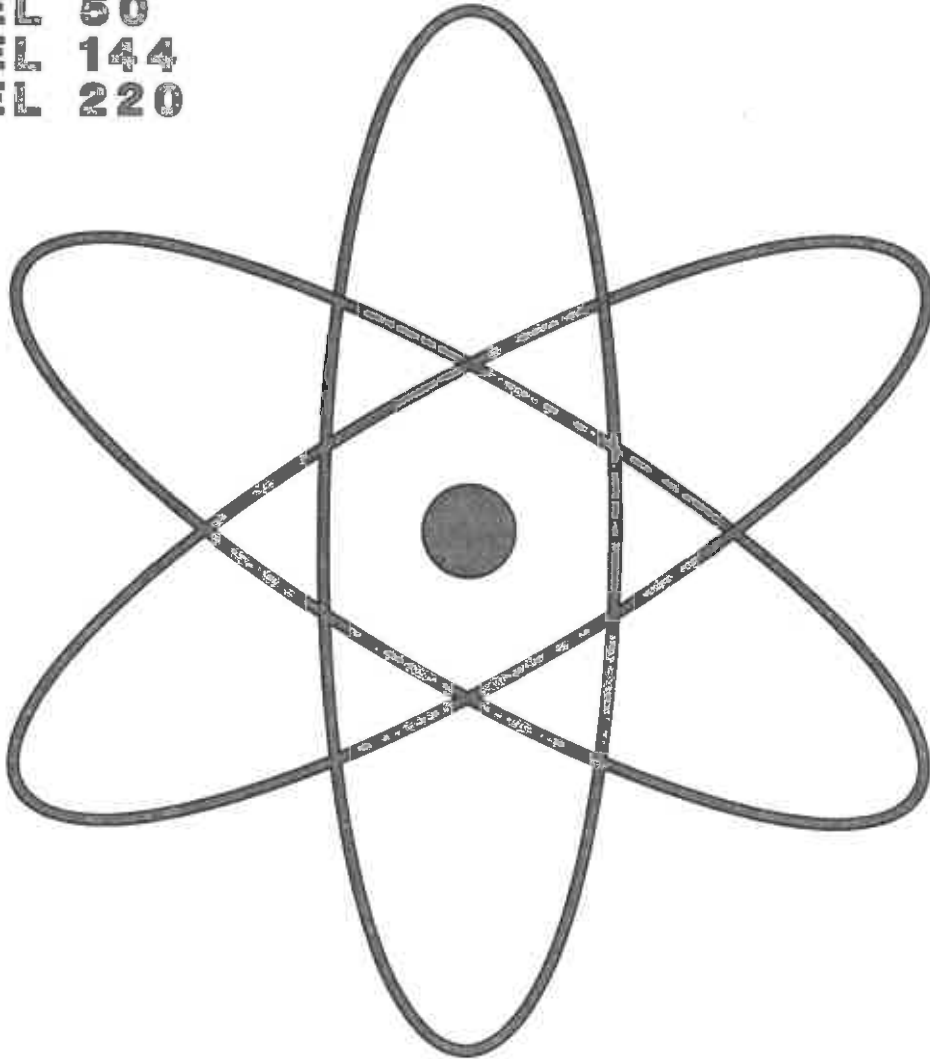


Criterion Series

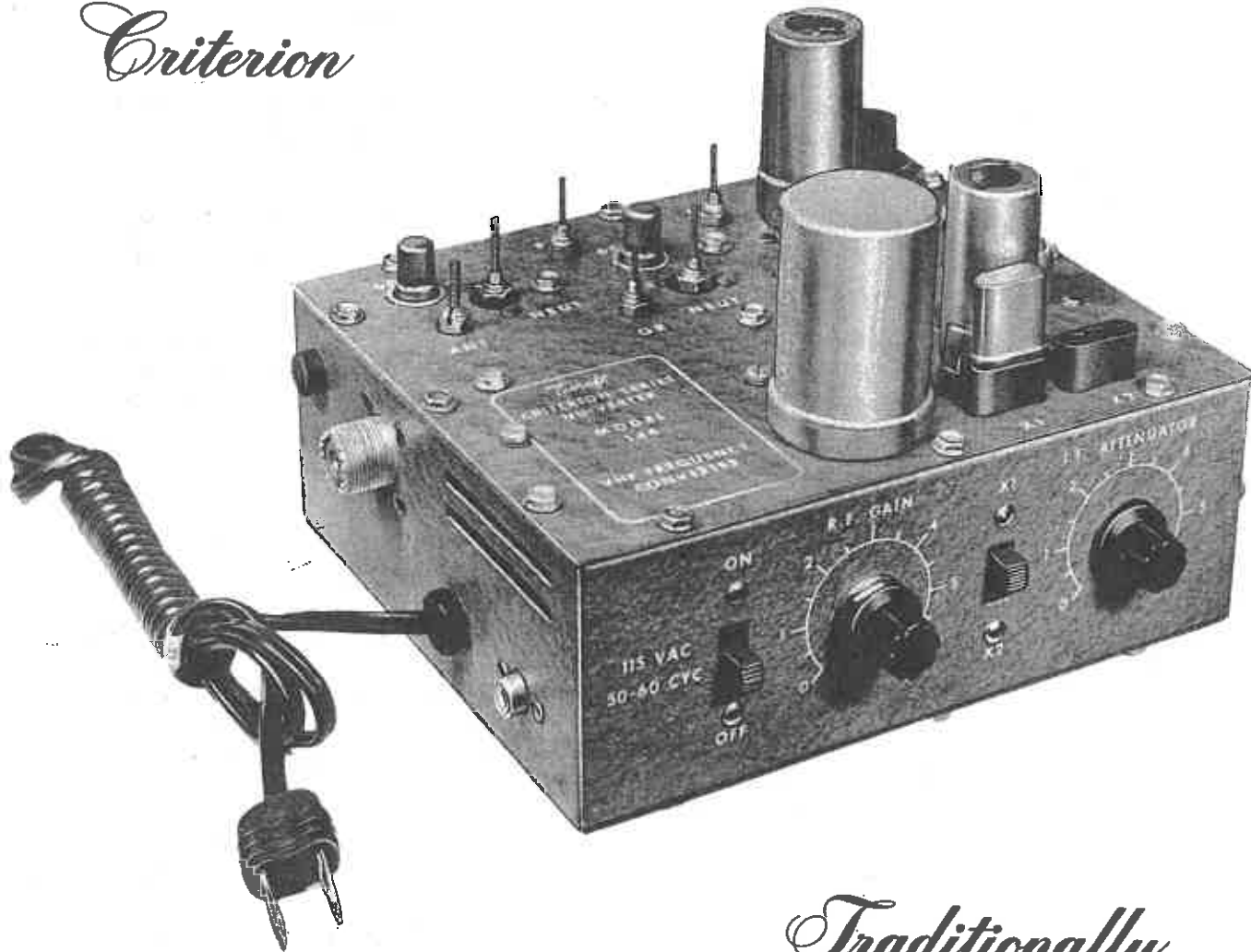
**6M, 2M, 220 Mc
Nuvistor Converters**

**MODEL 50
MODEL 144
MODEL 220**



THE

Criterion



Traditionally

CRITERION CONVERTERS by TECRAFT

GENERAL DESCRIPTION

Criterion Series Converters employ highly stable crystal controlled oscillators for maximum calibration accuracy and built in power supplies permitting precise voltage control for idealized operation of the two neutrode nuvistor R.F. stages. The R.F. stages are, optionally AVC or manually gain controlled and are broad banded, have a very low noise figure, extremely high gain and excellent rejection of image and spurious responses.

The mixer stage employs one section of a type 6JK8 low noise dual triode for optimum mixer performance. The remaining section is connected as a cathode follower, low impedance, I.F. output stage.

This stage incorporates a switching system to permit a choice of I.F. output frequencies and an attenuator to provide proper signal input level to the communications receiver employed.

A TECRAFT CRITERION Converter connected to the antenna terminals of a good communications receiver provides extreme sensitivity, low noise, high gain, maximum stability with complete control of signals within the frequency range of the converter.

SPECIFICATIONS

1. 1/10 μ v input will provide an output signal at least 6 db above noise.
2. More than 30 db overall gain.
3. 1 microvolt input will provide 20 db thermal noise quieting.
4. Adjustable R.F. gain to minimize cross modulation.
5. Pass band: 4 Mc. Down 6 db at 6 Mc. May be peaked to favor any portion of band.
6. .005% crystals provide maximum calibration accuracy.
7. High frequency crystals permit low order of frequency multiplication resulting in greater freedom from spurious responses.
8. Extensive shielding and L/C-R/C isolation of power wiring prevents coupling to local R.F. fields and interference therefrom.
9. 52 or 72 ohm input -- 300 ohm with Balun.

WARNING

Do not attempt to use this converter with AC/DC type receivers, since damage to converter and/or receiver can occur. There is also considerable danger of severe electrical shock to the operator.

GENERAL INSTRUCTIONS

Tecraft Converters, Criterion Series, should be used with good quality communications receivers.

Connect a short length of co-axial cable between converter I.F. output and antenna terminals of receiver. (Not over 3 feet). If undesired signals at the I.F. frequency are getting through, shorter cable should be employed. The receiver as well as the converter should be grounded, different grounds should be tried, antenna input terminals of receiver should be shielded or converted to co-ax type. Ideally, the cable between converter and receiver should be as short as possible. Be sure that the normal low frequency antenna feed line employed with the receiver be kept well clear of receiver and be sure to ground it, since coupling between it and the converter and/or receiver can occur, causing reception of unwanted signals and spurious responses.

ANTENNA REQUIREMENTS

Use any type of antenna, except long wire, cut accurately for the band. Use 50 or 72 ohm co-axial feed line to converter. If antenna uses 300 ohm line, a balun should be employed. This is less desirable than the use of a co-axial feed line which will provide least pickup of extraneous noise and unwanted signals.

SELECTION OF I.F. OUTPUT FREQUENCY

Both the 144Mc and 220Mc models provide a choice of I.F. output frequencies from 6Mc through 54Mc, thus permitting the use of the most convenient tuning range on the communications receiver.

The 50Mc model may be used at I.F. output frequencies from 6Mc through 35Mc.

The I.F. should be chosen so that the best tuning range and bandspread of the receiver are employed. Consideration should be given to maximum selectivity and freedom from images.

On general coverage receivers, 14-18Mc is usually the best band unless band switching breaks this range into two parts, in which case 10-14, 11-15, 12-16 or 16-20Mc etc. may be employed.

On Ham band receivers, the maximum tuning range is usually found to be 28-30Mc. Some receivers also provide a special converter band at 30-35Mc. Others provide a 50-54Mc band. Use the band which will afford the tuning range you require.

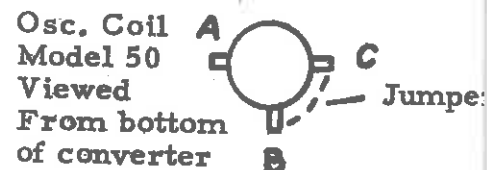
CRYSTAL VS I.F. FREQUENCY TABLES

MODEL 50

RECEIVE FREQUENCY	I.F. OUTPUT FREQUENCY	CRYSTAL FREQUENCY
50-54 Mc.	6-10 Mc.	44 Mc. See Note "A"
50-54 Mc.	7-11 Mc.	43 Mc. " " "A"
50-54 Mc.	10-14 Mc.	40 Mc. " " "A"
50-54 Mc.	14-18 Mc.	36 Mc. " " "A"
50-54 Mc.	26-30 Mc.	24 Mc. " " "B"
50-54 Mc.	28-32 Mc.	22 Mc. " " "B"
50-54 Mc.	30.5-34.5 Mc.	19.5 Mc. " " "B"

Note "A"-- Refer to oscillator coil drawing below. Connect jumper wire between lugs B and C.

Note "B"-- Remove jumper wire between lugs B and C.



Crystal Formula: To find crystal frequency for various I.F. output frequencies. Subtract desired I.F. frequency from 50 Mc.

Example: For I.F. 14-18 Mc.

$$\begin{array}{r} 50 \\ -14 \\ \hline \end{array}$$

36 Mc crystal required.

MODEL 144

RECEIVE FREQUENCY	I.F. OUTPUT FREQUENCY	CRYSTAL FREQUENCY	MULTIPLIER FREQUENCY
144-148 Mc.	6-10 Mc.	46 Mc.	138 Mc.
144-148 Mc.	7-11 Mc.	45.666 Mc.	137 Mc.
144-148 Mc.	10-14 Mc.	44.666 Mc.	134 Mc.
144-148 Mc.	14-18 Mc.	43.333 Mc.	130 Mc.
144-148 Mc.	26-30 Mc.	39.333 Mc.	118 Mc.
144-148 Mc.	28-32 Mc. Note "C"	38.666 Mc.	116 Mc.
144-148 Mc.	30.5-34.5 Mc.	37.833 Mc.	113.5 Mc.

ALIGNMENT PROCEDURE
OSCILLATOR ALIGNMENT

MODEL 144

- 1a. Connect VTVM between test point and ground and set VTVM to read negative DC Volts on low scale. Turn converter on and with crystal in socket, tune oscillator coil L7 until VTVM indicates maximum and then drops sharply, then turn slug one turn counter-clockwise so that VTVM shows slightly less than maximum voltage.
- 1b. Tune multiplier coil L8 for maximum reading. When crystal is removed, voltage will drop to approximately .8 of a volt. Insert crystal and tune L7 counter-clockwise until meter reads no less than 1.6 volts and no more than 2.5 volts.

MODEL 50

- 2a. As for MODEL 144, see 1a above.
- 2b. Tune oscillator coil L7 counter-clockwise for the required voltage reading as above.

NEUTRALIZATION before R.F. ALIGNMENT

MODEL 144 and MODEL 50

- 3a. Connect VTVM between test point and ground. Remove 6DS4 from socket and with R.F. Gain fully on, tune C11 for minimum reading on VTVM. Insert 6DS4 and tune C4 for minimum reading on VTVM.

R.F. ALIGNMENT

MODEL 144

- 4a. Remove crystal from converter and turn converter R.F. Gain fully clockwise. Connect 50 ohm terminated signal generator to converter input. Set signal generator to 146mc, tune C10 and C13 for maximum reading on VTVM. Set signal generator to 148mc, tune C2 for maximum reading on VTVM. Set signal generator to 144mc, tune C7 for maximum reading on VTVM. (See NOTE below).

MODEL 50

- 5a. Remove crystal from converter and turn converter R.F. Gain fully clockwise. Connect 50 ohm terminated signal generator to converter input. Set signal generator to 52mc, adjust L4 and L5 for maximum VTVM reading. Set signal generator to 50mc and adjust L2 and L3 for maximum reading on VTVM.

minimum reading on VTVM. Resolder lead to C6. Unsolder lead at C12 feed-thru capacitor. Adjust C11 neutralizing capacitor for minimum VTVM reading. Resolder lead to C12. Insert crystal. Alignment is now complete.

The use of a scope and sweep generator will greatly simplify alignment. The technique to be employed is outlined in sweep generator literature.

I.F. ALIGNMENT

To determine proper I.F. switch position for the I.F. chosen, connect converter to receiver, (receiver AVC off). Connect signal source, (generator or strong on the air signal) to converter input. Set receiver to chosen tuning range. (approximately 51mc or 146mc), set generator or tune signal to same frequency. Rotate I.F. switch for greatest receiver noise or audio output, (converter attenuator fully clockwise). Then peak up Mixer Plate Coil slug on converter for maximum increase in noise or audio. Be sure you have inserted proper crystal.

Communications receivers are seldom flat over any given tuning range, therefore the "S" meter response to noise will not be uniform throughout the tuning range. This does NOT mean that the converter response is faulty. The converter response can be made flat when examined at the mixer grid. (T.P.). In practical field use, it is generally desirable to adjust the converter for maximum output at the low frequency end of the band. This is especially true at 50 & 220mc, since most activity occurs at the low end of these bands. Alignment of the converters as shipped, takes this fact into consideration. DO NOT INTERPRET "S" METER READINGS TO BE AN EXPRESSION OF SENSITIVITY. Actually, the "S" meter is indicating variations in gain occasioned by possible mismatch between converter and receiver, and/or actual change within the tuning range of the receiver.

TO ADJUST ANTENNA COIL

As shipped, this adjustment is made to provide best noise figure with 50 ohm feed line at optimum VSWR.

To match to your antenna, antenna slug should be adjusted for best signal to noise ratio. Tuning will be broad. If tuning is critical, or oscillation occurs, your antenna system is not flat, has a high VSWR and is not terminating in the 50-72 ohm range. The cure is to correct your antenna system.

TO USE ATTENUATOR

The output attenuator is provided so that the companion receiver may be properly operated without overload and/or excessive systemic noise, and/or improper "S"

A lead brought from the AVC bus of your receiver may be plugged in.

When this is done, the short circuit jumper, internally wired from the junction of two 100K Ω resistors to ground, (2-100K Ω resistors in series from pin 4 of 6DS4 to Tip Jack) should be removed. See schematic.

To restore normal operation without AVC this jumper should be reinserted.

RELAY CONTROL TO DISABLE CONVERTER

A phono type jack is provided on left side panel. Remove jumper, internally wired across jack, for relay control.

The performance of electronic equipment is related to the skill of the user and the adequacy of installation. Proper choice of antennae and care in establishing precise operating frequencies will play the largest part in securing satisfactory service from your system.

The purchaser must assume responsibility for proper installation, operating conditions and accessory equipment. Our responsibility is outlined by the following warranty.

OWNER'S WARRANTY

The Tecraft electronic equipment which you have just purchased was carefully tested and inspected before leaving our factory. If properly installed and operated in accordance with instructions furnished, it should give excellent performance and reliable operation.

Tecraft equipment is guaranteed against all defects in material and workmanship for one year from date of sale to the original purchaser. Any part of the equipment which, with normal installation and use, becomes defective will be repaired or replaced by us provided it is returned for our examination, transportation prepaid, to our factory (or authorized service station). This warranty does not apply to equipment which has been subjected to abuse or accident or which has been altered in any way; nor does this warranty extend to tubes, vibrators or accessories, etc. not of our own manufacture which are separately covered by the producing manufacturer's warranty.

PARTS LIST
CRITERION CONVERTERS by TECRAFT

MODEL 144

C1, 14, 15, 25	47 mmf capacitor
C2, 4, 7, 10, 11, 13	1-8 mmf trimmer cap.
C3, 9	33 mmf capacitor
C5, 18, 24, 26	.005 mmf capacitor
C6, 12	500 mmf feed thru cap.
C8, 27	.0015 mmf capacitor
C16	.02 mmf capacitor
C17, 28	.01 mmf capacitor
C29, 30, 31	470 mmf capacitor
C20, 21, 22	5/20/100 mfd elect. cap.
C19	gimmick
C23	omitted

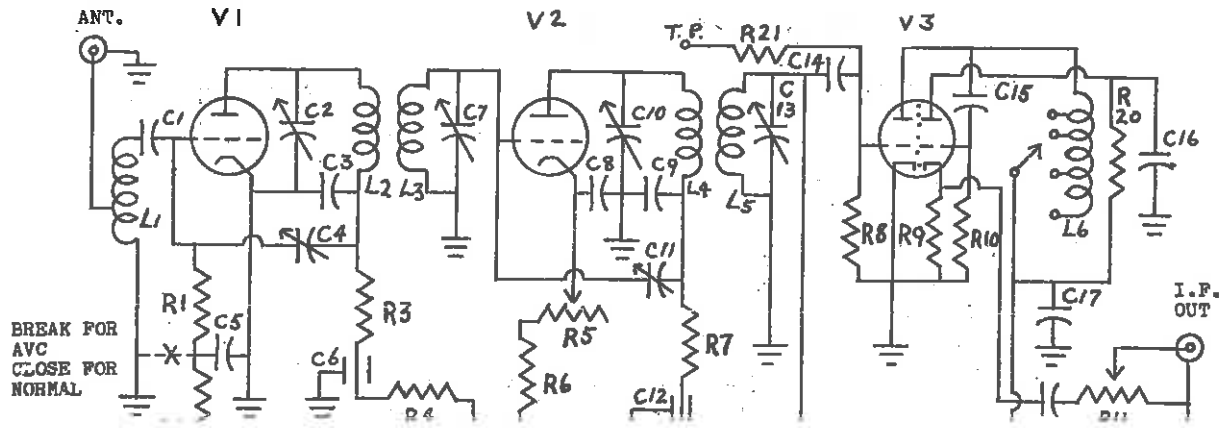
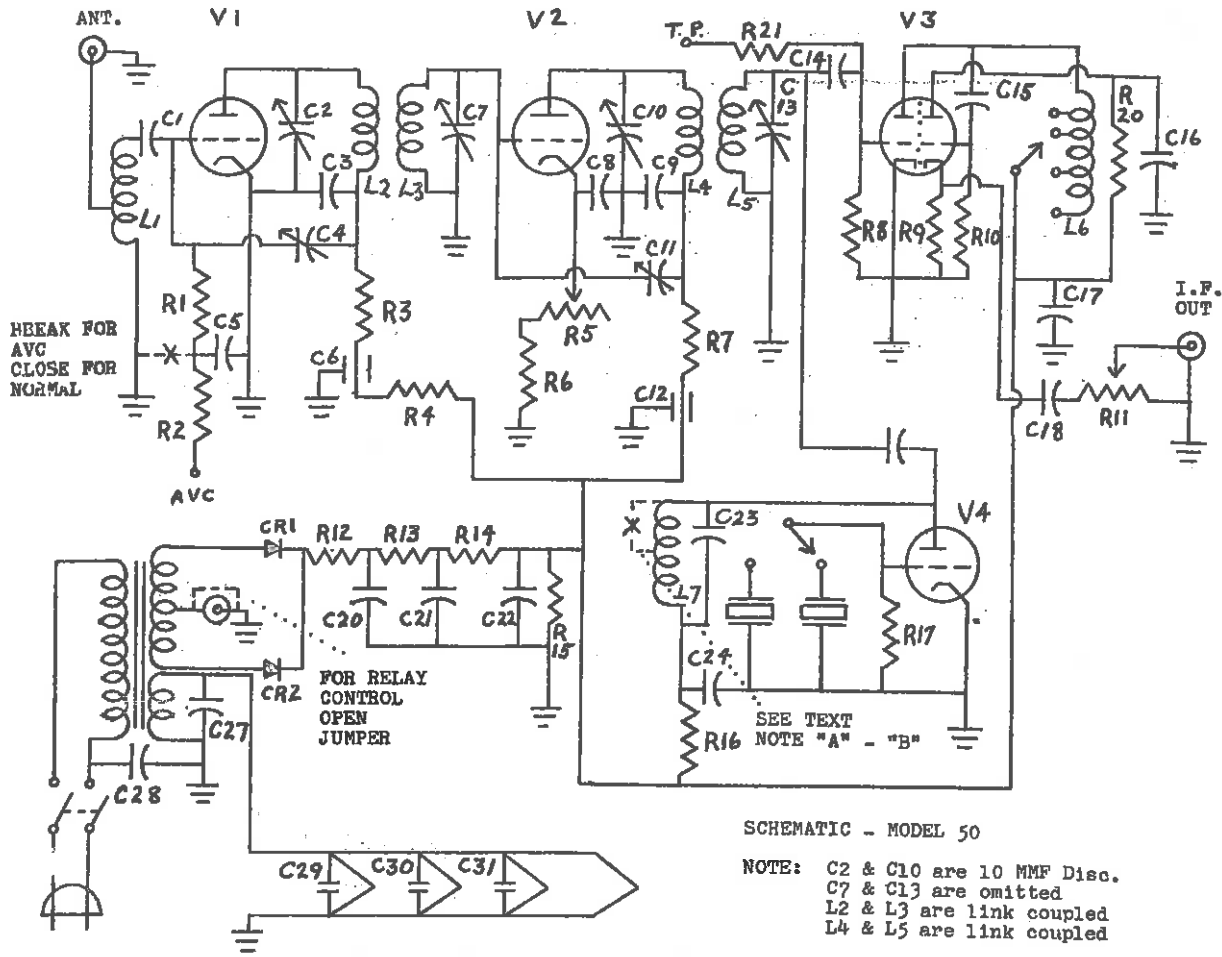
C1, 14, 15
C2, 10
C3, 9
C4, 11
C5, 8, 18, 24
C6, 12
C16
C17
C23
C20, 21, 22
C19
C7, 13

R1, 2, 17, 18	100k ohm resistor
R3, 4, 7, 16, 19	1K ohm resistor
R5	10K ohm potentiometer
R6	100 ohm resistor
R8	1 meg. ohm resistor
R9	220 ohm resistor
R10	500K ohm resistor
R11	2K ohm potentiometer
R12	1K ohm 2 watt resistor
R13	390 ohm 1 watt resistor
R14	200 ohm 1 watt resistor
R15	47K ohm 1 watt resistor
R20	3.3K ohm resistor
R21	10K ohm resistor

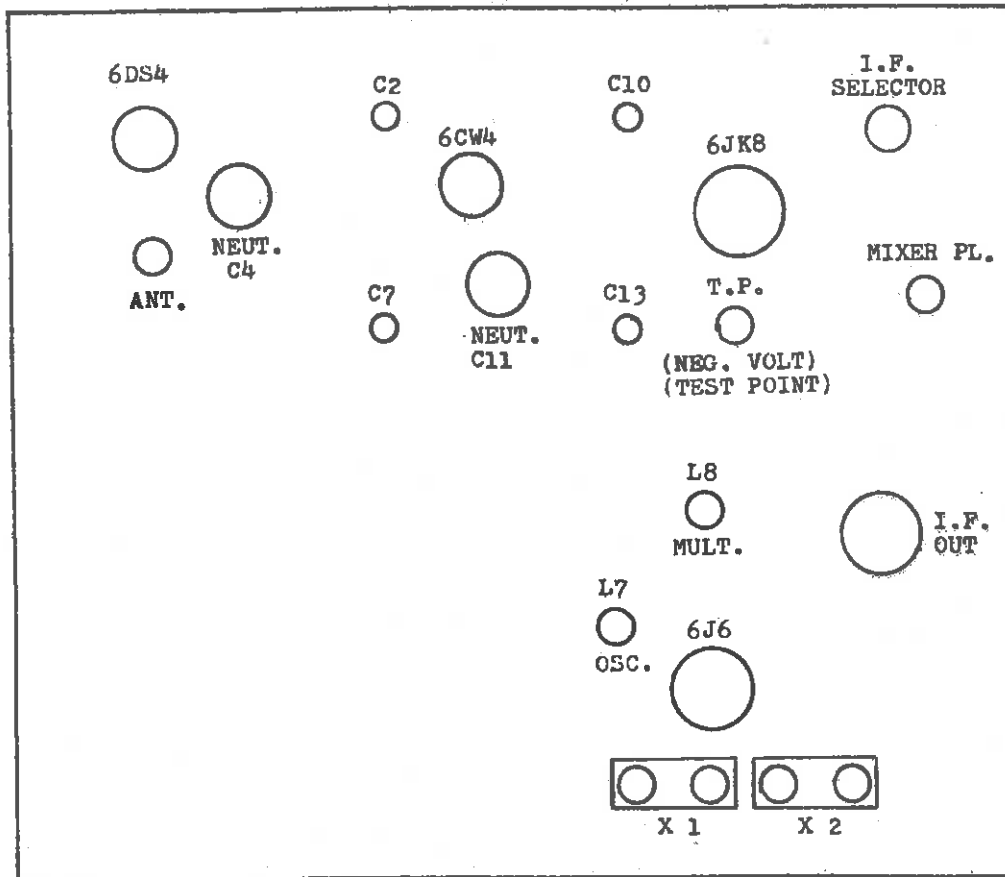
R1, 2, 17
R3, 7
R4, 16
R5
R6
R8
R9
R10
R11
R12
R13
R14
R15
R20
R21
R18, 19

L1	antenna coil	V1	6DS4
L2	6DS4 plate coil	V2	6CW4
L3	6CW4 grid coil	V3	6JK8
L4	6CW4 plate coil	V4	6J6
L5	mixer grid coil		
L6	mixer plate coil		
L7	oscillator coil		
L8	multiplier coil		
CR1, CR2	500 ma. 500 PIV Silicon Rectifiers		

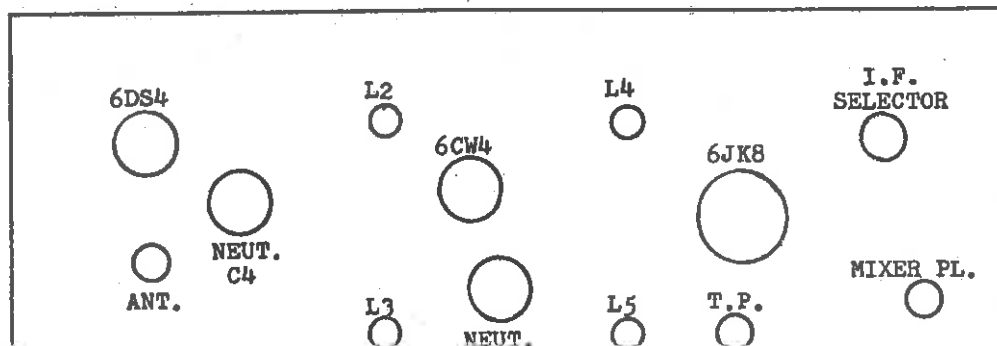
L1	antenna coil
L2	6DS4 plate coil
L3	6CW4 grid coil
L4	6CW4 plate coil
L5	mixer grid coil
L6	mixer plate coil
L7	oscillator coil
CR1, CR2	500 ma.

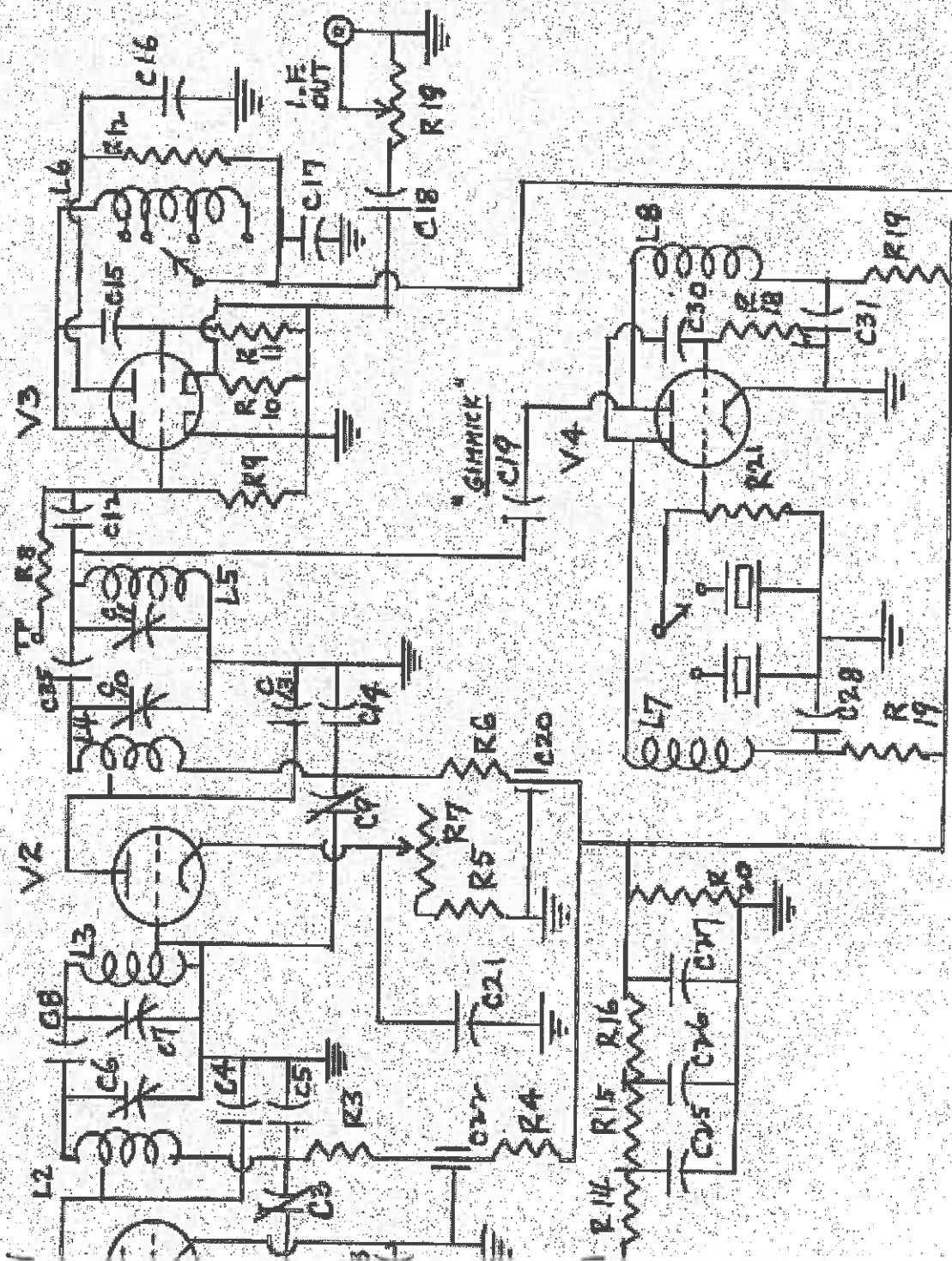


MODEL 144 - PANEL LAYOUT

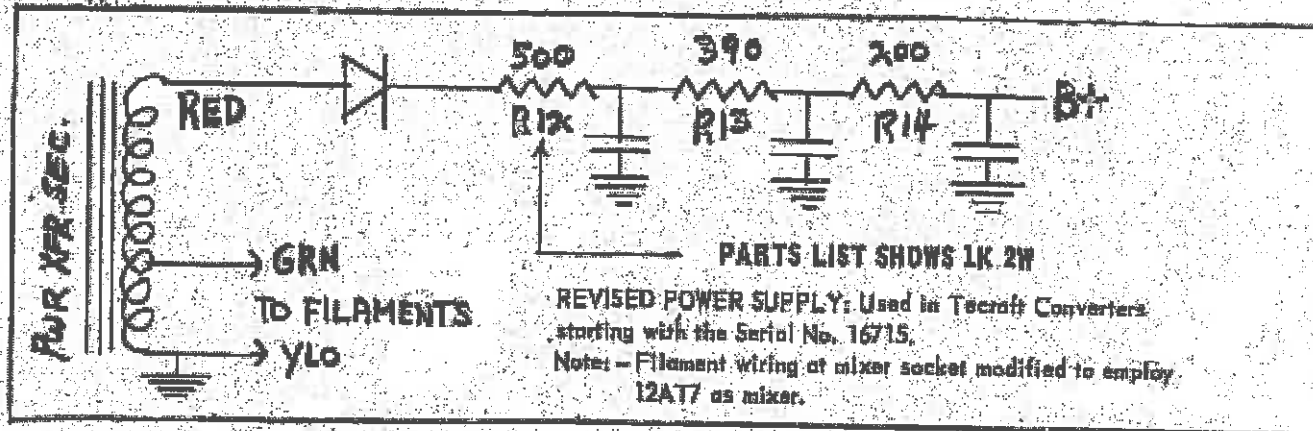


MODEL 50 - PANEL LAYOUT

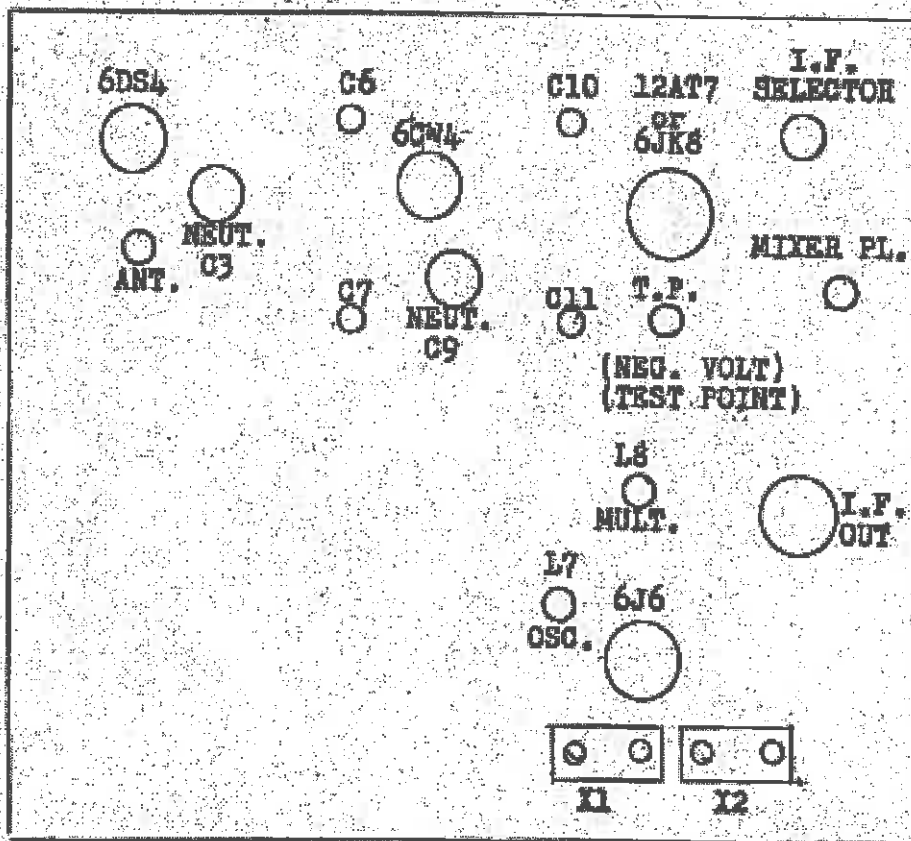


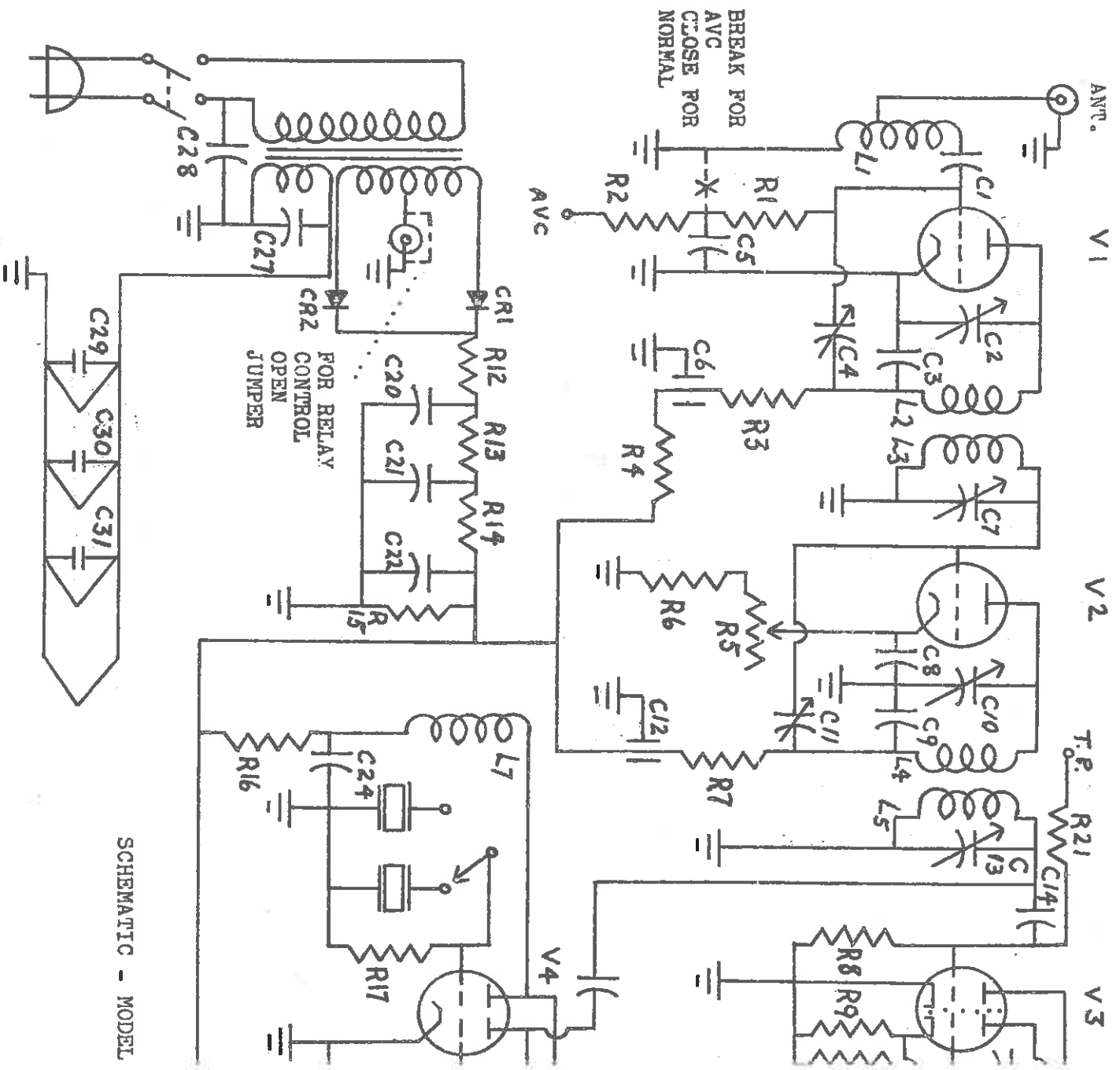


SCHEMATIC - MODEL 220



MODEL 220 - PANEL LAYOUT





SCHEMATIC - MODEL

