

PAD – 234
Analog/Digital
Trainer

Operator's Manual

GENERAL OPERATING PROCEDURES

1. This manual should be read thoroughly before engaging in any experimentation.
2. As a general rule, NEVER construct a circuit or insert any wiring with the PAD unit ON.
3. Construct the circuit. Double check your wiring. Then apply power to the circuit.
4. Should a problem occur. Turn the unit off immediately. Unplug the PAD and notify your instructor.
5. In the event this unit needs repairs, notify your instructor.

DO NOT ATTEMPT TO REPAIR THIS UNIT YOURSELF!!!

MAINTENANCE OF THE PAD 234 ANALOG DIGITAL TRAINER

*** * * CAUTION * * ***

FUSE REPLACEMENT

1. Before replacing the fuse be sure that the power switch is in the off position and UNPLUG THE PAD !!
2. Use only MDL 0.5 amp fuses.
3. Unscrew the black cap on the right side panel of the PAD unit and remove bad fuse. Replace with the correct fuse in the same manner.

******* WARNING *******

DO NOT USE ALL SOURCES SIMULTANEOUSLY !!

KEEP LIQUIDS AWAY FROM THE PAD UNIT !!

DO NOT USE NEAR FLAMMABLE MATERIALS !!!

PAD 234 ANALOG DIGITAL TRAINER

- POWER SUPPLY
 - (+) and (-) 12 volt regulated power supply, with 500 ma short circuit protection.
 - (+) 5 volt regulated power supply, with 1 amp short circuit protection.
 - (+) and (-) 15 volt variable supply (from 1.5 V to 15V) with 1.5 amp short circuit protection.
 - (+) 12.6 Volt AC center tap power supply.
- FUNCTION GENERATOR
 - Sine, square, and triangle output wave shape. 1 Hz to 100 Khz in 5 ranges, uncalibrated, buffered, adjustable output 0 to 15 volts peak to peak.
- CLOCK OUTPUT (TTL)
 - Frequency determined by COARSE FREQUENCY FINE FREQUENCY adjustment knob. Rise and fall time is 400 ns.
- INDICATORS
 - 8 BUFFERED TTL compatible LED'S.
- SWITCHES
 - 8 binary toggle switches (0 or 5 Volts) 2 momentary pulse switches, debounced with complimentary outputs.
- BREADBOARDS
 - 2 breadboards with 840 plug-in tie points each.
- POWER CONSUMPTION
 - 117 Volts at .5 Amps
- ADDITIONAL FEATURES
 - High impact plastic case with a 3-wire grounded line cord. Fuse protected AC line.

OPERATION

- DC POWER SUPPLY - +5, +12, -12, located in the vertical row of binding posts, positioned along the left side of the breadboards.
- Use of 5V Supply - Connect the load between the binding post and the GND (ground).
- Use of + 12V - Connector the load between the Binding Post marked + 12V and the Binding Post marked GND (ground).
- Use of - 12V - Connect the load between the Binding Post marked - 12V and the Binding Post marked GND (ground).
- VARIABLE DC SUPPLY - Located above left to the main breadboards and identified as + 15V, controlled by the appropriate knobs. (Lower left hand corner of the top plate.)
- Using the + 15V - Connect the load between the tie blocks identified as + 15 V and 0V (ground). Use the knob marked + 15V to control the output voltage of this tie block.
- Using the - 15V - Connect the load between the tie block identified as - 15V and 0V (ground). Use the knob marked - 15V to control the output voltage of this tie block.
- AC POWER SUPPLY - Located above right to the main breadboards and identified as AC Volts.
- Using the 6.3 VAC - Connect the load between the tie block identified as 6.3 and 0 (ground).
- Using the 12.6 VAC - Connect the load between the tie blocks marked 6.3 and 6.3.
- FUNCTION GENERATOR - The output for the GENERATOR and CLOCK are located in the top two Binding posts in the vertical row, on the left hand side of the breadboards marked GEN and CLOCK.
- The generator and clock outputs are controlled by the five knobs located on the far left hand side of the PAD unit and marked accordingly.

GENERATOR (CONTINUED)

Before using the Generator or Clock output in an actual circuit, familiarize yourself with the functions of the five control knobs and the effects they have on the output waveforms.

Connect an oscilloscope to the GEN Binding post and GND Binding post as described above. Adjust the O-scope as necessary to observe a clearly visible waveform.

By using the five control knobs observe how you are able to adjust the output waveforms, by using these controls.
(see the section below labeled "Using the Generator").

- Using the CLOCK
- Connect the load between the Binding posts marked CLOCK and GND (ground).
 - Select the appropriate frequency using the knob marked COARSE FREQUENCY.
 - Adjust to the exact frequency using the knob marked FINE FREQUENCY.
- Using the GENERATOR
- Connect the load between the Binding Posts marked GEN (Function Generator) and GND (ground).

1. Select the type of waveform required by using the top left knob.
2. Set the COARSE FREQUENCY knob to the correct range.
3. Fine tune the frequency (using the knob marked FINE FREQUENCY) to the exact frequency required.
4. Adjust the amplitude (using the AMPLITUDES) knob to adjust the output voltage maintaining a clear waveform.
5. Adjust the offset as needed with the bottom control knob marked OFFSET.

NOTHING TO DO WITH THE BOARD

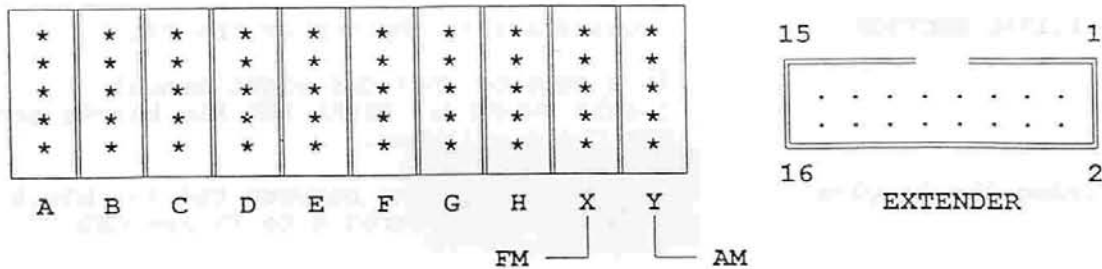
DIGITAL SECTION

- Located across the top of the PAD
 - This section includes eight manual toggle switches, eight LED tie blocks and two pulse switches.
- Using the Toggles
- Connect the device between the tie block to be used (numbered 0 to 7) and GND (ground).
 - When the toggle switch is in the up position, +5 volts is supplied to the device. When the switch is in the down position 0 volts is applied.
- Using the LED Tie
- Connect the device to the tie block directly under the LED to be used. When + 5V is applied the LED will light, when 0 is applied it will be off.
- Using the Momentary
- For + 5V pulse connect the device to the tie block marked 0. When the switch is pulsed the output at the tie block will be +5V. For 0 V pulse, connect the device to the tie block marked 1. +5 V will be applied to the point block till the switch is pulsed, then the output will be 0 V.

To become more familiar with the toggle switches and LED tie points, take a piece of wire and connect between one of the Toggle tie point blocks and one of the LED tie point blocks. Flip the switch and observe that voltage is being applied, lighting the LED.

Repeat this procedure using the momentary pulse switches.

PAD 234 EXTENDER DESCRIPTION

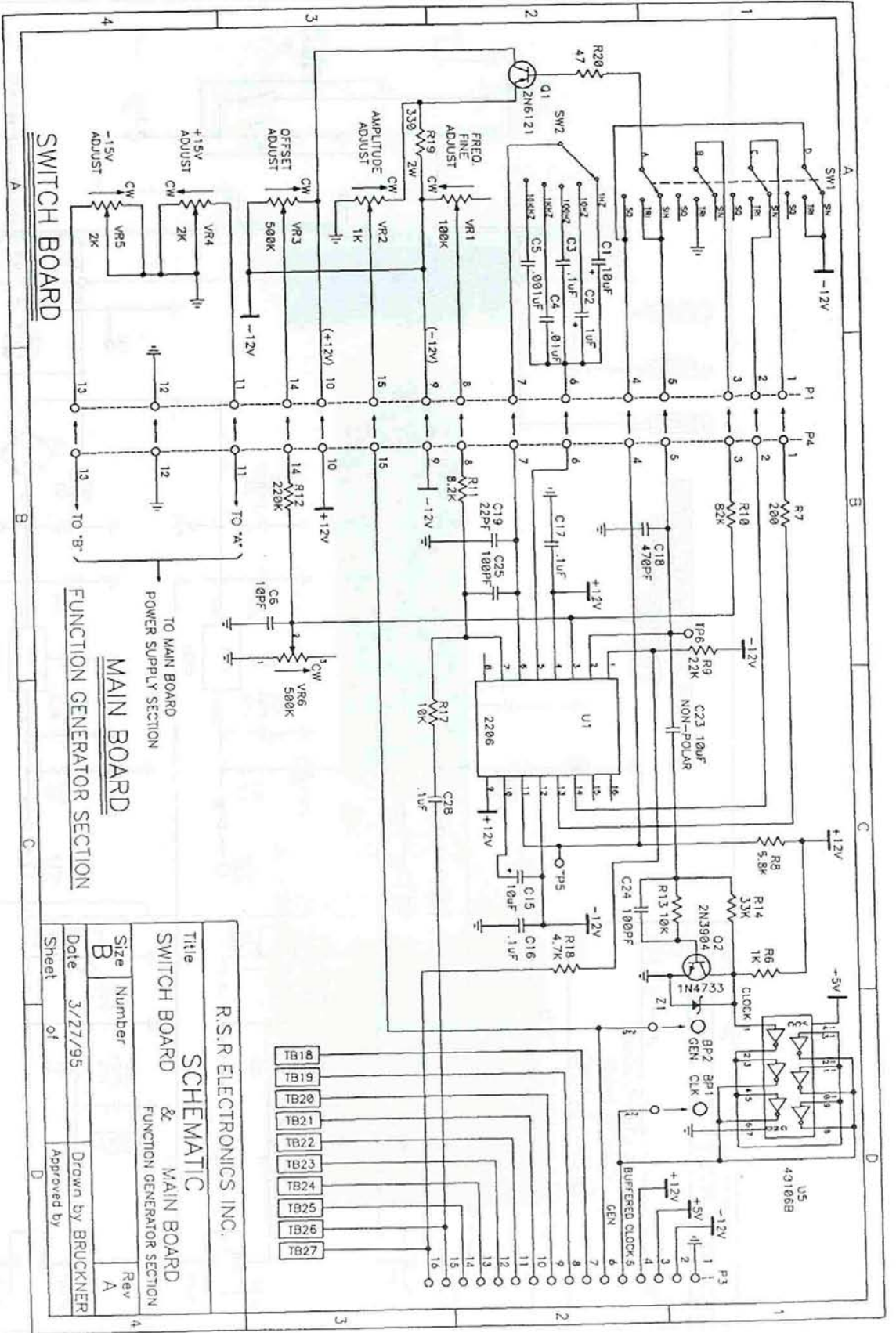


EXTENDER PIN	TIE BLOCK	FUNCTION
1	-	GROUND
2	-	- 12 V
3	-	+ 5 V
4	-	+ 12 V
5	-	CLOCK
6	-	GEN
7	A	-
8	B	-
9	C	-
10	D	-
11	E	-
12	F	-
13	G	-
14	H	-
15	X	FM INPUT
16	Y	AM INPUT

A 16-pin Insulation Displacement Connector (IDC), labeled **EXTENDER** on the top plate of the **PAD 234**, allows ribbon-cable connection to personal computers and other electronic equipment.

The user can supply power, analog, and digital signals to add-on boards via a ribbon cable. The **EXTENDER** has eight uncommitted bidirectional lines which can be easily connected via tie-blocks to the LEDs and switches of the **PAD 234**. Also, add-ons or external equipment can be interfaced to circuits already bread-boarded on the trainer.

In addition, the function generator built into the **PAD 234** can be either AM or FM modulated by applying signals to either pins 15 and 16 of the IDC or tie-blocks X and Y. Since pin 15 (FM) is capacitively coupled to the function generator, it may be used as an additional DC-level signal in certain applications.



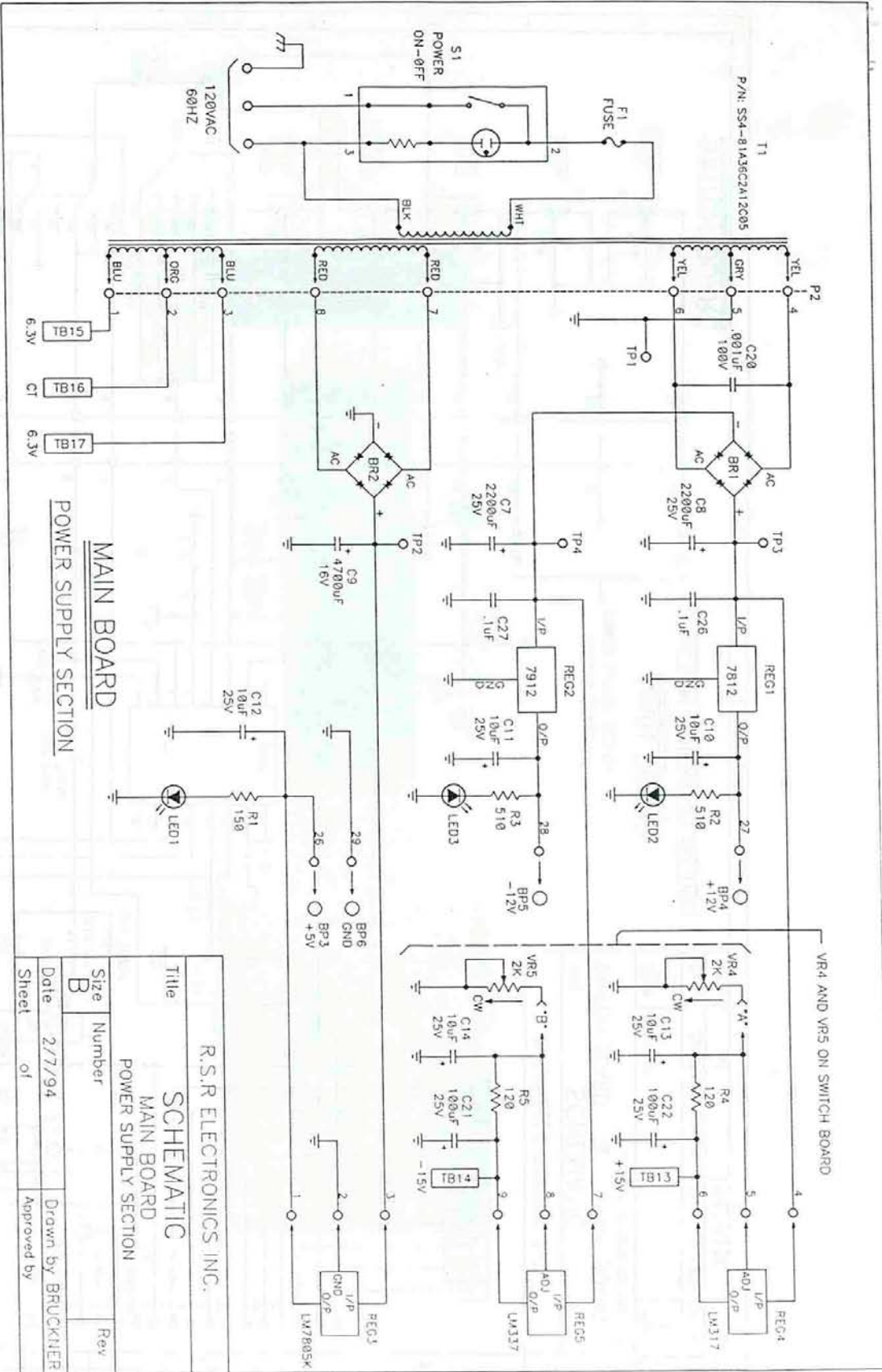
R.S.R ELECTRONICS INC.

SCHEMATIC

SWITCH BOARD & MAIN BOARD

FUNCTION GENERATOR SECTION

Title	SWITCH BOARD & MAIN BOARD		
Size	Number	Rev	
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Date	3/27/95	Drawn by	BRUCKNER
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MAIN BOARD
POWER SUPPLY SECTION

R.S.R ELECTRONICS INC.		
SCHEMATIC		
MAIN BOARD		
POWER SUPPLY SECTION		
Title	Size	Number
	B	
Date	2/7/94	
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		Drawn by BRUCKNER
		Rev