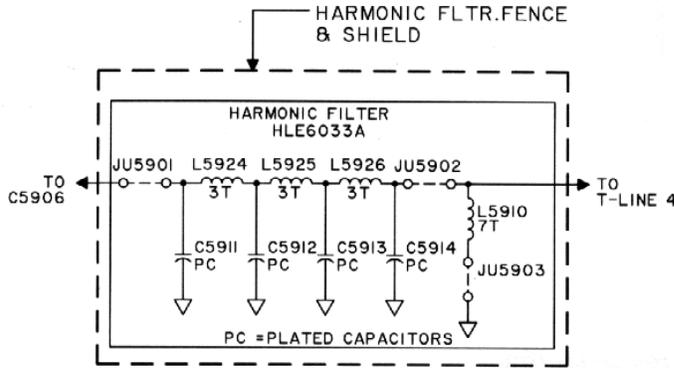


CIRCUIT SCHEMATICS

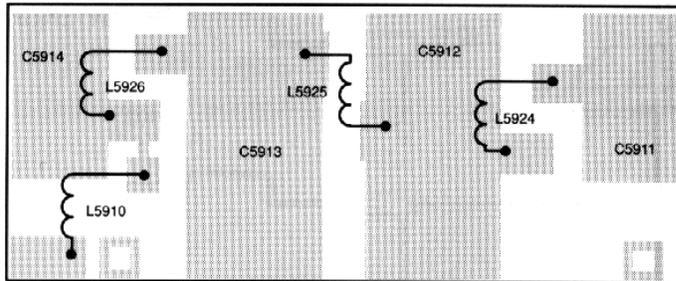
Pursuant to 47CFR 2.1033(c)10

<u>EXHIBIT</u>	<u>DESCRIPTION</u>
5A	RF POWER AMPLIFIER/HARMONIC FILTER
5B	EXCITER

# HARMONIC FILTER BOARD



GXW-5944-0



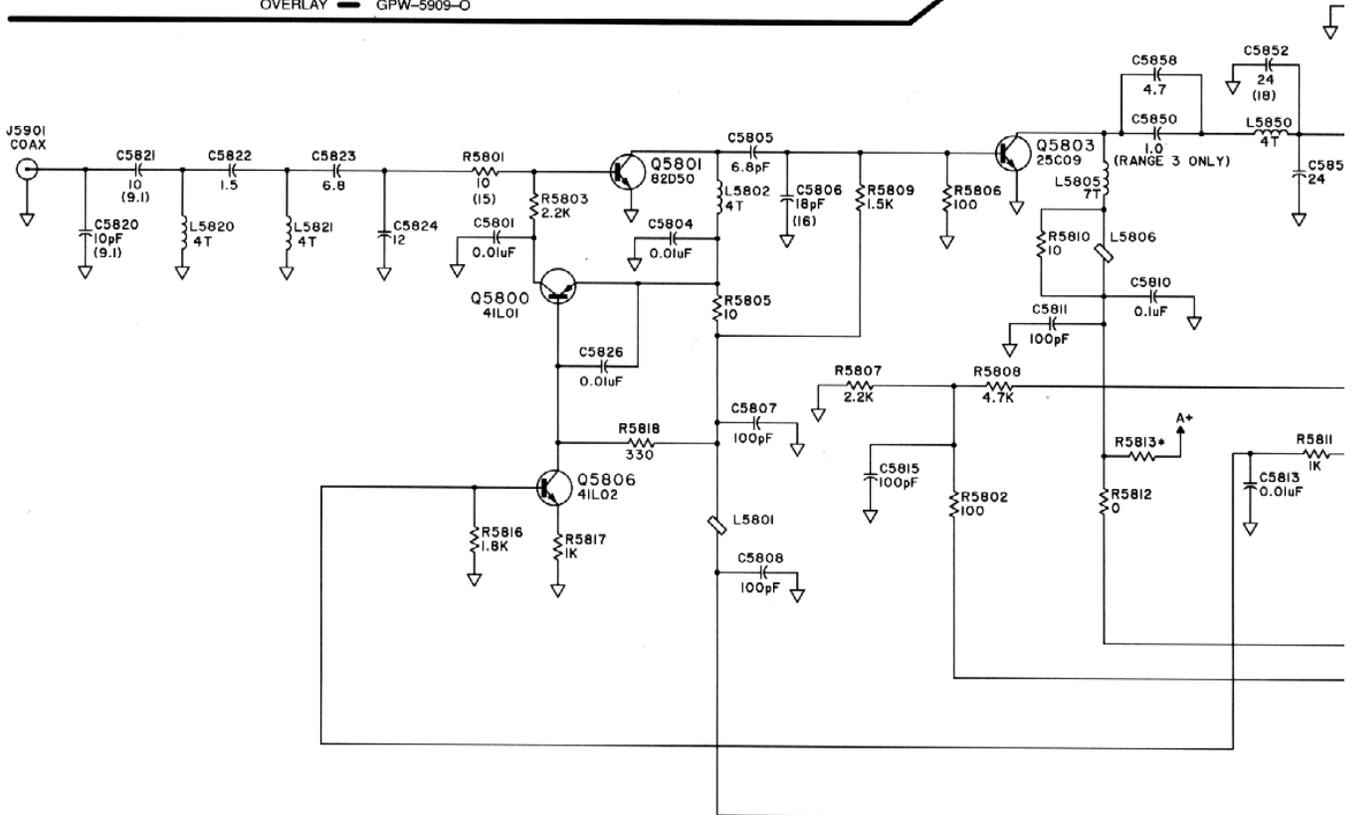
SUBSTRATE GPW-5908-O  
OVERLAY GPW-5909-O

## parts list

HLE6033A Harmonic Filter Hybrid UHF Range 3 & Range 4 MXW-5907-

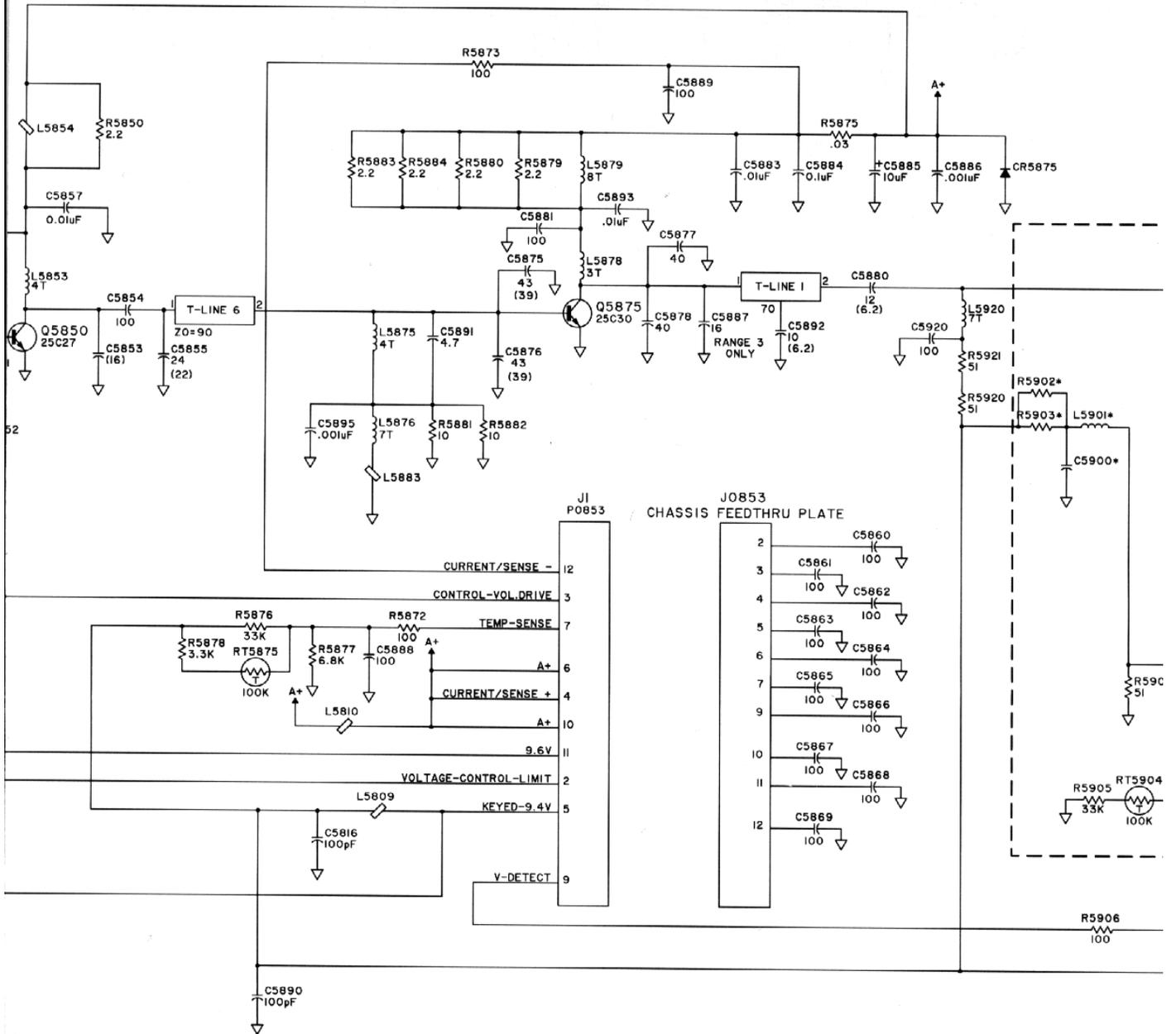
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
<b>connector receptacle</b>		
J5901-J5903	07-80299L01	frame lead, j-strap
<b>coil, RF</b>		
L5910	24-80091G36	7 turns, airwound
L5924	24-80090G03	3 turns, airwound
L5925	24-80090G04	3 turns, airwound
L5926	24-80090G03	3 turns, airwound

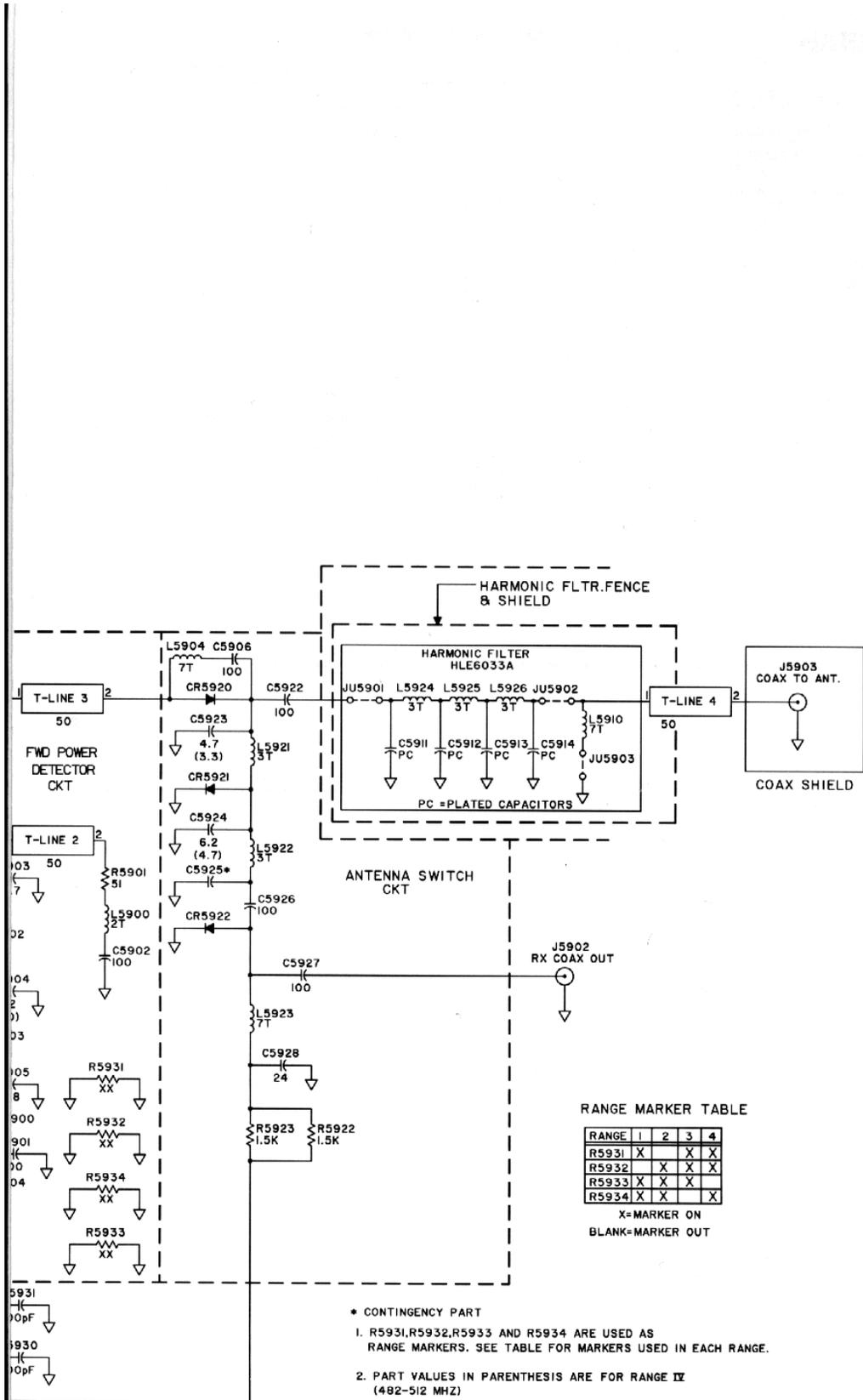
9/15/54



Schematic, Circuit Board Diagrams, and Parts Lists for HLE6043B (Range 3) and HLE6044B (Range 4) Spectra 40-Watt Power Amplifier PW-6533-A (Sheet 1 of 2) 3/30/90

### HLE6043B (RANGE 3) AND HLE6044B (RANGE 4) 40-WATT UHF POWER AMPLIFIER SCHEMATIC





GXW-6534-0

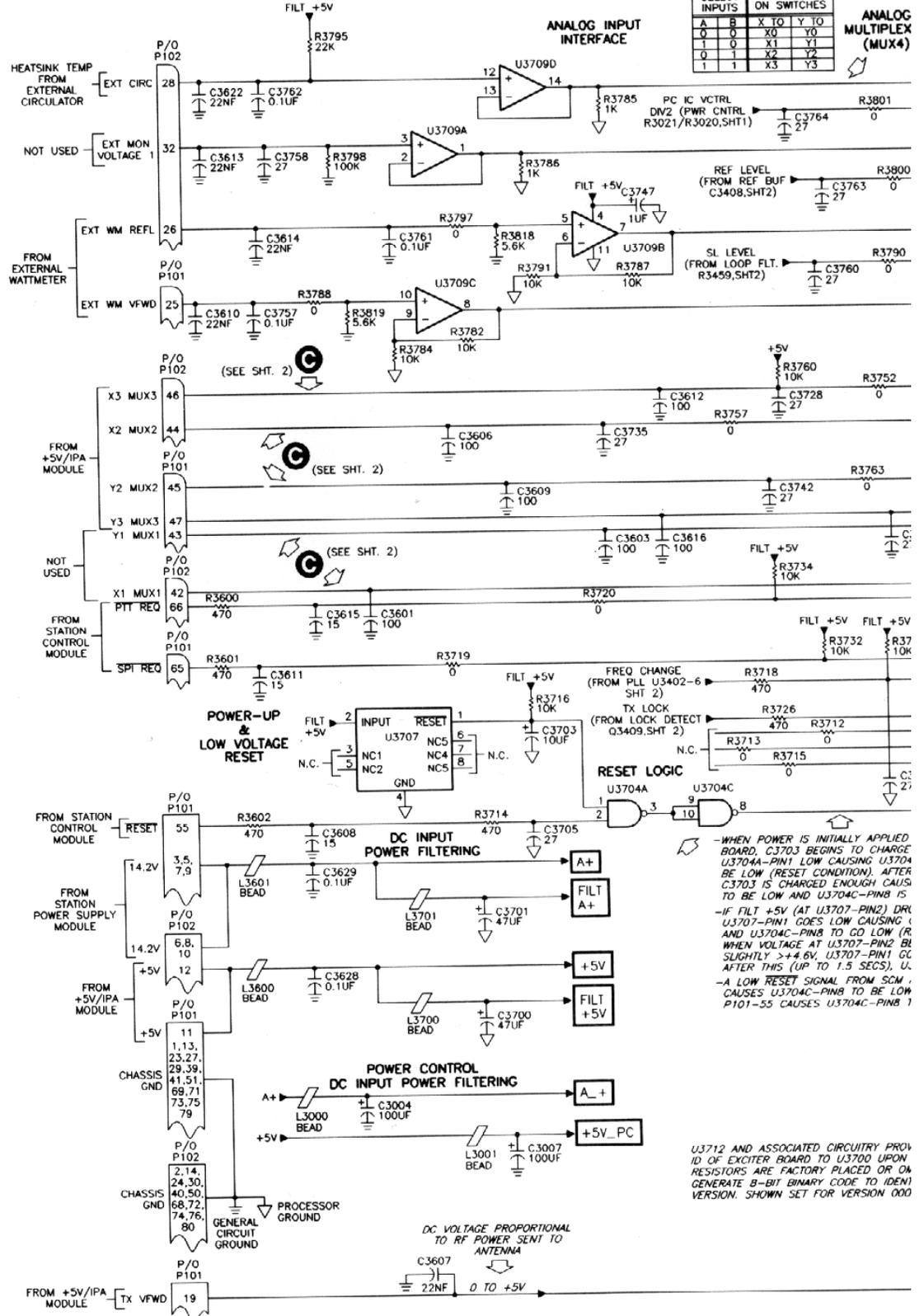
# UHF EXCITER BOARD

## MODELS TLE5971E-TLE5974E

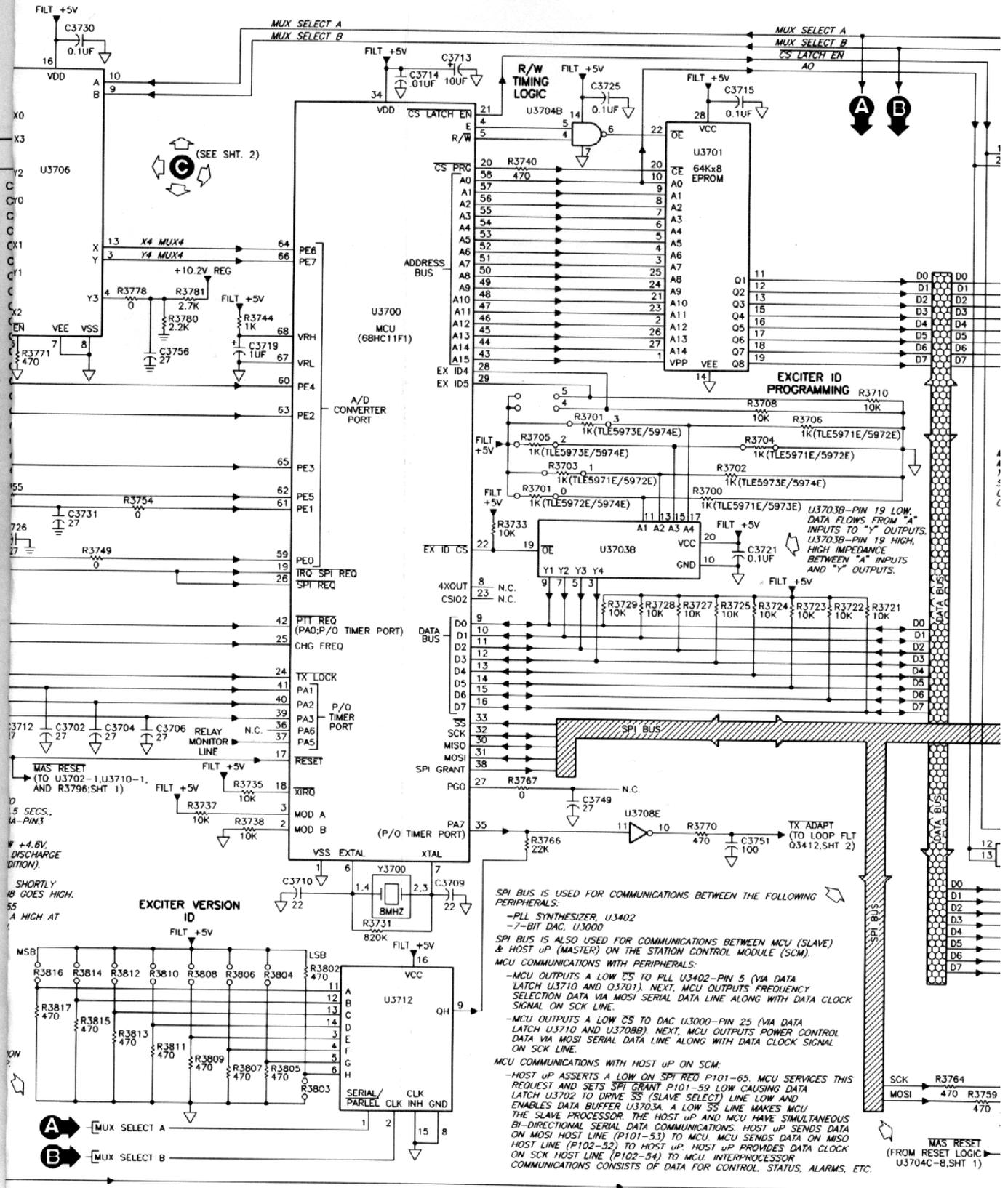
THE FOLLOWING STATE TABLE SHOWS U3706 INPUT/OUTPUT OPERATION:

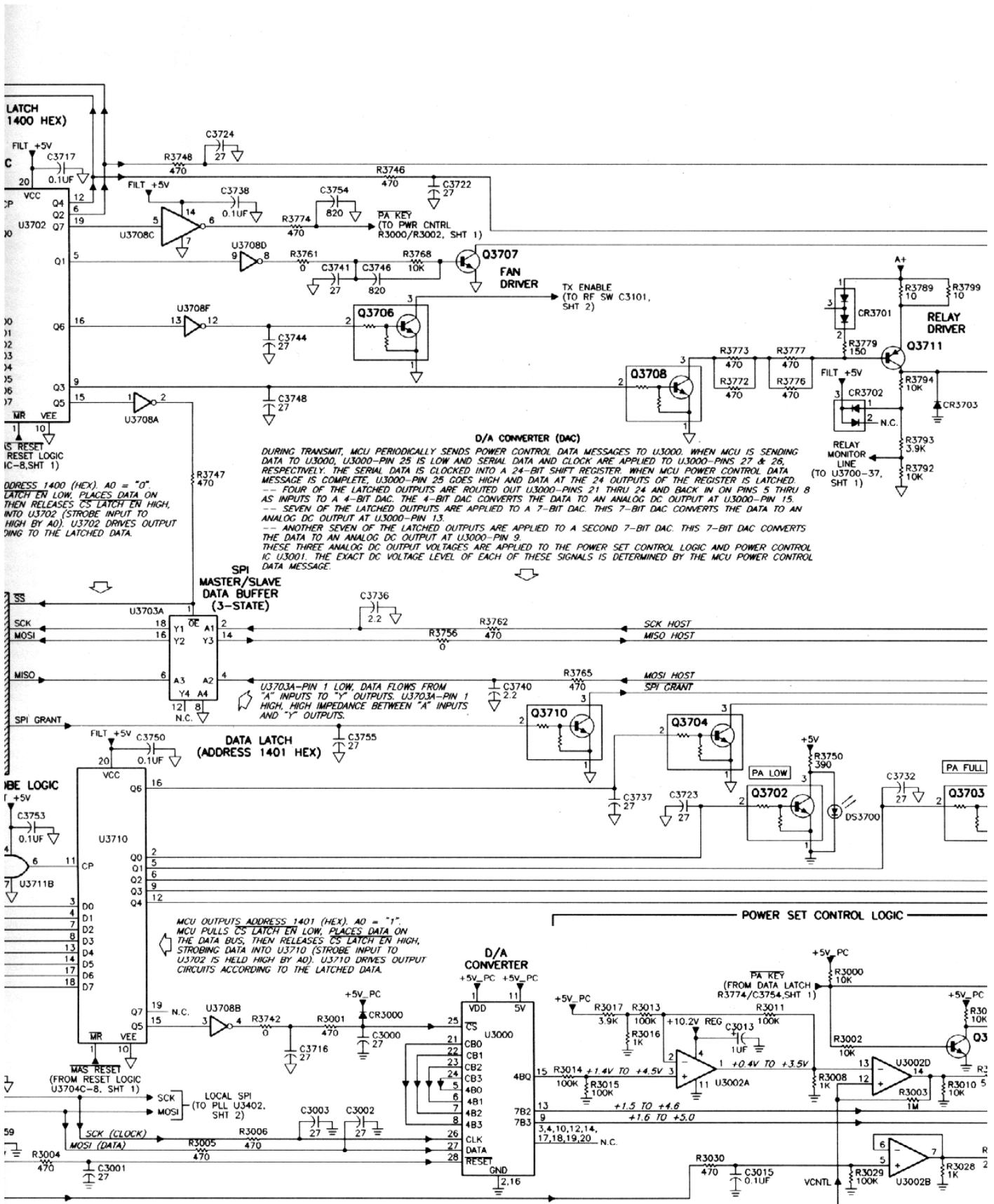
SELECT INPUTS		ON SWITCHES	
A	B	X TO	Y TO
0	0	X0	Y0
1	0	X1	Y1
0	1	X2	Y2
1	1	X3	Y3

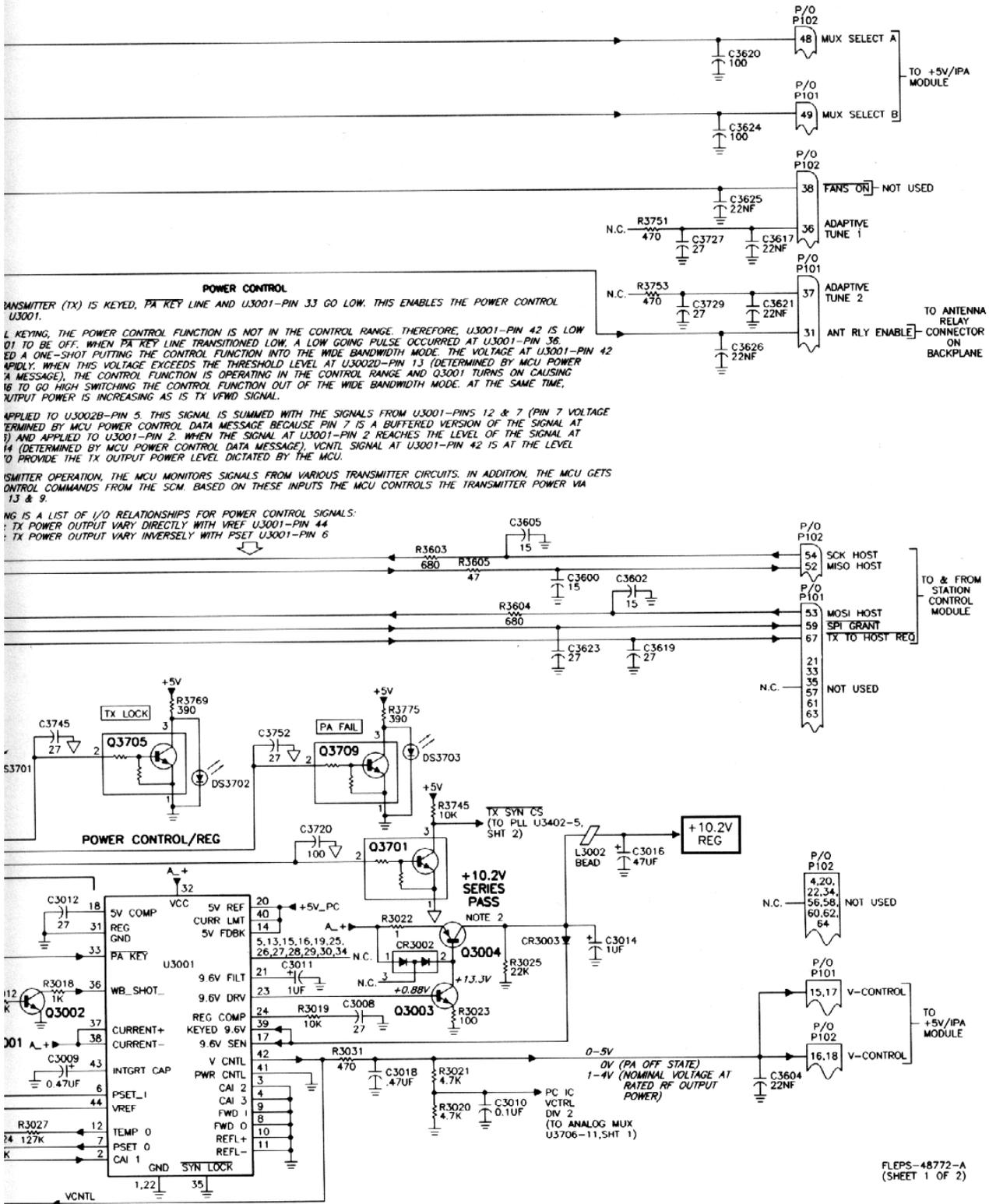
ANALOG MULTIPLEX (MUX4)

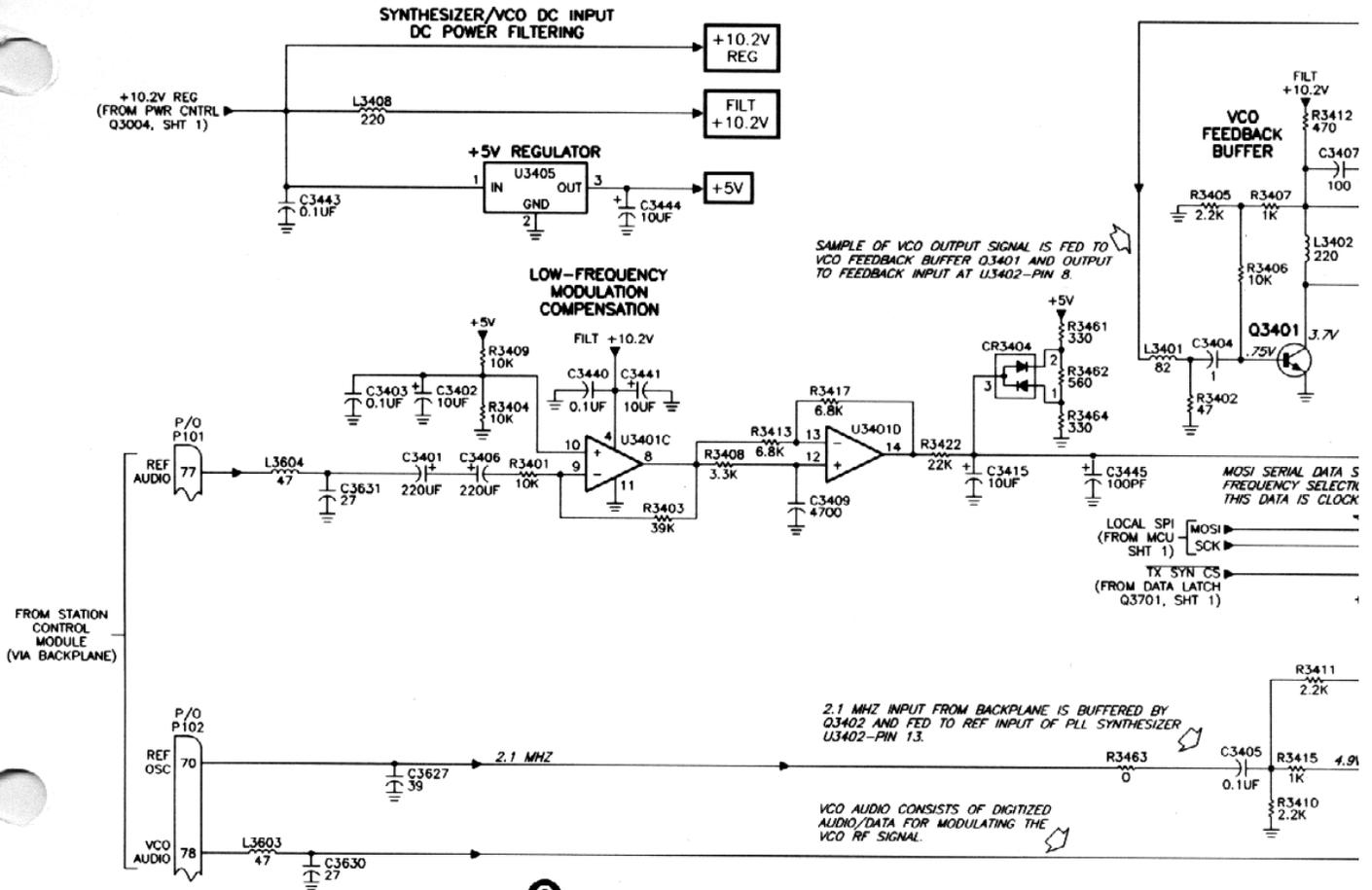


68P81090E92-A  
 (Sheet 4 of 5)  
 5/15/95-UP









DURING DIAGNOSTIC ROUTINES, MCU U3700 VIA DATA LATCH U3702 ASSERTS MUX SELECT A & B LINES AND THEN MONITORS THE FOLLOWING MUX OUTPUT LINES:

- X1 MUX1 (P102-42)
- Y1 MUX1 (P101-43)
- X2 MUX2 (P102-44)
- Y2 MUX2 (P101-45)
- X3 MUX3 (P102-46)
- Y3 MUX3 (P101-47)
- X4 MUX4 (U3706 PIN 13)
- Y4 MUX4 (U3706 PIN 3)

MCU U3700 POLLS EACH MUX OUTPUT LINE DURING A 10-20ms LOOP CYCLE.

EACH MUX OUTPUT LINE CONTAINS FOUR 200uS CHANNELS 0 THRU 3. EACH CHANNEL CORRESPONDS TO A MUX INPUT SIGNAL X0 THRU X3 OR Y0 THRU Y3. EACH MUX INPUT SIGNAL RANGES BETWEEN 0 TO +5V (SEE FIG. 1).

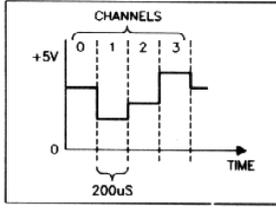
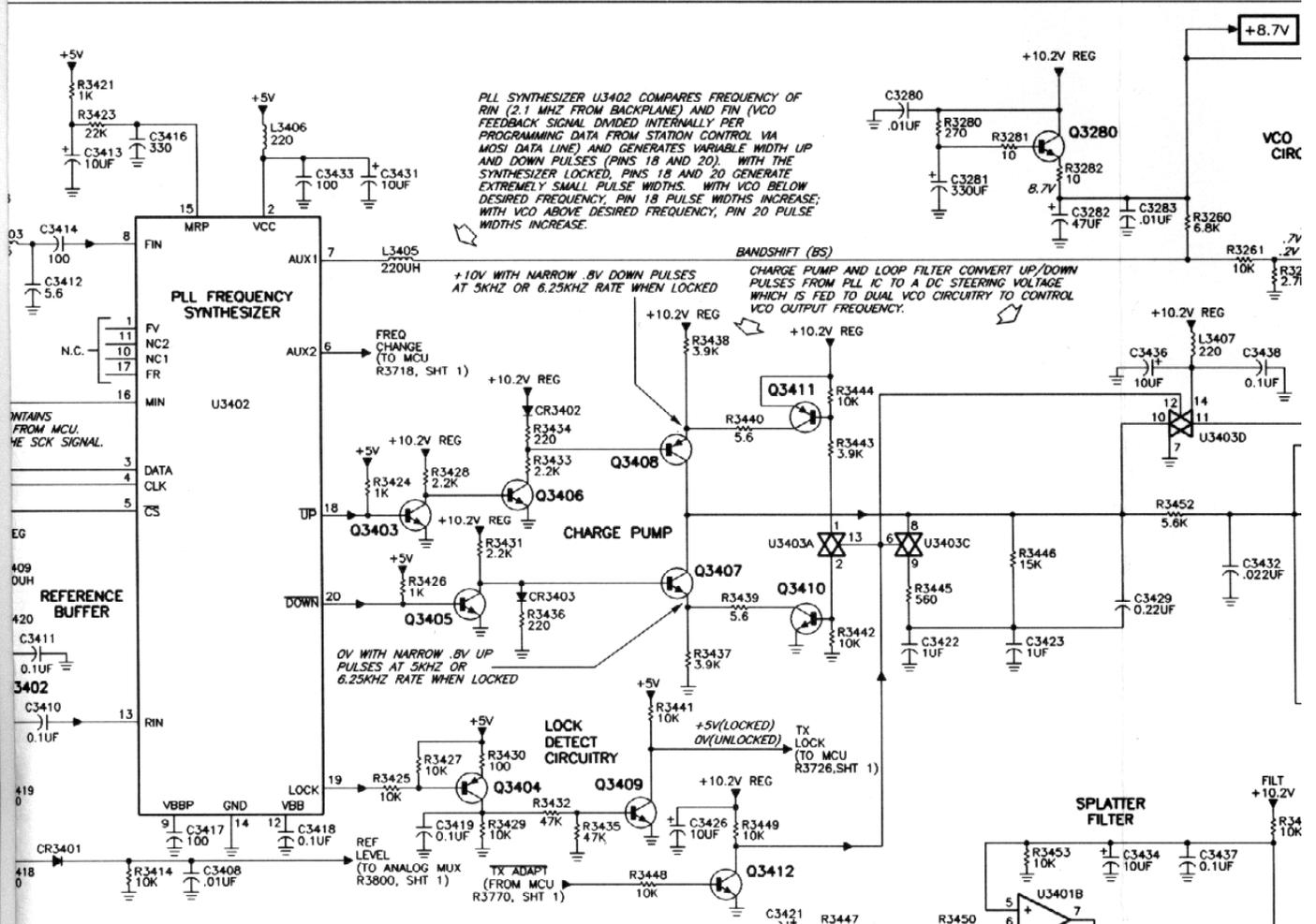


FIG. 1. TYPICAL DATA STREAM ON MUX OUTPUT LINE.

FOR THIS CIRCUIT BOARD APPLICATION, THERE ARE NO MUX1 SIGNAL INPUTS. U3706 MUX4 SIGNAL INPUTS CAN BE DETERMINED FROM THIS SCHEMATIC DIAGRAM. TO DETERMINE MUX2 & MUX3 SIGNAL INPUTS, SEE THE FOLLOWING TABLE.

OUTPUT LINE	SIGNAL INPUTS	OUTPUT LINE	SIGNAL INPUTS
X2MUX2 (P102-44)	X0 AC_FAIL	X3MUX3 (P102-46)	X0 N.C.
	X1 OVERVOLTAGE		X1 N.C.
	X2 VOMNI_REF		X2 IPA_IDA
	X3 FPA_TEMP		X3 IPA_IDB
Y2MUX2 (P101-45)	Y0 CIRCULATOR TEMP	Y0 DPA_VFWD (HIGH POWER ONLY)	
	Y1 N.C.	Y1 N.C.	
	Y2 N.C.	Y2 FPA_VREFL	
	Y3 N.C.	Y3 FPA_VFWD	



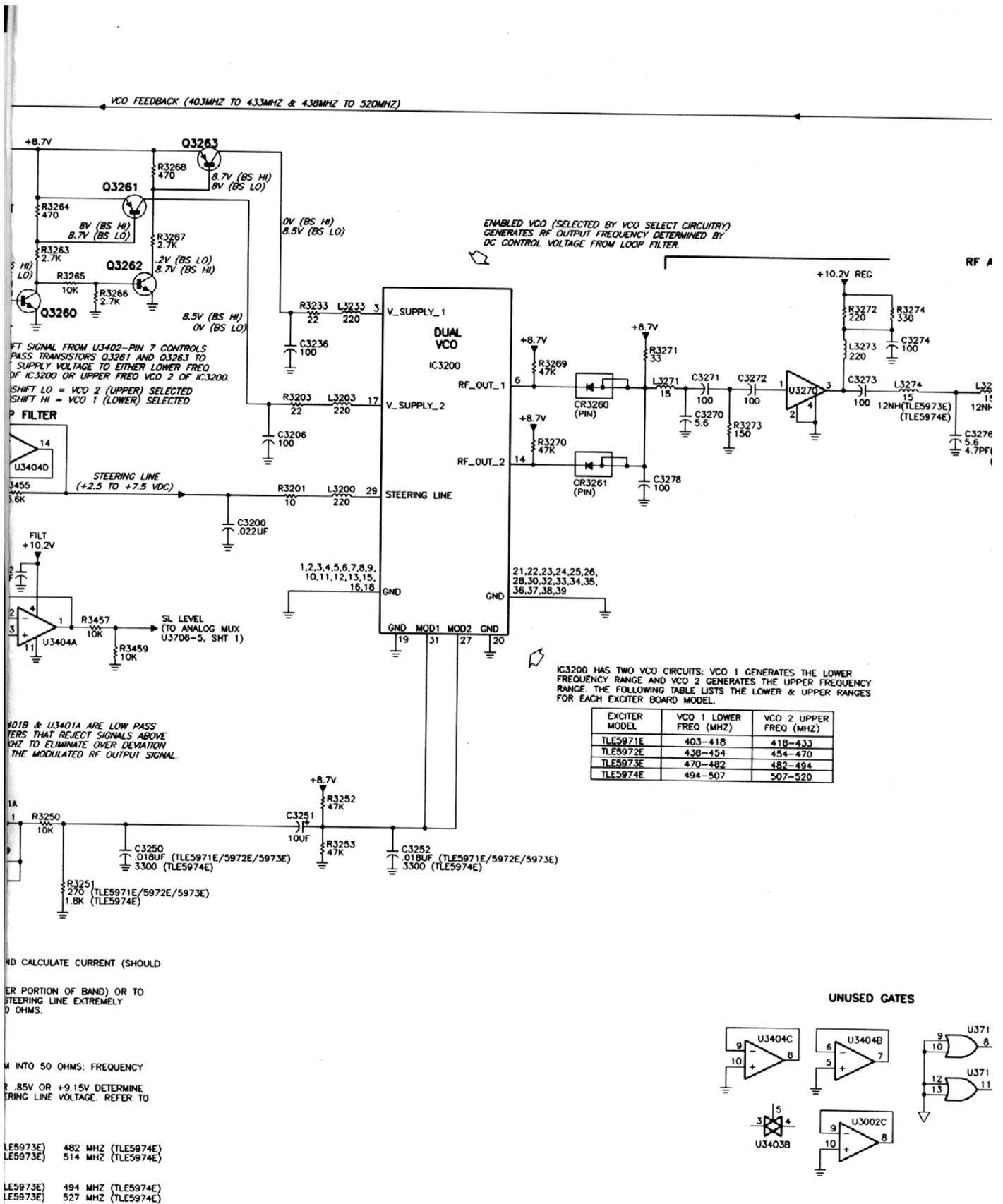
**U3402 PINOUT INFORMATION**

SIGNAL NAME	DESCRIPTION/NOMINAL VOLTAGE
FV	TEST POINT: DIVIDED DOWN VCO FREQUENCY. 6.25 KHZ OR 5 KHZ SAWTOOTH IN A LOCKED CONDITION.
VCC	IC POWER: +5V
DATA	SERIAL DATA INPUT; 0-5V LOGIC LEVEL
CLK	CLOCK FOR SERIAL DATA PROGRAMMING; 0-5V LOGIC LEVEL
CS	CHIP SELECT; LOW WHEN PROGRAMMING, HIGH WHEN NOT PROGRAMMING (0-5V LOGIC LEVEL)
AUX2	CHANGE FREQUENCY; TOGGLES BETWEEN LOGIC LOW AND HIGH WITH EVERY FREQUENCY CHANGE
AUX1	BANDSHIFT; HIGH SELECTS LOW FREQUENCY VCO (1 OF IC3200), LOW SELECTS HIGH FREQUENCY VCO (2 OF IC3200).
FIN	FEEDBACK RF INPUT; 40.3MHZ TO 43.3MHZ (TLE5971E), 43.8MHZ TO 47.0MHZ (TLE5972E), 47.0MHZ TO 49.4MHZ (TLE5973E), OR 49.4MHZ TO 52.0MHZ (TLE5974E).
VBBP	DC BIAS FOR PRESCALER INPUT; 1.4V DC
NC1	NOT USED
NC2	NOT USED
VBB	DC BIAS FOR REFERENCE DIVIDER INPUT; 1.4V DC
RIN	REFERENCE DIVIDER INPUT; 1V P-P, 2.1 MHZ SQUARE WAVE RIDING ON 1.4V DC
GND	IC GROUND; 0V
MRP	CONNECTION TO EXTERNAL RAMP CIRCUIT FOR PHASE MODULATOR; STEEPLY SLOPED RAMP, RAMPING BETWEEN 0 AND 5V @ 6.25 KHZ OR 5 KHZ RATE.
MIN	MODULATION INPUT TO PHASE MODULATOR; +2.5V DC BIAS
FR	TEST POINT; DIVIDED DOWN 2.1 MHZ REFERENCE @ 6.25 KHZ OR 5 KHZ IN A LOCKED CONDITION.
TP	WHEN LOCKED, NARROW (<1US) DOWN PULSES AT 6.25 KHZ OR 5 KHZ RIDING ON .7V DC
LOCK	LOOP LOCKED; WHEN LOCKED, NARROW (<1US) DOWN PULSES AT 6.25 KHZ OR 5 KHZ RIDING ON 5V DC
DOWN	WHEN LOCKED, NARROW (<1US) DOWN PULSES AT 6.25 KHZ OR 5 KHZ RIDING ON .7V DC

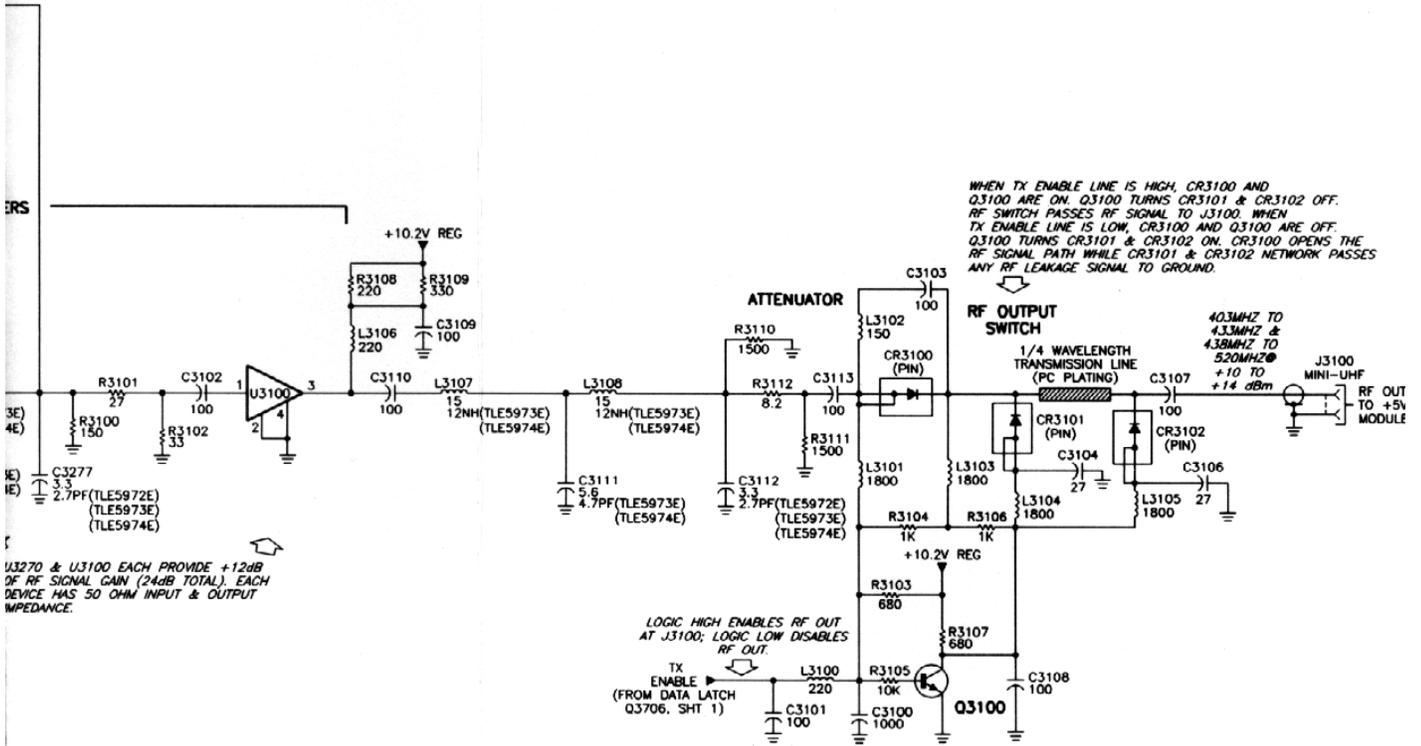
**VCO TROUBLESHOOTING**

- Q3280 AND ASSOCIATED CIRCUITRY COMPRISE +8.7V SUPERFILTER. MEASURE VOLTAGE DROP ACROSS BE APPROXIMATELY 60 MA.
- Q3260 THRU Q3263 COMPRISE BANDSHIFT CIRCUITRY WHICH SWITCHES DC POWER TO VCO 1 OF IC3; VCO 2 OF IC3200 (UPPER PORTION OF BAND). STEERING LINE SENSITIVITY IS APPROXIMATELY 3 MHZ SENSITIVE; DO NOT PROBE). POWER AT CR3260/CR3261 OUTPUT SHOULD BE APPROXIMATELY +100B
- IF BOARD IS NOT LOCKED, PERFORM FOLLOWING PROCEDURE TO DETERMINE IF VCO CIRCUITRY IS AT
  - VERIFY DC VOLTAGES AS SHOWN ON SCHEMATIC
  - MEASURE POWER AND FREQUENCY AT OUTPUT OF CR3260/CR3261; SHOULD BE APPROXIMATELY 3 MHZ SHOULD BE WITHIN LOWER OR UPPER RANGE.
  - MEASURE STEERING LINE VOLTAGE AT U3404A-PIN 1. IF BOARD IS NOT LOCKED, VOLTAGE WILL WHICH VCO IS ENABLED (U3402-PIN 7) AND VERIFY VCO OUTPUT FREQUENCY BASED ON MEAS DATA BELOW.

VCO 1 OF IC3200 ENABLED	STEERING LINE VOLTAGE .85V	APPROX. 390 MHZ (TLE5971E)	426 MHZ (TLE5972E)	45
	STEERING LINE VOLTAGE +9.15V	APPROX. 425 MHZ (TLE5971E)	461 MHZ (TLE5972E)	48
VCO 2 OF IC3200 ENABLED	STEERING LINE VOLTAGE .85V	APPROX. 406 MHZ (TLE5971E)	442 MHZ (TLE5972E)	46
	STEERING LINE VOLTAGE +9.15V	APPROX. 440 MHZ (TLE5971E)	477 MHZ (TLE5972E)	50



# UHF EXCITER BOARD MODELS TLE5971E-TLE5974E



**NOTES:**

1. UNLESS OTHERWISE INDICATED, ALL RESISTOR VALUES ARE IN OHMS, CAPACITOR VALUES ARE IN PICOFARADS, AND INDUCTOR VALUES ARE IN NANOHENRIES.
2. THE +10.2V SERIES PASS TRANSISTOR Q3004 IS HEATSINK MOUNTED. THE COLLECTOR IS INTERNALLY CONNECTED TO THE BODY WHICH CONTACTS THE HEATSINK.
3. EDGE CONNECTORS P101 AND P102 ARE PART OF THE PRINTED CIRCUIT BOARD AND MATE WITH BACKPLANE CONNECTOR.

INTEGRATED CIRCUIT POWER AND GROUND CONNECTIONS

REF DESIG	TYPE	DESCRIPTION	SUPPLY PIN	GROUND PIN
U3000	CUSTOM	D/A CONVERTER	1,11	2,16
U3001	CUSTOM	REGULATOR/POWER CONTROL	32	1,31
U3002	MC3303DR2	QUAD DIFFERENTIAL-INPUT OPERATIONAL AMPLIFIER	4	11
U3100 & U3270	MWA0311T1	MICROWAVE AMPLIFIER, 50-OHM INPUT & OUTPUT IMPEDANCE (MMIC)	3	4
U3401	MC33074D	QUAD DIFFERENTIAL-INPUT OPERATIONAL AMPLIFIER	4	11
U3402	CUSTOM	PHASE LOCKED LOOP SYNTHESIZER	2	14
U3403	MC74HC4066	QUAD ANALOG MULTIPLEXER/DEMULTIPLEXER	14	7
U3404	MC33184	LOW POWER QUAD OPERATIONAL AMPLIFIER	4	11
U3405	MC7805	+5V VOLTAGE REGULATOR	1	2
U3700	M68HC11F1	MICROCONTROLLER (MCU) W/SCL, SPI (NON-MULTIPLEXED ADDRESS/DATA BUS)	34	1
U3701	27C512	64K X 8-BIT EPROM, PROGRAMMED	28	14
U3702	MC74AC273	OCTAL D-TYPE FLIP-FLOP	20	10
U3703	MC74AC244	OCTAL BUFFER/LINE DRIVER, WITH 3-STATE OUTPUTS	20	10
U3704	MC74AC00	QUAD 2-INPUT NAND GATE	14	7
U3706	74HC4052	ANALOG MULTIPLEXER/DEMULTIPLEXER	16	7,8
U3707	MC33064	UNDERVOLTAGE SENSING CIRCUIT	2	4
U3708	MC74AC04	HEX INVERTER	14	7
U3709	MC3303DR2	QUAD DIFFERENTIAL-INPUT OPERATIONAL AMPLIFIER	4	11
U3710	MC74AC273	OCTAL D-TYPE FLIP-FLOP	20	10
U3711	MC74AC32	QUAD 2-INPUT OR GATE	14	7
U3712	74HC165	8 BIT S/P-IN S-OUT SHIFT REGISTER	16	8

FLEPS-48772-A  
(SHEET 2 OF 2)

68P81090E92-A  
(Sheet 5 of 5)  
5/15/95-UP