



Communication  
Systems

# PHILIPS

## Service Sheet

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# FM620

# UHF CB TRANSCEIVER

### SPECIFICATION

#### GENERAL

##### Frequency Range:

From 476.425 (Ch1) to 477.400MHz (Ch40)

##### Channel Spacing:

25kHz

##### Number of Channels:

Simplex Mode: 40 consecutive channels,  
numbered 01 to 40.

Repeater Mode: 8 Channels (receive channels 1 to 8  
transmit channels 31 to 38).

##### Frequency Stability:

Better than  $\pm 6$ ppm from 0°C to +50°C

Better than  $\pm 10$ ppm from -10°C to +60°C

##### Modulation:

Angle modulation, 6dB/octave pre-emphasis on Tx and  
6dB/octave de-emphasis on Rx.

##### Temperature Range:

Operational: 0°C to +50°C

Functional: -10°C to +60°C

##### Duty Cycle:

2 minutes transmit, 2 minutes receive, continuous  
cycle.

##### Supply Voltage:

Normal 13.8VDC, negative earth

Range: from 10.8 to 16.2VDC

##### Current Consumption:

Receive (standby)  $< 200$ mA (less selcall Channel 1  
illumin. no input signal)

Receive (full audio)  $< 1$ A

Transmit  $< 2$ A

##### Protection:

- 2A in-line fuses at battery end of cable.
- Fuse operated, reverse polarity protection  
using a shunt diode.
- Antenna system capable of withstanding a short  
or open circuit for at least 2 minutes of  
continuous operation, and protected against  
static build up.
- Audio PA circuitry protected against continuous  
open or short circuit conditions.
- Protected against transient over voltage  
situations which can occur in normal motor  
vehicle practice, with radio wired directly to  
the vehicle battery.

#### TRANSMITTER

##### Power Output:

5 Watts  $\pm 1$ dB (Temperature range 0°C to +50°C)

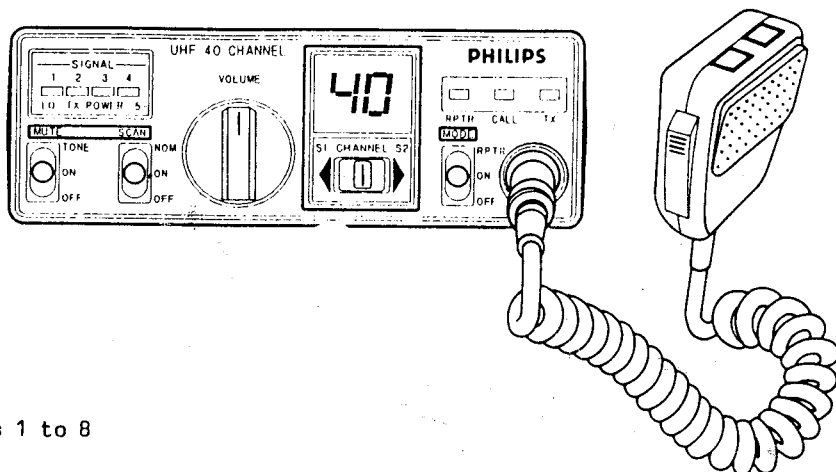
##### Maximum Deviation:

$< 5$ kHz (Limited, with +20dB overdrive @ 1kHz)

$< 1.5$ kHz (Limited, with +20dB overdrive @ 6kHz)

##### FM Noise:

$< -45$ dB wrt. 3kHz deviation in a 300-3000Hz  
bandwidth.



##### Distortion:

$< 3\%$  at 3kHz deviation, 1kHz modulating frequency.

##### Frequency Response:

6dB/octave pre-emphasis. Nominal response.

##### Spurious and Harmonics:

$> 70$ dB. Rejection with reference to carrier.

Compliant with RB250

##### AF Sensitivity:

1.5mV nominal sensitivity.

(1kHz for 60% modulation, 1k ohm input impedance).

#### RECEIVER

##### Sensitivity:

$< 0.3\mu$ V RF input level for 12dB Sinad

##### Blocking:

$> 85$ dB 2 signal method, measured at  $\pm 150$ kHz

##### Image Response:

$> 70$ dB Image: (Single signal)

##### Other Spurious Responses:

$> 80$ dB measured with single signal method.

##### Selectivity:

$> 70$ dB at  $\pm 25$ kHz. 2 signal method

##### Intermodulation:

$> 70$ dB measured at  $\pm 50$ ,  $\pm 100$ kHz. 3 signal method

##### Antenna Radiation:

$< 2$ nW measured into 50 ohm (RB250)

##### Mute:

Noise operated, factory set at 10dB, internally  
adjustable from 6-20dB Sinad.

##### Audio Output Power:

3 Watt into 4 ohm. Measured at 10% distortion,  
1kHz. (Internal speaker limited to 1 Watt only).

##### Audio Response:

6dB/octave de-emphasis nominal response.

##### Hum and Noise:

$> 50$ dB 15kHz bandwidth. Measured at 1kHz, 3kHz  
deviation 1mV RF level.

##### Modulation Acceptance Bandwidth:

$> 8$ kHz measured as per EIA method.

##### AF Regulation:

$< 1$ dB variation in AF output level from 0.3uV to  
100mV pd.

# FIELD TEST & ALIGNMENT

## TEST EQUIPMENT

- 1.1 IFR (or similar) Test Set
- 1.2 PS775 Power Supply (13.8V @ 3A)
- 1.3 CRO (10MHz)
- 1.4 AVO Model 8 MKIII (or similar) Meter
- 1.5 RF Wattmeter

## GENERAL INSTRUCTIONS

- 2.1 A non-metallic tool should be used for all tuning.
- 2.2 The -ve lead of all test equipment should be connected to chassis.

## PRELIMINARY ADJUSTMENTS

- 3.1 Set R52, R61 and R145 to fully clockwise position.
- 3.2 Set C103, C136, C142, C148 and C152, to 50% of mesh.
- 3.3 Set C154 fully out of mesh.
- 3.4 Set mute switch to "on" and scan switch to "off".
- 3.5 Set power supply to 13.8V dc.

## VOLTAGE REGULATOR CHECK

	Test Equipment	Test Point	Procedure	Result
4.1	AVO 10V dc	Top of D40	Check +5V P Regulator	5V $\pm$ 0.6V
4.2	AVO 10V dc	L9	Check +5V Regulator	5V $\pm$ 0.25V
4.3	AVO 30V dc	Top of D43	Check +10V Regulator	9.5V $\pm$ 0.5V
4.4	AVO 30V dc	Top of R20	Check +10V Rx	9.5V $\pm$ 0.5V
4.5	AVO 30V dc	D3 (Anode)	Activate PTT. Check 10V To	9.5V $\pm$ 0.5V

## TRANSMITTER PA ALIGNMENT

5.1			Select CH24 Activate PTT	
5.2	AVO 10V dc	TP1	Check VCO Control Voltage	2.5V $\pm$ 0.5V
5.3	AVO 30V dc	R164	Check +13V Tx	13V $\pm$ 1V
5.4	RF Wattmeter	Ant Skt	Adjust C154 and C152	Max. Power Output
5.5	RF Wattmeter	Ant Skt	Adjust C136, C142, C148 Re-adjust C154, C152	Max. Power Output > 5W
5.6	RF Wattmeter	Ant Skt	Adjust C148 (in mesh)	5-Watt Output < 1.8 Amp
5.7	Front Panel	Bar Graph	Activate PTT, 5W Output	All power LEDS on.

## REFERENCE CRYSTAL NETTING

6.1			Select CH24. Activate PTT	
6.2	IFR	Ant Skt	Adjust C108 netting	477.0000MHz

## TRANSMITTED MODULATION

7.1	IFR Dev. Meter	Fist Mic	Activate PTT. Test on Voice. Adjust R145.	$\pm$ 4.5kHz
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## RECEIVER ALIGNMENT

8.1	IFR		Set mute switch to Off position. Set RF output to 10uV at 477MHz. 1kHz mod $\pm$ 3kHz Dev.	
8.2	FM620		Select CH24.	
8.3	AVO 3V dc	TP2	Adjust FL1 & FL2 and L1 Helical Resonators	Max. voltage
8.4	CRO	Speaker	Volume Control to mid position. Adjust L2	Max. voltage ac.
8.5	IFR Sinad	Speaker	Adjust RF Sig. Gen. level to 0.3uV pd. Check sensitivity.	> 12dB Sinad
8.6	IFR Sinad	Speaker	Adjust FL1 and FL2. If 12dB Sinad not achieved.	> 12dB Sinad

## MUTE ADJUSTMENT

9.1	Front Panel		Set mute switch to "Off"	
9.2	IFR Sinad	Speaker	Adjust RF Sig. Gen. level for 1kHz $\pm$ 3kHz Dev. to achieve 10dB Sinad.	10dB Sinad
9.3			Set Mute Switch to "On"	
9.4	IFR Sinad	Speaker	Adjust R52 anti-clockwise. until 1kHz tone received.	Mute Opens

## SIGNAL METER ADJUSTMENT

10.1	IFR		Set RF Sig. Gen. to 0.5uV	0.5uV
10.2	Front Panel	Bar Graph	Adjust R61 anti-clockwise	First LED illuminated

# TECHNICAL DESCRIPTION

## GENERAL:

The FM620 UHF transceiver is divided into six main sections:

- 1) Synthesiser
- 2) Receiver
- 3) Transmitter/Modulator
- 4) Power Supply
- 5) Computer Control
- 6) Selcall Interface

### 1) SYNTHESISER:

The FM620 synthesiser comprises a single phase-locked-loop using two Voltage Controlled Oscillators (VCO), one for a local oscillator source in receive mode and one for a signal source for the transmitter.

The VCO signal is first divided in a prescaler integrated circuit IC6. The division ratio is "two-modulus" of 64/65 delivering a nominal frequency of 7MHz to the synthesiser, IC5, which contains two programmable frequency dividers, a phase comparator and a lock detector. One divider establishes a 25kHz reference frequency by dividing the 8MHz reference crystal XL3. The other divider, divides the input frequency to produce 25kHz for comparison in the phase detector with the reference signal. The resultant output is a dc control voltage which passes through a passive Loop Filter comprised of R104, C108, R105 and C101. This control voltage phase locks the VCO to the preprogrammed frequency and is stabilized by the reference crystal XL3.

Frequency selection for both the transmitter and the receive local oscillator VCO is programmed by the micro-computer, by setting the value of the division ratio in the synthesiser, IC5. The division ratio for the programmable dividers is only addressed by the micro-computer when; channel changing in receive, changing from receive to transmit (or vice versa) or if the phase locked loop is out-of-lock in receive mode. In this situation the synthesiser is reprogrammed repeatedly approximately every 10ms.

The lock detection output instructs the micro-computer of the lock status and also controls the transmit inhibit switch TR30 to ensure the transmitter is not active if the loop is out-of-lock in transmit.

When the loop is out-of-lock a square waveform appears at pin 13 of IC5. This is detected by R111, R114, D14 and C114 for a lock detect status to the micro-computer and by R154, R156, D46 and C180 for transmit inhibit in the power supply.

### 2) RECEIVER:

The receiver is a double conversion configuration with a first IF frequency of 21.4MHz and a second IF frequency of 455kHz.

The input signal is coupled from the antenna socket to the receiver via the transmit/receive switch, which in the receive mode D36, D37 and D38 are all biased off. The residual capacitance of D37 and D38 is tuned out by L32 to minimise insertion loss of the switch circuit.

The input signal is then filtered by the helical resonator pair FL1 before amplification in TR1. After further filtering in the helical resonator pair FL2 the signal is coupled to the first mixer TR2. The mixer has a local oscillator injection from the Rx VCO at the input frequency minus 21.4MHz. The Rx VCO therefore covers the range 455.025MHz to 456.0MHz.

The output of the mixer is tuned by L1 to 21.4MHz and further amplified by TR4. A cascaded pair of crystal filters FL3 and FL5 then provide further selectivity to reject unwanted signals.

After this filtering the signal is processed in IC1 which contains a second mixer, 455kHz limiter amplifier, demodulator, audio frequency amplifier and a logic switch circuit. The input signal is first converted to 455kHz by a mixer with a second local oscillator provided by crystal reference XL1 at 20.945MHz. After the second mixer the signal is then filtered further at 455kHz by FL4. The combined filtering of FL3, FL5 and FL4 provides at least 70dB rejection of adjacent channel signals.

Following FL4 is a limiter amplifier and the FM demodulator which is tuned by L2. The low level audio signal appearing at pin 9 of IC1 is then passed in two directions, one for the mute processing and the other for audio power amplification.

In the mute processing C32, C37, L3 and C38 form a bandpass filter at 70kHz. One half of IC3 amplifies the receiver noise in this band and after rectification by D6 a mute switching voltage is established by TR34 and TR25. R52 is normally set so that for a 10dB Sinad input signal, TR34 switches off. Hysteresis is provided by the feedback of TR35 to the emitter of TR34. The mute switch voltage at the collector of TR34 couples to the logic switch circuit internal to IC1. When pin 12 of IC1 goes high the output at pin 14 goes low thereby removing bias to the mute gate TR6 and permitting audio into the audio amplifier IC2. Also, the output at pin 13 goes high, this is used to activate the "call", green LED D605, and to indicate the "mute open" status for the micro-computer at IC7 pin 39. This "mute open" status is used by the micro-computer for stopping the scan cycle.

The audio processing path first low pass filters the signal in an active filter with a 3kHz cut off by using an Operational-Amplifier available in IC1. The amplifier input is at pin 10 and the output at pin 11 passes to the de-emphasis network of R32 and C34.

After the signal passes through the volume control R617 it is amplified in IC2 for a power output of 3 Watts into a 4 ohm speaker. C35, connected to pin 7 of IC2 via switch S604 to ground, provides for a "treble cut" tone control.

For strength indication of the incoming signal the 455kHz level at pin 5 of IC1 is first amplified by TR8. The other half of IC3 amplifier further amplifies this signal which is then rectified by D9. The resulting dc voltage which is proportional to the input signal strength is coupled to the LED bar graph driver IC603. The signal strength amplifier TR8 is disabled when the mute is closed.

### 3) TRANSMITTER:

The transmitter power amplifier takes the signal generated by the Tx VCO and amplifies it in the class B UHF buffer amplifier TR18 to approximately 100mW. Three class C stages comprised by TR19, TR21, TR22 then amplify the power to a level of 5 watts.

When transmitting the pin diode D36 is forward biased and the power is coupled to the antenna socket via the harmonic reject filter which utilises printed coils L33, L34, L36 and L37. The forward bias for D36 also biases D37 and D38 'on' to affect a short-circuit across the receiver input. This short-circuit is transformed to an effective open-circuit at the connection to D36 by the quarter wavelength transmission line.

D34 detects a small amount of the transmit output power and supplies IC603 with a voltage to indicate power output level on the bar graph D606.

### MODULATORS

The output of the dynamic microphone is amplified by one half of a dual operational amplifier IC10. Pre-emphasis is then applied to the signal by C121 and R123. The remaining half of IC10 further amplifies the signal and also provides the amplitude limiting function by utilizing the supply rail 0V to 10V as the peak-to-peak limit. The signal is then processed in an active low pass filter TR17, to restrict out-of-band modulation products. Following the filter the deviation level is set by R145 where the modulating voltage is coupled to a varicap D13 in the Tx VCO.

### 4) POWER SUPPLY:

Each battery supply lead has a 2 Amp in-line fuse. D39 provides for over voltage suppression as well as reverse polarity protection by acting as a fuse-blower. Three regulators establish the internal supply rails. IC9 provides for a

permanent +5V to the micro-computer IC7 for "last channel memory" when the transceiver is switched off. IC8 provides a 5V supply to operate the logic devices of IC4, IC5, IC6, IC7, IC601 and IC602.

A 10V regulator delivers a nominal 9.5V at the collector of TR23 to supply the remaining circuits of the equipment. This voltage is switched by TR26 for the receiver supply and by TR27 for the transmitter supply.

TR31 is a transmit inhibit switch which is under control of either the micro-computer or the selective call option.

#### 5) **COMPUTER CONTROL:**

The micro-computer IC7 is responsible for programming of the synthesiser, controlling the channel display and providing for the channel scanning feature. The channel change switch S601, scan/nom switch S603, On/Off/ Repeater switch S602, PTT switch on the microphone and the nominated channel select switches SW1, all instruct the micro-computer to perform each specific task. The micro-computer is driven by an

external clock of 4MHz which is derived by using a divide by 2 flip flop IC4 on the synthesiser reference crystal XL3.

The reset switch of TR32 and TR33 ensures that the micro-computer is reset when the battery voltage drops below 7.5V. The state of the nominated channel select switches are only read after a reset takes place.

#### 6) **SELCALL INTERFACE:**

Socket SK3 provides a complete interface for the selective call signalling option. When the selcall module is installed the functions of the "call" LED D605, the mute gate TR6 and the PTT inhibit switch TR31 become fully controlled by the selcall module.

For decoding, the Selcall module receives its audio input from the demodulator output at pin 9 of IC1. The encode output is connected to the modulator via an independent input to the microphone pre-amp at pin 2 of IC10. Alarm tones for 'Call Received' indication are coupled to the audio power amplifier at pin 6 of IC2.

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without notice.

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## FM620 ASSEMBLY

(3502 350 04250)

	Front Panel Board	3502 349 97760
	Main PCB Assy.	3502 349 97680
	Panel, Front	3502 310 38070
	Case Half Screened	3502 310 38610
	Case Half Moulded	3502 310 38600
	Lens, LED Display	3502 310 37970
	Knob, Switch	3502 310 38010
	Knob, Channel	3502 310 38030
	Knob, Volume	3502 310 38020
	Cradle	3502 310 38100
	Washer Indexing	3502 310 11550
	Screw Cradle	3502 310 11530
	Collar Mic Plug	3502 310 38750
	Nut St. Wing	2502 500 06002
	Dress Plate Cover	3502 310 38590
	Dress Plate Switch CB	3502 310 11420
LS1	Speaker 87mm 16 ohm	2422 264 00041
	Heatsink T05 CB	3502 310 12290
	PA Shield LID CB	3502 310 12030
	Shield Filter CB	3502 310 12060
	Shield,VCO	3502 310 38980
	Shield, VCO, base	3502 310 38990
	Assy LT Cable CB	3502 350 01130
	Grommet Cord Grip Black H2098	2402 015 09064
	Bead Ferroxcube 8.5x14x14	4312 020 31520
	Speaker Lead CB	3502 310 12540
	Coax 50E Line T/R SW	3502 310 12140
SK2	Socket Ant. Coax X-U5024	2422 031 10288
JK1	Socket PH/Jack 4121 Oshima	2422 026 01857
L37	Coil A/W	3502 380 00880
	Fuses 2 Amp (x2)	2402 085 00137
	Cradle Fist Microphone	3502 310 11970
	Fist Microphone DM1570	3502 350 03020

## FRONT PANEL PC BOARD

(3502 349 97760)

R602	330E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46331
R603	330E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46331
R604	330E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46331
R605	330E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46331
R606	330E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46331
R607	330E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46331
R608	330E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46331
R609	330E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46331
R610	330E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46331
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R614	330E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46331
R615	330E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46331
R616	330E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46331
R617	50k 200V .2W Pot Carb.	2120 354 90004
R618	1E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46108
R619	100E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46101
R620	330E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46331
C601	100p 2% 100V Cer.Pl. NPO	2222 680 10101
C602	100p 2% 100V Cer.Pl. NPO	2222 680 10101
C603	100p 2% 100V Cer.Pl. NPO	2222 680 10101
C604	100p 2% 100V Cer.Pl. NPO	2222 680 10101
C605	1u -10+75% 63V Elec.	2020 002 65108
C606	4u7 -10+50% 63V Al.Elec.	2222 035 58478
C607	10u -10+50% 50V Al.Elec.	2222 035 90008
D601	LED CQW10B3	9336 547 10112
D602	LED 7 Segment HDSP7503	9337 925 20682
D603	LED 7 Segment HDSP7503	9337 925 20682
D604	LED CQW12B3	9336 547 50112
D605	LED CQW11B3	9336 547 30112
D606	LED (Amber) LND4402P	9337 983 60682
S601	Switch Tgle 2p 3pS	2422 125 01492
S602	Switch Tgle 3pS	2422 125 01491
S603	Switch Tgle 3p3	2422 125 01491
S604	Switch Tgle 3p3	2422 125 01491
SK601	Socket 5p MIC	2422 026 01856
IC601	Intgrd Circ MC14511BCP	9334 329 70112
IC602	Intgrd Circ MC14511BCP	9334 329 70112
IC603	Intgrd Circ IR2E31A	9337 924 60682

## MAIN PC BOARD ASSEMBLY

(3502 349 97680)

	VCO PCB Assy.	3502 349 97840
R1	68k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46683
R2	22E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46229
R3	560E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46561
R4	27E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46279
R5	10k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46103
R6	100k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46104
R7	47E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46479
R8	220E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46221
R9	15k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46153
R11	39k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46393
R12	47E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46479
R13	1k0 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46102
R14	390E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46391
R15	47k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46473
R16	100E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46101
R17	1k0 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46102
R18	220E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46221
R19	12k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46123
R20	270E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46271
R21	27k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46273
R22	47k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46473
R23	120k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46124
R24	100k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46104
R25	10k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46103
R26	330k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46334
R27	10k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46103
R28	33k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46333
R29	10k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46103
R30	27k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46273
R31	33k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46333
R32	4k7 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46472
R33	150k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46154
R34	1k0 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46102
R35	22k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46223
R37	4k7 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46472
R39	330k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46334
R41	22k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46223
R42	1M0 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46105
R43	33k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46333
R46	47E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46479
R47	330k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46334
R48	6k8 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46682
R49	680k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46684
R50	15k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46153
R51	10k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46103
R52	47k 20% Preset Carb. LIN	2322 410 05059
R53	4E7 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46478
R54	8k2 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46822
R55	680E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46681
R56	6k8 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46682
R57	6k8 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46682
R58	1k0 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46102
R59	680E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46681
R60	6k8 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46682
R61	2k2 20% Preset Carb. LIN	2322 410 05055
R62	100E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46101
R63	22k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46223
R64	100k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46104
R65	10k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46103
R66	82k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46823
R67	18k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46183
R68	1k2 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46122
R70	4k7 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46472
R75	27k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46273
R78	5k6 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46562
R79	2k7 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46272
R80	8k2 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46822
R81	22E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46229
R82	150E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46151
R84	1k2 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46122
R85	33E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46339
R96	5k6 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46562
R97	2k7 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46272
R98	22E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46229
R99	150E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46151
R101	390E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46391
R102	390E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46391
R103	100E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46101
R104	1k8 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46182
R105	3k3 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46332
R106	1k0 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46102
R107	10E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46109
R109	10k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46103
R110	10k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46103

# SCHEDULE OF REPLACEABLE COMPONENTS

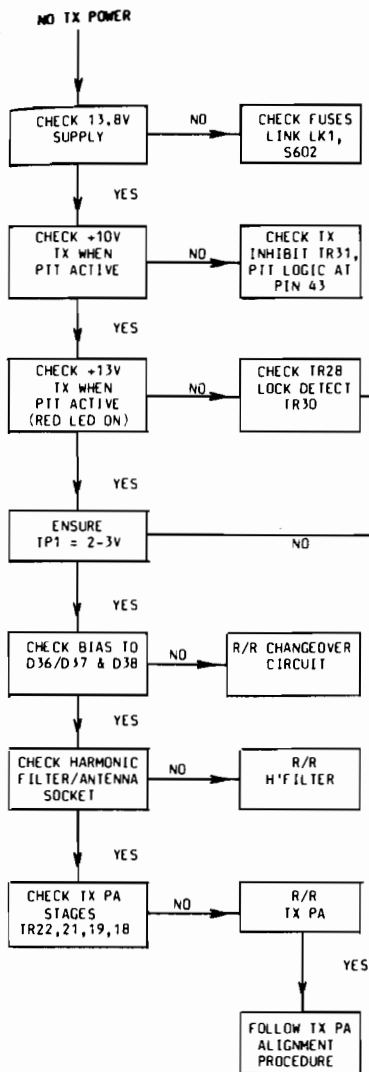
R111	1k5 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46152	C33	10n 10% 100V Pest.	2020	300	85103
R112	10k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46103	C34	100n 10% 100V Pest.	2020	300	85104
R113	10k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46103	C35	15n 10% 100V AMX	2020	300	85153
R114	100k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46104	C36	10n 10% 100V AMX	2020	300	85103
R115	10k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46103	C37	1n0 10% 100V Cer.Pl.	2222	630	08102
R118	10k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46103	C38	1n0 10% 100V Cer.Pl.	2222	630	08102
R119	15k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46153	C39	15n 10% 100V AMX	2020	300	85153
R120	1k0 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46102	C40	1u -10+75% 63V Elec.	2020	002	65108
R121	18k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46183	C41	100p 2% 100V Cer.Pl. NPO	2222	680	10101
R122	100k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46104	C42	1u -10+75% 63V Elec.	2020	002	65108
R123	2k2 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46222	C43	10n -20+80% 63V Cer.Pl.	2222	629	08103
R124	22k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46223	C44	10u -10+50% 50V Al.Elec.	2222	035	90008
R125	120k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46124	C46	22n 10% 100V Pest.	2020	300	85223
R126	39k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46393	C47	10n 10% 100V AMX	2020	300	85103
R127	33k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46333	C48	22n -20+80% 63V Cer.Pl.	2222	629	08223
R128	220k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46224	C49	4n7 10% 100V Cer.Pl.	2222	630	08472
R129	47k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46473	C51	4n7 10% 100V Cer.Pl.	2222	630	08472
R130	22E 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46229	C52	47u -10+50% 25V Al.Elec.	2222	035	56479
R131	47k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46473	C53	47u -10+50% 25V Al.Elec.	2222	035	56479
R132	1k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46102	C54	100n 10% 100V Pest.	2020	300	85104
R133	4k7 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46472	C55	4n7 10% 100V Cer.Pl.	2222	630	08472
R134	1k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46102	C56	2u2 -10+50% 100V Al.Elec.	2222	035	59228
R135	47E 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46479	C57	220u -10+50% 16V Al.Elec.	2222	035	55221
R136	68E 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46689	C58	1n0 10% 100V Cer.Pl.	2222	630	08102
R137	100E 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46101	C59	10n 10% 100V Pest.	2020	300	85103
R138	82E 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46829	C60	22n 10% 100V Pest.	2020	300	85223
R139	150E 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46151	C62	10n 10% 100V Pest.	2020	300	85103
R140	470E 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46471	C63	4u7 -10+50% 63V Al.Elec.	2222	035	58478
R141	10E 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46109	C65	10u -10+50% 50V Al.Elec.	2222	035	90008
R142	150E 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46151	C73	1u -10+75% 63V Elec.	2020	002	65108
R143	10E 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46109	C75	2p2 p25 100V Cer.Pl. NPO	2222	680	09228
R144	1k0 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46102	C77	470p 10% 100V Cer.Pl.	2222	630	08471
R145	10k 30% Preset Carb. LIN	2120	357	02103	C78	33p 2% 100V Cer.Pl. NPO	2222	680	10339
R146	47k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46473	C79	3p9 p25 100V Cer.Pl. NPO	2222	680	09398
R148	47E 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46479	C80	82p 2% 100V Cer.Pl. NPO	2222	680	10829
R149	1k0 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46102	C93	1u -10+75% 63V Elec.	2020	002	65108
R150	470E 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46471	C95	100p 2% 100V Cer.Pl. NPO	2222	680	10101
R151	1k0 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46102	C97	470p 10% 100V Cer.Pl.	2222	630	08471
R152	10k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46103	C98	33p 2% 100V Cer.Pl. NPO	2222	680	10339
R153	8k2 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46822	C99	3p3 p25 100V Cer.Pl. NPO	2222	680	09338
R154	470E 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46471	C100	82p 2% 100V Cer.Pl. NPO	2222	680	10829
R155	10k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46103	C101	100n 10% 100V Pest.	2020	300	85104
R156	22k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46223	C102	100p 2% 100V Cer.Pl. NPO	2222	680	10101
R157	1k0 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46102	C103	2p-18p 300V Trim Film H/T	2222	809	05003
R158	10k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46103	C104	100p 2% 100V Cer.Pl. NPO	2222	680	10101
R159	10k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46103	C105	2p2 p25 100V Cer.Pl. NPO	2222	680	09228
R161	1k0 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46102	C106	4n7 10% 100V Cer.Pl.	2222	630	08472
R162	1k0 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46102	C107	10p 2% 100V Cer.Pl. NPO	2222	680	10109
R163	1k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46102	C108	1u -10+50% 100V Al.Elec.	2222	035	59108
R164	820E 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46821	C109	12p 2% 100V Cer.Pl. NPO	2222	680	10129
R165	220k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46224	C110	4n7 10% 100V Cer.Pl.	2222	630	08472
R166	47k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46473	C111	1n0 10% 100V Cer.Pl.	2222	630	01102
R167	33k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46333	C112	4n7 10% 100V Cer.Pl.	2222	630	08472
R168	4k7 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46472	C113	4n7 10% 100V Cer.Pl.	2222	630	08472
R169	3k3 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46332	C114	22n -20+80% 63V Cer.Pl.	2222	629	08223
R170	10k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46103	C115	100n 10% 100V Pest.	2020	300	85104
R171	10k 5% $\frac{1}{2}$ W, Carb.F.	2120	101	46103	C116	220p 10% 100V Cer.Pl.	2222	630	08221
C1	47p 2% 100V Cer.Pl. NPO	2222	680	10479	C117	4n7 10% 100V Cer.Pl.	2222	630	08472
C2	47p 2% 100V Cer.Pl. NPO	2222	680	10479	C118	1n0 10% 100V Cer.Pl.	2222	630	08102
C3	470p 10% 100V Cer.Pl.	2222	630	08471	C119	2u2 -10+50% 63V Elec.	2020	002	65228
C4	47p 2% 100V Cer.Pl. NPO	2222	680	10479	C120	10u -10+50% 25V Elec.	2020	002	44109
C5	4p7 p25 100V Cer.Pl.	2222	680	09478	C121	27n 10% 100V Pest.	2020	300	85273
C6	4n7 10% 100V Cer.Pl.	2222	630	08472	C122	3n9 10% 100V Pest.	2020	300	85392
C7	22p 2% 100V Cer.Pl. NPO	2222	680	10229	C123	1u -10+75% 63V Elec.	2020	002	65108
C8	22n -20+80% 63V Cer.Pl.	2222	629	08223	C124	3n9 10% 100V Pest.	2020	300	85392
C9	4n7 10% 100V Cer.Pl.	2222	630	08472	C125	270p 10% 100V Cer.Pl.	2222	630	08271
C11	33p 2% 100V Cer.Pl. NPO	2222	680	10339	C126	1u -10+75% 63V Elec.	2020	002	65108
C12	68p 2% 100V Cer.Pl. NPO	2222	680	10689	C127	15p 2% 100V Cer.Pl. NPO	2222	680	10159
C13	22n -20+80% 63V Cer.Pl.	2222	629	08223	C128	4p7 p25 100V Cer.Pl. NPO	2222	680	09478
C14	4n7 10% 100V Cer.Pl.	2222	630	08472	C129	470p 10% 100V Cer.Pl.	2222	630	08471
C15	12p 2% 100V Cer.Pl. NPO	2222	680	10129	C130	100u -10+50% 25V Al Elec.	2222	035	56101
C16	1n0 10% 100V Cer.Pl.	2222	630	08102	C131	4n7 10% 100V Cer.Pl.	2222	630	08472
C21	10u -10+50% 50V Al.Elec.	2222	035	90008	C132	470p 10% 100V Cer.Pl.	2222	630	08471
C22	22n -20+80% 63V Cer.Pl.	2222	629	08223	C133	10p 2% 100V Cer.Pl. NPO	2222	680	10109
C23	100n 10% 100V Pest.	2020	300	85104	C134	22p 2% 100V Cer.Pl. NPO	2222	680	10229
C24	100n 10% 100V Pest.	2020	300	85104	C136	2p-10p 100V Trim Film Diel	2222	808	00005
C25	2u2 -10+50% 63V Elec.	2020	002	65228	C137	100p 2% 100V Cer.Pl. NPO	2222	680	10101
C26	18p 2% 100V Cer.Pl. NPO	2222	680	10189	C138	1n0 10% 100V Cer.Pl.	2222	630	08102
C27	56p 2% 100V Cer.Pl. NPO	2222	680	10569	C139	4n7 10% 100V Cer.Pl.	2222	630	08472
C28	1u -10+75% 63V	2020	002	65108	C141	33p 2% 100V Cer.Pl. NPO	2222	680	10109
C29	100p 2% 100V Cer.Pl.	2222	680	10101	C142	2p-22p 100V Trim Film Diel	2222	629	08223
C31	1n0 10% 100V Pest.	2020	300	85102	C143	22n -20+80% 63V Cer.Pl.	2222	630	08472
C32	1n5 10% 100V Pest.	2020	300	85152	C144	1n0 10% 100V Cer.Pl.	2222	630	08472
					C146	22p 5% 500V Cer.T.	2013	500	00000

100n 10% 100V Pest.	2020 300 85104
2p-18p 300V Trim Film 3H/T	2222 809 09003
1n0 10% 100V Cer.Pl.	2222 630 08102
100n 10% 100V Pest.	2020 300 85104
2p-18p 300V Trim Film 3H/T	2222 809 09003
2p2 p25 100V Cer.Pl. NPO	2222 680 09228
2p-18p 300V Trim Film 3H/T	2222 809 09003
22n -20+80% 63V Cer.Pl.	2222 629 08223
4n7 10% 100V Cer.Pl.	2222 630 08472
6p8 p25 100V Cer.Pl. NPO	2222 680 09688
8p2 p25 100V Cer.Pl. NPO	2222 680 09828
6p8 p25 100V Cer.Pl. NPO	2222 680 09688
4n7 10% 100V Cer.Pl.	2222 630 08472
68p 2% 100V Cer.Pl. NPO	2222 680 10689
100n 10% 100V Pest.	2020 300 85104
100n 10% 100V Pest.	2020 300 85104
100u -10+50% 25V, Al.Elec.	2222 035 56101
47u -10+50% 25V, Al.Elec.	2222 035 56479
47u -10+50% 25V, Al.Elec.	2222 035 56479
100u -10+50% 25V Al.Elec.	2222 035 56101
47n 10% 100V Pest	2020 300 85473
10u -10+50% 50V, Al.Elec.	2222 035 90008
10n -20+80% 63V, Cer.Pl.	2222 629 08103
4n7 10% 100V, Cer.Pl.	2222 630 08472
18p 2% 100V, Cer.Pl. NPO	2222 680 10189
4n7 10% 100V, Cer.Pl.	2222 630 08472
TR1 Transistor 2SC3355	9337 925 10682
TR2 Transistor BF960	9335 105 20112
TR4 Transistor BF494	9331 987 70112
TR6 Transistor BC548C	9331 976 70112
TR7 Transistor BC548C	9331 976 70112
TR8 Transistor BF494	9331 987 70112
TR11 Transistor 2SC3355	9337 925 10682
TR13 Transistor 2SC3355	9337 925 10682
TR17 Transistor BC548C	9331 976 70112
TR18 Transistor BFR96-02	9335 219 60112
TR19 Transistor MRF629	9334 397 90112
TR21 Transistor MRF629	9334 397 90112
TR22 Transistor BLX68C	9334 713 20112
TR23 Transistor BD136	9330 911 70112
TR25 Transistor BC548C	9331 976 70112
TR26 Transistor BC548C	9331 976 70112
TR27 Transistor BC558	9331 977 30112
TR28 Transistor BC327	9331 491 80112
TR30 Transistor BC548C	9331 976 70112
TR31 Transistor BC548C	9331 976 70112
TR32 Transistor BC548C	9331 976 70112
TR33 Transistor BC548C	9331 976 70112
TR34 Transistor BC548C	9331 976 70112
TR35 Transistor BC548C	9331 976 70112
D3 Diode 1N4148	9330 839 90112
D6 Diode 1N4148	9330 839 90112
D9 Diode 1N4148	9330 839 90112
D10 Diode 1N4148	9330 839 90112
D14 Diode 1N4148	9330 839 90112
D15 Diode BZX79-C6V8	9331 177 50112
D16 Diode 1N4148	9330 839 90112
D17 Diode 1N4148	9330 839 90112
D18 Diode 1N4148	9330 839 90112
D19 Diode 1N4148	9330 839 90112
D21 Diode 1N4148	9330 839 90112
D22 Diode 1N4148	9330 839 90112
D23 Diode 1N4148	9330 839 90112
D24 Diode 1N4148	9330 839 90112
D26 Diode 1N4148	9330 839 90112
D27 Diode 1N4148	9330 839 90112
D28 Diode 1N4148	9330 839 90112
D32 Diode BZX79-C6V8	9331 177 50112
D33 Diode BA482	9334 632 90113
D34 Diode 1N4148	9330 839 90112
D36 Diode BA482	9334 632 90113
D37 Diode BA482	9334 632 90113
D38 Diode BA482	9334 632 90113
D39 Diode BZT03-C20	9336 015 80112
D40 Diode BAT85	9336 247 60113
D43 Diode BZX79-C5V6	9331 177 30112
D44 Diode 1N4148	9330 839 90112
D46 Diode 1N4148	9330 839 90112
D48 Diode 1N4148	9330 839 90112
D49 Diode 1N4148	9330 839 90112
D52 Diode 1N4148	9330 839 90112
IC1 Intgrd Cirt MC3361P	9337 941 60682

IC2 Intgrd Cirt IDA1010	9333 849 50112
IC3 Intgrd Cirt LM359N	9337 925 00682
IC4 Intgrd Cirt MM74HC107N	9337 924 70682
IC5 Intgrd Cirt MC145146P	9337 924 80682
IC6 Intgrd Cirt UPB571C	9337 927 10682
IC7 PROM (Programmed)	3502 362 01400
IC8 Intgrd Cirt LM340T5	9333 006 00682
IC9 Intgrd Cirt MC78L05ACP	9335 107 20682
IC10 Intgrd Cirt LM358N	9333 935 10112
FL1 Coil Helical Resntr	3502 383 01350
FL2 Coil Helical Resntr	3502 383 01360
FL3 Xtal Filt MNLTHIC 2p 21F15A	2722 172 90044
FL4 Filter Cer 455kHz	2422 549 03635
FL5 Xtal Filt MNLTHIC 2p 21F15A	2722 172 90044
XL1 Crystal 20.945MHz	3502 413 48410
XL3 Crystal 8.0MHz	3502 414 98400
L1 Coil, Toko 7E, 85ANS30373Z	3522 020 81980
L2 Coil, Dscr, Toko RMC-2A6597HM	2422 549 18111
L3 Choke 6.8MHz EL0607SK1	2422 535 97062
L9 Choke RF 10uH Delevan	2422 535 98031
L11 Coil A/W	3502 380 02060
L12 Coil A/W	3502 380 02070
L13 Coil A/W	3502 380 02080
L15 Coil RFC	3502 380 00670
L16 Choke Wide Band RF	4312 020 36640
L19 Coil RFC	3502 380 00670
L21 Choke Wide Band RF	4312 020 36640
L24 Coil RFC	3502 380 00670
L26 Choke Wide Band RF	4312 020 36640
L28 Coil	3502 380 00660
L29 Coil RFC	3502 380 00670
L32 Coil A/W	3502 380 02090
L38 Coil A/W	3502 380 00880
L39 Choke Wide Band RF	4312 020 36640
SW1 10 Way, DIL, ALPS	2422 129 14024

VCO PC BOARD ASSEMBLY		(3502 349 97840)
R69 6k8 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46682	
R71 2k7 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46272	
R72 5k6 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46562	
R73 33E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46339	
R74 33E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46339	
R76 220E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46221	
R77 22E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46229	
R83 12k 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46123	
R86 6k8 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46682	
R87 6k8 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46682	
R88 2k7 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46272	
R89 5k6 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46562	
R91 33E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46339	
R92 33E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46339	
R93 220E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46221	
R94 22E 5% $\frac{1}{2}$ W, Carb.F.	2120 101 46229	
C64 4n7 10% 100V Cer.Pl.	2222 630 08472	
C66 3p9 p25 100V Cer.Pl. NPO	2222 680 09398	
C67 6p8 p25 100V Cer.Pl. NPO	2222 680 09688	
C68 1n0 10% 100V Cer.Pl.	2222 630 08102	
C69 3p3 p25 100V Cer.Pl. NPO	2222 680 09338	
C70 4n7 10% 100V Cer.Pl.	2222 630 08472	
C71 8p2 p25 100V Cer.Pl. NPO	2222 680 09828	
C72 4p7 p25 100V Cer.Pl. NPO	2222 680 09478	
C74 5p6 p25 100V Cer.Pl. NPO	2222 680 09568	
C76 10p 2% 100V Cer.Pl. NPO	2222 680 10109	
C81 100p 2% 100V Cer.Pl. NPO	2222 680 10101	
C82 4n7 10% 100V Cer.Pl.	2222 630 08472	
C83 1p8 p25 100V Cer.Pl. NPO	2222 680 09188	
C84 3p9 p25 100V Cer.Pl. NPO	2222 680 09398	
C86 1p8 p25 100V Cer.Pl. NPO	2222 680 09188	
C87 5p6 p25 100V Cer.Pl. NPO	2222 680 09568	
C88 1n0 10% 100V Cer.Pl.	2222 630 08102	
C89 3p3 p25 100V Cer.Pl. NPO	2222 680 09338	
C90 4n7 10% 100V Cer.Pl.	2222 630 08472	
C91 8p2 p25 100V Cer.Pl. NPO	2222 680 09828	
C92 4p7 p25 100V Cer.Pl. NPO	2222 680 09478	
C94 5p6 p25 100V Cer.Pl. NPO	2222 680 09568	
C96 10p 2% 100V Cer.Pl. NPO	2222 680 10109	
TR9 Transistor 2SC3355	9337 925 10682	
TR12 Transistor 2SC3355	9337 925 10682	
D11 Diode BB405G	9333 182 90112	
D12 Diode BB405G	9333 182 90112	
D13 Diode BB405G	9333 182 90112	

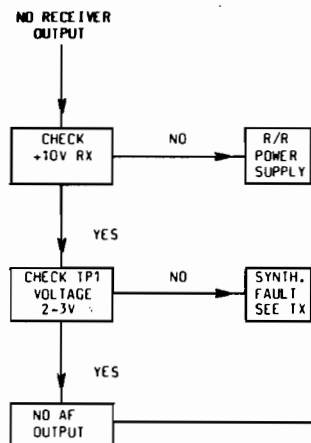
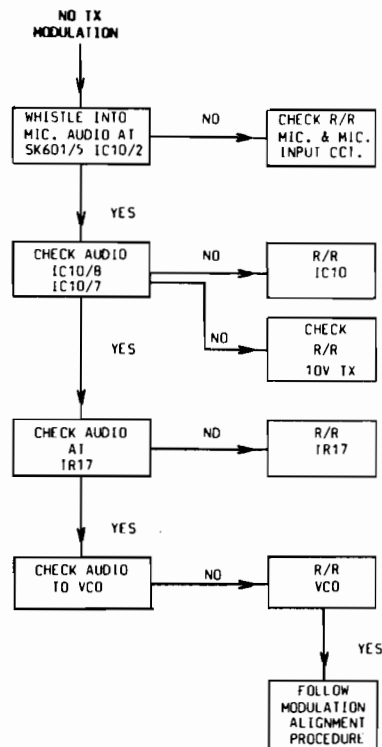
# AULT FINDING FLOW DIAGRAMS



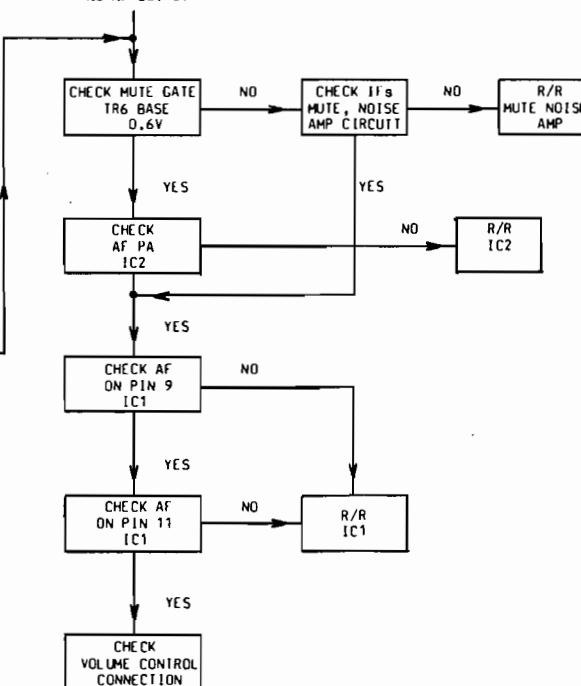
## NOTE:

### CHECK R/R

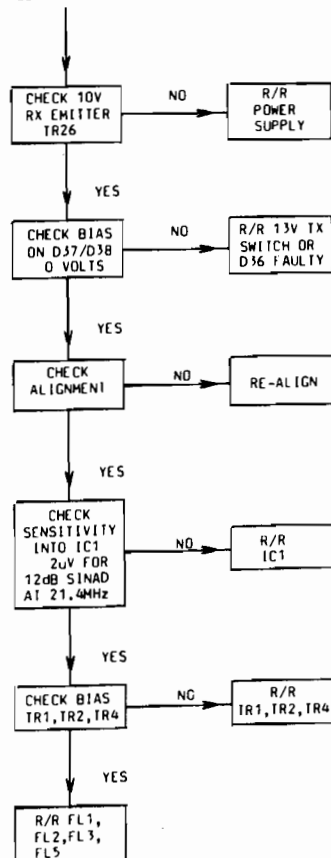
Means that a complete check around the associated area (Voltages, Values, S/Cct O/Cct) should be carried out prior to repair/replacement.



## CARRIER RECEIVED (GREEN LED ON) NO AF OUTPUT

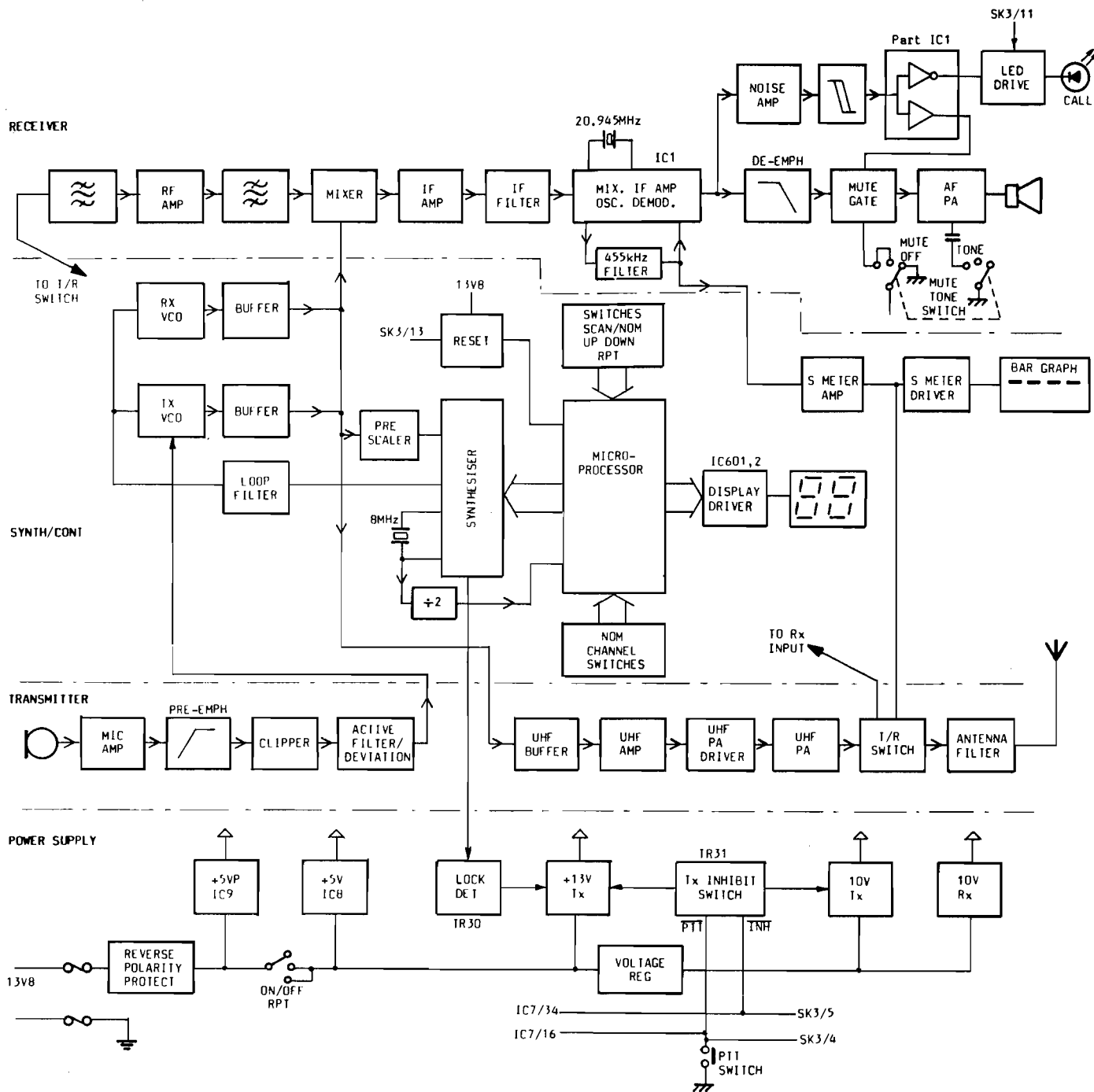


## LOW RECEIVER SENSITIVITY

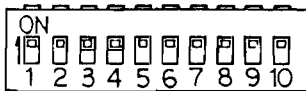




### BLOCK DIAGRAM



## CHANNEL SELECTION

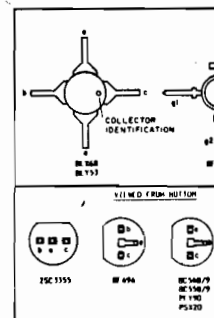
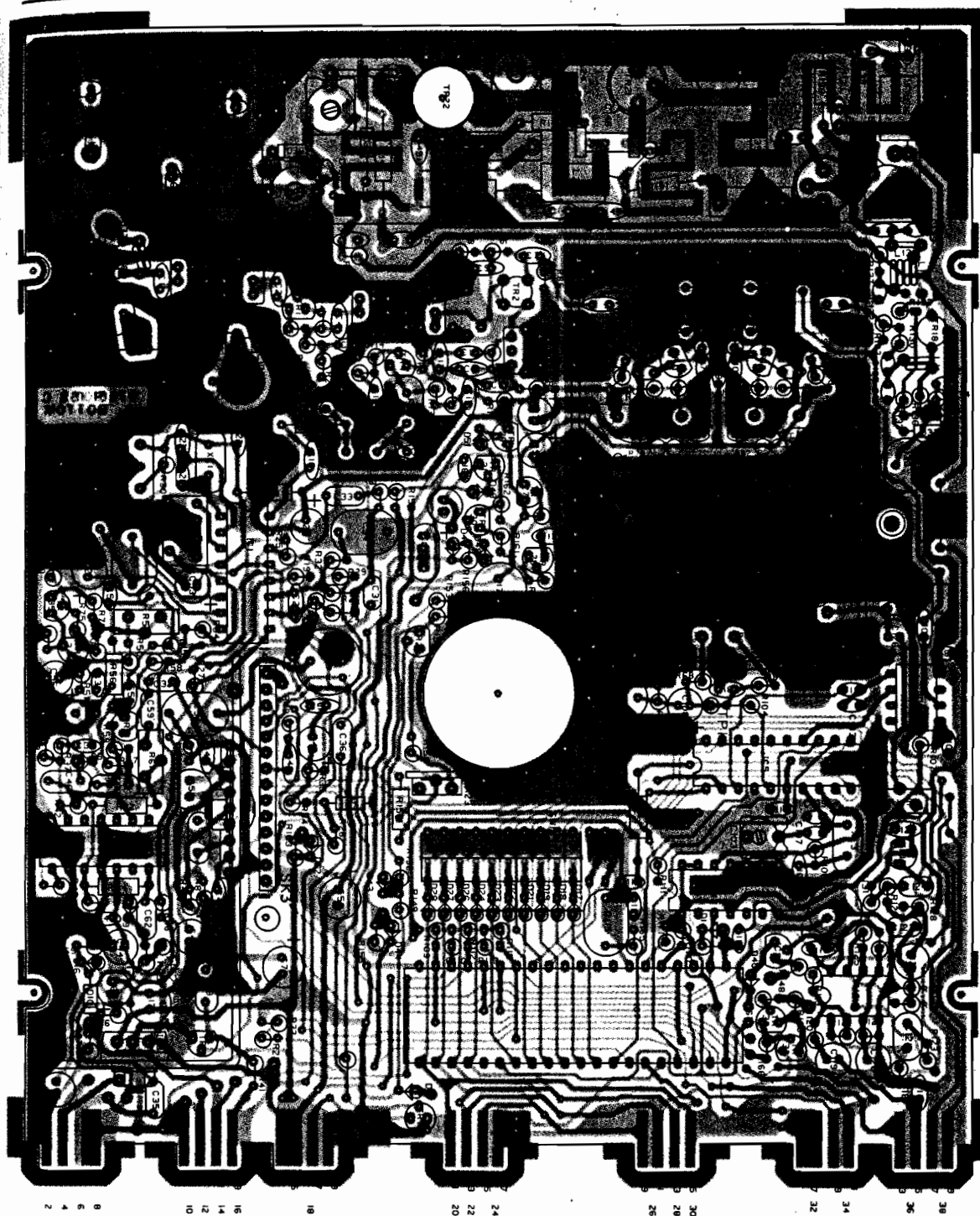


SWITCH (SW1)  
CHANNEL SELECTOR

CHANNEL NO.	CHANNEL SELECTOR SWITCH (SW1)										
	REPEATER				SIMPLEX						
	1	2	3	4	5	6	7	8	9	10	
1	ON	-	-	-	ON	-	-	-	-	-	
2	-	ON	-	-	-	ON	-	-	-	-	
3	ON	ON	-	-	ON	ON	-	-	-	-	
4	-	-	ON	-	-	-	ON	-	-	-	
5	ON	-	ON	-	ON	-	ON	-	-	-	
6	-	ON	ON	-	-	ON	ON	-	-	-	
7	ON	ON	ON	-	ON	ON	ON	-	-	-	
8	-	-	-	ON	-	-	-	ON	-	-	
9					ON	-	-	ON	-	-	
10					-	ON	-	ON	-	-	
11					ON	ON	-	ON	-	-	
12					-	-	ON	ON	-	-	
13					ON	-	ON	ON	-	-	
14					-	ON	ON	ON	-	-	
15					ON	ON	ON	ON	-	-	
16					-	-	-	-	ON	-	
17					ON	-	-	-	ON	-	
18					-	ON	-	-	ON	-	
19					ON	ON	-	-	ON	-	
20					-	-	ON	-	ON	-	

CHANNEL NO.	CHANNEL SELECTOR SWITCH (SW1)									
	REPEATER				SIMPLEX					
	1	2	3	4	5	6	7	8	9	10
21					ON	-	ON	-	ON	-
22					-	ON	ON	-	ON	-
23					ON	ON	ON	-	ON	-
24					-	-	-	ON	ON	-
25					ON	-	-	ON	ON	-
26					-	ON	-	ON	ON	-
27					ON	ON	-	ON	ON	-
28					-	-	ON	ON	ON	-
29					ON	-	ON	ON	ON	-
30					-	ON	ON	ON	ON	-
31					ON	ON	ON	ON	ON	-
32					-	-	-	-	-	ON
33					ON	-	-	-	-	ON
34					-	ON	-	-	-	ON
35					ON	ON	-	-	-	ON
36					-	-	ON	-	-	ON
37					ON	-	ON	-	-	ON
38					-	ON	ON	-	-	ON
39					ON	ON	ON	-	-	ON
40					-	-	-	ON	-	ON

# MAIN PC BOARD ASSEMBLY



SEMICK

## TEST POINTS

Top of R20 R16

TP1

L9

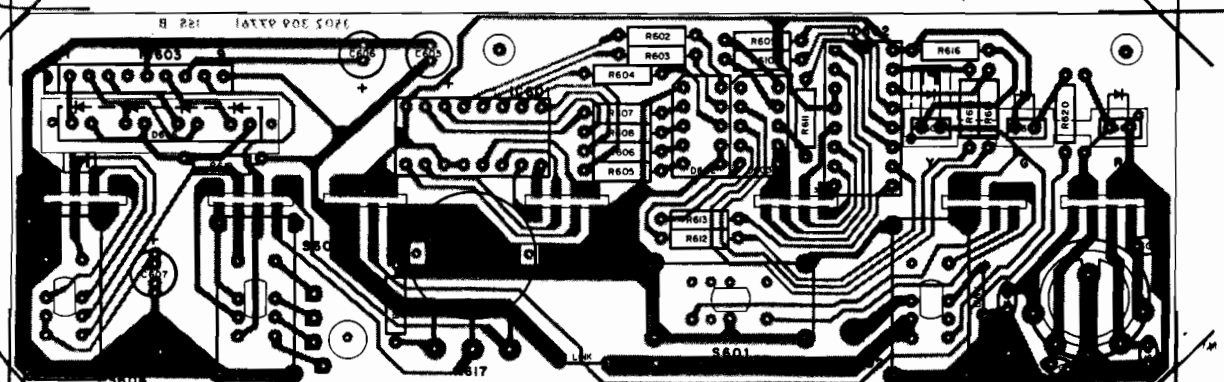
D3 (Anode)

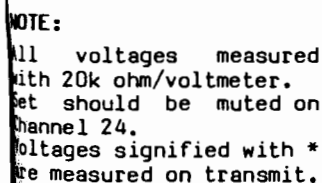
Top of D43

TP2

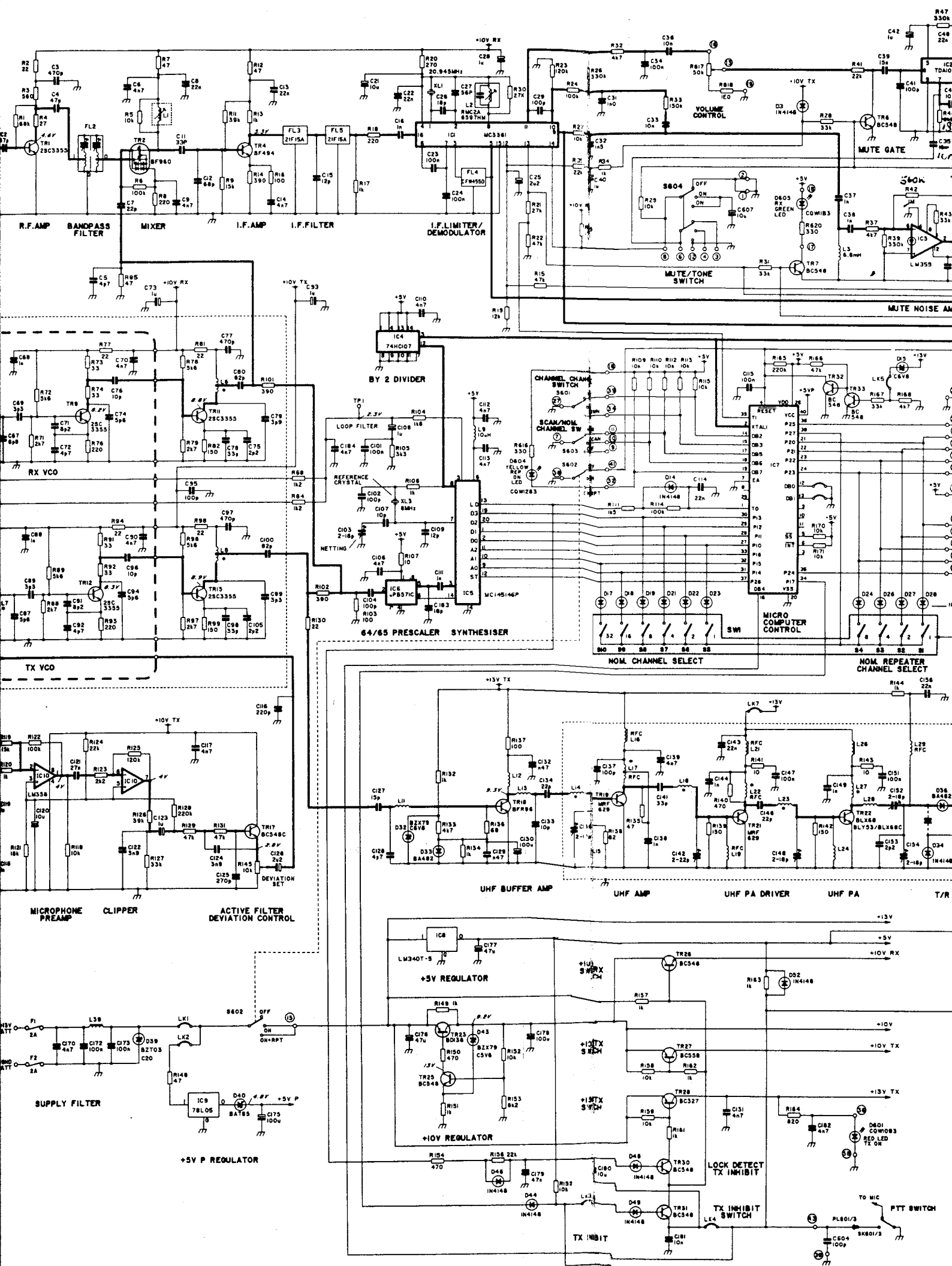
Top of D40

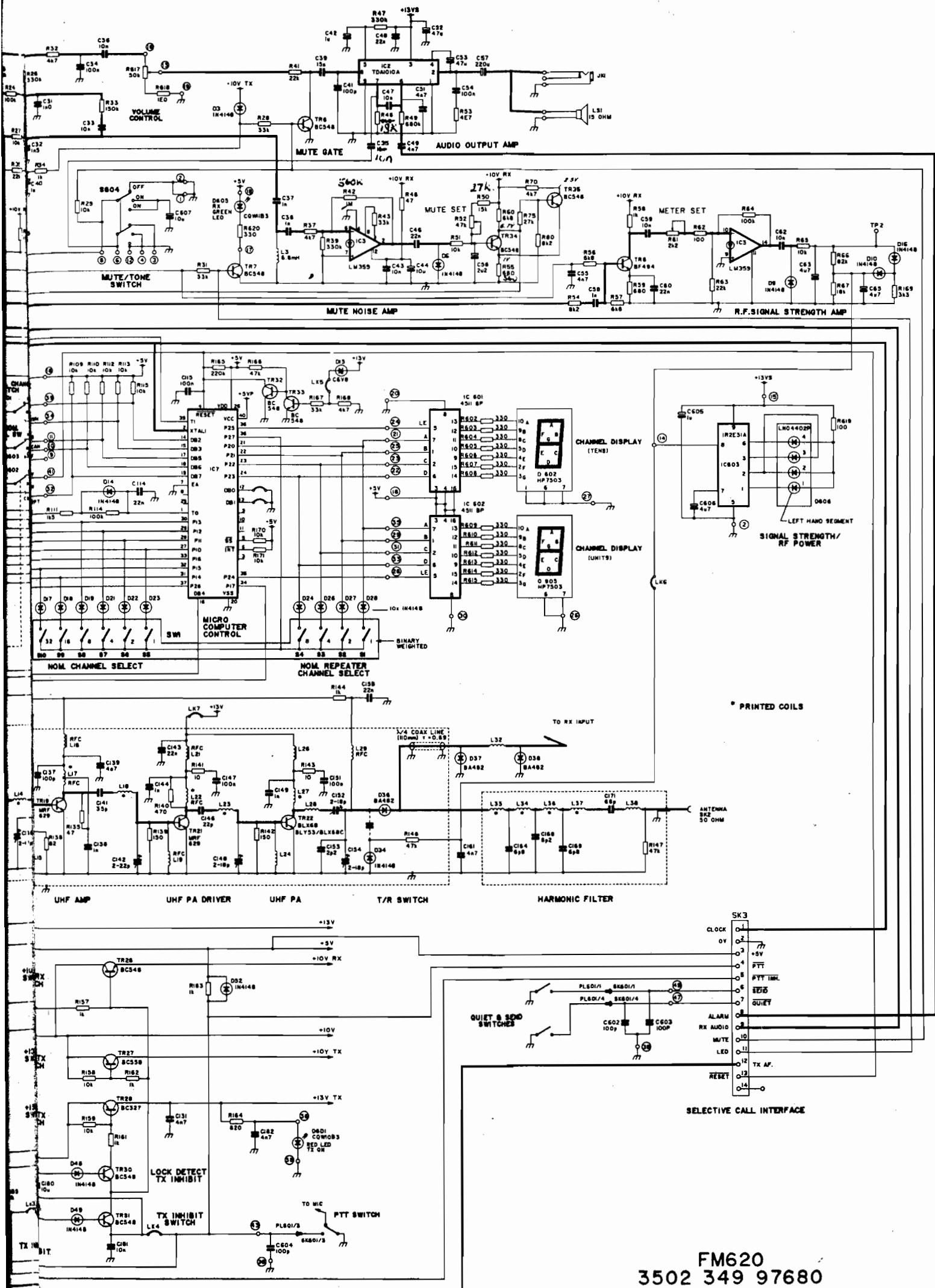
# FRONT PANEL PC BOARD ASSEMBLY





PIN	VOLTAGE		
	IC1	IC2	IC3
1	7.1	0	7.8
2	6.5	7.4	4.2
3	7.3	13.8	5.3
4	7.6	13V	0
5	4.9	5.3	0
6	4.9	1.2	0.6
7	4.9	0.6	0
8	7.7	0.65	0.75
9	4	0	0
10	0.8		0.6
11	3.9		0
12	1.1		8.8
13	0		5
14	4.7		3.8
15	0		
16	1.7		





FM620  
3502 349 97680