

MODEL PX 200BL
BUSINESS TRANSCEIVER AMPLIFIER

MANUAL
for
INSTALLATION AND SERVICE



PACE, a Division of Pathcom Inc., 24049 South Frampton Avenue
Harbor City, California 90710 - (213) 325-1290

Important: This transceiver was factory tuned to 27.290 MHz for operation within specification from 26.990 to 27.590 MHz. It must be retuned for operation below 26.990 and above 27.590 MHz.

PACE WARRANTY POLICY

PACE Communications, a division of PATHCOM Inc., warrants each new radio product to be free from defects in material and workmanship, and if it is found to be defective within 90 days from date of user purchase, the factory will either, at its discretion, repair or replace it, provided the unit is delivered by the owner to the factory intact for examination with shipping charges prepaid and provided that such examination discloses, in the factory's judgment, that it is defective under warranty. This warranty does not apply if the unit has been subjected to physical abuse, improper installation or unauthorized modifications. This warranty does not apply to carrying cases, covers or other dress parts and is in lieu of all other warranties expressed or implied. To place warranty in effect, the unit must be warranty registered with the factory at the address listed below within 10 days from the date of purchase.

PACE EXTENDED 2-YEAR FACTORY SERVICE PROGRAM

Also available is a unique continuing service program applying to transceivers and scanning monitors which extends protection after the 90-day warranty period for two years after the date of purchase. If requiring service under this program, the unit must be returned to the factory, shipping charges prepaid, for check-out and service. There is a \$14.95 inspection and handling charge per return. Labor and replacement parts are free. Service performed under this program is warranted for 90 days. When \$14.95 is submitted with the unit, the factory will pay for the return shipping charges.

PACE Communications Division, PATHCOM Inc.
24049 South Frampton Avenue
Harbor City, California 90710

TABLE OF CONTENTS

	Page
INSTALLATION AND SERVICE FOR MODEL PX 200BL	1
GENERAL DESCRIPTION	1
TECHNICAL SPECIFICATIONS	1
INSTALLATION	2
ANTENNAS	2
OPERATION	3
MODES OF OPERATION	3
TUNING INSTRUCTIONS	3
Power Amplifier	3
Receiver Pre-Amplifier	4
CIRCUIT DESCRIPTION	5
Power Amplifier	5
Detector and Relay Switching Circuit	5
Receiver Pre-Amplifier	6
Relay Switching Circuit	6
Pre-Amplifier	6
PX 200BL PARTS LIST	8
SCHEMATIC	10
FIGURE 1. TEST EQUIPMENT SETUP	4
FIGURE 2. TEST EQUIPMENT SETUP	5
FIGURE 3. PARTS LOCATION DIAGRAM	6
FIGURE 4. PX 200BL BLOCK DIAGRAM	7

INSTALLATION AND SERVICE FOR MODEL PX 200BL

GENERAL DESCRIPTION

The PACE Model PX 200BL Power Amplifier is designed for 12 volt positive (+) or negative (-) ground operation on any frequency in the range of 26-36 MHz. The most advanced solid state techniques are employed to ensure maximum power output and efficiency consistent with trouble-free service. When properly installed and operated, the unit will substantially increase the effective communications range of any low power (5 watts or less) two-way radio system. All of the common communication modes (AM/FM) may be used.

Operation of this equipment is governed by the FCC Rules and Regulations set forth in Parts 88, 91, and 93. An FCC license is required for operation and the driver/transmitter for the PX 200BL must be FCC Type Accepted under Parts 88, 91, and 93 for valid operation. It is the user's responsibility to be cognizant of and to comply with these rules and regulations.

The PX 200BL complies with the FCC Rules and Regulations when shipped from the factory.

The PX 200BL has wide applications in the Business, Industrial, Government, and Amateur Service in the 26-36 MHz range.

TECHNICAL SPECIFICATIONS

Frequency Range	26-36 MHz *
Bandwidth	\pm 300 KHz of Center Frequency, Factory Adjusted for Operation on 27.290 \pm 300 KHz
Power Output	80-110 Watts, at 3 Watts Input and 13.6 VDC (AM)
Drive Power	1-5 Watts, 3 Watts Nominal for Rated Power Output
Emission	AM/FM
Receiver Amplifier	10 db Gain (Typical)

* In U.S.A., FCC Rules and Regulations do not permit operation on Part 95 Class "D" Citizens Radio Service.

TECHNICAL SPECIFICATIONS (continued)

Input/Output Impedance	50 Ohms
Power Requirements	12-16 VDC (13.6 V Nominal)
	Standby - Approximately 0.2 A
	Transmit - Approximately 13 A

CAUTION: Warranty is void if RF drive level exceeds 5 watts or DC input voltage exceeds 16 volts.

INSTALLATION

The PX 200BL is designed for mobile operation on 13.6 VDC positive (+) or negative (-) ground system. It is recommended that the power leads connect directly across the vehicle battery terminals due to the high current drain of the amplifier. Regardless of which one is ground, the RED wire goes to the positive (+) terminal and the BLACK wire goes to the negative (-) terminal. The case is designed so that it can be installed in any mobile vehicle. Any convenient mounting position may be used. However, since the PX 200BL is convection cooled (natural flow of air around unit), the area surrounding the unit must be kept clear to provide adequate ventilation.

After mounting and power connections are completed, proceed as follows:

1. Connect a coax cable (RG-58U) from antenna to the output connector of the PX 200BL Power Amplifier.
2. Connect a coax cable (RG-58U) from driver transmitter to the input connector of the PX 200BL Power Amplifier.
3. Plug the connector from the remote control unit into the connector of the PX 200BL Power Amplifier.

ANTENNAS

No other single part of the system can be as significant a factor in complete success or total failure of performance as the antenna installation.

The PX 200BL Power Amplifier is designed for operation with an antenna whose SWR is less than 1.5:1 at the frequency of operation. It is mandatory that the antenna be checked and adjusted if necessary to maintain an SWR no greater than 1.5:1. Failure to do this may result in serious degradation of the performance of the system.

The PACE Model P5403 or P5425 VSWR/Watt Meter combination may be used and the antenna should be adjusted according to the manufacturer's instructions. If the antenna is a 1/4 wave nonadjustable type, the cable connections and the ground to vehicle at the antenna mount should be checked if the SWR is greater than 1.5:1.

OPERATION

Operation of the PX 200BL should be attempted only after installation is completed and antenna checked or adjusted for an SWR of 1.5:1 or less at the frequency of operation.

The PX 200BL is factory tuned for operation on 27.290 MHz \pm 300 KHz. If operation is required outside of this frequency range, retuning is required for optimum performance (see TUNING INSTRUCTIONS).

MODES OF OPERATION (Remote Control Unit)

Mode	Operation
Transmitter Switch - OFF Receiver Switch - OFF	Straight-through operation to the antenna is provided.
Transmitter Switch - ON Receiver Switch - OFF	The power amplifier is automatically switched on when transmitter is turned on. During receive periods straight-through operation is provided.
Transmitter Switch - OFF Receiver Switch - ON	During transmit periods, straight-through operation is provided. The receiver amplifier is automatically switched on when the transceiver is turned on.
Transmitter Switch - ON Receiver Switch - ON	The power amplifier is automatically switched on when transmitter is turned on. The receiver amplifier is automatically switched on when the transceiver is turned off.

TUNING INSTRUCTIONS

Power Amplifier

Refer to TEST EQUIPMENT SETUP, FIGURE 1, and PARTS LOCATION DIAGRAM, FIGURE 3.

1. Connect equipment as shown in FIGURE 1 with transmitter switch in the "ON" position and set the transceiver to the middle of the operating frequency range desired.

TUNING INSTRUCTIONS (continued)

2. Key the transceiver transmitter on and adjust C1 and C2 for minimum SWR on the input SWR Meter.
3. Adjust C13 and C18 for maximum output on the output watt meter.
4. Repeat Steps 2 and 3 several times to obtain maximum output and lowest input SWR.

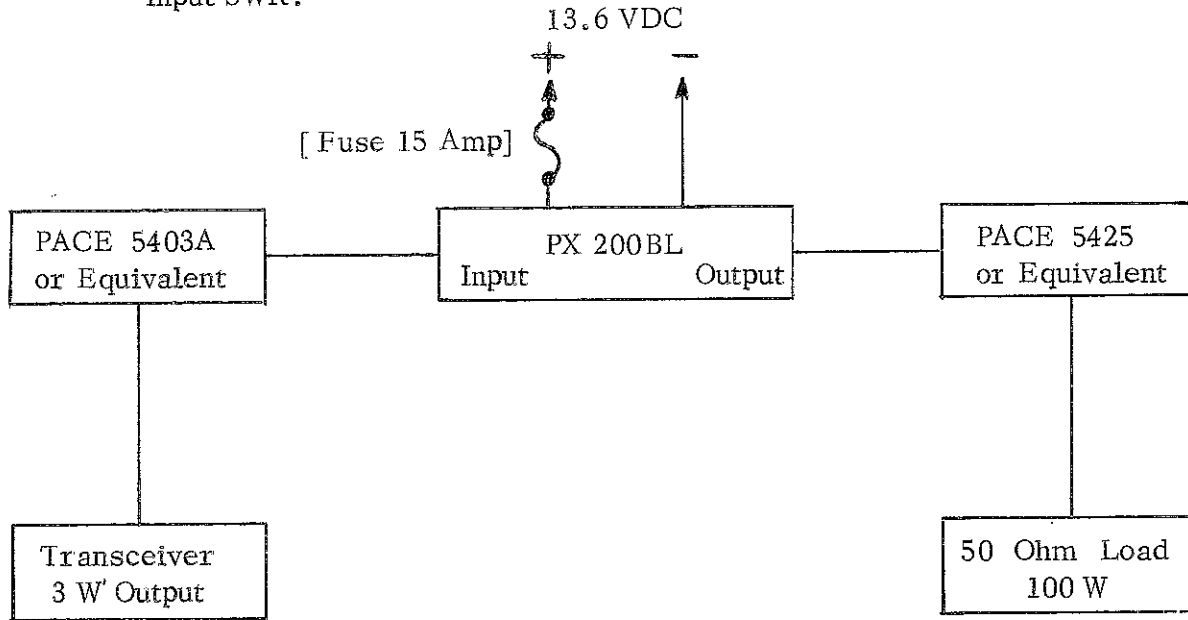


FIGURE 1

TEST EQUIPMENT SETUP

- Note:
- (1) All cables RG-58U.
 - (2) Power Supply must be capable of supplying 13.6 VDC @ 15 amps.

Receiver Pre-Amplifier

Refer to TEST EQUIPMENT SETUP, FIGURE 2, and PARTS LOCATION DIAGRAM, FIGURE 3.

1. Connect equipment as shown in FIGURE 2 with receiver switch in the "ON" position and set the RF signal generator to the middle of the operating frequency range desired, and using VTVM across the speaker.
2. Peak L13 and L14 for maximum indication. If no equipment is available, the pre-amplifier may be peaked on noise by connecting the amplifier to the antenna.

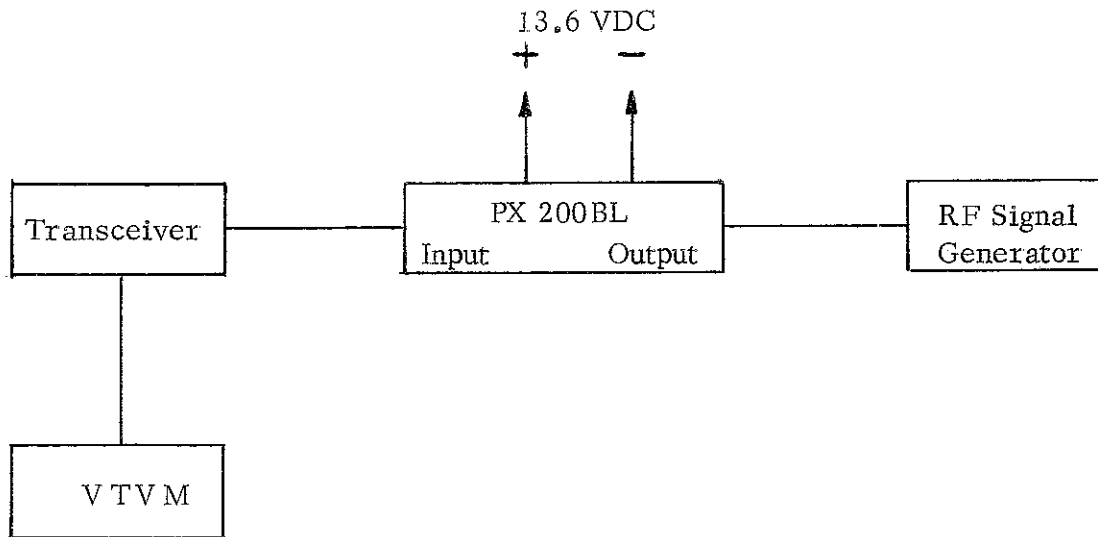


FIGURE 2

TEST EQUIPMENT SETUP

CIRCUIT DESCRIPTION

Power Amplifier

Detector and Relay Switching Circuit (with Transmit Switch Turned On)

When drive is applied, a small amount of RF voltage is coupled via C24 to diode CR1. The RF voltage is rectified by CR1 supplying a positive DC voltage to the base of Q4. Q4 conducts charging C25 and supplying base current to Q5. Sufficient base current is supplied to Q5 to cause saturation, thereby energizing relay RY3. When RY3 is energized, 13.6 VDC is supplied to RY1, hence turning it on.

The RF input is applied, after operation of relay RY1, to the base input matching network of Q1, Q2, and Q3 consisting of C1, C2, C3, and L1 in conjunction with L2, L3, and L4. L2, L3, and L4 split the input power equally between the base of Q1, Q2, and Q3.

Coils L5, L6, and L7 recombine the amplified power at the collectors of Q1, Q2, and Q3. L9, C16, C17, and C18 match Q1, Q2, and Q3 output impedance to 50 ohms.

Coils L10, L11, L12, and capacitors C19 and C20 provide the m-derive filter to the power amplifier, suppressing all spurious emissions 65 db below fundamental.

R1 through R9 form stabilization networks which prevent amplifier from oscillation and spurious generation.

L8, C26, C27, and C28 form the collector to DC supply isolation network.

Receiver Pre-Amplifier

Relay Switching Circuit

When receiver switch is on, relay RY2 is energized.

Pre-Amplifier

When relay RY2 is energized, the incoming RF signal is connected to source of FET Q6. C32, C33, C34, and L13 provide input matching to Q6. The output matching network of Q6 consists of C29, C30, and L14.

CR2, CR3, CR4, and CR5 provide protection for high level RF.

R14 provides bias voltage and receiver pre-amplifier gain.

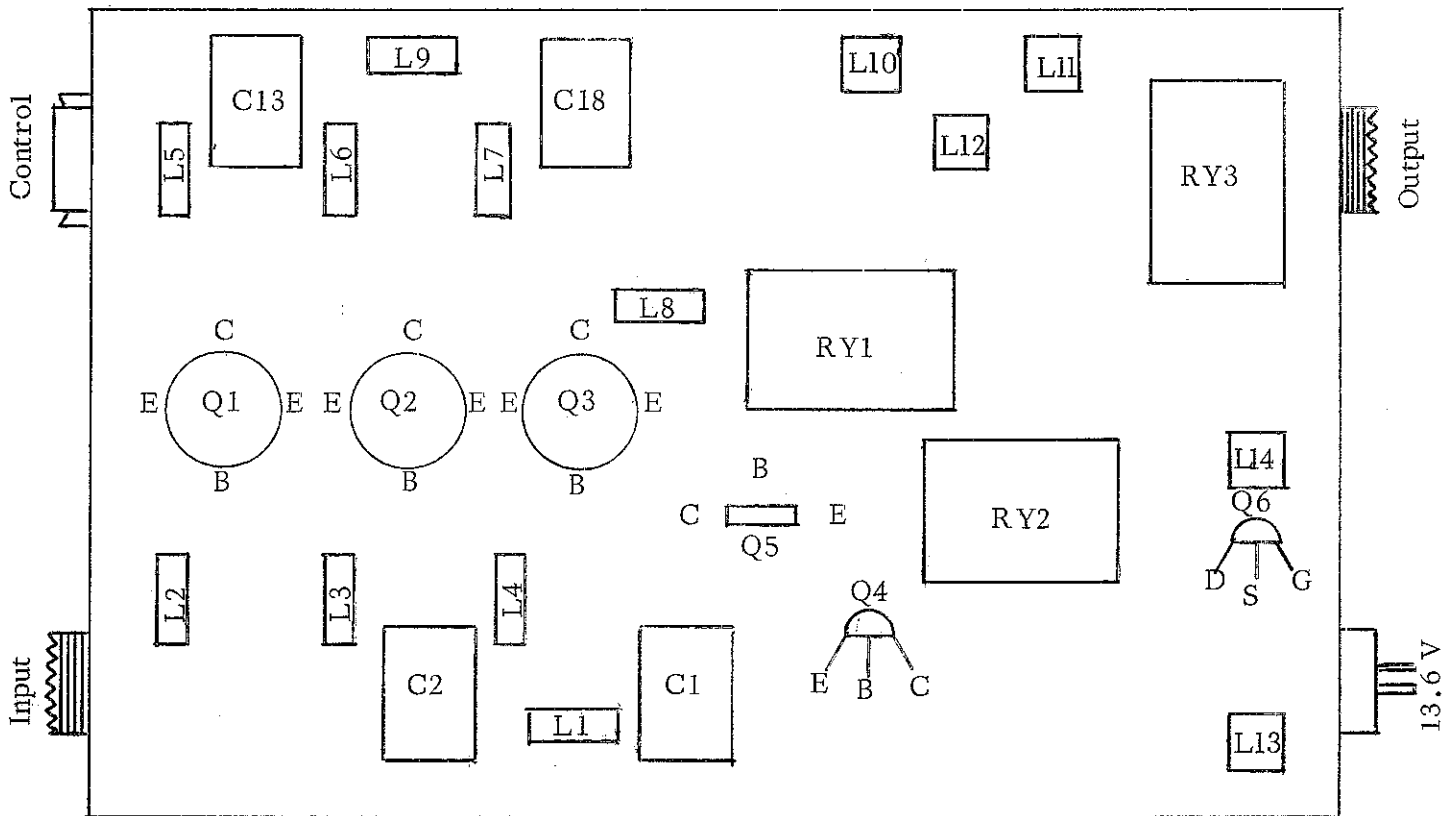


FIGURE 3

PARTS LOCATION DIAGRAM (PX 200BL INSIDE TOP VIEW)

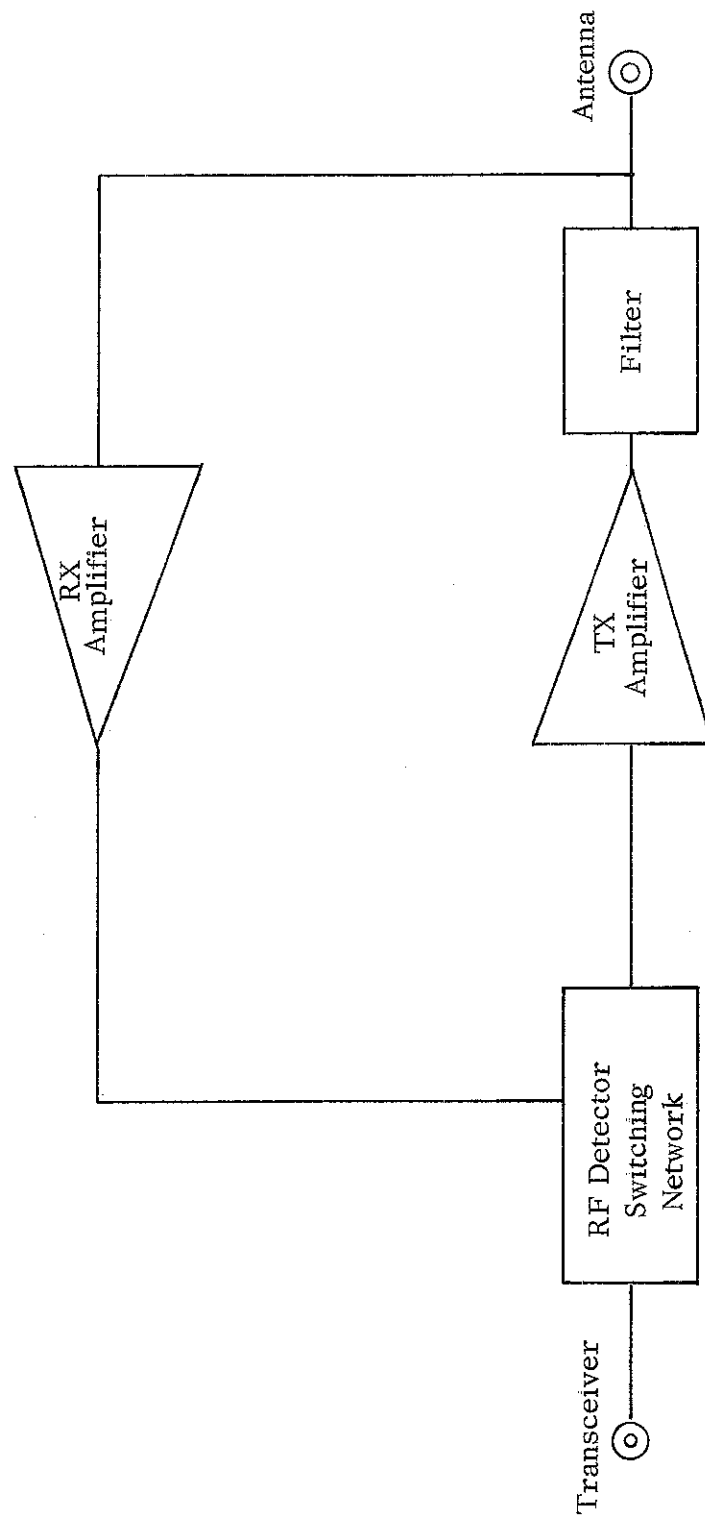


FIGURE 4
PX 200BL BLOCK DIAGRAM

PX 200BL PARTS LIST

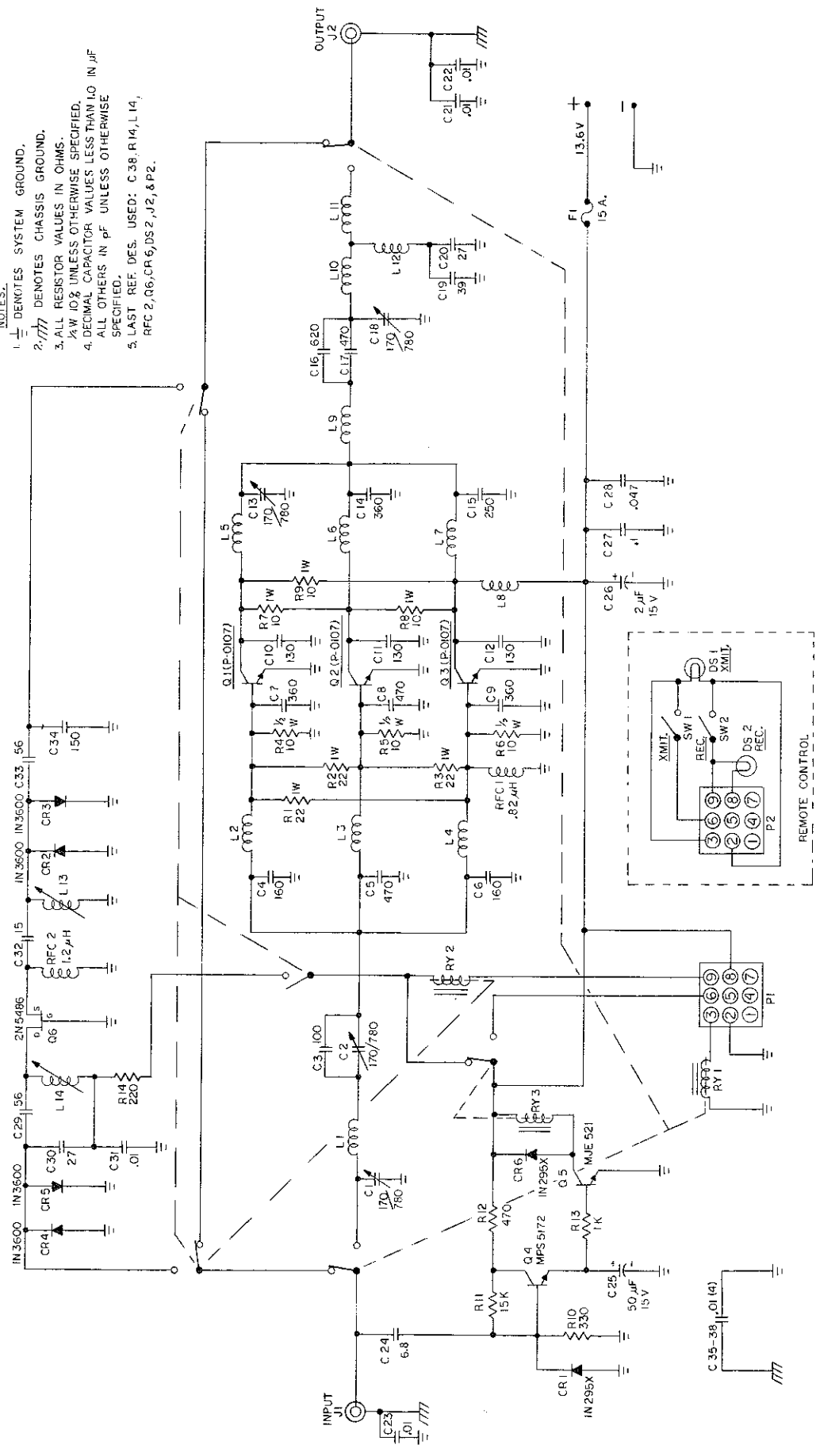
Reference Number	Part Number	Commercial Equivalent
<u>Semiconductor - Transistors</u>		
Q1, Q2, Q3	13-0107	Special
Q4	13-0092	MPS 5172
Q5	13-0094	MJE 521
Q6	13-0101	2N5486
<u>Semiconductor - Diodes</u>		
CR1, CR6	13-0004	GER IN295
CR2, CR3, CR4, CR5	13-0003	Silicon IN3600
<u>Resistors</u>		
R1, R2, R3	14-0002-48	22 Ohms 1 W
R4, R5, R6	14-0001-40	10 Ohms 1/2 W
R7, R8, R9	14-0002-40	10 Ohms 1 W
R10	14-0009-76	330 Ohms 1/4 W
R11	14-0009-116	15 K Ohms 1/4 W
R12	14-0009-80	470 Ohms 1/4 W
R13	14-0009-88	1 K Ohms 1/4 W
R14	14-0009-72	220 Ohms 1/4 W
<u>Fuse</u>		
F1	15-0081	15 Amps
<u>Switches</u>		
SW1, SW2	15-0010-2	Slide Switch
<u>Coils and Chokes</u>		
L1, L2, L3, L4	17-0080	RF 14 GA (4 turns)
L5, L6, L7, L8, L9	17-0079	RF 14 GA (5 turns)
L10, L11	17-0081	Filter Coil, 14 GA (4 turns)
L12	17-0082	Filter Coil, 14 GA (3 turns)
L13	17-0068	RX Coil
L14	17-0025	RX Coil
RF C1	17-0062	RF Choke .82 uh
RF C2	17-0042	RF Choke 1.2 uh

PX 200BL PARTS LIST (continued)

Reference Number	Part Number	Commercial Equivalent
<u>Capacitors</u>		
C1, C2, C13, C18	19-0138	Variable Arco 469
C3, C11	19-0014	100 pF Mica
C4, C6	19-0021	160 pF Mica
C5, C8, C17	19-0053	470 pF Mica
C7, C9, C14	19-0016	360 pF Mica
C10, C12	19-0131	130 pF Mica
C15	19-0015	250 pF Mica
C16	19-0076	620 pF Mica
C19	19-0011	39 pF Mica
C20	19-0010	27 pF Mica
C24	19-0071-6A	6.8 pF Ceramic Disc
C25	19-0129	50 uF Electrolytic
C26	19-0049	2 uF Electrolytic
C27	19-0044	.1 uF Foil
C28	19-0043	.047 uF Foil
C29, C33	19-0071-22	56 pF Ceramic Disc
C30	19-0071-16A	27 pF Ceramic Disc
C21, C22, C23, C31, C35, C36, C37, C38	19-0082	.01 uF Ceramic Disc
C32	19-0071-11A	15 pF Ceramic Disc
C34	19-0071-30	150 pF Ceramic Disc
<u>Relays</u>		
RY1, RY2	21-0009	Relay, 4 PDT
RY3	21-0008	Relay, Spot
<u>Connectors</u>		
J1, J2	27-0060	Coax SO-239
J3	27-0076	Plug
J4	27-0077	Plug

NOTES:

1. \perp DENOTES SYSTEM GROUND.
2. /// DENOTES CHASSIS GROUND.
3. ALL RESISTOR VALUES IN OHMS.
4. $\frac{1}{2}$ W 10% UNLESS OTHERWISE SPECIFIED.
5. ALL CAPACITOR VALUES LESS THAN 10 IN μ F SPECIFIED.
6. ALL OTHERS IN pF UNLESS OTHERWISE SPECIFIED.
7. LAST REF. DES. USED: C.38, R.14, L.14, RFC 2, CR 6, DS 2, J2, & P2.



REV.	DATE	BY	CHKD.	DESCRIPTION
1				SCHEMATIC PX200RL
2				
3				
4				
5				
6				
7				
8				
9				
10				

PATHCOM, INC.
HARBOR CITY, CALIF.

SCHEMATIC PX200RL

REV. 2-26-74

DATE 2/26/74

BY

CHKD.

11-0048