

INTERNATIONAL 3600

Constructional details.

UNLIKE our larger 4600 unit, the modules in the 3600 are not designed to be removable as a single unit. Additional components (such as input and output switching for the oscillators) are mounted directly on the front panel (rather than on a sub-panel) and some printed circuit boards, such as the keyboard controller, are mounted in the box and connected to the potentiometers and switches on the front panel by means of leads.

OSCILLATORS

These are the same as the larger unit except that only three (instead of four) are used. The oscillators, as described, are configured for use with F to F keyboards. If C to B keyboards are used resistors R11 and R12 should be changed to 47 k. In using the larger

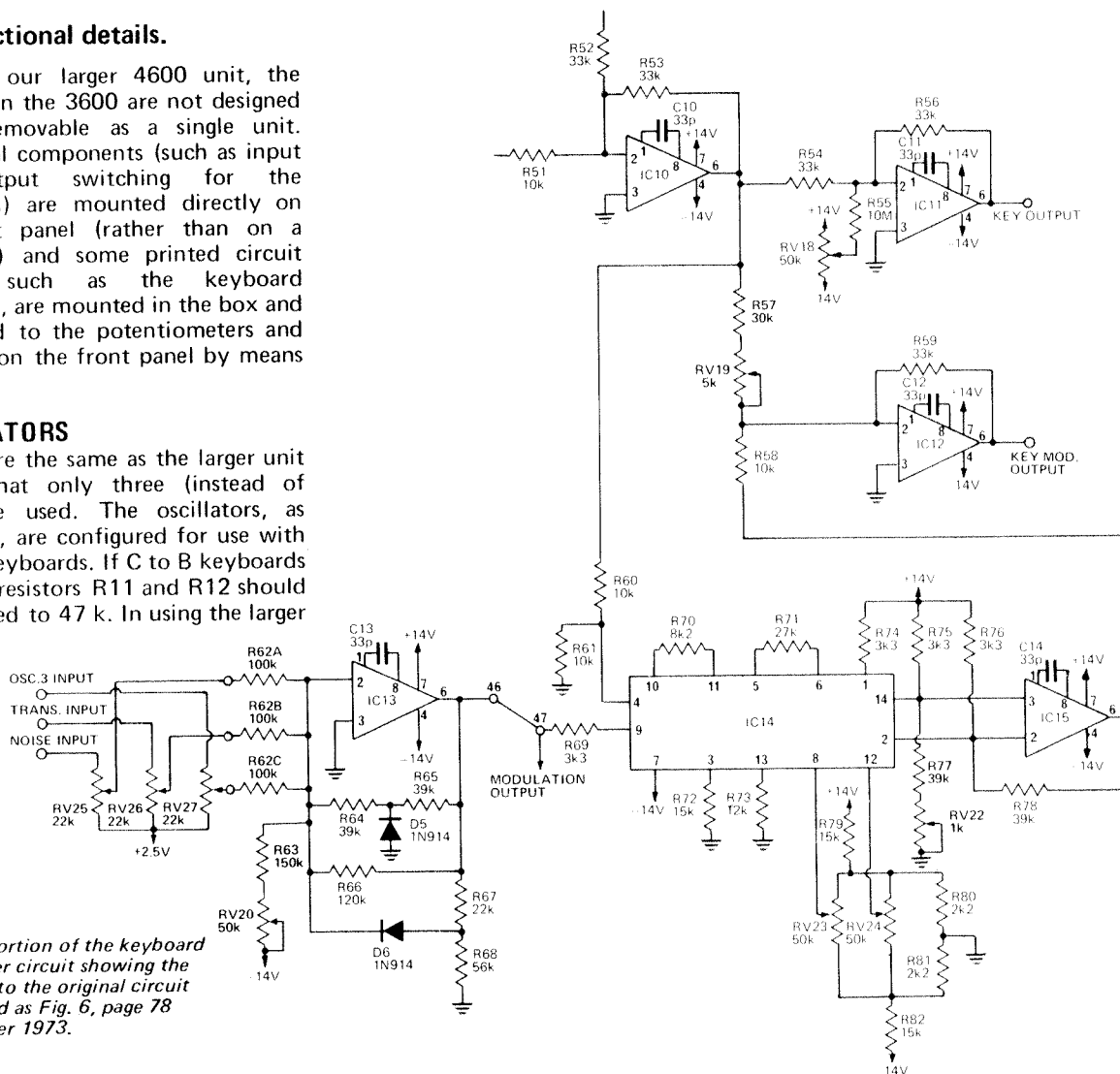
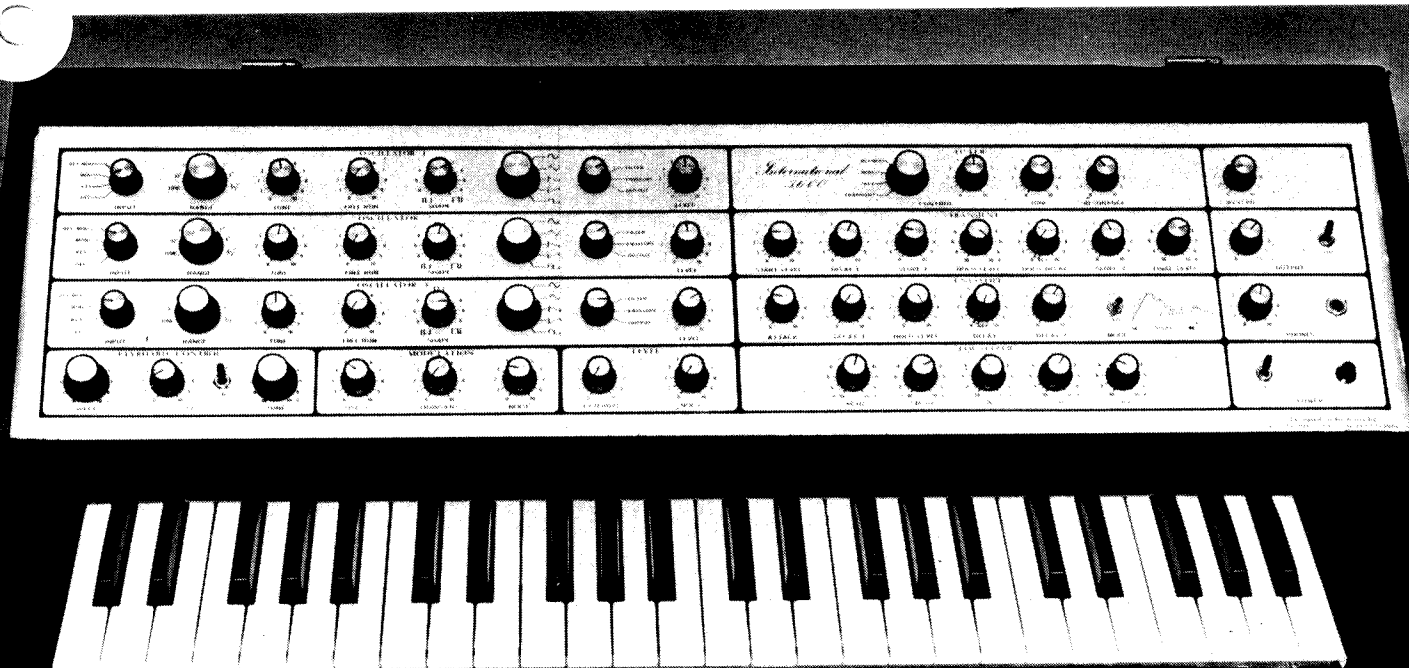
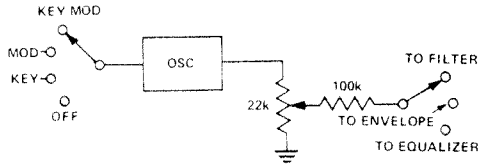


Fig. 1. Portion of the keyboard controller circuit showing the changes to the original circuit published as Fig. 6, page 78 November 1973.



SYNTHESIZER



4600 unit it was determined that the low range of the oscillator is lower than really necessary. It is therefore suggested that the value of C4 be

reduced to 1μF. Additional front-panel controls required for the oscillator are a four position rotary switch to select input, a level control potentiometer and resistor, and a three position rotary switch on the output (see diagram left).

KEYBOARD CONTROLLER

The keyboard controller is substantially as published in November

1973 and the subsequent modification published in June 1974. Some parts are deleted and others added (see parts list) to make minor improvements and to adapt the unit to the 3600 format.

A minor modification, which improves accuracy in setting up the keyboard modulation output, is performed by changing R57 to 30 k, RV19 to 5 k, R77 to 39 k and RV22 to 1 k (see Fig. 1).

To set up the controls the following procedure should be used. Connect two oscillators to the 'key output', select '4-foot' range and check that the oscillators track over the entire keyboard range. After setting up RV23 and RV24 as described for the 4600 Unit, connect one oscillator to 'KEY OUTPUT' and the other to 'KEY MOD OUTPUT'.

Disconnect the link between 46 and 47, (if connected) connect 47 to zero volts and adjust RV22 to 'beat' the oscillators on the lowest note. Then adjust RV19 at the top end. These two controls interact and it will be necessary to repeat the procedure several times to get both ends right. The range of RV22 has been made small so that adjustment is less sensitive. However this means that component tolerances may cause the correct setting to be outside the range of RV22. If the correct setting is below the minimum setting of RV22 parallel R77 with 1.5 megohm. If still not correct use 820 k. If the correct setting is above the maximum setting of RV22 parallel R78 with 1.5 megohm or 820 k as required.

On the 3600 the modulation potentiometer, RV21 as fitted to the 4600, is not used and 46 and 47 are therefore linked. An output is taken from this point, being the modulation output. To prevent confusion the output of IC12 is relabelled 'KEY MOD OUTPUT'.

The input to the exponential converter, IC13, is modified to accept the three inputs required. The bias network R63-RV20, has also been changed.

The original R62 (47 k) is replaced by three resistors, labled R62A, B and C, each of 100 k. To save making a different printed circuit board the two additional resistors are glued onto the top surface of the board with epoxy cement.

Potentiometer RV20 is adjusted to give zero volts at point 46 when all modulation controls are at zero. Zero volts can be checked by switching one of the oscillators to ½-foot range and

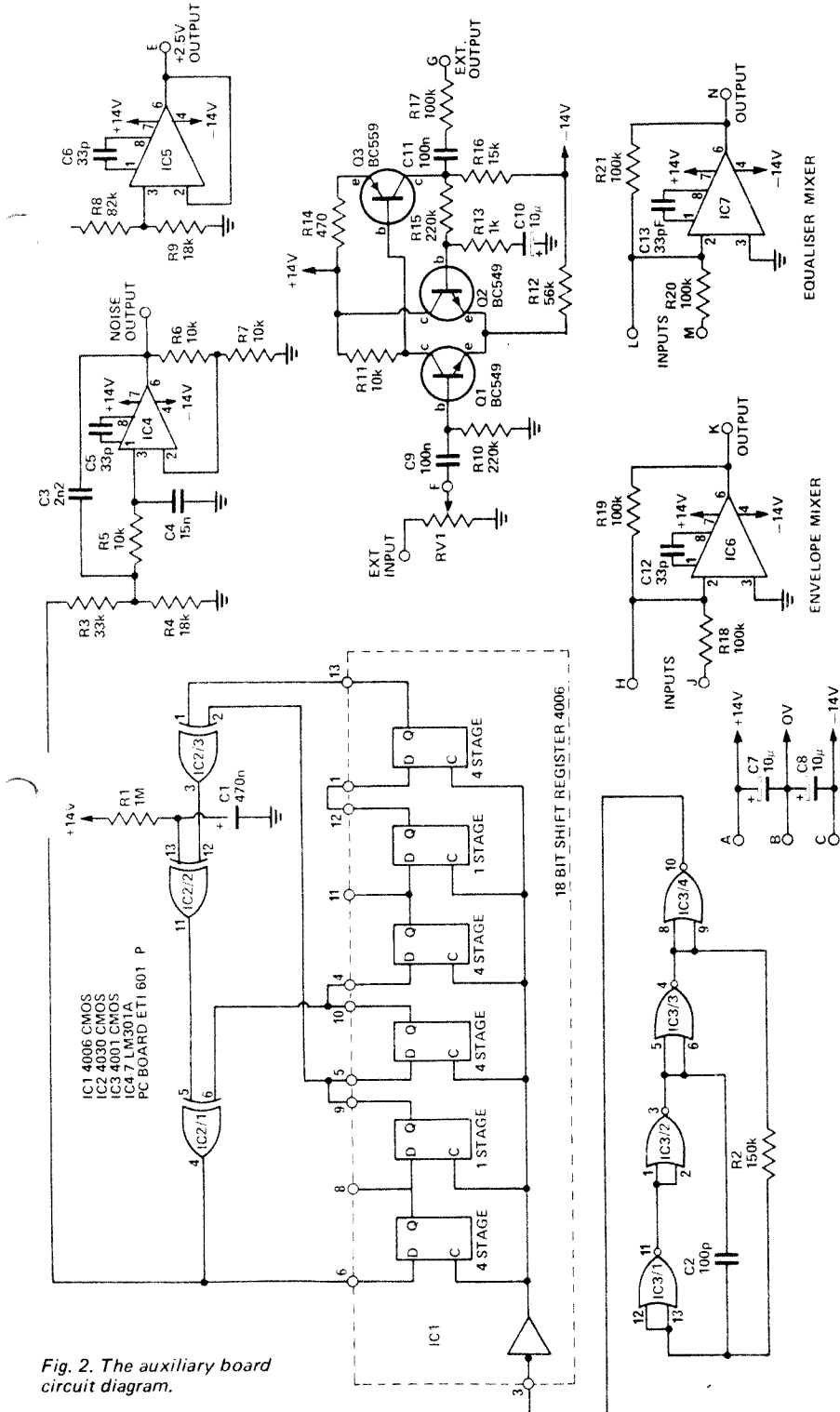


Fig. 2. The auxiliary board circuit diagram.

INTERNATIONAL 3600 SYNTHESIZER

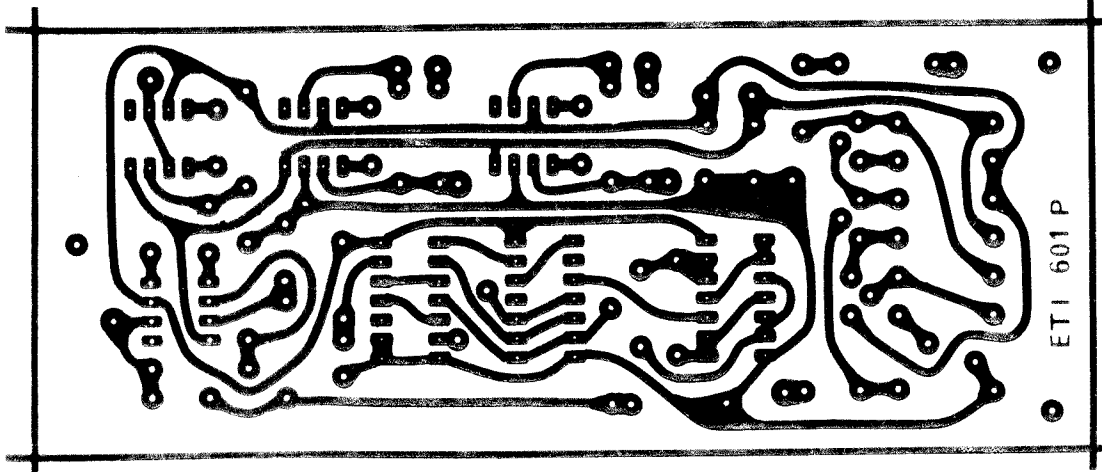


Fig. 3. Printed circuit board layout for the auxiliary board. Full size 142 x 57 mm.

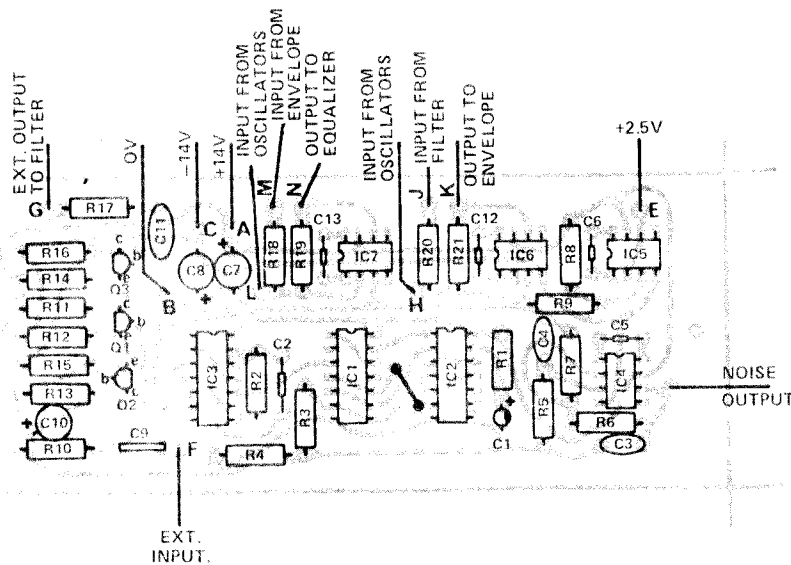


Fig. 4. Component overlay for the auxiliary board.

zero volts can be checked by switching one of the oscillators to the 1/2 foot range and the input selector to off. Adjust the oscillator to the lowest frequency possible. Now select the modulation input and adjust RV20 to give the same frequency.

AUXILIARY BOARD

The auxiliary board contains the odd circuitry necessary to interface the various sections of the 3600 synthesizer. It contains two mixers, one for the envelope inputs and one for the equalizer inputs. A circuit is incorporated to derive a 2.5 volt supply for the modulation potentiometers. Additionally the board contains a noise generator, similar to that described in the December '73 edition, with the exception that it is permanently connected to produce 'pink' noise. Reference should be made to that issue for the principle of operation of this circuit.

The two mixers are simply LM301 operational amplifiers which have two inputs. One input is via a 100 k resistor and the other is direct to pin 2 of the IC. The later input is used for the oscillator which has a 100 k output impedance.

A 2.5 volt supply is derived from the +14 volt supply by divider R8 and R9. This voltage is buffered by IC5 which is connected as a unity gain non-inverting amplifier.

The external input amplifier uses a differential pair, Q1 and Q2, followed by an additional gain stage, Q3. The feedback components R15, R13 and C10 provide a gain of approximately 40 dB. The output of this amplifier, goes to the filter input.

to be continued next month ...

PARTS LISTS

PARTS LIST - OSCILLATORS (Three required)

- 1 oscillator as described in ETI November 1973
- 1 switch single pole 4 position rotary (or 2 pole 4 position)
- 1 switch single pole 3 position rotary (or 3 pole 3 position)
- 1 potentiometer 22 k lin rotary
- 1 resistor 100 k 1/4 watt 5%

KEYBOARD CONTROLLER

- 1 keyboard controller as published November 1973.
- 1 keyboard controller mod as published June 1974 plus
- 1 1 k trimpot
- 1 5 k trimpot
- 1 50 k trimpot
- 3 22 k potentiometers rotary lin
- 3 100 k resistors 1/4 watt 5%
- 1 150 k resistors 1/4 watt 5%
- 1 30 k resistors 1/4 watt 5%
- 1 39 k resistors 1/4 watt 5%

The following parts are not used - delete from list.

- 2 10 k trim potentiometers
- 1 10 k rotary potentiometer
- 1 100 k trim potentiometer
- 1 27 k resistor 1/4 watt 5%
- 1 33 k resistor 1/4 watt 5%
- 1 47 k resistors 1/4 watt 5%
- 1 220 k resistor 1/4 watt 5%

PARTS LIST - AUXILIARY BOARD

R14	resistor	470	1/4 W	5%
R13	"	1k	1/4 W	5%
R5,6,7,11	"	10 k	1/4 W	5%
R16	"	15 k	1/4 W	5%
R4,9	"	18 k	1/4 W	5%
R3	"	33 k	1/4 W	5%
R12	"	56 k	1/4 W	5%
R8	"	82 k	1/4 W	5%
R17,18,19	"	100 k	1/4 W	5%
R20,21	"	100 k	1/4 W	5%
R2	"	150 k	1/4 W	5%
R10,15	"	220 k	1/4 W	5%
R1	"	1M	1/4 W	5%
RV1	potentiometer	47 k	log	rotary
C6,12,13	capacitor	33 pF	ceramic	
C2	"	100 pF	ceramic	
C3	"	0.0022 uF	polyester	
C4	"	0.015 uF	polyester	
C9,11	"	0.1 uF	polyester	
C1	"	0.47 uF	Tag	
C7,8,10	Tantalum	10 uF	16V	electrolytic
Q1,2	transistor	BC549	or similar	
Q3	"	BC559	or similar	
IC1	integrated circuit	4006	(CMOS)	
IC2	"	4030	(CMOS)	
IC3	"	4001	(CMOS)	
IC4,5,6,7	"		LM301A	
PC board ETI 601P				