TECHNICAL DESCRIPTION

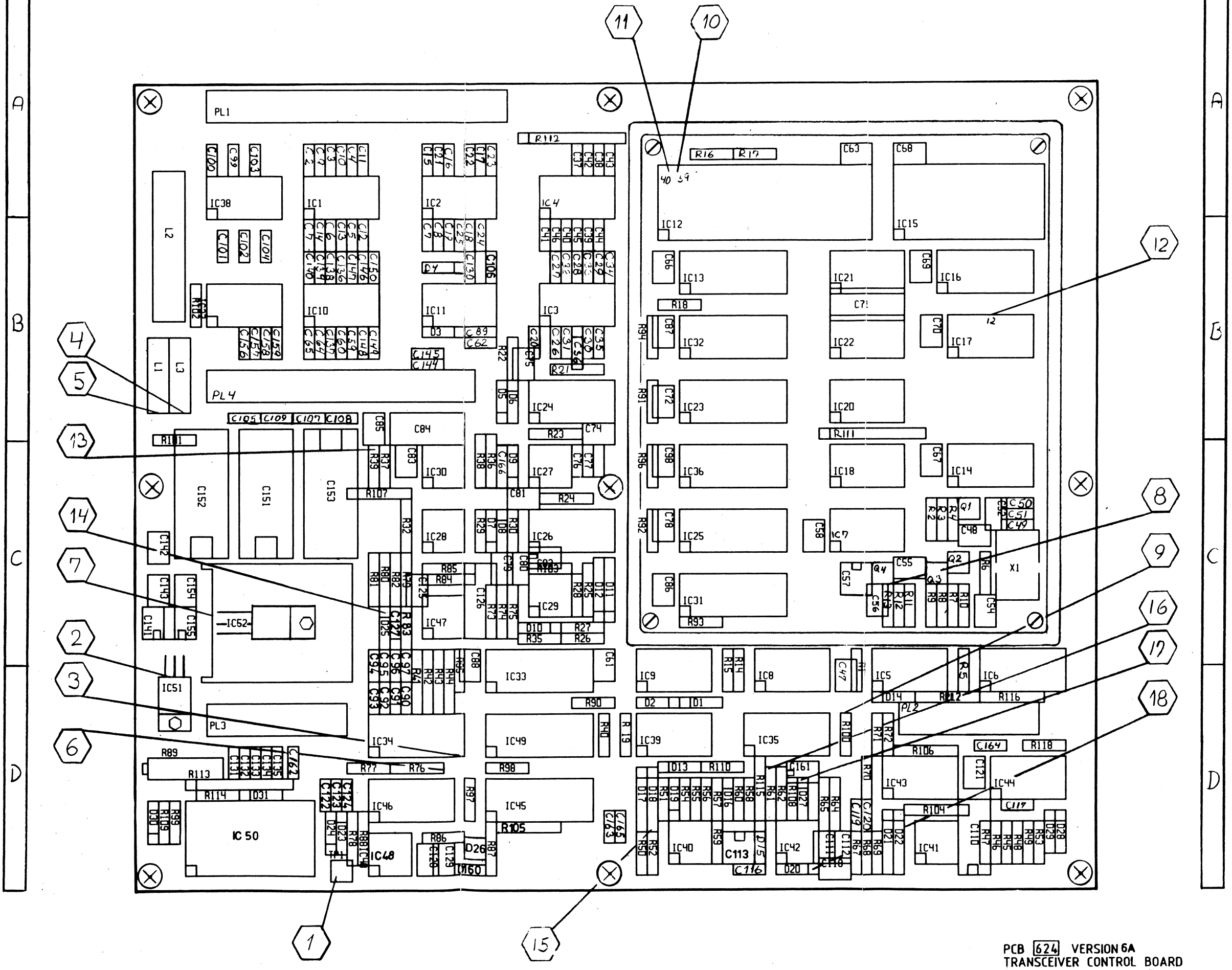
PCB [624] TRANSCEIVER CONTROL BOARD

This module implements the following functions: Communication with Control Board [600] as a slave by receiving and executing command messages in order to control Receiver Signal Path [618], Exciter Signal Path [619], Synthesizer Board's [611] (one for the receiver and one for the exciter), P.A. Filters and Antenna Tuning Unit Board [660], and by transmitting acknowledge and status messages back to [600]. To achieve this, a structure similar to that described in the section concerning [600] is used: The "MPU" communicates with its counterpart on [600] using (TUDATA) and (CUDATA) via "RS 232C INTERFACE". Status of [618] (i.e. crystal filters installed) is read as a 16 bits packet using the signals (STAT DATA RX/EX), (CLOCK) and (STAT LOAD), while commands are transferred from [624] in the form of a 32 bits packet using (COMDATA), (CLOCK) and (COM LOAD RX/EX). This processor is also clocked by a "4 MHz XTAL OSCILLATOR" and is initialized by a "WATCHDOG" capable of automatically restarting a stalled program, which does not issue a 32 Hz trigger signal combined with "MODE SWITCH". "ADDRESS LATCH" and "MAP DECODER" operate in the same manner as on [600], "PROGRAM ROM" holds 16 kbytes in EPROM, while "SCAN BUFFER RAM" (1 knibbles) is used for holding the programmed scanning channels.

The frequency synthesizers on [611] are controlled via multiplexed data (SYNDATA 0--3) and address busses (SYNADR 0--2) using (SYNSTRO 0--5), whereas the corresponding switching between transceiving states on [618] and [619] is done by proper sequencing of the signals (TX/RX), (SHAPEKEY) and (MUTING) triggered by transitions of the signal (KEYLINE) originating from Audio Processing Board [601]. (KEYLINE) is also modulated by "VF CONVERTER" to carry a telemetry signal representing output power back to [600] via [601]. Two analog loops are located on this board. The most simple is associated with the receiving state of [618] through "MGC REGISTER" and the corresponding DAC driving "MGC LOOP" connected to another "VF CONVERTER" generating a new telemetry signal representing received signal strength (RXRATE). The other loop ("PA STRESS MONITOR/ALC LOOP") stabilizes the output in the transmitting state by comparing the output of the "SETPOINT REGISTER" and the corresponding DAC with the signals FILPEAK, PAPEAK and IANTAVR in order to generate the error signal ALC used for driving an electronically controlled attenuator placed in the transmitter signal path. If the signal (PA OK), derived from [654] Power Splitter, is high during transmission in full power, it means that one or more of the power amplifiers is faulty. In this (SET POINT) is decreased by 0.8 dB to prevent overload of the remaining power amplifiers.

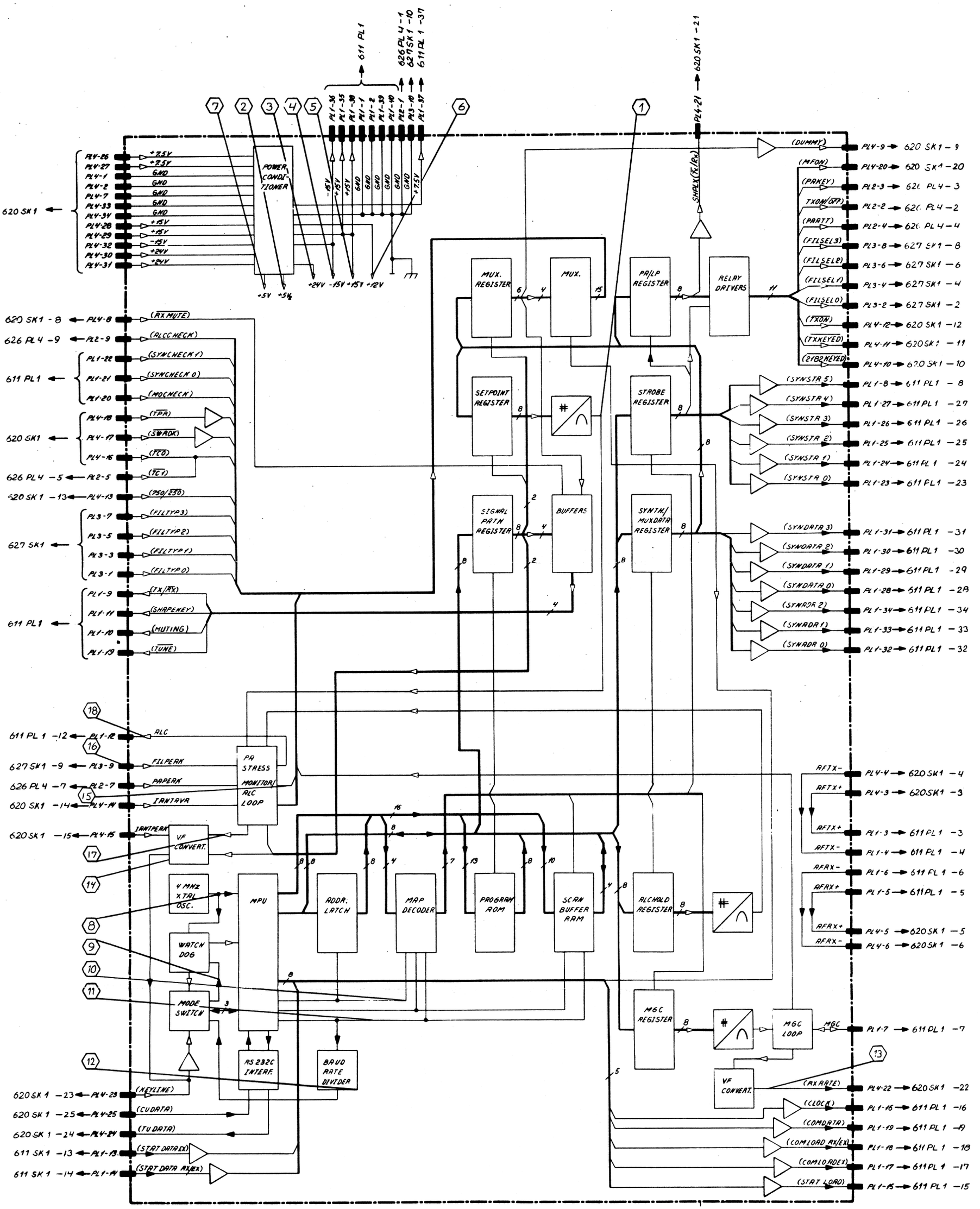
Finally, another signal controlled from the processor is generated using "ALCHOLD REGISTER" and the corresponding DAC to make the gain of the transmitter signal path independent of the modulating signal. To increase the number of peripherals on this board beyond the capacity of "MAP DECODER" indirect addressing is introduced by using "SYNTHESIZER/MUXDATA REGISTER" not only for driving the synthesizers but also as a local bus feeding the following registers: "PA/LP REGISTER" (controls the relays switching the P.A. Filters depending on the TX frequency via "RELAY DRIVERS" and the power to Power Amplifier Board [626]), "MULTIPLEXER REGISTER" (controls a 16-to-1

multiplexer "MUX" used for monitoring diagnostic and status signals) and "SETPOINT REGISTER" (already mentioned). Directly driven from the databus are "STROBE REGISTER" (strobes the synthesizer as described earlier) and "SIGNAL PATH REGISTER", which via "BUFFERS" controls the keying signals mentioned before. The handshake protocol with the processor located on 660 uses the signals ($\overline{\text{TUNE}}$) and ($\overline{\text{TPR}}$). The status of [660] is constantly monitored via ($\overline{\text{SWROK}}$) and ($\overline{\text{TCO}}$) and any changes detected are signalled to [600] using appropriately coded messages. In the same way [626] is monitored via (TC1) and "PA STRESS MONITOR/ALC LOOP". The signals (FILTYP 0--3) and (750/250) from P.A. Filters and [660] are used for identifying purposes by the "MPU".



PCB 624 VERSION 6A
TRANSCEIVER CONTROL BOARD
VIEWED FROM COMPONENT SIDE

993 562 4X COMP



PCB 624 TRANSCEIVER CONTROL BOARD
VERSION 6 A. MAIN DIAGRAM

4MHz XTAL OSCILLATOR

MPU

ADDR. LATCH

MAP DECODER

PROGRAM ROM

BAUD RATE DIVIDER

SCAN BUFFER RAM

RS232C INTERFACE

WATCHDOG

MODE SWITCH

POWER CONDITIONER

INPMUX

620 SK1 - 25 ← PL4-25 (CWDATA)

611 PL 1 -13 ← PL1-13 (START DATA RX/CW)

611 PL 1 -14 ← PL1-14

620 SK1 -1 ← PL4-1 GND
620 SK1 -2 ← PL4-2
620 SK1 -7 ← PL4-7
620 SK1 -33 ← PL4-33
620 SK1 -34 ← PL4-34

611 PL 1 -1 ← PL1-1 GND
611 PL 1 -2 ← PL1-2
611 PL 1 -39 ← PL1-39
611 PL 1 -40 ← PL1-40

626 PL4 -1 ← PL8-1
627 SK1 -10 ← PL3-10

611 PL 1 -5 ← PL1-5 AFRX
611 PL 1 -6 ← PL1-6

620 SK1 -6 ← PL4-6
620 SK1 -5 ← PL4-5

620 SK1 -3 ← PL4-3 AFEX
620 SK1 -4 ← PL4-4

611 PL 1 -4 ← PL1-4
611 PL 1 -3 ← PL1-3

620 SK1 -32 ← PL4-32 -15V
611 PL 1 -36 ← PL1-36 -15V

620 SK1 -23 ← PL4-23 (TXKEY)
624-9 (TXDATA)

IC36-11 624-2

IC23 INPMUX 624-2 624-9

(STATLOAD) PL1-16 → 611 PL 1 -15
(VERCOMLOAD) PL1-17 → 611 PL 1 -17
(PATCOMLOAD) PL1-18 → 611 PL 1 -18
(CODDAT) PL1-19 → 611 PL 1 -19
(CLOCK) PL1-16 → 611 PL 1 -16
(TWDATA) PL4-24 → 620 SK1 -24

IC29-11 624-2
IC25-11 624-2
IC31-11 624-2
IC32-11 624-2

+24V PL4-30 → 620 SK1 -30
+24V PL4-31 → 620 SK1 -31
+15V PL4-28 → 620 SK1 -28
+15V PL4-29 → 620 SK1 -29
+15V PL1-35 → 611 PL 1 -35
+15V PL1-38 → 611 PL 1 -38
+15V PL4-26 → 620 SK1 -26
+15V PL4-27 → 620 SK1 -27
+15V PL1-37 → 611 PL 1 -37

PCB 624 TRANSCEIVER CONTROL BOARD
VERSION 6A. SUBDIAGRAM 1 OF 3

993 562 4X SUB1

ALC/HOLD REGISTER

MGC LOOP

MGC REGISTER

VF CONVERTER

SYNTH. MUX DATA REGISTER

STROBE REGISTER

PA/LP REGISTER

RELAY DRIVERS

SIGNAL PATH REGISTER

BUFFERS

624-1 IC18-3

624-1 IC16

624-1 IC18-6

624-1 IC18-8

624-1 IC18-11

624-1 IC20-3

620 SK1-8 ← PL4-8 (RX MUTE)

624-3 IC45

IC44-11 → 624-3

MGC → PL1-7 → 611 PL1-7

(SYNSTR 5) → PL1-8 → 611 PL1-8

(SYNSTR 4) → PL1-27 → 611 PL1-27

(SYNSTR 3) → PL1-26 → 611 PL1-26

(SYNSTR 2) → PL1-25 → 611 PL1-25

(SYNSTR 1) → PL1-24 → 611 PL1-24

(SYNSTR 0) → PL1-23 → 611 PL1-23

(HGC CAL) → 624-3

(RX RATE) → PL4-22 → 620 SK1-22

(FILSEL 0) → PL3-2 → 627 SK1-2

(FILSEL 1) → PL3-4 → 627 SK1-4

(FILSEL 2) → PL3-6 → 627 SK1-6

(FILSEL 3) → PL3-8 → 627 SK1-8

(PA RTT) → PL2-4 → 626 PL4-4

(TX ON/OFF) → PL2-2 → 626 PL4-2

(PANE) → PL2-3 → 626 PL4-3

(MF ON) → PL4-20 → 620 GK1-20

(2182 KEYED) → PL4-10 → 620 SK1-10

(TX KEYED) → PL4-11 → 620 SK1-11

(TXON) → PL4-12 → 620 SK1-12

(SMPLX) → PL4-21 → 620 SK1-21

(SMPLX/DPLX) → 624-3

(TX/RX) → PL1-9 → 611 PL1-9

(SWAPKEY) → PL1-11 → 611 PL1-11

(RX F1) → PL1-10 → 611 PL1-10

(TUNE) → PL4-19 → 620 SK1-19

IC43-2 → 624-3

IC39-9 → 624-3

IC49-11 → 624-3

IC45-11 → 624-3

(SYNDAT 3) → PL1-31

(SYNDAT 2) → PL1-30

(SYNDAT 1) → PL1-29

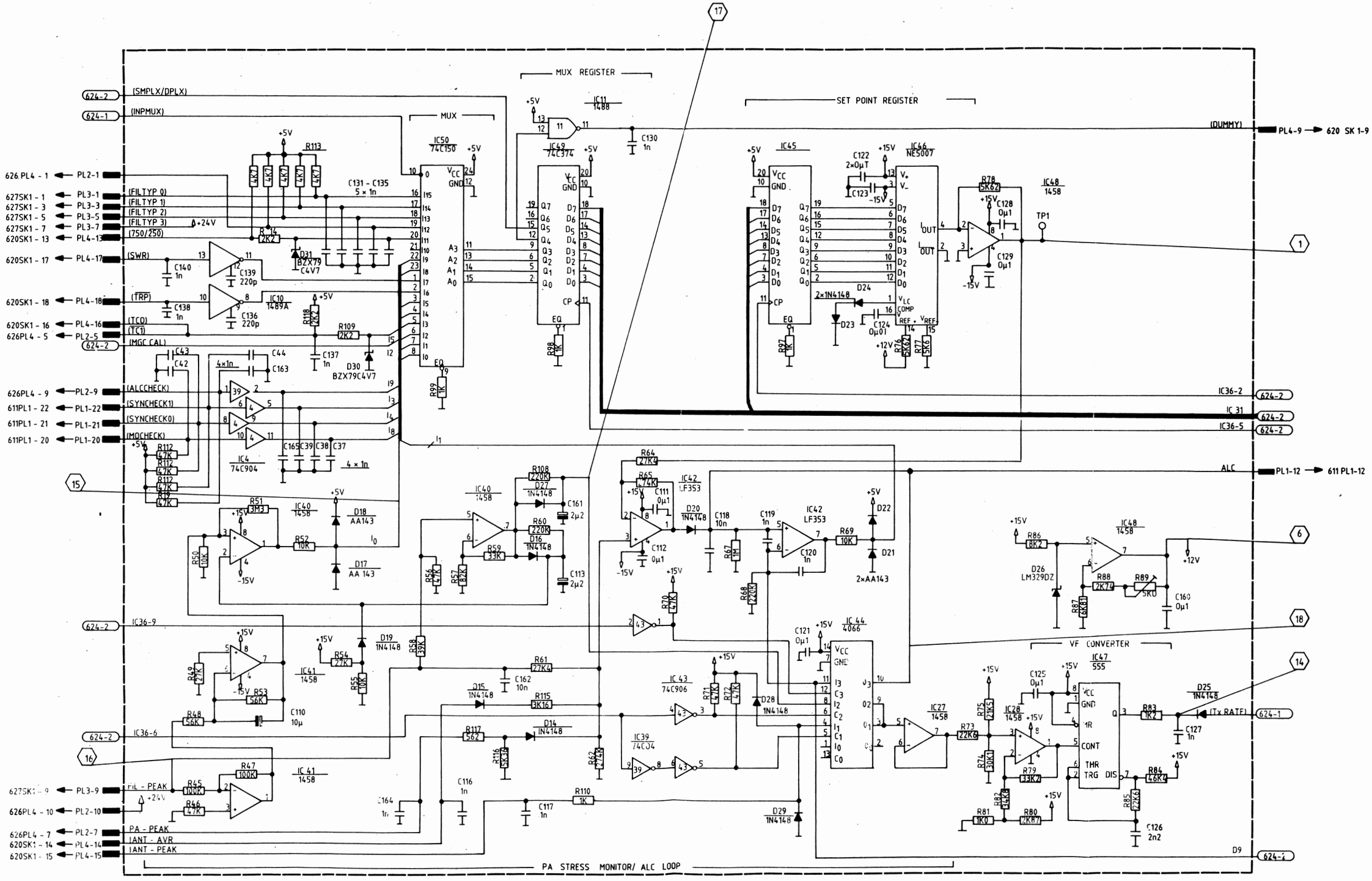
(SYNDAT 0) → PL1-28

(SYNADR 2) → PL1-34

(SYNADR 1) → PL1-33 → 611 PL1-33

(SYNADR 0) → PL1-32 → 611 PL1-32

PCB 624 TRANSCEIVER CONTROL BOARD
VERSION 6A. SUBDIAGRAM 2 OF 3



PCB 624 TRANSCEIVER CONTROL BOARD
VERSION 6A. SUBDIAGRAM 3 OF 3.

TEST POINTS FOR 624 TU CONTROL BOARD

(1) +8.62V (IN NORMAL CONDITION)

+5.71V WITH - 3.2dB REDUCED POWER (IF (15) HAS BEEN "HIGH" MORE THAN ONE MIN.)
+4.36 WITH - 5.25dB REDUCED POWER (IF THE INTERNAL TEMPERATURE OF THE ATU EXCEEDS 85°)

(2) +5V

(3) +24V

(4) -15V

(5) +15V

(6) +12V

(7) +5V

(8) 4Mhz +5V 0V 

(9) 32hz +5V 0V 

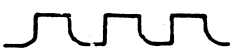
(10) 1Mhz +5V 0V 

(11) 1Mhz +5V 0V 

(12) 2400hz +5V0 0V 

(13) 13.3Khz +2V 0V 

(NO SIGNAL RECEIVED)

(14) 10.5Khz +15V 0V 

(NO KEYING)

(15) NORMALLY 0V

IF IN A FULL POWER TRANSMISSION THE AVERAGE POWER EXCEEDS THE PEAK POWER MINUS 3dB IT CHANGES TO +5V THIS CAN BE TESTED BY WHISTLING IN THE MICROPHONE DURING TRANSMISSION.

(16) 9V dc WHEN 250W OUTPUT

(17) 6.5V dc WHEN 250W OUTPUT

(18) 3-6V dc +5V 0V DEPENDING ON OUTPUT SIGNAL

PARTS LIST FOR TRANSCEIVER CONTROL BOARD 624 VERSION 6A

Printed Circuit Board Complete 624 (specify program version when ordering)						107 562 41
IC1-4,38	74C904					857 490 40
IC5	CD4070BC					850 407 00
IC6	4020B					850 402 00
IC7	SN74LS93					850 749 32
IC8,39	74C04					850 740 42
IC9,44	CD4066BC					850 406 60
IC10	1489P					850 148 90
IC11	1488P					850 148 80
IC12	6803					850 680 30
IC13	74LS373					857 437 30
IC14	74LS138					857 413 80
IC15	27128 (XX denotes program version number)					383 66X X1
IC16	9124C					850 912 40
IC17	CD4040BC					850 404 00
IC18,20	74LS32					850 743 20
IC21	SN74LS20					850 740 21
IC22	74LS04					850 740 41
IC23,25,31-33, 36,45,49	74C374					857 437 40
IC24,26,46	NE5007					850 500 70
IC27-29,40,41,48	MC1458N					850 145 80
IC30,47	NE555					850 055 50
IC34	UDN2981					850 298 10
IC35	ULN2003A					850 200 30
IC37	74C00					850 740 01
IC42	LF353					850 035 30
IC43	74C906					857 490 60
IC50	74C150					857 415 00
IC51,52	MA7805					850 780 50
Q1-4	BF240					840 024 00
D1-10,13-16,19, 20,23-25,27-29	1N4148					830 414 80
D26	LM329DZ					830 032 90
D11,12,17,18,21,22	AA143					830 014 30
D30,31	BZX79C4V7					832 794 70
X1	4MHz	CRYSTAL				812 000 00
R1,6,110,97-99	1 kohm	5%	1/8W	MF		500 310 00

PARTS LIST FOR TRANSCEIVER CONTROL BOARD 624 VERSION 6A

R2-4,26,28,35, 50,52,55,69, 90-96	10 kohm	5%	1/8W	MF	500 410 00
R5,37,109,114	2.2 kohm	5%	1/8W	MF	500 322 00
R7,16,17	3.3 kohm	5%	1/8W	MF	500 333 00
R8	6.8 kohm	5%	1/8W	MF	500 368 00
R9,18,103	220 ohm	5%	1/8W	MF	500 222 00
R10	100 ohm	5%	1/8W	MF	500 210 00
R11,39	330 ohm	5%	1/8W	MF	500 233 00
R12	3.9 kohm	5%	1/8W	MF	500 339 00
R13	820 ohm	5%	1/8W	MF	500 282 00
R14,102	15 kohm	5%	1/8W	MF	500 415 00
R15,48,53,101	56 kohm	5%	1/8W	MF	500 456 00
R19,46,56,70-72,100	47 kohm	5%	1/8W	MF	500 447 00
R21,24,25,76,78	5.62 kohm	1%	1/4W	MF	511 356 20
R22,30,77	5.6 kohm	5%	1/8W	MF	500 356 00
R23,80	2.87 kohm	1%	1/4W	MF	511 328 70
R27,51	3.3 Mohm	5%	1/4W	Car.	501 633 00
R29,32	22 kohm	5%	1/8W	MF	500 422 00
R36	31.6 kohm	1%	1/4W	MF	511 431 60
R38	61.9 kohm	1%	1/4W	MF	511 461 90
R40	12 kohm	5%	1/8W	MF	500 412 00
R41-44,104-107	56 ohm	5%	1/2W	MF	512 156 00
R45,47	100 kohm	5%	1/8W	MF	500 510 00
R49,54	27 kohm	5%	1/8W	MF	500 427 00
R58	39 kohm	5%	1/8W	MF	500 439 00
R57	82 kohm	5%	1/8W	MF	500 482 00
R59	33 kohm	5%	1/8W	MF	500 433 00
R60,68,108	220 kohm	5%	1/8W	MF	500 522 00
R61,64	27.4 kohm	1%	1/4W	MF	511 427 40
R62,65	274 kohm	1%	1/4W	MF	511 527 40
R67	1 Mohm	5%	1/8W	MF	500 610 00
R73,85	22.6 kohm	1%	1/4W	MF	511 422 60
R74	30.1 kohm	1%	1/4W	MF	511 430 10
R75	21.5 kohm	1%	1/4W	MF	511 421 50
R79	33.2 kohm	1%	1/4W	MF	511 433 20
R81	1.0 kohm	1%	1/4W	MF	511 310 00
R82	34.8 kohm	1%	1/4W	MF	511 434 80
R83	1.2 kohm	5%	1/8W	MF	500 312 00
R84	46.4 kohm	1%	1/4W	MF	511 446 00
R86	8.2 kohm	5%	1/8W	MF	500 382 00
R87	6.81 kohm	1%	1/4W	MF	511 368 10
R88	2.74 kohm	1%	1/4W	MF	511 327 40
R89	5 kohm			Pot.	582 310 02
R111	2.2 kohm			Sil.	530 000 12
R112	47 kohm			Sil.	530 000 11
R113	4.7 kohm			Sil.	530 000 06
R115	3.16 kohm	1%	1/4W	MF	511 331 60
R116	5.36 kohm	1%	1/4W	MF	511 353 60
R117	562 ohm	1%	1/4W	MF	511 256 20

PARTS LIST FOR TRANSCEIVER CONTROL BOARD 624 VERSION 6A

C1-46,60,62,65,89, 90-97,99-109, 116,117,119,120,127, 130-135,137,138,140, 144-150,156-159,163, 164-166	1 nF	10%	100V	Cer.	603 310 02
C47,52,54,55,75, 81,85,118,124	10 nF	10%	63V	Polyes.	622 410 01
C48,56,58,61,63, 66-70,72,74,76-80, 83,86-88,98,111,112, 121-123,125,128,129, 142,160	0.1 uF	10%	63V	Polyes.	622 510 00
C49	39 pF	2%	63V	N150	602 139 01
C50	1.2 nF	10%	100V	Cer.	602 312 00
C51	180 pF	10%	63V	Cer.	602 218 00
C57,82,141,155	6.8 uF	20%	25V	Sol.al.	652 668 01
C59,64,136,139	220 pF	10%	100V	Cer.	603 222 00
C71,84,126	2.2 nF	1%	125V	Polyst.	613 322 00
C110	10 uF	+50-10%	16V	W.alum.	651 710 01
C113,161	2.2 uF	20%	35V	Tantal	652 622 01
C143,154	0.47 uF	10%	63V	Polyes.	622 547 01
C151-153	100 uF	20%	25V	W.alum.	652 810 00
C162	10 nF	-20+50%	100V	Cer.	602 410 01
L1,L3	22 uH				740 122 00
L2	100 uH				740 210 06
PL1	40 Pol.				756 040 04
PL2,3	10 Pol.				756 010 02
PL4	34 Pol.				756 034 01