Model AAA-1C. Addendum to AAA-1B documentation

1. Specifications for Model AAA-1C[11]

General

Output impedance	50 Ohms, BNC connector on control board
Power supply[1]	External, 13.8 V, =< 170 mA max.
	Polarity protection & recoverable fuse are on the control board
Maximal output voltage[10]	6V p-p or 4.2 V p-p
Physical size	76 x 76 mm Amplifier board; 32mm x76mm Control board

Current amplifier with 1m diam. loop

Loop :	diam. 1 m, 1 turn, conductor with 25 mm diameter, 2.4 uH
Antenna Factor K_a[2]	2 dB meters^{-1} @ 10 MHz
	(1 uV/m input signal will give 0.8 uV output voltage)
K_a Frequency response[2]	0.35 – 51 MHz; (within 3dB)
Usable frequency range [3]	0.02 – 55 MHz
MDS @ 10MHz [2]	0.7 uV/m , Noise bandwidth =1KHz
Output noise power at 10MHz[4,5]	-116 dBm
1 dB output compression point[9]	+19dBm (5.6 V p-p), equal to +125 dB(uV/m) at input
Second harmonic OIP2[7]	+82dBm to +105dBm
Third harmonic OIP3[8]	+41dBm to +42dBm

Voltage amplifier with dipole arms of 2 x 1 m

Antenna Factor K_a[2]	2 dB meters^{-1} @ 10 MHz
	(1 uV/m input signal will give 0.8 uV output voltage)
K_a Frequency response[2]	0.35 – 55 MHz; (within 3dB)
Usable frequency range [3]	0.02 – 55 MHz
MDS @ 10MHz [2]	0.25 uV/m, Noise bandwidth =1KHz
Output noise power at 10MHz [4,6]	-118 dBm
1 dB output compression point[9]	+19dBm (5.6 V p-p) equal to +125 dB(uV/m) at input
Second harmonic OIP2[7]	+99dBm to +105dBm
Third harmonic OIP3[8]	+40dBm to +42dBm

(1) The voltage measured between control points CP8 and CP1 of the amplifier should be > = 11.8 V. The maximal voltage should not exceed 15.7 V.
(2) The value is not measured but based upon spice model calculations.
(3) The amplifier can be used down to 20 KHz lower limit since the degradation of the gain is not so important on these frequencies (the atmospheric and man-made noise levels are high).
(4) The noise power is measured with Perseus SD RX at 10MHz at 1KHz noise bandwidth. The amplifier is placed into a shielded box and powered by battery. The inputs are connected to antenna equivalents. Careful shielding is needed to measure the amplifier output noise eliminating the noise of external sources.
(5) Measured with antenna equivalent of 2.4uH. Symmetric signal source at +A, -A terminals. Typical value.
(6) Measured with antenna equivalent of 10 pF. Symmetric signal source at V1, V2 terminals. Typical value.
(7) Measured with single tone method at 3.69MHz / 7.38 MHz at +2 dBm output level. Symmetric signal source. Data are from 100 randomly chosen production samples.
(8) Measured with single tone method at 2.46MHz / 7.38 MHz at +2 dBm output level. Symmetric signal source. Data are from 100 randomly chosen production samples.
(9) Measured at 10MHz, typical value
(10) *Clipping level. Typical value. 4.2 V is for diode limiter jumper in ON position.*
(11) *Specifications subject to change without notice. Current version* AAA-1C. *PCB identifications: ampl. board v.5.02, control board v.1.04*

2. Amplifier Board Model AAA-1C

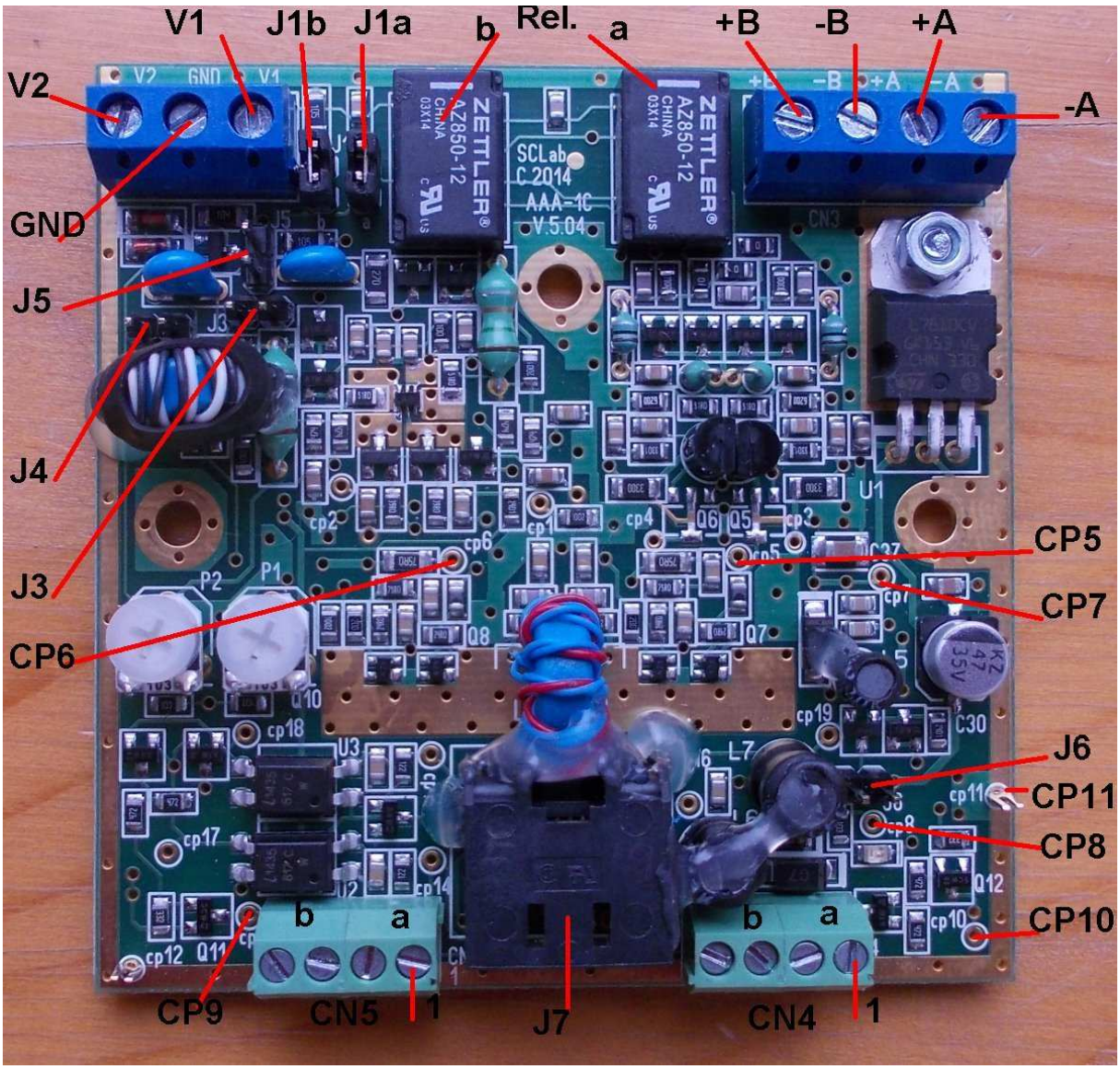

Fig.1

The amplifier board (***Fig. 1***) gets its power supply and mode control through an FTP cable. Here are the terminals and jumpers which the user can use:

+A, -A	*Terminals of Loop A. Polarity is important if crossed loops are used.*
+B, -B	*Terminals of Loop B. Polarity is important if crossed loops are used.*
V1, V2	*Terminals for separate dipole if loops are not used for dipole arms.*
GND	*Lightning protection ground terminal. Connect only to a good electrical ground point. Leave it unconnected if there is no good ground.*
J1a	*Jumper, OFF position if V1 terminal is used for dipole arm.*
J1b	*Jumper, OFF position if V2 terminal is used for dipole arm. If loops A and B are used for dipole arms these jumpers must be in ON position.*
J3,J4	*Jumpers for the input balun (in dipole mode). The default position is OFF (the balun is disconnected from the input circuit). The balun must be used when there are 2nd order IMD distortions. They might occur when large or*

asymmetric electric antennas are used. See the Application note " Adding an Input Balun in AAA-1 in Dipole Mode to Reduce 2nd Order IMD Distortions when Asymmetric Signal Source (antenna) is Used"

J5 *Jumper that connects GND terminal with the amplifier common point. Used for factory adjustments. Default position is OFF.*

J6 *Jumper. In OFF position the power supply is disconnected from the board. Used to connect the power for the first time and to protect the amplifier from wrongly crimped cable. With J6 in OFF position make sure that the green LED is ON – that means that the polarity is OK. Then J6 can be left safely in ON position.*

CP5, CP6 *DC bias measurements control points*

CP7 *10V stabilized supply voltage control point.*

CP8 *Input DC supply voltage control point.*

CP11 *Common point of the amplifier. Connect the common point of the measuring equipment here.*

J7 *RJ45 (8P8C jack modular connector). Connect crimped FTP cable here for connection to Control board.*

Pin 1	*-13.8 V*
Pin 2	*+13.8 V*
Pin 3	*-13.8 V*
Pin 4	*Dipole antenna mode; active 0V; For Loop mode must be open circuit.*
Pin 5	*Loop A mode; active 0V*
Pin 6	*Loop B mode; active 0V; if pins 5 & 6 are 0V cross-loop mode is activated.*
Pin 7	*RF Signal*
Pin 8	*RF Signal*

CN4 *terminal block connector. Connect parallel to J7.*

Pin 1	*-13.8 V*
Pin 2	*+13.8 V*
Pin 3	*-13.8 V*
Pin 4	*Dipole antenna mode; Not used by the control circuit of AAA-1C models and can be left open in all modes.*

CN5 *terminal block connector. Connect parallel to J7.*

Pin 1	*Loop A mode; active 0V*
Pin 2	*Loop B mode; active 0V; if pins 5 & 6 are 0V cross-loop mode is activated.*
Pin 3	*RF Signal*
Pin 4	*RF Signal*

There are other jumpers and control points which are not documented here but are used for factory adjustments.

3. Changes in AAA-1C model

Two changes are made in AAA-1C model. There is an additional connector (parallel to RJ45) with terminal blocks (with screws) which permits to connect the FTP cable directly and not to use RJ45 plug (***Fig.2***) . This enables other types of protected compartments to be used.

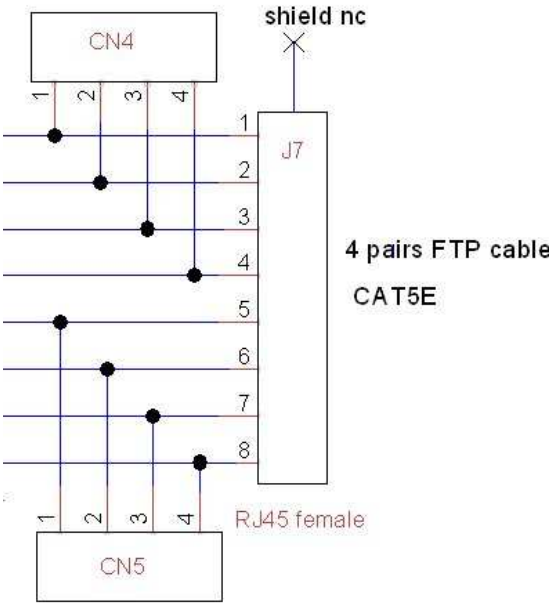

Fig. 2 *Additional plug circuit. For AAA-1C models pin 4 and the associated wire are not connected anywhere. The information for dipole mode is taken from the state of pins5 and 6 (-A Loop and –B Loop). When they are in inactive position (open) the dipole mode is activated. The compatibility with older versions of AAA-1 is preserved and there is no need to change anything in the cable wiring and Control board of earlier models.*

The control circuits for mode and antenna relays are now with opto-couplers (***Fig.3***). This will increase the protection level of the device from external electromagnetic fileds. The power consumption of the AAA-1 device is increased with approximately 18 – 22 mA due to the opto-couplers ON current. 0 V (connected to ground) is the active state. The control circuit in AAA-1B is shown on Fig.4 for reference.

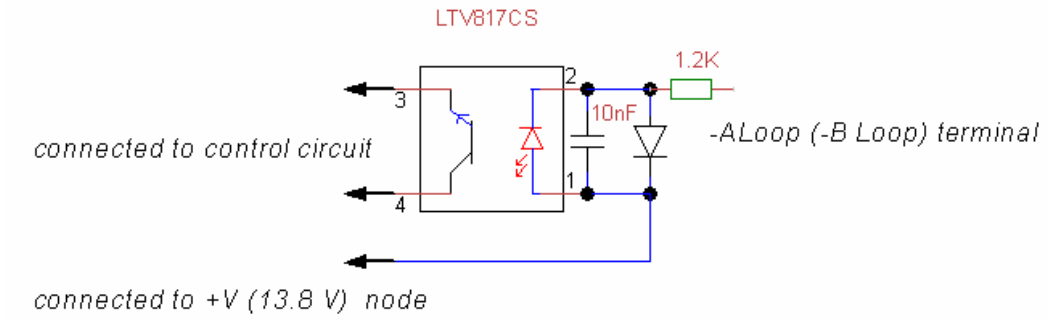

Fig.3 *Schematics of the opto-coupler control line in AAA-1C*

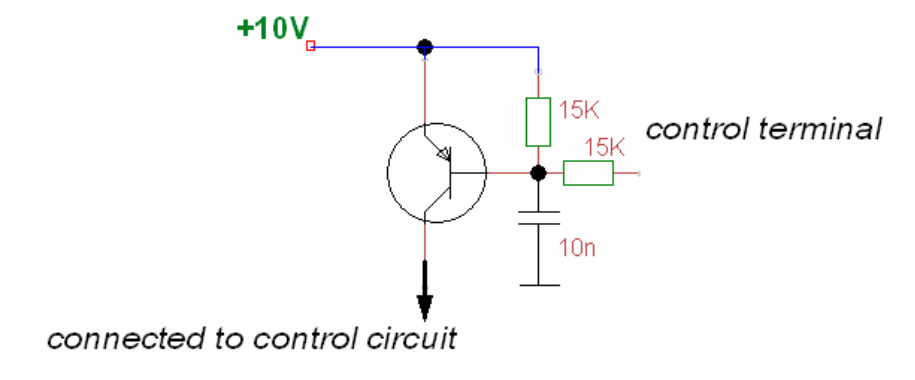

Fig.4 *Schematics of the transistor control line in AAA-1B*