Key PCC270CGCT-ND; BC - Digi-Key BC1261CT-ND
20	CKS	473M	Cap cer multilayer SMD 1206 47nF ±20% 50V; AVX 12065C473KAT2A	11	AVX - Digi-Key 478-1550-1-ND
21	CKS	560J	Cap cer multilayer SMD 0805 NP0 56pF ±5% 50V; Panasonic ECJ-2VC1H560J	4	Digi-Key PCC560CGCT-ND
22	CTK	111K	Trimmer cap 6/110pF N100 250V Violet; PHILIPS 222 808 31101	1	AVNET Order Code 014019
23	DEG	3DIA	LED Φ3mm green; Fairchild HLMP-1790	3	Fairchild - Digi-Key HLMP1790-ND; Mouser 512-HLMP1790
24	DEG	5DIA	LED Φ5mm green CQY72 (VQA23); Fairchild MV6451; HLMP-4740	21	PHILIPS (RFT); Fairchild - Digi-Key MV6451-ND; HLMP4740-ND; Mouser 512-MV6451; 512-HLMP4740

25	DER	3DIA	LED Φ3mm red; Fairchild HLMP-K150	1	Fairchild - Digi-Key HLMPK150-ND; Mouser 512-HLMPK150
26	DER	5DIA	LED Φ5mm red CQY40 (VQA13); Fairchild MV6951; HLMP-D150A	7	PHILIPS (RFT); Fairchild - Digi-Key MV6951-ND; HLMPD150A-ND; Mouser 512-MV6951; 512-HLMPD150A
27	DEY	3DIA	LED Φ3mm yellow; Fairchild HLMP-1719	4	Fairchild - Digi-Key HLMP1719-ND; Mouser 512-HLMP1719
28	DEY	5DIA	LED Φ5mm yellow CQY74 (VQA33); Fairchild MV6351; HLMP-4719	3	PHILIPS (RFT); Fairchild - Digi-Key MV6351-ND; HLMP4719-ND; Mouser 512-MV6351; 512-HLMP4719
29	DGD	311	Diode germanium D311	2	RUSSIA
30	DSD	BAV99	Diode Si SOT-23 BAV99	4	Philips (A7p); Diodes Inc. - Digi-Key BAV99DICT-ND
31	DSR	BY4	Diode Si HV type BY4; BY4000	4	DIOTEC
32	DSR	S1A	Diode Si DO214AC (DO214BA, DO214AA) - S1A (GF1A)	4	GS; FCH - Farnell 165-669; 547-499; 251-460 (GS - Digi-Key S1ADICT-ND; GF1AGICT-ND)
33	DSR	S1G	Diode Si DO214AC (DO214BA, DO214AA - S1G (GF1G)	3	Digi-Key S1GDICT-ND
34	DSR	S1M	Diode Si DO214AC (DO214BA, DO214AA) - S1M (GF1M)	7	Digi-Key S1MDICT-ND
35	DSX	4E7	Diode Si Zener 4,7V SOT-23 - BZX84C4V7	3	Philips (Z1p); Vishay - Digi-Key BZX84C4V7DICT-ND
36	DSZ	120	Diode Si Zener SOT-23 - BZX84C12 12V/03W; Diodes Inc. BZX84C12-7 (KY2)	3	Diodes Inc. - Digi-Key BZX84C12DICT-ND
37	DSZ	271	Diode Si Zener BZT03C270 270V/3W	1	www.viewcom.force9.co.uk; www.rapidelectronics.co.uk; www.usbid.com; angliac.co.uk
38	DSZ	680	Diode Si Zener BZV85C68 (BZX85C68,1N4760A) 68V/1W	1	Microsemi - Digi-Key 1N4760AMSCT-ND
39	FHP	10A	Fuse Holder 5x20mm 10A/250VAC snap-in; Canal WTN1114R2	2	www.canal.com.tw
40	FHS	20	Fuse Holder 5x20mm ZH1 (ECLIPSE CFH02/W p/nJVS) (Reichelt PL112000) (Multicomp MCHTC-15M ref.146-123)	2	PULSATOR (ECLIPSE, Reichelt, Multicomp-Italy)
41	FLQ	10A	Fuse 10A 250V 5x20mm Fast (Quick Blow), Littel Fuse 0217010.H; Wickmann 1942100000	4	Littelfuse - Digi-Key F955-ND; Wickmann - Digi-Key WK2071-ND
42	FLQ	5A	Fuse 6.3A 250V 5x20mm Fast (Quick Blow), Littel Fuse 0217006.3; Wickmann 1931630000	4	Littelfuse - Digi-Key F952-ND; Wickmann - Digi-Key WK1063-ND
43	FLS	2ASB	Fuse 2A 250V SLOW BLOW (Time Lag) Φ5x20mm; Wickmann 1951200000; Littelfuse 218002.H	2	Wickmann - Digi-Key WK5057-ND; Littelfuse - Digi-Key F978-ND

44	FLS	5ASB	Fuse 5A 250V SLOW BLOW (Time Lag) Φ5x20mm; Wickmann 1951500000; Littelfuse 0218005.H	2	Wickmann - Digi-Key WK5063-ND; Littelfuse - Digi-Key F982-ND
45	FTF	125	Ferrite toroide 12,7x7,9x6,35 u=125 (80); Fair-Rite 59 61 001 101; Amidon FT-50A-61; Siemens B64290-P44-X1	2	Fair-Rite - Dexter; Amidon; Siemens
46	FTF	2000	Ferrite toroide K 16x8x6mm u=2000	6	Pernik
47	FTF	28	Ferrite toroide HF28 u=28 25x15x10mm	2	Samokov
48	FTF	2000	Ferrite tube CTF4x1x20mm u=2000	1	Samokov
49	HPB	TO220	Plastic TO220 Isolierbuchse; Alutronic IS561	1	Alutronic - Setron 054968
50	HPP	TO220	Plastic TO-220 Waermeableitscheibe; Alutronic SI489	1	Alutronic - Setron 018467
51	JBF	3	10A 250VAC IEC320/EN60320 AC POWER INLET Snap-in Mountable; Canal 2111-P-Q	1	www.canal.com.tw
52	JCF	1	7,5mm Panel Mount RCA Phono Jack (Cinch-Einbaubuchse); Keystone Cat.No.574 (Round Base - SENO); Keystone Cat.No.576 (Hex Base - Digi-Key); DELTRON 431-0100 (Farnell)	1	Digi-Key-Keystone (Hex) p/n 576K-ND; FARNELL-Del-tron 147-012; SETRON CBM 006629; Conrad 032100; Reichelt Best. nr.CBM Metall; MT1(Shiuachy, SC) SCJ-0363; PULSATOR CC-114
53	JCF	239	UHF Coaxial Connectors Panel Mount SO239 p/n 83-1R-RFX	3	Amphenol; Digi-Key ARFX1005-ND
54	JRF	10	MTA100 10 IDC Receptacle white (AWG24) 1-640441-0	3	AMP; Digi-Key p/n A1905-ND
55	JRF	12	MTA100 12 IDC Receptacle white 24AWG 1-640441-2	3	AMP; Digi-Key p/n A19025-ND
56	PF	6E4	Plastic groove Φ4xΦ6,4 ELPAC LPR 2301	3	ELPAC
57	JRF	3	CONNECTOR MTA156 3 IDC CONTACTS ORANGE 18AWG 640426-3)	1	AMP; Digi-Key p/n A19580-ND
58	PT	X	5mm/T1-3/4 LED Lens/Mount Low Profile green + Spacer; ARCOLECTRIC SWITCHES (Visual Communications Company - VCC) type "Cliplite" CLB300GTP+SPC125; Keystone "LED Lens Caps, Round, Green + SPACER" p/n 8669 + 8692	1	Farnell 176-918; Mouser 593-3000G; Keystone 8669 + 8692
59	JRF	4	MTA100 12 IDC Receptacle white 24AWG 640441-4	1	AMP; Digi-Key p/n A1902-ND
60	JRF	5	MTA100 5 IDC Receptacle white (AWG24) 640441-5	1	AMP; Digi-Key p/n A19021-ND

61	JRM	10	PIN HEADER MTA100 10 STRAIGHT POST FRICTION LOCK 1-640456-0	2	AMP; Digi-Key p/n A1925-ND
62	JRM	10	PIN HEADER MTA100 10 RIGHT ANGLE POSTS FRICTION LOCK AMP p/n 1-640457-0	1	AMP; Digi-Key p/n A1930-ND
63	JRM	12	PIN HEADER MTA100 12 STRAIGHT POSTS FRICTION LOCK AMP p/n 1-640456-2	1	AMP; Digi-Key p/n A19475-ND
64	JRM	12	PIN HEADER MTA100 12 RIGHT ANGLE POSTS FRICTION LOCK AMP p/n 1-640457-2	2	AMP; Digi-Key p/n A19485-ND
65	JRM	3	PIN HEADER MTA156 3 STRAIGHT POSTS FRICTION LOCK 640445-3	1	AMP; Digi-Key p/n A19890-ND
66	JRM	4	PIN HEADER MTA100 4 RIGHT ANGLE POSTS FRICTION LOCK AMP p/n 640457-4	1	AMP; Digi-Key p/n A1927-ND
67	JRM	5	PIN HEADER MTA100 5 STRAIGHT POST FRICTION LOCK 640456-5	1	AMP; Digi-Key p/n A19471-ND
68	JSF	1	FASTON 6,35mm 16-14AWG blue AMP p/n 640905-1	1	AMP; Digi-Key A0904-ND, WEITKOWITZ -44017
69	JSF	1	4,8x0,5mm Flachsteckhuelsen vollisoliert rot; Weitkowitz bestell-nr.44042	2	WEITKOWITZ - 44042
70	JSF	1	4,8x0,8mm Flachsteckhuelsen vollisoliert rot; Weitkowitz bestell-nr.44043	4	WEITKOWITZ - 44043
71	JSM	1	AMP FASTON TAB 6,3mmx0,8mm	1	Teteven (AMP 216926-1)
72	KSH	2X8A	Relay Finder - 41.52.9.012.0311 (41.52.9.012.0310); Potter & Brumfield / Schrack - RTE44012(F) -(RT444012(F)	1	Finder; P&B, Schrack - Tyco Electronics
73	KSH	2X8A	Relay Finder - 41.52.9.012.0011 (41.52.9.012.0010); Potter & Brumfield / Schrack - RTE24012(F)\; (RT424012(F))	1	Finder; P&B, Schrack - Tyco Electronics
74	KSH	2X8A	Relay Finder - 41.52.9.012.5011 (41.52.9.012.5010); Potter & Brumfield / Schrack - RTE25012(F); (RT425012(F)	2	Finder; P&B, Schrack - Tyco Electronics
75	KSL	TQ2	Relay A-12WK (TQ2E-12V)	1	TAKAMISAWA-AVNET, No.33982 (Aromat - Digi-Key Part No. 255-1002-ND)
76	LFD	220	RF choke 22uH; ф4.3x10mm max J.W.Miller Magnetics 77F220K; 78F220J	2	Miller - Digi-key 77F220K-ND; M7829-ND
77	MDC	12V	Blower DELTA BFB1012L(M,H)	1	DELTA
78	MMT	THV	Transformer HV	1	Teteven

79	RAM	272J	Res 2,7kOhm ±5% 0,25W max ϕ3,3x9mm; Yageo CFR-25JB-2K7	1	Yageo - Digi-key 2.7KQBK-ND
80	RAM	393J	Res 39kOhm ±5% 0,25W max ϕ3,3x9mm; CFR-25JB-39K	1	Yageo - Digi-Key 39KQBK-ND
81	RAM	622J	Res 6,2kOhm ±5% 0,25W max ϕ3,3x9mm; Yageo CFR-25JB-6K2	1	Yageo - Digi-key 6.2KQBK-ND
82	RCM	104J	Res 100kOhm ±5% 1W; BC Components type PR01 cat.nr. 2322 193 13 104 (5073NW100K0J12AFX - American); Yageo RSF100JB-100K;	2	BC - Digi-key BC100KW-1CT-ND; Yageo - Digi-key - 100KW-1-ND
83	RCM	105J	Res 1MOhm ±5% 1W; BC Components type PR01 cat.nr. 2322 193 13 105 (5073NW1M000J12AFX - American); Yageo RSF100JB-1M0	3	BC - Digi-key BC1.0MW-1CT-ND; Yageo - Digi-key - 1.0MW-1-ND
84	RCM	153J	Res 15kOhm ±5% 1W; BC Components type PR01 cat.nr. 2322 193 13 153 (5073NW15K00J12AFX - American); Yageo RSF100JB-15K; Panasonic ERG-1SJ153	2	BC - Digi-key BC15KW-1CT-ND; Yageo - Digi-Key 15KW-1-ND; Panasonic - Digi-Key P15KW-1BK-ND
85	RCM	391J	Res 390 Ohm ±5% 1W; BC Components type PR01 cat.nr. 2322 193 13 391 (5073NW390R0J12AFX - American); Yageo RSF100JB-390R; Panasonic ERG-1SJ391	2	BC - Digi-Key BC390W-1CT-ND; Yageo - Digi-Key 390W-1-ND; Panasonic - Digi-Key P390W-1BK-ND
86	RCM	470K	Res 47 Ohm ±10% 1W max ϕ4,5x12mm; BC Components type PR01 cat.nr. 2322 193 13 479 (5073NW47R00J12AFX - American); Yageo RSF100JB-47R; Panasonic ERG-1SJ470	2	Yageo - Digi-Key 47W-1-ND; Panasonic - Digi-Key P47W-1BK-ND; BC - Digi-Key BC47W-1CT-ND
87	RCM	472J	Res 4,7kOhm ±5% 1W; BC Components type PR01 cat.nr. 2322 193 13 472 (5073NW4K700J12AFX - American); Yageo RSF100JB-4K7; Panasonic ERG-1SJ472	3	BC - Digi-Key BC4.7KW-1CT-ND; Yageo - Digi-Key 4.7KW-1-ND; Panasonic - Digi-Key P4.7KW-1BK-ND
88	RCP	2740F	Res 27,4 Ohm ±1% 1W; ϕ5x12mm max; 15mm; BC Components type MBE 0414 p/n 2312 92.12749	2	BC - Setron

89	RDC	220K	Res 22 Ohm ±10% 2W; Ohmite OY220K; Globar Kanthal 233AS 220K	2	Ohmite - Digi-Key OY220K-ND; Ohmite - Mouser - 588-OY-22; Ohmite - Allied Electronics 296-5352; Globar (ex CESIWID): sales.globar@kanthal.com
90	RDM	154J	Res 150kOhm ±5% 2W (3W if carbon); Yageo RSF200JB-150K; BC Components 5083NW150K0J12AFX	7	Digi-Key 150KW-2-ND; BC150KW-2CT-ND
91	RDM	6R8K	Res 6,8 Ohm ±5% 2W max ϕ8x13mm; Yageo RSF200JB-6R8; Panasonic ERX-2SJ6R8; BC Components type PR03 cat.nr. 2322 195 13 688 (5083NW6R800J12AFX - american)	1	Yageo - Digi-Key 6.8W-2-ND; Panasonic - Digi-Key P6.8W-2BK-ND; BC - Digi-Key BC6.8W-2CT-ND
92	RDM	683J	Res 68kOhm ±5% 2W; Yageo RSF200JB-68K; MULTICOMP MCF 2W 68K	3	Yageo - Digi-Key 68KW-2-ND; MULTICOMP - Farnell 489-785
93	REC	121J	Res 120 Ohm ±5% 3W ERG-3SJ121; MOLDED A/B RC42GF121K	1	Panasonic: Digi-Key P120W-3BK-ND; (A. BRADLY USA)
94	REM	333J	Res 33kOhm ±5% 3W; Panasonic ERG-3SJ333; BC Components type PR03 cat.nr. 2322 195 13 333 (5093NW33K00J - American)	1	Panasonic - Digi-Key - P33KW-3BK-ND; BC - Digi-key BC33KW-3JCT-ND
95	REW	2E2J	Res 2,2 Ohm ±5% 3W max ϕ6,5x15mm; BC Components type AC03 cat.nr. 2322 329 03 228; or 2,0 Ohm 2322 329 03 208	1	BC - Setron; 2,0 Ohm - Digi-Key AC3W2.0TB-ND
96	RGW	220K	Res 22 Ohm ±10% 10W max ϕ9x55mm; BC Components type AC10 cat.nr. 2322 329 10 229; BIOHMSA KNA 844 11W 22R 5%; Welwyn W24 22R JI	1	BC - Setron; BIOHMSA - Setron; Welwin - Farnell 106-934
97	RGW	220K	Res 22 Ohm ±10% 10W max ϕ9x55mm; YAGEO/VITROHM KF214-4-10B22R; HTR FR-C7-22RK; Megastar-Ohm (Gembird) FSQ7-10%-22RB; Token FSQ7W-10%-22RB	2	Yageo/Vitrohm - Setron
98	RHC	500J	Res 50 Ohm 5% 100W 25x25mm	1	HIS - Sofia
99	RSM	102J	Res 1206 1kOhm ±5% ; Yageo 9C12063A1001JLHFT	9	Yageo - Digi-Key 311-1.0KECT-ND
100	RSM	103J	Res 1206 10kOhm ±5% ; Yageo 9C12063A1002JLHFT	17	Yageo - Digi-Key 311-10KECT-ND
101	RSM	121J	Res 1206 120 Ohm ±5%; Panasonic ERJ-8GEYJ121V; Yageo 9C12063A1200JLHFT	7	Panasonic - Digi-Key P120ECT-ND; Yageo - Digi-Key 311-120ECT-ND

102	RSM	122J	Res 1206 1,2kOhm ±5% ; Yageo 9C12063A1201JLHFT	1	Yageo - Digi-Key 311-1.2KECT-ND
103	RSM	154J	Res 1206 150kOhm ±5% ; Yageo 9C12063A1503JLHFT	3	Yageo - Digi-Key 311-150KECT-ND
104	RSM	221J	Res 1206 220 Ohm ±5%; Panasonic ERJ-8GEYJ221V; Yageo 9C12063A2200JLHFT	1	Panasonic - Digi-Key P220ECT-ND; Yageo - Digi-Key 311-220ECT-ND
105	RSM	222J	Res 1206 2,2kOhm ±5% ; Yageo 9C12063A2201JLHFT	7	Yageo - Digi-Key 311-2.2KECT-ND
106	RSM	223J	Res 1206 22kOhm ±5% ; Yageo 9C12063A2202JLHFT	1	Yageo - Digi-Key 311-22KECT-ND
107	RSM	224J	Res 1206 220kOhm ±5%; Yageo 9C12063A2203JLHFT	5	Yageo - Digi-Key 311-220KECT-ND
108	RSM	271J	Res 1206 270 Ohm ±5%; Yageo 9C12063A2700JLHFT	10	Yageo - Digi-Key 311-270ECT-ND
109	RSM	272J	Res 1206 2,7kOhm ±5% ; Yageo 9C12063A2701JLHFT	1	Yageo - Digi-Key 311-2.7KECT-ND
110	RSM	333J	Res 1206 33kOhm ±5% ; Yageo 9C12063A3302JLHFT	1	Yageo - Digi-Key 311-33KECT-ND
111	RSM	390J	Res 1206 39 Ohm ±5%; Yageo 9C12063A39R0JLHFT	2	Yageo - Digi-Key 311-39ECT-ND
112	RSM	471J	Res 1206 470 Ohm ±5%; Yageo 9C12063A4700JLHFT	1	Yageo - Digi-Key 311-470ECT-ND
113	RSM	472J	Res 1206 4,7kOhm ±5%; Panasonic ERJ-8GEYJ472V; Yageo 9C12063A4701JLHFT	4	Panasonic - Digi-Key P4.7KECT-ND; Yageo - Digi-Key 311-4.7KECT-ND
114	RSM	473J	Res 1206 47kOhm ±5% ; Yageo 9C12063A4702JLHFT	5	Yageo - Digi-Key 311-47KECT-ND
115	RSM	474J	Res 1206 470kOhm ±5% ; Yageo 9C12063A4703JLHFT	1	Yageo - Digi-Key 311-470KECT-ND
116	RSM	681J	Res 1206 680 Ohm ±5% ; Yageo 9C12063A6800JLHFT	1	Yageo - Digi-Key 311-680ECT-ND
117	RSM	682J	Res 1206 6,8kOhm ±5% ; Yageo 9C12063A6801JLHFT	3	Yageo - Digi-Key 311-6.8KECT-ND
118	RSM	820J	Res 1206 82 Ohm ±5% ; Yageo 9C12063A82R0JLHFT	4	Yageo - Digi-Key 311-82ECT-ND
119	RSP	1002F	Res 1206 10kOhm ±1%; Yageo 9C12063A1002FKHFT	3	Yageo - Digi-Key 311-10.0KFCT-ND
120	RSP	2490F	Res 1206 249 Ohm ±1%; Yageo 9C12063A2490FKHFT	1	Yageo - Digi-Key 311-249FCT-ND
121	RSP	3012F	Res 1206 30,1kOhm ±1%; Yageo 9C12063A3012FKHFT	1	Yageo - Digi-Key 311-30.1KFCT-ND
122	RSP	4020F	Res 1206 402 Ohm ±1%; Yageo 9C12063A4020FKHFT	1	Yageo - Digi-Key 311-402FCT-ND
123	RTM	103K	Res trimmer pot 10kOhm Type Piher PT6V Laydown (Panasonic EVN-D8AA03B14)	5	Piher; Burklin 66E5812, AVNET 018537; (Digi-Key D4AA14-ND)
124	RVA	320V	Varistor 230VAC/300VDC 360V@1mA 60J 4500Apk D=16,5mm; Panasonic ERZ-V14D361; Epcos B72214S231K101; Littelfuse V230LA20A	1	Panasonic - Digi-Key P7265-ND; Epcos - USBid; Littelfuse - Newark

125	SWK	BTN	Button ITT ISOSTAT 532-010-001 (E-SWITCH 520-02-1)	3	Farnell 151-145 (Digi-Key EG1411-ND)
126	SWM	10A	10A/250VAC; Micro-Switch Snap Action; Canal M141T02-A30404D	1	www.canal.com.tw
127	SWP	XXX	10A/250V DPST power switch; Canal MR210-R2A-BB; Cherry RRA32H3FBBNN	1	www.canal.com.tw; www.cherrycorp.com
128	TFN	210	MOSFET TO252 (D-Pak, SOT428) - IRFR210 (IRFR214,IRFR220)	1	International Rectifier - Digi-Key IRFR210-ND
129	TFN	820	MOSFET IRF820	1	IR - Digi-Key IRF820-ND
130	TSN	19	Transistor Si SOT-23 - BCX19	4	Zetex - Digi-Key BCX19CT-ND; Rohm (GU1)
131	TSP	17	Transistor Si SOT-23 - BCX17	2	Rohm (GT1) Digi-Key BCX17CT-ND
132	TSP	TA92	Transistor Si SOT-23 - MMBTA92 (FMMTA92,BF821)	2	Fairchild - Digi-Key MMBTA92FSCT-ND; Philips (7Dp, 7Dt)
133	UCL	7805	IC uA7805 (TO220)	1	Fairchild - Digi-Key LM7805CT-ND; MC7805CT-ND
134	USH	ATM8	IC ATmega8(L); Atmel ATMEGA8L-8PC; ATMEGA8L-8PI	1	Atmel - Digi-Key ATMEGA8L-8PC-ND; ATMEGA8L-8PI-ND
135	USL	2003	IC SO16 ULN2003D; Toshiba ULN2003AFW	2	Thomson; Toshiba - Digi-Key ULN2003AFW-ND
136	USL	336	IC SO8 LM336D; TI LM336D-2-5	1	Thomson - AVNET 021146; TI - Digi-Key 296-9549-5-ND
137	USL	358	IC SO8 LM358D	1	Thomson; TI - Digi-Key 296-1014-5-ND
138	USL	393	IC SO8 LM393D	1	Thomson; TI - Digi-Key 296-1015-5-ND
139	USL	T132	IC SO14 CD74HCT132; TI - CD74HCT132M96	1	TI - Digi-Key 296-12831-1-ND
140	USM	T165	IC SO16 74HCT165; TI - CD74HCT165M	1	TI - Digi-Key 296-9258-5-ND
141	USM	4094B	IC SO16 - HEF4094B; TI CD4094BPWR	2	Philips; TI 296-13860-1-ND
142	USM	C5921	IC DAP 32 - TLC5921; TI - TLC5921DAP	1	TI - Digi-Key 296-10349-5-ND
143	VTT	GU74	Valve GU74B (4CX800A)	1	Russia
144	YK	4000	Piezoceramic res 4000kHz 5,08mm	1	KOMET Electronics CRM0400
145	RGW	220K	Res 22 Ohm ±10% 10W max ϕ9x55mm; Vitrohm/Yageo KH214-8 - 10B22R; KH210-8 - 10B22R; Meggitt SBCHE11 22R		BC - Setron 003353; RDR7E022; Meggitt - Farnell 748018
146	WCC	50	Cable coax 50-Ohm 3mm PE; RG58/U L=(~300)mm	1	Gamakabel (Helukabel 40003); for Bypass; Cable X-perts
147	WCC	50	Cable coax 50-Ohm 4mm PE; RG8X (RG8MINI) L=(~50)mm	1	Belden 9258; Cable X-perts
148	WCC	50	Cable coax 50-Ohm 4mm PE; RG8X (RG8MINI) L=(~500)mm	1	Belden 9258; Cable X-perts; Gamakabel