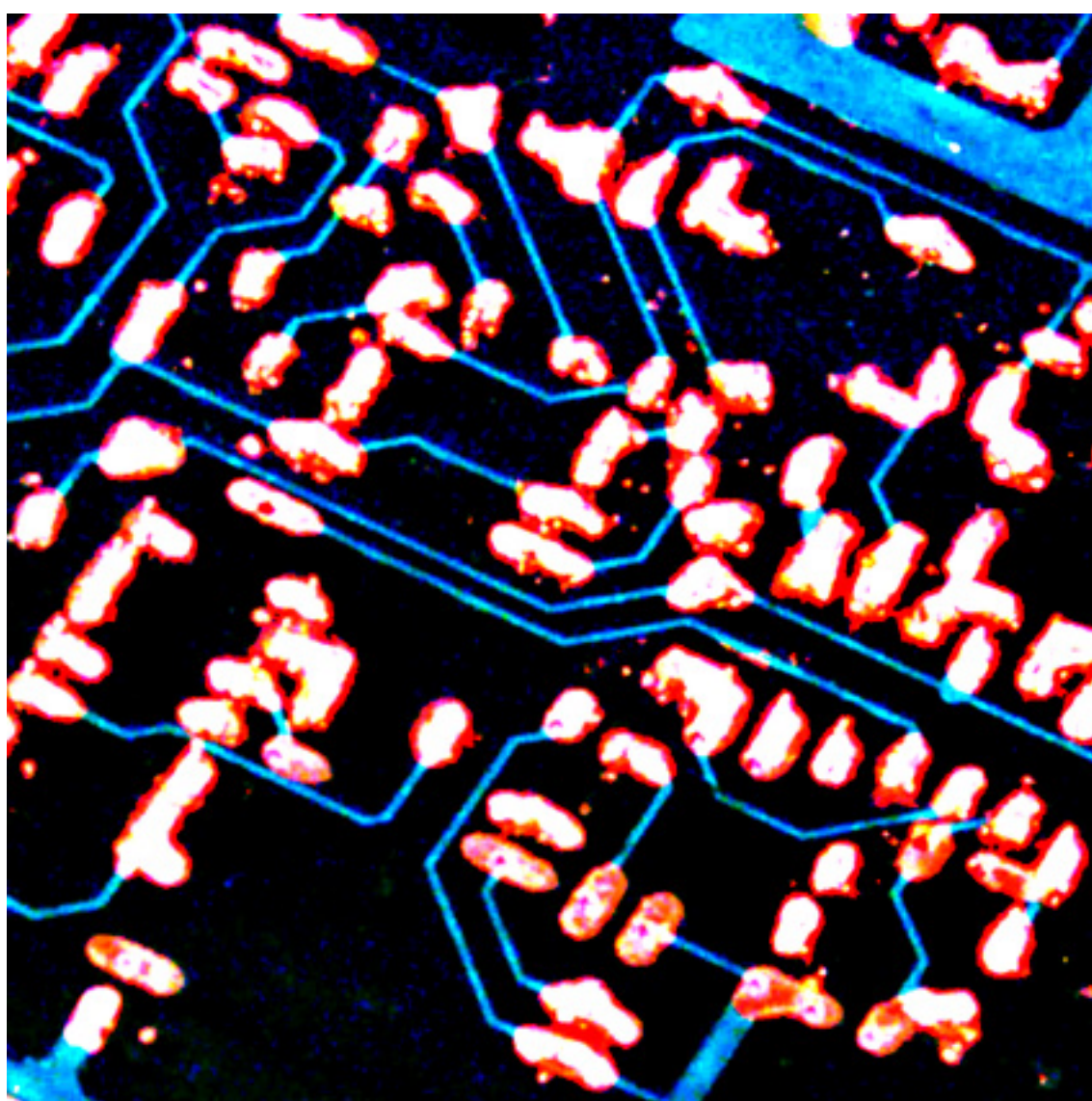


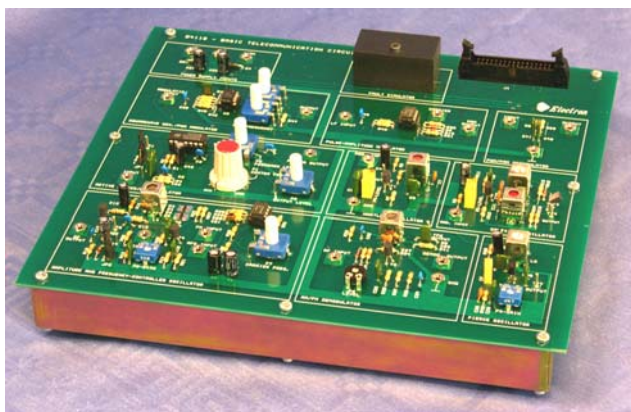
*Electron* S.R.L.

Design  
Production &  
Trading of  
Educational  
Equipment

**B41 SERIES – BASIC TELECOMMUNICATIONS TRAINERS  
(BOARD VERSION)**



## B4110-B – BASIC TELECOMMUNICATIONS CIRCUITS



### General:

This board is intended to familiarize the students which already attended a General Electronics course, with circuits specifically employed in the telecommunications field. The basic features of each circuit type are investigated, together with some application examples of special interest.

For instance, a tunable bandpass active filter is first investigated in its fundamentals and then turned into a Low Frequency oscillator by looping its output signal to the input. This allows the student three-fold Tele-communications study topic: active filters, feedback, signal generation.

Another module of the B4110 trainer is a varicap oscillator, which is first studied as it is, then its amplitude and frequency ranges are investigated. Furtherly the circuit is configured as an Amplitude Modulator and Frequency Modulator, and finally the amplitude and frequency control characteristics of the circuit are used to show the principle of stabilization of these parameters by means of feedback.

### Features:

- Band-Pass active filter and its conversion into a Low Frequency oscillator
- Hartley and Colpitts oscillators
- Crystal-controlled Pierce oscillator, with FET
- Amplitude and Frequency controlled oscillator
- Selective amplifier with AM and FM detectors

The trainer comes complete with a cable accessories kit and an extensive instructions manual.

Fault simulation by 12 microswitches concealed under a cover accessible to the instructor.

In addition to this manual fault simulating system the trainer is fully compatible with the B1180-WS Laboratory Student Workstation.

The B1180-WS provides a PC based fault simulation system, virtual instrumentation (optional) and all the power supplies required for the trainer.

A dedicated system CD is supplied containing the software for fault simulation and trainer documentation.

In cases where the advanced features of the B1180-WS are not required, a simple power supply delivering +15/-15V stabilized should be provided. Use of the B4192 power supply is recommended.

### Study topics:

- The tunable active bandpass filter
- Fourier analysis of a squarewave by means of the tunable BP filter
- The low-frequency sinewave oscillator
- The Hartley and Colpitts oscillators
- The Varicap oscillator
- Amplitude modulation
- AM demodulation
- The Varicap FM modulator
- The FM slope demodulator
- The Pierce oscillator
- The trouble-shooting

The trainer is available in two versions. One is the Board version with the components in view, shown in the picture. The other version is the Panel one, where the circuits are enclosed in a sturdy aluminium cabinet (340 x 260 x 40mm size).

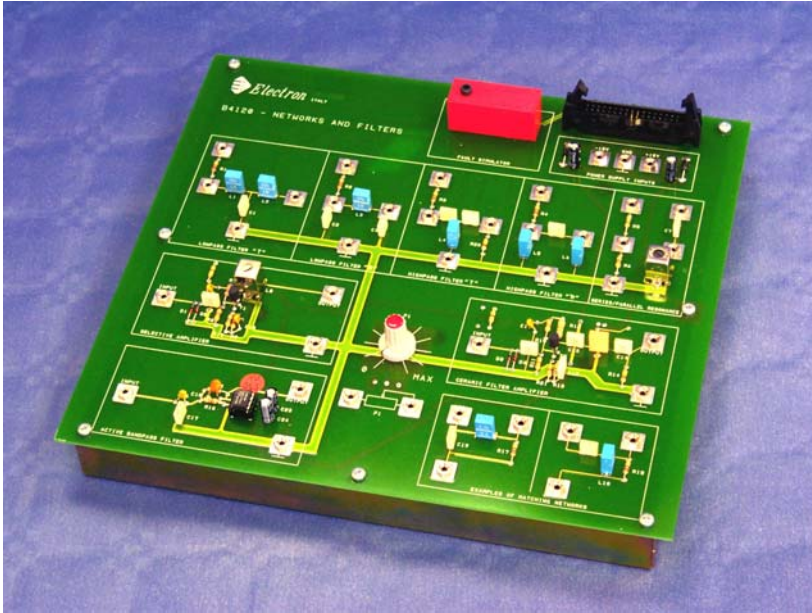
Both versions have substantially the same technical characteristics and allow the same study topics.

Please refer to the Electron Catalogue section for the Panel series for further details.

### Ordering code:

B4110-B (Board type)

## B4120-B – NETWORKS AND FILTERS



### General:

The B4120-B trainer deals with important aspects of network analysis which are a background requirement for students attending courses in telecommunications.

### Study topics:

- Resonance - resonance curves
- Resonance in loaded circuits
- Impedance transformation - Coupled circuits
- Filters of various configurations and characteristics
- Active bandpass filter
- Ladder network problems
- Piezoelectric crystals
- Selective amplifier
- Matching networks

The trainer also includes a Fault Simulation system, to train students in the troubleshooting techniques. 8 simulated and non-destructive fault situations are provided, programmable by the Instructor through micro-switches concealed by a plastic cap.

In addition to this manual fault simulating system the trainer is fully compatible with the B1180-WS Laboratory Student Workstation.

The B1180-WS provides a PC based fault simulation system, virtual instrumentation (optional) and all the power supplies required for the trainer.

A dedicated system CD is supplied containing the software for fault simulation and trainer documentation.

In cases where the advanced features of the B1180-WS are not required, a simple power supply delivering +15/-15V stabilized should be provided. Use of the B4192 power supply is recommended.

The trainer is available in two versions. One is the Board version with the components in view, shown in the picture. The other version is the Panel one, where the circuits are enclosed in a sturdy aluminium cabinet (340 x 260 x 40mm size).

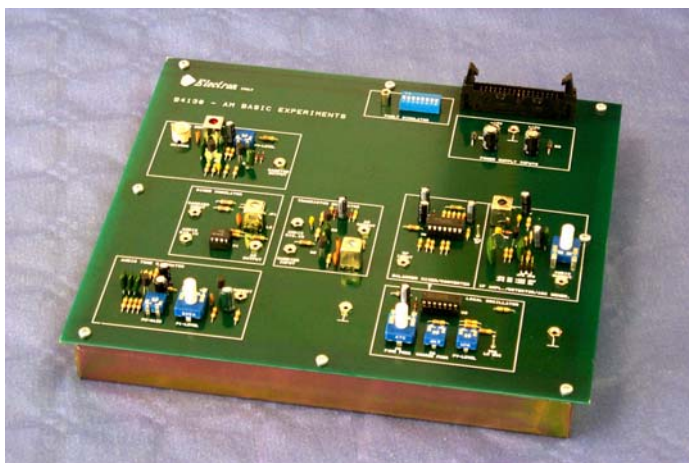
Both versions have substantially the same technical characteristics and allow the same study topics.

Please refer to the Electron Catalogue section for the Panel series for further details.

### Ordering code:

B4120-B (Board type)

## B4130 – AM BASIC EXPERIMENTS



### General:

This trainer consists of a set of modules to study and experiment the basic properties of AM Waves and to introduce the student to the most widely diffused circuits to generate and process these signals.

### Features:

- Diode AM modulator
- Transistor modulator
- AM mixer/frequency converter
- Local oscillator and IF amplifier with AGC
- AM diode detector
- VF and carrier generators
- Fault simulation by 8-microswitches concealed under a cover accessible to the Instructor.

In addition to this manual fault simulating system the trainer is fully compatible with the B1180-WS Laboratory Student Workstation.

The B1180-WS provides a PC based fault simulation system, virtual instrumentation (optional) and all the power supplies required for the trainer.

A dedicated system CD is supplied containing the software for fault simulation and trainer documentation.

In cases where the advanced features of the B1180-WS are not required, a simple power supply delivering +15/-15V stabilized should be provided.

Use of the B4192 power supply is recommended.

### Study topics:

- Basic properties of AM: spectra and power.
- AM wave generation: operation of AM modulators, efficiency, linearity, modulation index, etc..
- AM conversion: operation of mixers/converters, conversion products, filtering of unwanted terms, etc..
- AM wave processing: principle of IF amplifiers, gain, bandwidth, stability.
- AM wave detection: operation of driver/detector stage.
- Troubleshooting of AM communication systems

The trainer is available in two versions. One is the Board version, shown in the picture. The other is the Panel version where the circuits are enclosed in a sturdy aluminium cabinet (340 x 260 x 40mm size)..

Please refer to the Electron Catalogue section for the Panel series for further details.

### Ordering code:

B4130-B (Board type)

## B4141 – FM/PM BASIC EXPERIMENTS



### General:

This trainer consists of a set of modules to study and experiment the basic properties of FM and PM waves and to introduce the student to the basic circuit configurations in use to generate, process and detect these signals.

### Features:

- Auxiliary voice frequency generator, adjustable in level and fixed in frequency, to be used as a source of modulating signal
- Carrier oscillator, capable of use as a FM modulator
- PLL FM detector, usable as a PM modulator
- Limiter and FM Ratio detector
- PM coherent detector
- Transmission channel simulator with artificial noise generator
- Fault simulation by 8-microswitches concealed under a cover accessible to the Instructor.

In addition to this manual fault simulating system the trainer is fully compatible with the B1180-WS Laboratory Student Workstation.

The B1180-WS provides a PC based fault simulation system, virtual instrumentation (optional) and all the power supplies required for the trainer. A dedicated system CD is supplied containing the software for fault simulation and trainer documentation.

In cases where the advanced features of the B1180-WS are not required, a simple power supply delivering +15/-15V stabilized should be provided. Use of the B4192 power supply is recommended.

The panel operates at a nominal frequency to approx 470kHz. This allows execution of the experiments with low-cost instruments.

The panel is supplied complete with plug-in cables and instructions manual.

### Study topics:

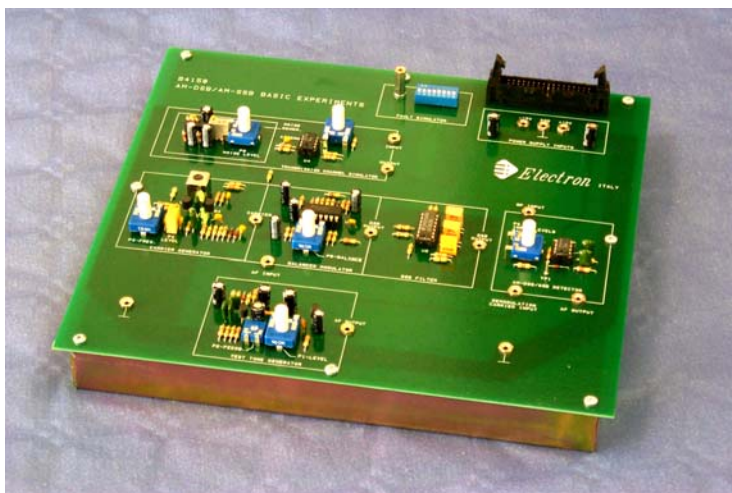
- Study of the voice frequency auxiliary generator
- The Varicap (Varactor) modulator (FM)
- Modulation index and deviation ratios
- Side bands and bandwidth for FM and PM
- The FM Ratio detector and PLL detector
- The PM modulator and coherent detector
- Performance of FM and PM in noisy transmission environment
- Troubleshooting of FM and PM transmission systems

The trainer is available in two versions. One is the Board version, shown in the picture. The other is the Panel version where the circuits are enclosed in a sturdy aluminum cabinet (340 x 260 x40mm size)..

Please refer to the Electron Catalogue section for the Panel series for further details.

**Ordering code:** B4141-B (Board type)

## B4150 – AM-DSB/AM-SSB BASIC EXPERIMENTS



### General:

This trainer consists of a set of modules to study and experiment the basic properties of AM with suppressed carrier, both of Dual and Single Side Band type (DSB, SSB).

In addition the panel introduces the student to the basic circuits to generate, process and detect the DSB/SSB signals.

### Features:

- Carrier generator with adjustable frequency and level
- Audio frequency generator, for use as a modulating signal source
- DSB balanced modulator
- SSB filter
- DSB/SSB detector
- Transmission channel simulator with artificial noise generator
- Fault simulation by 8-microswitches concealed under a cover accessible to the Instructor.

In addition to this manual fault simulating system the trainer is fully compatible with the B1180-WS Laboratory Student Workstation.

The B1180-WS provides a PC based fault simulation system, virtual instrumentation (optional) and all the power supplies required for the trainer.

A dedicated system CD is supplied containing the software for fault simulation and trainer documentation.

In cases where the advanced features of the B1180-WS are not required, a simple power supply delivering +15/-15V stabilized should be provided. Use of the B4192 power supply is recommended.

### Study topics:

- Basic properties of DSB/SSB waves: bandwidth, power, spectrum.
- DSB waves generation: operation of the modulator efficiency, etc..
- SSB waves generation by DSB filtering. Requirements of the SSB filter.
- DSB/SSB detection: operation of the detector, efficiency and linearity of the detector.
- Performance of both DSB and SSB in noisy transmission environment
- Troubleshooting of DSB/SSB transmission systems

The trainer is available in two versions. One is the Board version, shown in the picture. The other is the Panel version where the circuits are enclosed in a sturdy aluminum cabinet (340 x 260 x 40mm size)..

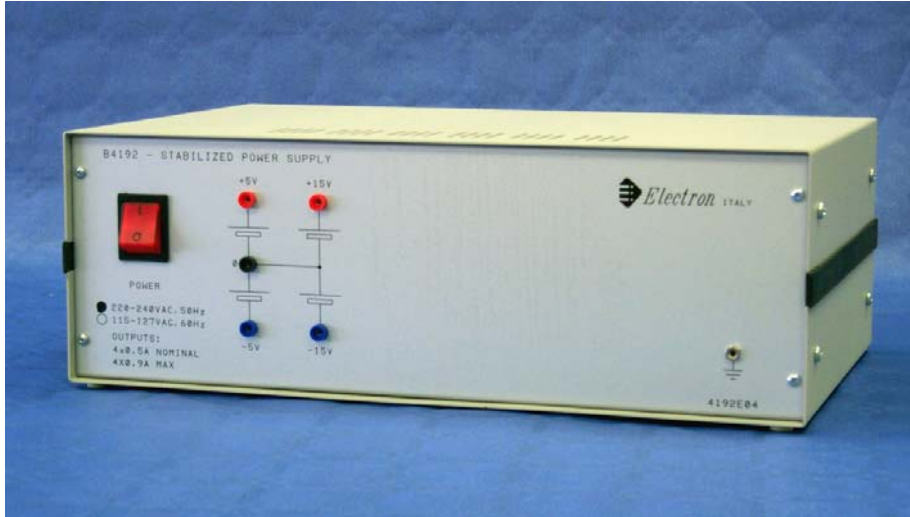
Please refer to the Electron Catalogue section for the Panel series for further details.

### Ordering code:

B4150-B (Board type)



## B4192 – POWER SUPPLY



This power supply is implemented in a desktop cabinet enclosure, and has the following characteristics:

- Stabilized +5, -5, +15, -15V outputs
- Max nominal current of 500mA on each output
- Max overload current of 900mA on each output
- Overload current limitation: approx. 900mA

- Foldback short-circuit current limiting (approx. 200mA I<sub>cc</sub>)
- Output ripple: better than 50mV RMS

The B4192 operates from the AC mains: 110 to 250V, 50-60Hz (please specify while ordering).

### Ordering code:

B4192