



PRO SOLOIST MODEL 2701 PRO/DGX MODEL 2720

SERVICE MANUAL



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1. Introduction

Included in this service manual are troubleshooting references which if used properly can greatly reduce the repair time of the Pro Soloist.

Section 2 covers the signal flow through the Pro Soloist. Section 3 describes design techniques unique to the product. Section 4 describes 'where to start' when a problem occurs. The circuit descriptions in section 5 should be consulted once a faulty circuit has been identified by the use of the R.O.M. truth tables and Voice Flow charts in sections 7 and 8.

VOICES AND EFFECTS

Bassoon	Buzz Bassoon
English Horn	Sax
Oboe	Space Reed
Clarinet	Telstar
Flute	Song Whistle
Tuba	Noze
Trombone	Pulsar
French Horn	Comic Wow
Trumpet	Mute Trumpet
Cello	Steel Guitar
Violin	Harpichord
Bass	Space Bass
Piano	Steel Drum
Banjo	Country Guitar
Fuzz Guitar I	Fuzz Guitar II

CONTROLS:

Portamento— Enables the pitch to slide from note to note.

Portamento Speed—Regulates the time required to slide from note to note.

Touch Sensitivity—Controls the over-all amount of keyboard touch sensor effects.

Brilliance—Permits the addition or subtraction of brilliance.

Volume—Regulates the over-all volume of the instrument.

Repeat—Creates the rapid pick strokes of string instruments.

Vibrato/Repeat Speed—Controls the vibrato speed and repeat rate.

Octave Transpose Switch—Transposes the instrument up and down one octave.

2. Theory of Operation

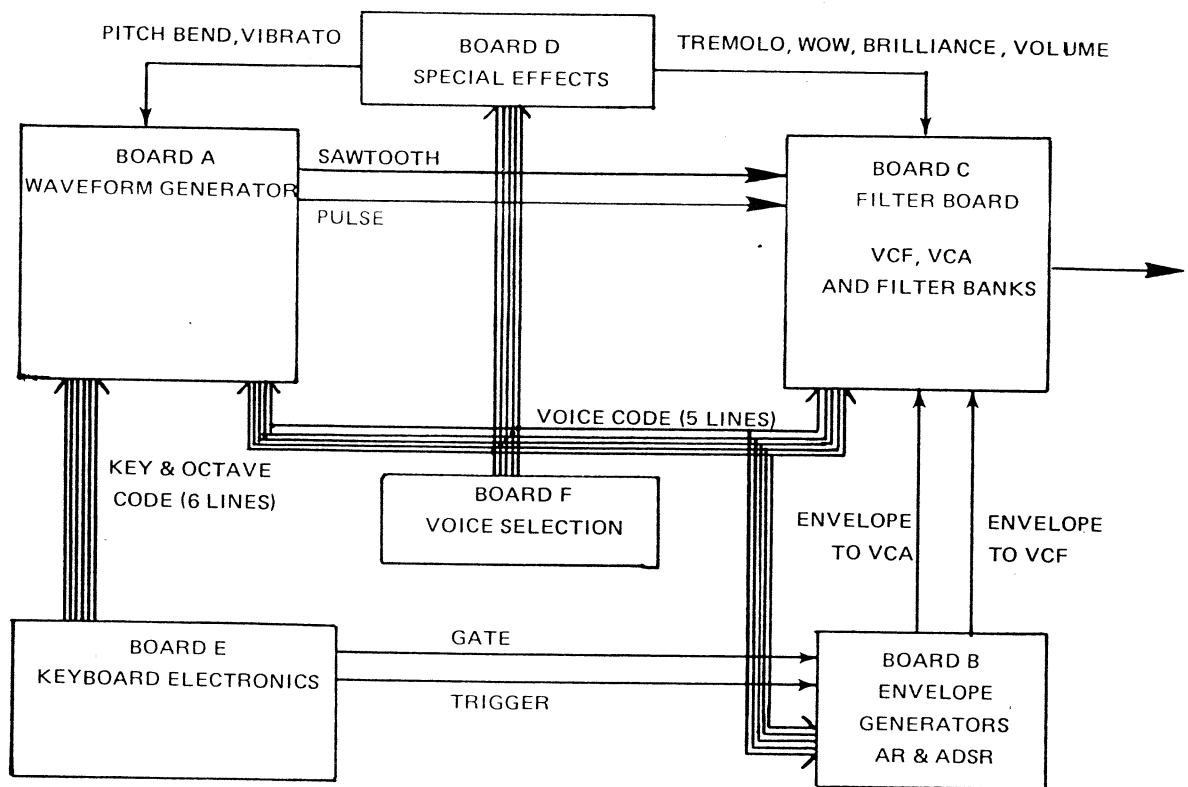
The Pro Soloist is a hybrid of digital and analog circuits. The internal flow of the audio signals is, in most respects, quite similar to any of our other synthesizers. That is, a raw signal (pulse or sawtooth wave) is processed through a voltage controlled filter and a voltage controlled amplifier to the output of the instrument. Two envelope generators (ADSR and AR) are available to control the VCF and VCA to determine the attack and decay characteristics of the instrument. In addition to the voltage controlled filter, there are fixed band pass filters which shape the raw waveforms for particular voices.

In variable synthesizers, such as the ARP Odyssey or the ARP 2600, the signal paths, oscillator waveforms and filter characteristics are adjusted manually. In the Pro Soloist, each of these settings are programmed by a digital memory. (Read Only Memory, or R.O.M.).

Referring to the block diagram, Board A is the

Waveform Generator board. A sawtooth wave and a pulse wave are supplied (at the correct pitch) to Board C, the Filter board. Board C contains the voltage controlled filter (VCF), the voltage controlled amplifier (VCA), and 14 fixed filters. The signal paths through board C are determined by the R.O.M. outputs which select one of several paths through the different filters.

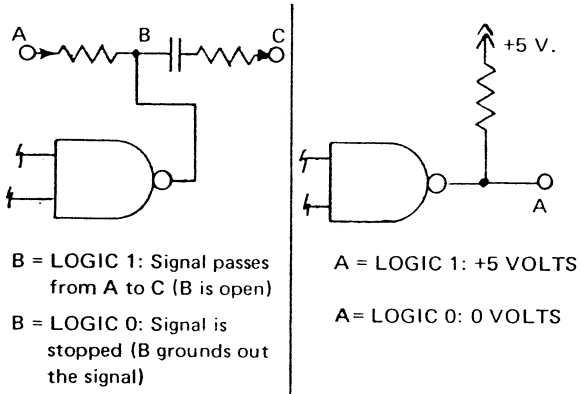
Board B provides the ADSR or AR output to the VCF and/or the VCA (again determined by the R.O.M.s). Board E (keyboard electronics) sends a 6 bit (6 line) code to board A to control the pitch of the oscillator. Board E also supplies the envelope generators on board B with a gate and trigger. Board F, the Voice Selection board, generates a 5 bit code which addresses all of the R.O.M.s (eight total) which in turn program the signal paths and filter settings. The Special Effects board (D) generates the touch sensor effects: vibrato, growl, wow, volume, brilliance and pitch bend.



PRO SOLOIST BLOCK DIAGRAM

3. General Information

The digital circuits in the Pro Soloist employ 'open collector' TTL devices. This means that a logic 1 is an open circuit, and a logic 0 is ground. The voltage level on the output of this type of gate does not necessarily relate to the logic level. Illustrated below are two uses for the open collector type gates which will be found in the Pro Soloist.



It is necessary in some circuits to add (externally) a "pull up" resistor (22K typical) from the +5 volt power supply to the output of an open collector type gate so that the logic level can be identified with a DVM or oscilloscope. Always verify the logic state of these chips in this manner before assuming the device is defective.

4. Trouble Shooting Procedure

INSTRUMENT DEAD: When the Pro Soloist is totally dead, the following should be checked:

1. Power supply: Check the +15 volt, -15 volt and +5 volt outputs. If the power supply (board G) is malfunctioning, remove the power connector from board C and connect the supply to a dummy load while trouble shooting (see the power supply section for dummy load values).
2. VCA: All signals in the Pro Soloist are routed through the VCA; therefore, the output of the VCA should be checked while a key is depressed. If there is no signal, check the output of the VCF. If there is still no signal, check the sawtooth and pulse outputs of board A.

VOICES MISSING, INCORRECT OR DEAD: When some of the voices are correct and some incorrect, the defective circuit common to the incorrect voices must be identified. Proceed as follows:

1. Check the voice code output of board F: This code addresses ALL of the Read Only Memory chips in the Pro Soloist. See the board F circuit description section for the voice code truth table.

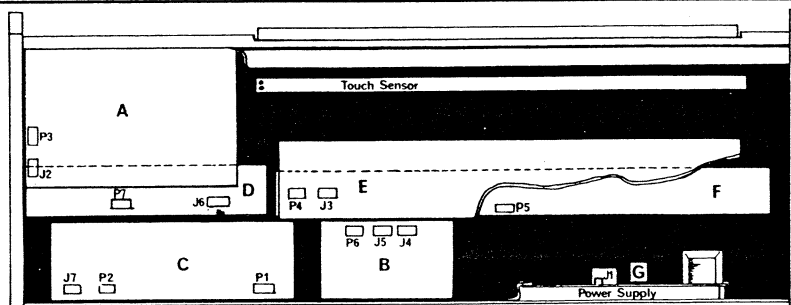
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2. Make a list of *all* the defective voices.
3. Consult the Voice Flow charts in this manual to determine the circuit which is common only to the voices listed above.
4. Consult the schematics, Voice Flow chart test points and the R.O.M. truth tables to determine the code outputs of the R.O.M. which

is in the suspected circuit. *Caution: The R.O.M. is often falsely accused of being defective; the failure rate of the R.O.M.s is actually very low. Example: Oboe, Electric Bass and Electric Piano are dead, Violin and Cello are not correct. Conclusion: defective resonator bank 3, board C; change Z2B.*

5. Tuning and Calibrations

REF.	TRIMMER	TRIM PROCEDURE	BOARD A
R37	VCF TRACK	<ol style="list-style-type: none"> 1. Pin low C on the keyboard. 2. Monitor TP-1 (J2-4) with a digital voltmeter. 3. Adjust trimmer R37 for exactly zero volts. 	
R29	SET 'B'	<ol style="list-style-type: none"> 1. Pin low C on the keyboard. 2. Turn ON the VIOLIN voice switch. 3. Put the vibrato switch DOWN. 4. Adjust trimmer R24 (TUNE) so that the Pro Soloist is tuned to low C on an organ or strobe tuner. 5. Pin the B1 key on the keyboard. 6. Adjust trimmer R29 so that the output of the Pro Solist is tuned to 'B' on the organ or strobe tuner. 	
R49	TOUCH SENSITIVITY	<ol style="list-style-type: none"> 1. Turn ON the TRUMPET and PITCH BEND switches. 2. Put the TOUCH SENSITIVITY slider on the front panel in the MIDPOSITION. 3. Adjust trimmer R49 for the amount of pitch bend desired by the customer on a firm key depression (usually maximum). 	
R24	TUNE	<ol style="list-style-type: none"> 1. This control is used to tune the Pro Soloist to the same frequency as other instruments it is being used with. It is adjustable from the front for the customer. 	
		BOARD C TRIM PROCEDURE	
R20	VCF OFFSET (CALIBRATE)	<ol style="list-style-type: none"> 1. Turn ON the FLUTE voice switch. 2. Put the BRILLIANCE slider on the front panel MIDPOSITION. 3. Adjust R20 for the best flute sound possible. 	
R45	VCF CONTROL REJECT	<ol style="list-style-type: none"> 1. Turn ON the HARPSICHORD voice switch. 2. Adjust trimmer R45 for minimum 'thump' on key depression (turn amplifier up) 	
R54	VCA CONTROL	<ol style="list-style-type: none"> 1. Adjust trimmer R45 (see above) 2. Turn ON the HARPSICHORD voice switch. 3. Adjust trimmer R54 for minimum 'thump' on key depression (turn amplifier up) 	



2701 BOARD LOCATIONS