

MICHEL

Avionics Products

INSTRUCTION MANUAL

FOR

MX170B NAV / COMM TRANSCEIVER

Manufactured by: TKM, Inc.

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INSTRUCTION MANUAL
FOR
MX170B NAV / COMM TRANSCEIVER

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1. INTRODUCTION

This manual contains information on the Michel MX170B, manufactured by TKM, Inc. The information includes installation, operation, mechanical and electrical descriptions and alignment and test considerations.

A. Purpose Of Equipment

The equipment is a 760 channel communication (COMM) transceiver for use in aviation services and a 200 channel navigation (NAV) receiver to provide VOR / LOC signals to navigational converters. The NAV receiver also provides frequency selection for remote mounted Distance Measuring Equipment and Glideslope Receivers.

The MX170B is designed to be used as a direct replacement for the King KX170/ KX175. The unit is dimensionally identical to the King units and can therefore use existing aircraft installations. Except for improved performance characteristics, the Unit is electrically interchangeable with the King unit and will provide the proper audio, navigation signal and channeling signals for existing installations. New installations can be made using KX170A installation kits.

B. Equipment Description

The unit features digital (LED) displays for active frequency channel and standby frequency channel for both COMM and NAV.

For channel selection a MHz knob and a KHz knob are provided. For 25 KHz increments in COMM, a 25 KHz button is provided. To activate COMM or NAV frequency selection, an N/C button is provided, a tic appears in the selected standby channel display.

Channel selection operates on the standby channel only. When the desired channel is indicated in the standby display it may be placed into the active position by depressing the "Flip-flop" button located between the displays, the active channel is then placed into the standby position.

The NAV receiver features a VC/ID button to permit selection of voice or ident reception. In the Ident condition a tic is displayed on the active NAV channel display.

The COMM transceiver features a test button which overrides the squelch to verify proper receiver operation and to allow reception of weak signals. Also provided on the active COMM display, is a tic to indicate transmitter power output.

Power switches are included with the NAV and COMM volume controls. The COMM is the master power switch and the NAV provides power switching for remote navigation units

The MX170B is comprised of eight replaceable subassemblies: five of the subassemblies are contained in shielded modules to reduce radio frequency interference. The five are the NAV receiver, the NAV synthesizer, the COMM receiver, the COMM synthesizer, and the Transmitter.

The remaining three subassemblies are the Rear Panel Assembly, the Front Panel Assembly and the Computer Board. The Rear Panel Assembly contains the Audio Amplifier, Power Filter, and the T/R switching. The Front Panel Assembly contains the digital displays, the functional select switches and the volume controls. The Computer Board contains the microprocessor, the memory and the Program storage.

Also contained on the computer board are the audio processing circuits and the channeling circuits.

The subassemblies are interconnected with plugs so that any module may be replaced without the use of a soldering iron. For equipment repair it is recommended that complete subassemblies be replaced.

As an aid to locating the defective subassembly a set of analog test points are provided. The analog test points include the receiver tuning voltages, the synthesizer control voltages and the AGC lines.

NOTICE TO INSTALLER

The TKM MX170B NAV/COMM is authorized by the FAA to TSO C34e, C36e, C37d, C38d, and C40c. The product is an incomplete system. In order to achieve a complete TSO quality system, the MX170B must be installed to configure in conjunction with a TSO C37/C38 authorized antenna and a TSO C34e authorized navigation receiver. It is the responsibility of the installer to ensure proper installation.

CONTINUED AIRWORTHINESS (HBA 98-18)

Permission is hereby given to installers approved by the recognized aviation authority to reference relevant excerpts from the installation instructions provided by TKM, Inc. in order to fulfill documentation requirements for Instructions for Continued Airworthiness. Adequacy of the documents should not be assumed by this permission. ICA documentation rests solely with the ICA applicant. The MX170B product is 'Repair on Condition Only'

SPECIFICATIONS

MX170B TRANSCEIVER

Mounting:	Panel mounted, no shock mounting required.
Size:	6.312 x 2.600 x 14.15 inches w/ connectors (16.03 x 6.60 x 35.94 cm)
Weight:	4.9 lbs excluding external connector and harness.
Power Requirements:	13.75 Vdc (or v w/CONV)
NAV and COMM Recv'r	1.7A
Max COMM Total w/ Transmit (Tone)	7.1A (6.2A unmodulated)
	COMM Transceiver
Crystal Controlled:	760 channel
Frequency Range:	118.00 to 136.975 MHz
Frequency Stability:	+ .003%. -20 to 50C
	Transmitter
VHF Power Output:	8 watts minimum, 50 ohm
Modulation:	85% capability with 90% limiting provided.
Microphone:	Dynamic mike containing transistorized pre-amp or carbon (must provide at least 120 m Vrms into 500 ohm load.

Sidetone: Adjustable up to 40 mw into
500 ohm headphones.

Duty Cycle: 1 minute on, 4 minutes off (20%)

Receiver

Sensitivity: 1.5 uv (soft) will provide a 6 db
minimum signal plus noise to noise
ratio (KHz, 30% mod).

Selectivity: Typical 6 db at +/-7.5 KHz, 60 db at
+/- 17.5 KHz,

Spurious Responses: Down at least 70 db.

Squelch: Noise adaptive squelch with override.

AGC Characteristics: From 2 to 100.000 uV audio
output will not vary more than 1 db.

NAV Receiver

Crystal Controlled: 200 Channels

Frequency Range: 108.00 to 117.95 MHz

Sensitivity: 1.5 uv (soft) will provide a half-
flag indication.

Selectivity: Typical 6 db at +/- 15 KHz 60 db at
+/- 35 KHz,

Spurious Responses: Down at least 70 db.

Ident Filter: 15 db minimum

AGC Characteristics: From 26 to 100.000 u V audio
output will not vary more than 1 db

NAV Receiver Accuracy: Two sigma limit, +/- 1 degree

NAV Output: With LOC adjusted for 0.35 Vrms

VOR = 0.5 Vrms (typical) into
20K ohms or greater load impedance.

Audio

Auxiliary Audio Inputs:

Three (3) 500 ohms with 30 db
isolation between any two.

Frequency Responses:

Within 6 db from 350 Hz to 2500 Hz

Headphone Output:

40 mw into 500 ohm

Speaker Output:

4.5 Vrms into auxiliary input
produces 5 watts audio output.

DME Channeling

	M0	M1	M2	M3		K0	K1	K2	K3		50 KHz
108	-	-	0	-	.0X	0	0	-	-	.X0	-
109	-	-	-	0	.1X	0	0	0	-	.X5	0
110	0	-	-	-	.2X	0	0	0	0		
111	0	0	-	-	.3X	-	0	0	0		
112	0	0	0	-	.4X	-	-	0	0		
113	-	0	0	0	.5X	0	-	-	0		
114	0	-	0	0	.6X	-	0	-	-		
115	-	0	-	0	.7X	-	-	0	-		
116	0	-	0	-	.8X	-	-	-	0		
117	0	0	-	0	.9X	0	-	-	-		

NOTE: (-) = OPEN, (0) = GROUND

ILS Energize:

OPEN for VOR, GROUND for ILS

	GS	GS	GS	GS		GS	GS	GS	GS	GS
	108	109	110	111		0.1	0.3	0.5	0.7	0.9
108	0	-	-	-	.0X	-	-	-	-	-
109	-	0	-	-	.1X	1	-	-	-	-
110	-	-	0	-	.2X	-	-	-	-	-
111	-	-	-	0	.3X	-	1	-	-	-
112	-	-	-	-	.4X	-	-	-	-	-
113	-	-	-	-	.5X	-	-	1	-	-
114	-	-	-	-	.6X	-	-	-	-	-
115	-	-	-	-	.7X	-	-	-	1	-
116	-	-	-	-	.8X	-	-	-	-	-
117	-	-	-	-	.9X	-	-	-	-	1

NOTE: (-) = OPEN, (0) = GROUND, (1) = CONNECTED TO G / S
Switching Line

II. OPERATION

Operating controls for the MX170B are located on the unit front panel or are remote inputs through the rear panel.

The unit front panel is shown in figure 1. The left-hand COMM readout indicates the active COMM frequency and the right hand COMM readout indicates the standby COMM frequency. The left-hand NAV readout indicates the active NAV frequency and the right hand NAV readout indicates the standby NAV frequency. A "Tic" readout is provided on the upper left-hand corner of the first digit of each of the four frequency readouts.

The active COMM "Tic" indicates the presence of transmitter power.

The standby COMM "Tic" indicates that the Frequency Selection knobs will control COMM standby frequency.

The active NAV "Tic" indicates that the NAV receiver is in the Ident Mode.

The standby NAV "Tic" indicates that the Frequency Selector knobs will control NAV standby frequency.

Power Application. The COMM volume control contains the master power switch and activates both the NAV and COMM functions. The NAV volume control contains a power switch for the remote NAV units.

Frequency Selection. The N/C button is used to activate either the COMM or the NAV frequency selection as indicated by the appropriate "Tic" display. The MHz and KHz controls can then be used to select a desired standby channel. In COMM the "25" button is used to advance the frequency by 25 KHz.

After the desired standby frequency is selected it may be transferred to the active position by pressing the flip-flop button between the two displays. The active and standby channels will be interchanged each time the button is pressed.

Ident / Voice Selection. The ID / VC button can be used to select a tone filter in order to receive voice signals on the NAV receiver. The switch is also used for frequency storage as described below.

Test. The TEST button is a dual function switch. In normal operation, it is used to override the squelch to verify receiver operation and to receive weak signals. The switch is also used for frequency storage as described below.

Transmit. The transmit mode on the transceiver is selected by grounding the MIC Key line on the unit's rear panel.

Channel Reset. If it is desired to clear memory, a holding system reset may be accomplished by turning off the main power switch, pressing and holding the TEST button and then turning on the main power switch: after reset both the COMM active and the COMM Standby frequencies will be set to 121.500 MHz.

Frequency Storage. The MX170B NAV COMM allows up to 50 NAV and 50 COMM preset frequencies to be stored in the memory for recall. The use of memory presets is described in the following sections.

Clear all frequency presets. To erase all frequency presets with one operation, simply turn on the power to the radio while holding the TEST button depressed.

Examining / Changing / Inserting / Deleting frequency presets. These operations on individual frequency presets are accomplished in EDIT mode. To enter EDIT mode, turn on the power to the radio while holding the VT button depressed. When the radio is in EDIT mode, the ACTIVE displays show the reference number of the preset and the STBY displays show the actual preset frequency. After a CLEAR operation as described above, the only presets of 121.5 and the default NAV preset of 112.0

EDIT mode operations are performed on either the COMM or NAV preset list, according to where the tuning tic indicator is displayed. The tuning tic appears immediately to the left of the COMM or NAV STBY displays. Pressing the N/C button toggles between NAV and COMM preset editing.

Examining presets (EDIT MODE). Pressing the COMM F-F button will step to the next frequency in the preset list. Pressing the TEST button will step to the previous frequency in the preset list. Pressing COMM F-F when the last preset is displayed will cause the first preset to display. Similarly, pressing TEST when the first preset is displayed will cause the last preset to display. Warning: When there is only one preset in the list, the radio will not appear to "do anything" when the COMM F-F or TEST is pressed. This is because the current, previous, and next presets are all the same preset.

Changing a preset (EDIT MODE). Press COMM F-F or TEST until the preset to be changed is displayed. Dial in the new preset frequency using the tuning controls and press either COMM F-F or TEST.

Inserting (Adding) a preset (EDIT MODE). Press COMM F-F or TEST until the desired insert point is displayed (the new preset will be inserted AFTER this insert point). Dial in the desired frequency using the tuning controls and press NAV F-F. Remember that a preset list may contain a maximum of 50 entries, insert commands that would cause this limit to be exceeded are ignored.

Deleting a preset (EDIT MODE). Press COMM F-F or TEST until the preset to be deleted is displayed. Then press the VC - ID switch to delete. If the deleted preset was not at the end of the list, all the presets that followed it are renumbered. Each preset list (NAV and COMM) must always contain at least one entry. If there is only one entry remaining in a preset list, it may not be deleted (It can be changed to another frequency).

Frequency preset normal operation. At any time the radio is in normal operation (Not EDIT MODE), COMM preset frequencies may be called into the STBY frequency display by pressing COMM F-F while the TEST button is depressed. During the time that both buttons are held simultaneously depressed, the reference number for the preset appears in the ACTIVE window. Each time this operation is repeated, it will copy the "next" preset to the COMM STBY frequency.

NAV preset operation is similar, with the exception that presets are retrieved by pressing NAV F-F while the VC - ID.

III. INSTALLATION

The MX170B is designed to be an exact replacement for the KING KX170A and similar units. As a replacement unit, the MX is inserted directly into the mounting tray for the KX170A and tightened down with an allen wrench (5/64).

For new installations the Installation instructions for the KX170A should be used.

Equipment removal is accomplished by rotating the clamp screw counterclockwise a few turns until it can be felt that the clamp screw is disengaged. Excessive torque on the clamp screw will result disassembly of the clamp. After the clamp has been disengaged the unit may be extracted by rocking the unit from side to side. The knobs should not be used as extraction handles. A King Extraction tool # 071-6045-00 is also an acceptable extraction device. Another method for extraction of a tight unit would be to rotate the clamp screw counterclockwise until significant resistance is noted, the clamp screw can then be pulled forward to expose the screw head. Grasp the screw head with a suitable device and extraction force can be applied. Excessive side to side motion should not be applied to the clamp screw.

IV. THEORY OF OPERATION

For ease of service the MX170B has been designed into 8 replaceable modules. The modules are:

- A. Front Panel Assembly
- B. Rear Panel Assembly
- C. Computer Board
- D. NAV Receiver
- E. COMM Receiver
- F. NAV Synthesizer
- G. COMM Synthesizer
- H. Transmitter

A block diagram is shown in figure 2.

A. Front Panel Assembly

The front panel includes the four frequency displays, a photocell for automatic brightness control, 7 push buttons, two volume controls with proper switches and two frequency selectory switches. The displays and controls are connected to the display driver board through pin and socket connectors and to the compute board with a ribbon cable.

B. Rear Panel Assembly

The rear panel includes the power converter, the audio circuits and T/R switching circuits. Refer to SS1750B01.

IIA is the audio preamplifier and is the summing point for all audio inputs except the microphone input. IIB is the second audio amplifier; the input to this amplifier is selected between the first audio and the microphone input with 12A or 12B. 12C is used as an inverted to activate 12A. The selected audio is volume comprised in I3 and applied to the pushpull audio output IC's 14 and 15. Q1, Q2, and K1 provide switching to couple the audio amplifier to the speaker for receive operation or the Transmitter for transmit operation.

The power supply consists of an input filter L1, C29, and C30, a +5 volt regulator and a voltage converter. The +5 volt regulator is designed around a 3524 pulse width

modulator with a crowbar protection circuit. Q3 is the power switch in the circuit. Q4 and Q5 with T1 form the converter circuit and provide a 20 volt p-p square wave for the output rectifiers. I8 provides a regulated +15 vdc output and D9 and D10 provide an unregulated -20 vdc output.

The T/R switch SS1709A01 contains switching diodes D1 and D2 and a low pass filter L1, C1, L2, C4. In receive the diode is forward biased to couple the receiver to the antenna. In transmit the T/R line is open circuited to permit the transmitter signal to generate a reverse bias on the diode to the peak value of the transmitter signal.

C. Computer Board

The computer board contains 3 basic sections:

1. Computer
2. Analog Processing
3. Channeling Circuits

Refer to SS1760B01

1. Computer

The computer is comprised of the processor (I6), the Program Prom (I5), the Memory Ram (I4), the address decoder (I7), the oscillator (I3), and the read/write decoder (I8). The RAM contains a lithium battery that will support the memory indefinitely.

2. Analog Processing

The Analog Processing functions include noise detection, phone amplification, tracking, squelch, Ident code filtering and transmitter monitoring.

I12 B is an adjustable gain amplifier used to track receiver tuning to synthesizer frequency. I12A and I12 D is a 2 pole bandpass filter to separate noise from audio signals. The noise is detected with D4; the noise level is used to inhibit the carrier squelch threshold as determined by I13 B.

I13A detects the voltage on the T/R switch. When a large negative voltage is detected, an active signal is applied to I1 to turn on the transmit "Tic".

3. Channeling Circuits

The channeling circuits are comprised of digital latches and output drivers. I16 provides the Slip code channeling for the DME, I15 provides Glide Slope KHz output drive, and I14, 17 provide Glide Slope MHz output drive in addition to the ILS enable drive.

D / E NAV & COMM Receiver

The NAV and COMM receivers are functionally the same. The only difference between the two receivers is the RF tuning, the AGC time constant and a tuning voltage sensor in the COMM receiver which reduces the receiver gain during Transmitter actuation. Refer to SS1866A01 and SS1866A02.

D1, 2, 3 and 4 provide RF tuning and are tracked to the appropriate Frequency Synthesizer using circuitry on the computer board.

Q1 is the RF amplifier, D8 is a diode quad used as a balanced mixer, Q2 is the first IF amp, I1 is the second IF amp, and D5 is the detector.

I2 A is the first agc amp and I2 D is the second agc amp. I2 B and I2 C are audio amplifiers.

The crystal filter is a single assembly containing 8-poles.

D7 with associated components, provide dynamic noise limiting.

F / G NAV & COMM Synthesizer

The NAV and COMM synthesizers are identical except for tuning and an additional output is provided in the COMM synthesizer to drive the transmitter. Refer to schematics SS1714B01 and SS1714B02 for component reference.

I3 receives digital frequency information from the computer and sets the internal frequency divide ratios to determine the desired output frequency. I3 also contains a phase detector to generate an error signal for the voltage-controlled oscillator (VCO) I2. I1 is used to amplify and filter the error signal for the VCO.

Q4 is a buffer amplifier which isolates the VCO from the divider circuits. I4 is a high frequency divider which is used in conjunction with and controlled by I3.

Q1, Q2, and Q3 are buffer amplifiers which provide the proper output levels and isolation from the VCO.

Q5 is a T/R switch which provides power switching for Q3 as well as the first amplifier transistor in the transmitter.

H. Transmitter

RECEIVER TEST PROCEDURE

TP1866

Date: SEPT. 21, 1996

Connect a Synthesizer and Receiver combination to a NAV COMM assembly.

COMM Receiver

1. Using a Spectrum Analyzer with a tracking generator align RF filters to have a symmetrical response centered at 136.9 MHz when NAV COMM unit is tuned to 136.9 MHz. Peak gain shall be 15 +/- 1.5 DB. when output is measured at mixer input.

2. Apply -99 dbm at 136.9 MHz with 30% modulation. Peak the IF coil and adjust the AGC pot for 6.0 volts on the AGC line. Adjust the Audio gain pot for 4.0 vp-p on Audio Output.

NAV Receiver

1. Use the COMM Receiver procedure except use 117.9 MHz for the test channel.

Approved: M. E. G. G.

4/1/99

The transmitter consists of 4 RF power amplifiers. Refer to SS1880B01. The first amplifier Q4 is gated on by power received from the frequency synthesizer. Q1, Q2, and Q3 form a broadband collector modulated transmitter chain.

V. Alignment and Test Specifications

Adjustments are made on the total unit on a final test basis and on an installation basis.

Installation adjustments are accessible without removing the cover and include a side tone level adjustment, a microphone gain adjustment, and an audio gain adjustment.

August 18, 1992

Bulletin: #081792

Subject: Requirement for Spectrum Analyzer to repair TKM NAV / COMM Radios.

A spectrum analyzer is required only for alignment of the Frequency Synthesizer module. If Synthesizer repair is made on a replacement basis, it is not necessary to have a spectrum analyzer for field service.

Other adjustments which are not normally adjusted on installation but may require adjustment different from factory set levels include the squelch level, the dimmer and the NAV demod level.

Module Alignment

A. Front Panel Assembly

The front panel requires no alignment.

B. Rear Panel Assembly

The rear panel contains two potentiometers and are adjusted as follows:

1. Microphone Gain (R10). Apply .30 Vrms at 1000 Hz to pin 39 of P1. Adjust R10 so that 12 v p-p is output to the transmitter modulation line.
2. Sidetone Level (R33). Apply .30 Vrms at 1000 Hz to pin 39 of P1 and adjust R33 so that 1.0 vrms appears across a 500 ohm load connected to pin 34 of P1.

C. Computer Board (SS-1707-C01)

The computer board contains mostly system alignment adjustment which can be set only with a complete unit. The clock frequency, however, can be set on the board level.

Clock Frequency (C5)

Adjust C5 so that frequency measured on pin 6 of U3 is $4,000,800 \pm 10$ Hz at 70 degrees F room temperature.

D. NAV Receiver

Apply +15 vdc and -30 vdc to appropriate input leads, local oscillator signal at 3.0 ± 2 dbm and a 0 to 14 vdc variable voltage source to Vt.

IF Alignment (L2, L3, L4). Apply -7.0 vdc to Vt, 117.90 MHz at -90 dbm to RF in and 96.50 MHz at +3 dbm to L. O. Adjust L2, L3 and L4 for minimum voltage reading on Vagc. Apply amplitude modulation of 30% and monitor DMD output.

As the modulation frequency is adjusted from 1.0 to 12.0 KHz the DMD level shall be constant +1 db. Adjust L2 and L3 as necessary to keep DMD level constant.

RF Alignment (T1, T2, L1, T3). With conditions the same as in IF Alignment, but modulation set to 0, adjust turn spacing on T1, T2, L1 and T3 so that Vagc reading is a minimum.

Change RF to 108.00 MHz and L.O. to 86.60 MHz. Adjust Vt for minimum Vagc.

DMD Level (R25). With conditions the same as in IF Alignment apply a standard centered LOC modulation and adjust R25 for .35 Vrms on DMD output.

E. COMM Receiver

Apply +15 vdc and -30 vdc to appropriate input leads, set local oscillator signal to 3 ± 2 dbm and a 1 to 15 vdc variable voltage source to Vt.

IF Alignment (L2, L3, L4). Apply +10 vdc to Vt, 135.975 MHz at -90 dbm to RF and 157.175 MHz to L.O. Adjust L2, L3, and L4 for minimum voltage reading on Vagc. Apply amplitude modulation of 30% and frequency is adjusted from 1.0 to 12.0 KHz the DMD level shall be constant + 1 db. Adjust L2 and L3 as necessary to keep DMD level constant.

RF Alignment (T1, T2, L1, T3). With conditions the same as in IF Alignment but modulation set to 0, adjust turn spacing on T1, T2, L1, and T3 so that Vagc reading is a minimum.

F. NAV Synthesizer

Apply +15 vdc and 1 MHz to appropriate module input. Set R3 to midrange. Digitally input, using Computer board or equivalent, the proper coding for 96.50 MHz. Verify correct output frequency. Adjust turn spacing on T1 so that $V_t = 7.00$ vdc. Digitally input coding for 86.60 MHz. V_t shall be $2.50 + .30$ vdc.

Digitally input coding for 91.60 MHz and monitor output on a spectrum analyzer. Adjust R3 so that 50 KHz sidebands are nulled.

G. COMM Synthesizer

Apply +15 vdc and 1 MHz to appropriate module input. Set R3 to midrange. Digitally input, using Computer board or equivalent, the proper coding for 157.30 MHz. Verify correct output frequency. Adjust turn spacing on T1 so that $V_t = 10.00$ vdc. Digitally input coding for 139.40 MHz. V_t shall be $5.00 + .50$ vdc.

Digitally input coding for 149.00 MHz and monitor output on a spectrum analyzer. Adjust R3 so that 25 KHz sidebands are nulled.

H. Transmitter

The transmitter does not normally require alignment but tests should be performed to verify proper operation.

Connect the transmitter to a properly aligned COMM Synthesizer and connect a 50 ohm load to the Transmitter output. Monitor the output power level to verify that it is at least 9.0 watts without modulation across the frequency range of 118 to 136 MHz. Apply at least 80% modulation at 1.0 KHz and monitor the output with a spectrum analyzer to verify that no parasitic oscillation is present. If problems are encountered consult the factory.

System Alignment

When all modules are aligned and assembled into a system, it is necessary to make receiver tracking, VOR / LOC converter and squelch adjustments.

COMM receiver tracking is accomplished by selecting 118.00 MHz as the active channel, applying a 10 uV RF input signal at 118.00 MHz, and adjusting R49 on the Computer board for minimum reading on COMM AGC line.

NAV Receiver tracking is accomplished by selecting 108.00 MHz and adjusting R33 on the Computer board for a minimum reading on NAV AGC.

Carrier squelch is adjusted by applying an unmodulated carrier at 3.0 uV to the COMM receiver and adjusting R18 on the Front Panel, to just break squelch.

Noise inhibit is adjusted by applying a carrier with 30% modulation at 6.666 KHz to the COMM receiver and adjusting R31 on the computer board so that a 12 uV signal will just break squelch.

Demod output level is set by R29 (Demod Level) on computer board.

The 1020 Hz Filter is adjusted by monitoring the audio output and applying a 1020 Hz modulation to the NAV Receiver input. With "Voice" selected adjust R12 (1020 Hz) for minimum tone output.

V. Mechanical Disassembly

The first step in mechanical disassembly is to remove the top cover by removing the nine screws around the sides and rear of the cover. The cover may then be pried up at either rear corner, lifted slightly and slid away from the front panel.

The computer board is removed by first removing the connectors and then remove the six spacers holding the Computer board and the board may be lifted from the unit.

The Front Panel may be removed by removing four screws from the sides and bottom.

The Rear Panel is removed by removing two screws on the bottom of the unit and one screw from each side of the unit. The Transmitter power lead can be removed by loosening the attaching screw.

The R-F modules may be removed by removing the mounting.

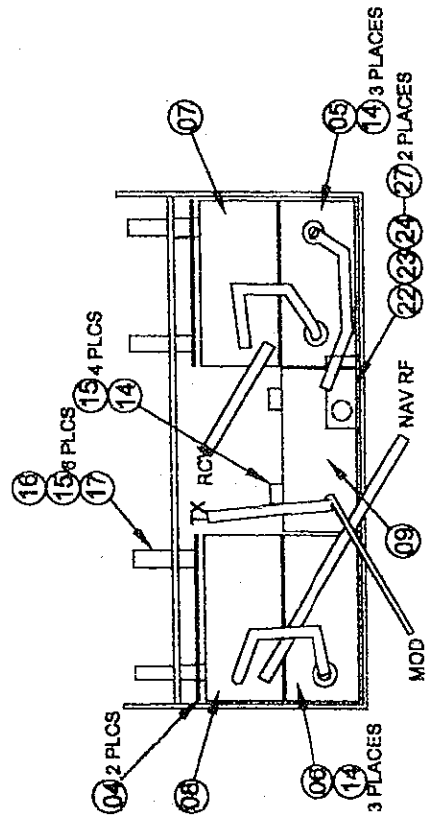
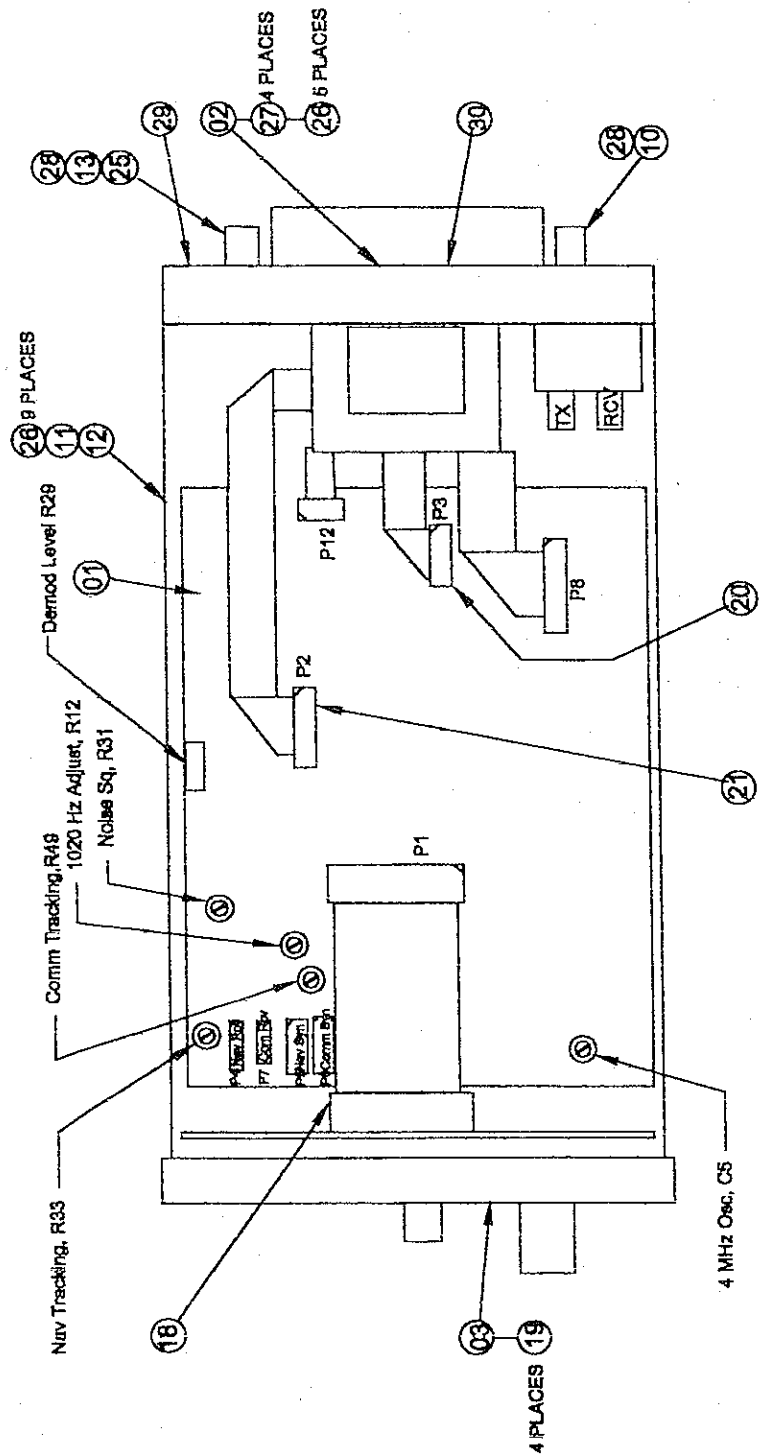
MX170B INTERCONNECT

The following table lists the pin description for the MX170B external interconnect:

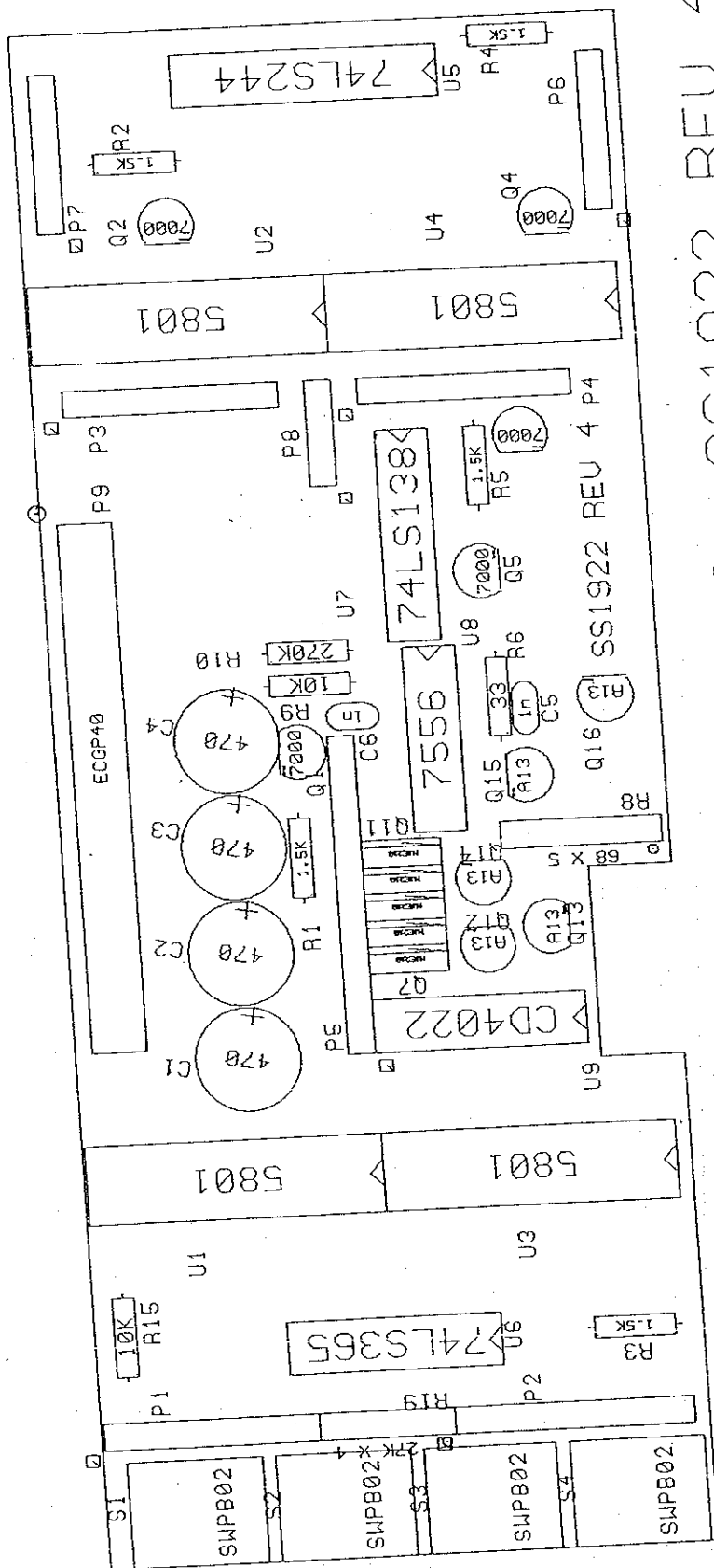
Pin #	Description	Pin #	Description
1	NAV A +	22	DME M0
2	GS +	23	DME M1
3	VOR/LOC Signal	24	DME M2
4	ILS ENABLE	25	DME M3
5	50 KHz GS	26	NAV A+ Switched
6	0.1 MHz GS	27	DME K0
7	0.3 MHz GS	28	DME K1
8	0.5 MHz GS	29	DME K2
9	0.7 MHz GS	30	DME K3
10	0.9 MHz GS	31	DME 50 KHz
11	108 MHz GS	32	DME Common
12	109 MHz GS	33	VOR Test
13	110 MHz GS	34	Phones, Comm
14	111 MHz GS	35	NAV Audio
15	Aux Audio -1	36	Aux Audio -1
16	Aux Audio -4	37	ICS
17	A / C Power Switched	38	Not Used
18	13.5 vdc Input	39	Mic Audio
19	Ground	40	Mic Key
20	A / C Power	41	Speaker
21	Power/Speaker Ground	42	COMM FLIP-FLOP*

- Requires addition of internal resistor R53 on computer board.

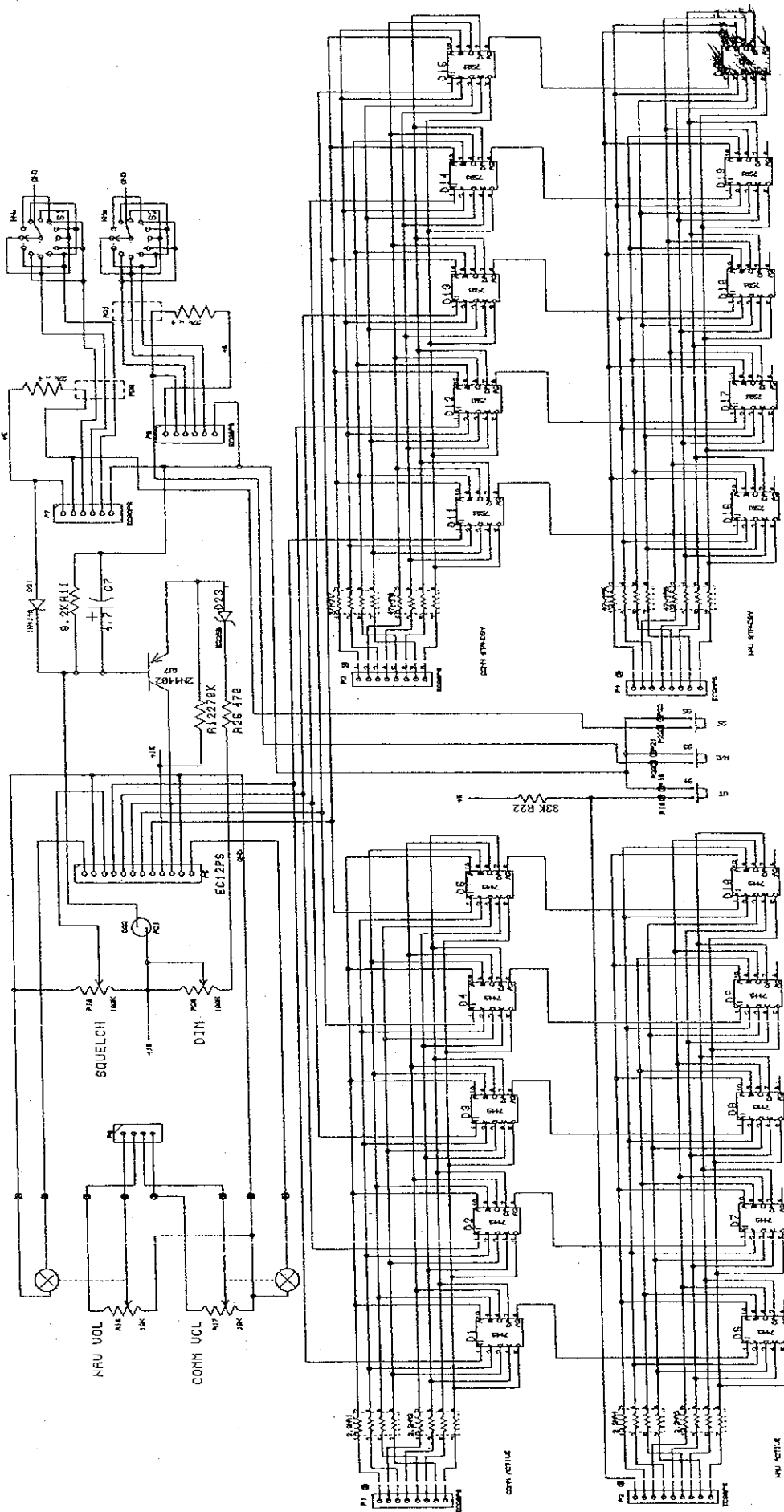
SHEMATICS, LAYOUTS, AND PARTS LIST



Ref#	Part #	Description	Qty
01	SS1760-5	SUB-ASSEMBLY COMPUTER ASSY; 170B	1
02	SS1750-5	SUB-ASSEMBLY REAR PANEL; MX170B	1
03	SS1740-	SUB-ASSEMBLY FRONT PANEL; 170; 12; 385.	1
04	MP1704-	MISC. PARTS Insulator; Computer Bd.	1
05	SS2716-4	SUB-ASSEMBLY COMM SYNTHESIZER ASSY	1
06	SS2714-4	SUB-ASSEMBLY NAV SYNTHESIZER ASSY	1
07	SS1866-8	SUB-ASSEMBLY RECEIVER ASSEMBLY COMM(Gre	1
08	SS1867-8	SUB-ASSEMBLY RECEIVER ASSEMBLY NAV(blue	1
09	SS1881-4	SUB-ASSEMBLY TRANSMITTER ASSY	1
10	SS1731-1	SUB-ASSEMBLY T/R ASSY; MX170B	1
11	SM1756-2	SHEET METAL COVER; MX170B	1
12	SM1757-1	SHEET METAL CASE; MX170B	1
13	HM1730-1	HARDWARE; MACHINE COAX; MTG BLOCK	1
14	NB416F-	FASTENERS 4-40 x 1, PH FL, MS24693-C1	1
15	NB400K-	FASTENERS 4-40 KEPS NUT	10
16	HS1000-	SPACER/STANDOFF 3/16H X 1/2" 4-40 THD	6
17	NB408A-	FASTENERS 4-40x1/2 SOC. SET SCREW	6
18	EC1005-	CONNECTOR 40 PIN; RIBBON CONN	1
19	NB407F-	FASTENERS 4-40x7/16 Ph Fl 100, MS246	4
20	EC1001-	CONNECTOR 10 PIN; RIBBON CONN	2
21	EC1002-	CONNECTOR 14 PIN; RIBBON CONN	2
22	HM1757-4	HARDWARE; MACHINE CLAMP BLOCK; 170B	1
23	HM1758-	HARDWARE; MACHINE CLAMP; 170B	1
24	NB8200-	FASTENERS 8-32 X 1.25 Allen Hd. SS	1
25	EC1022-	CONNECTOR COAX CONN; UG/1094; SHORT	1
26	NB403F-	FASTENERS 4-40x3/16 Ph Fl 100, MS246	14
27	NB404F-	FASTENERS 4-40x1/4, Ph Fl 100, MS246	6
28	NB404P-	FASTENERS 4-40x1/4 Ph Pan, MS51957-1	2
29	MP1730-	MISC. PARTS NAMEPLATE; TSO; MX170B	1
30	MP1806-	MISC. PARTS NAMEPLATE; MX170B	1

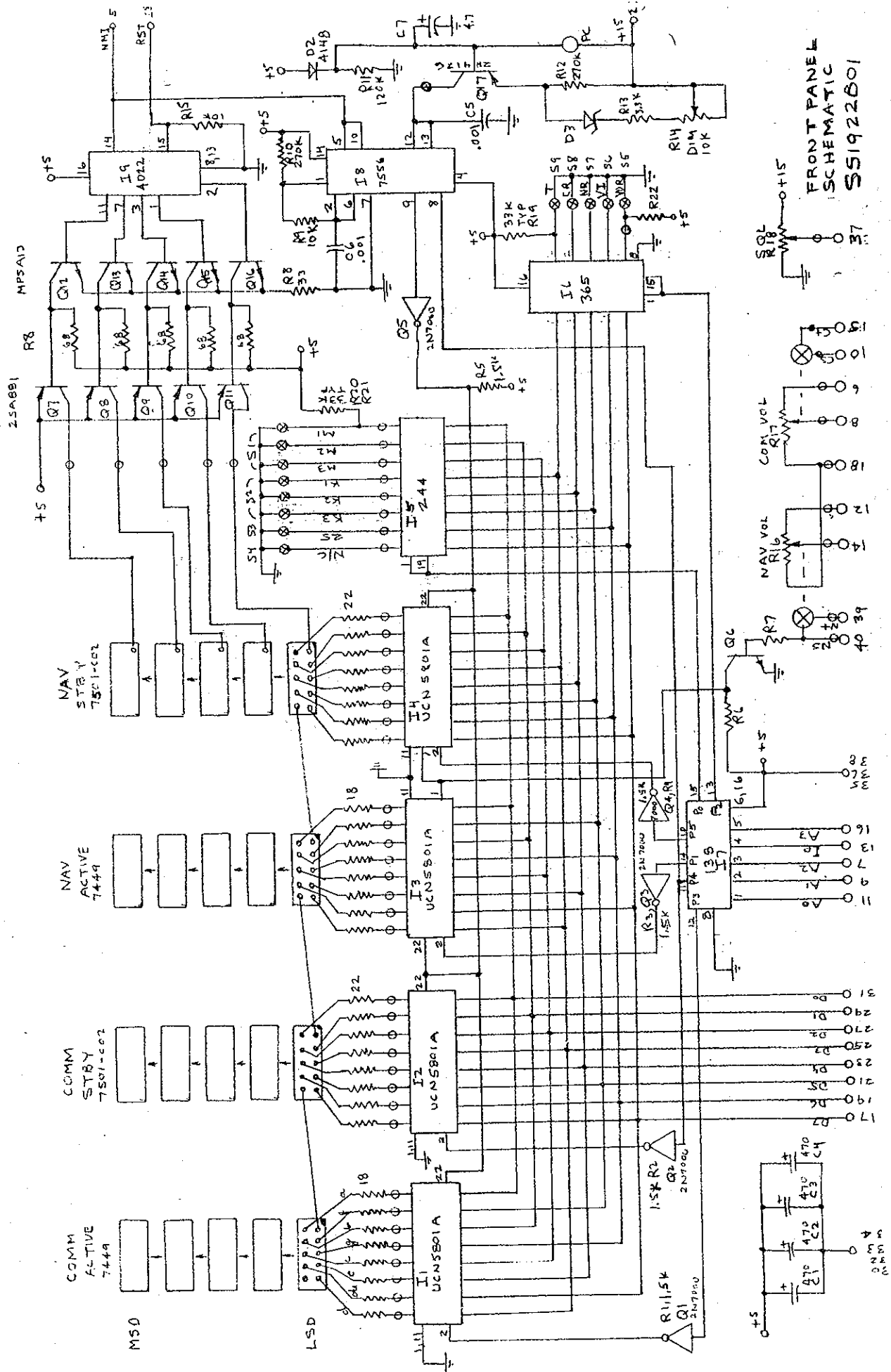


DRIVER SS1922 REV 4



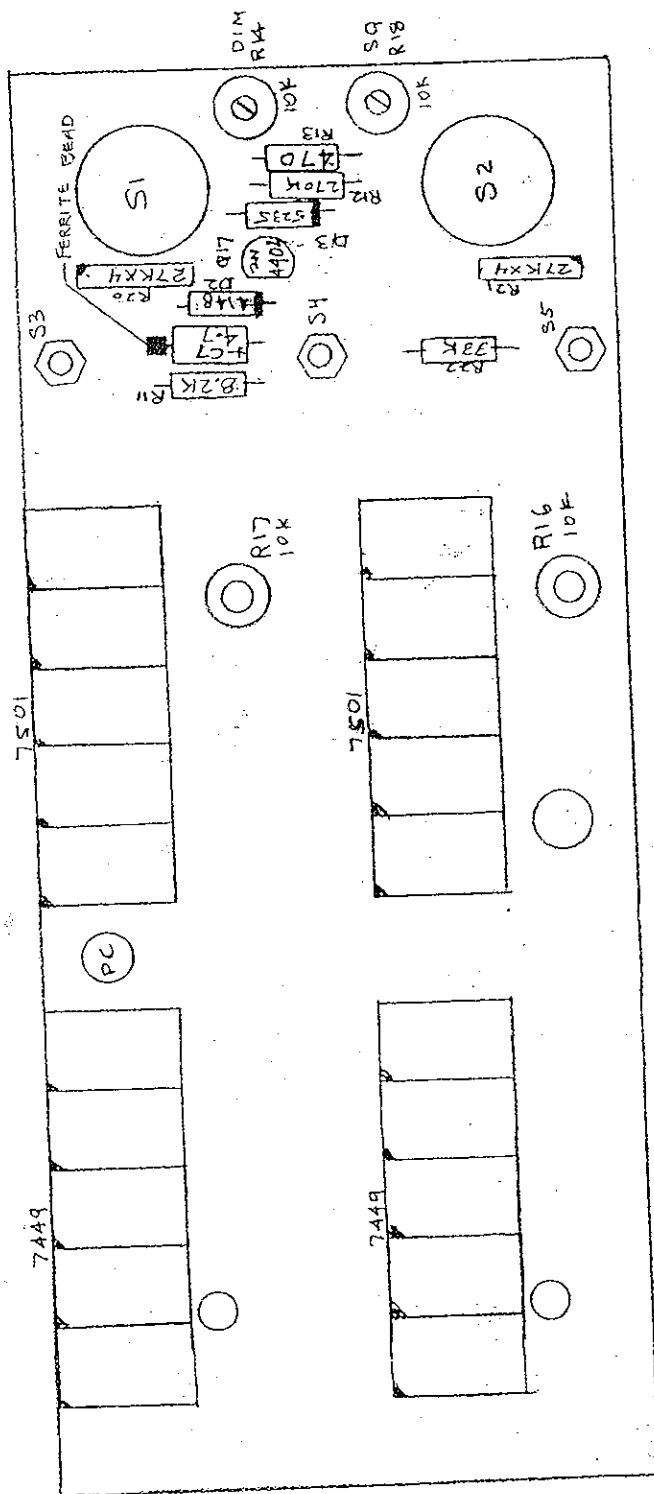
DISPLAY BOARD SS1925 REV 2

Ref#	Part #	Description	Qty
01	PC1922-1	PCB DRIVER; 170B/385/12	1
02	ES1002-	IC SOCKET; DIP 14 PIN; DIP	1
03	MP1801-	MISC. PARTS SWITCH CAP; ROUND/WHT	4
04	HS1814-	SPACER FRONT PANEL; SPACER	2
05	ES1004-	IC SOCKET; DIP 20 PIN; DIP	1
06	MP1043-	MISC. PARTS SOCKET STRIP; GOLD	1
C01	CE4772-	CAP; ALUM ELECT. 470/6.3-10V; RADIAL	1
C02	CE4772-	CAP; ALUM ELECT. 470/6.3-10V; RADIAL	1
C03	CE4772-	CAP; ALUM ELECT. 470/6.3-10V; RADIAL	1
C04	CE4772-	CAP; ALUM ELECT. 470/6.3-10V; RADIAL	1
C05	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C06	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
I01	IM5801-	INT. CKT.; MISC. UCN5801	1
I02	IM5801-	INT. CKT.; MISC. UCN5801	1
I03	IM5801-	INT. CKT.; MISC. UCN5801	1
I04	IM5801-	INT. CKT.; MISC. UCN5801	1
I05	IL7644-	INT. CKT.; LPSHTK 74LS244	1
I06	IL7765-	INT. CKT.; LPSHTK 74LS365	1
I07	IL7538-	INT. CKT.; LPSHTK 74LS138	1
I08	IM7556-	INT. CKT.; MISC. 7556	1
I09	IC4022-	INT. CKT; CMOS 14022	1
Q01	QX7000-	TRANSISTOR 2N7000	1
Q02	QX7000-	TRANSISTOR 2N7000	1
Q03	QX7000-	TRANSISTOR 2N7000	1
Q04	QX7000-	TRANSISTOR 2N7000	1
Q05	QX7000-	TRANSISTOR 2N7000	1
Q07	QXA881-	TRANSISTOR 2SA1585	1
Q08	QXA881-	TRANSISTOR 2SA1585	1
Q09	QXA881-	TRANSISTOR 2SA1585	1
Q10	QXA881-	TRANSISTOR 2SA1585	1
Q11	QXA881-	TRANSISTOR 2SA1585	1
Q12	QX0A13-	TRANSISTOR MPSA13	1
Q13	QX0A13-	TRANSISTOR MPSA13	1
Q14	QX0A13-	TRANSISTOR MPSA13	1
Q15	QX0A13-	TRANSISTOR MPSA13	1
Q16	QX0A13-	TRANSISTOR MPSA13	1
R01	RC0152-	RESISTOR; CARB. 1.5 Kohm; 5%; 1/4 watt	1
R02	RC0152-	RESISTOR; CARB. 1.5 Kohm; 5%; 1/4 watt	1
R03	RC0152-	RESISTOR; CARB. 1.5 Kohm; 5%; 1/4 watt	1
R04	RC0152-	RESISTOR; CARB. 1.5 Kohm; 5%; 1/4 watt	1
R05	RC0152-	RESISTOR; CARB. 1.5 Kohm; 5%; 1/4 watt	1
R06	RC0103-	RESISTOR; CARB. 10 Kohm; 5%; 1/4 watt	1
R07	RR2734-	RESISTOR NETWORK 27K X 4	1
R08	RC0330-	RESISTOR; CARB. 33 OHM; 1/4W 5%	1
R09	RC0103-	RESISTOR; CARB. 10 Kohm; 5%; 1/4 watt	1
R10	RC0274-	RESISTOR; CARB. 270K 1/4W 5%	1
R11	RR6801-	RESISTOR NETWORK 68 OHM X 5	1
S01	SW1800-	SWITCHES PUSH BUTTON	1
S02	SW1800-	SWITCHES PUSH BUTTON	1
S03	SW1800-	SWITCHES PUSH BUTTON	1
S04	SW1800-		

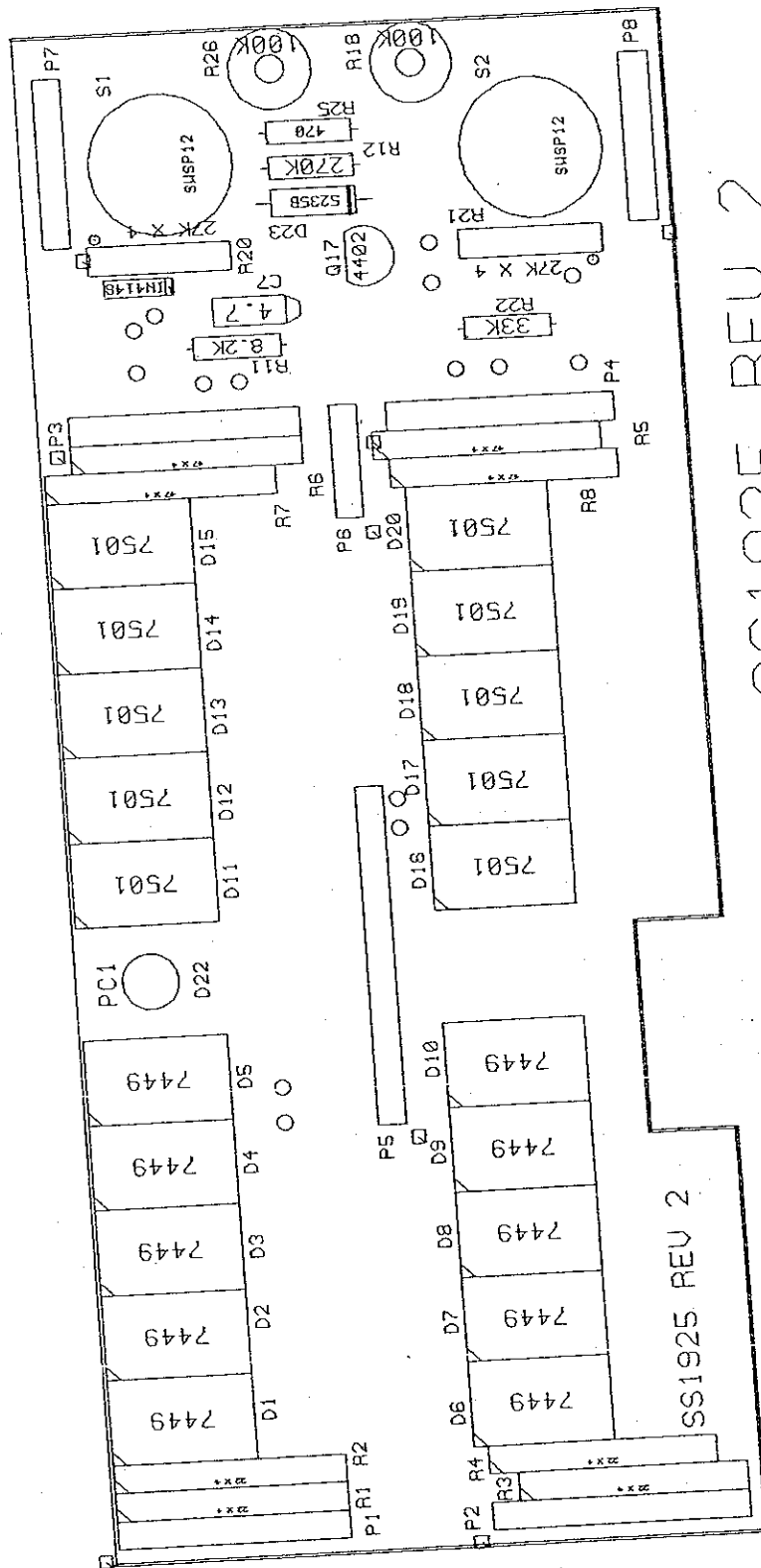


FRONT PANEL
SCHEMATIC
551922801

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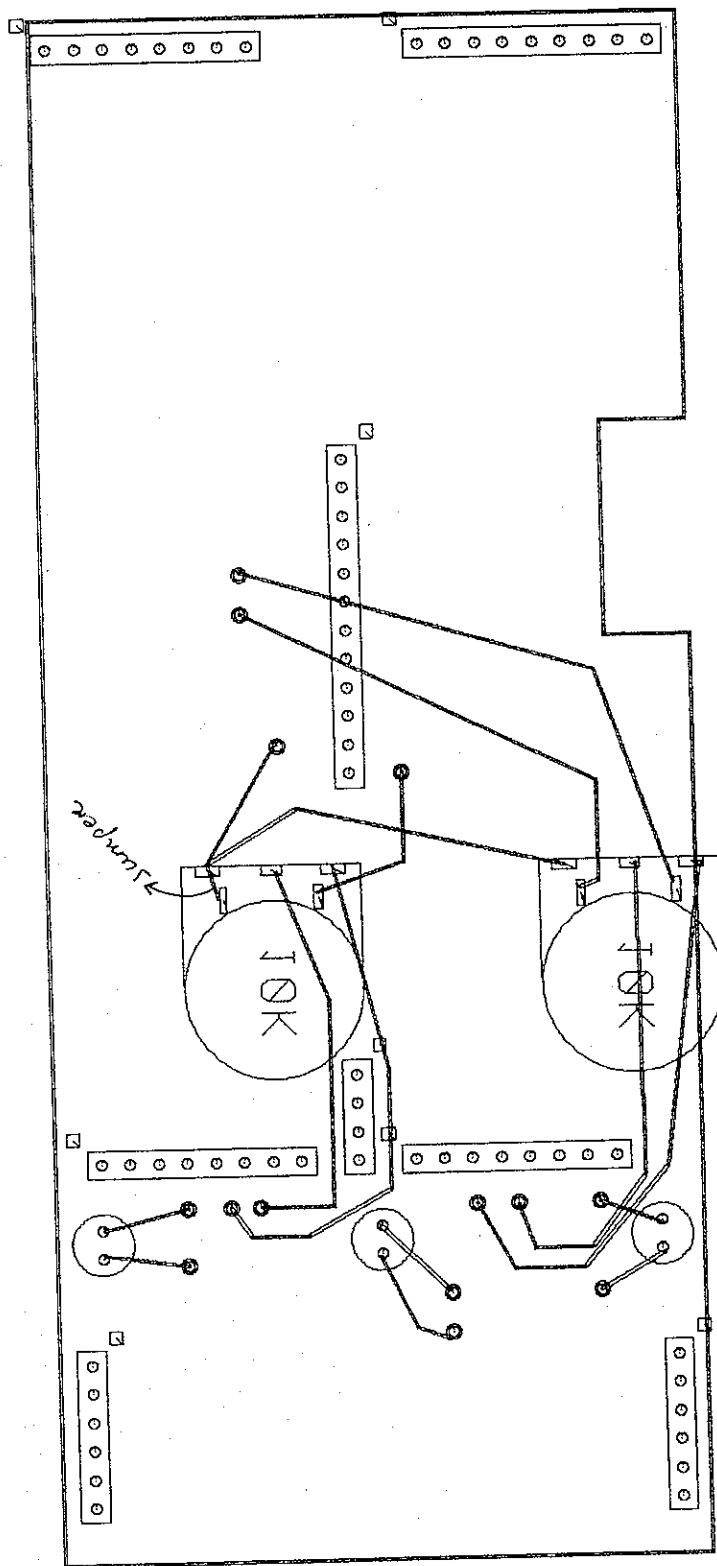


SCALE:	TKM, Inc.	
	SCOTTSDALE, ARIZONA	
MAT'L	DISPLAY, MX12,170,385	
	DATE	REV
FINISH:	11-15-00	3
	SS1925	
DWG. BY: WM		USED ON
APPROVED:		SHEET 1 OF 4
APPROVED:		



SS1925 REV 2

DISPLAY BOARD SS1925 REV 2



DISPLAY BOARD SS1925 REV 2

DISPLAY; MX170B, 385, 12

SS1925-1

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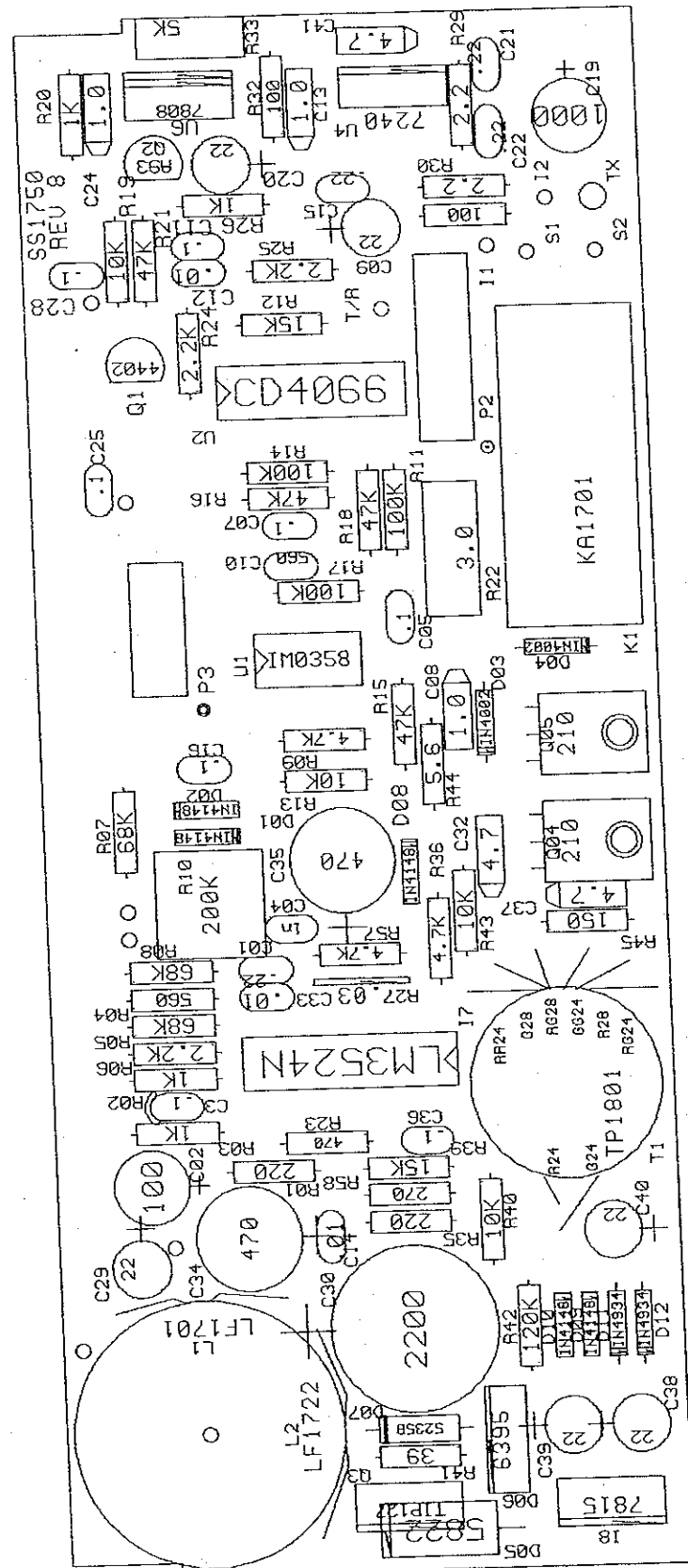
Ref#	Part #	Description	Qty
O1	PC1925-2	PCB DISPLAY; 170B/385/12	1
O2	DL7401-	OPTICAL YELLOW; 7 SEG. LED	10
O3	DL7501-	OPTICAL RED; 7 SEGMENT LED	10
O4	HM1725-2	HARDWARE; MACHINE SWITCH CAP	3
O5	HM1814-	HARDWARE; MACHINE SPACER; FRONT PANEL	2
O6	MP1036-	MISC. PARTS BEAD; FERRITE	1
C07	CT4751-	CAP; TANTALUM 4.7UF/20V; AXIAL	1
D01	DD1700-	DIODE PHOTOCELL	1
D02	DD4148-	DIODE 1N4148	1
D03	DD5235-	DIODE ZENER; 1N5235	1
Q17	QX4402-	TRANSISTOR 2N4402	1
R01	RC0822-	RESISTOR; CARB. 8.2 Kohm; 5%; 1/4 watt	1
R02	RC0274-	RESISTOR; CARB. 270K 1/4W 5%	1
R03	RC0471-	RESISTOR; CARB. 470 Ohm; 5%; 1/4 watt	1
R04	RC0333-	RESISTOR; CARB. 33 Kohm; 5%; 1/4 watt	1
R05	RR2734-	RESISTOR NETWORK 27K X 4	1
R06	RR2734-	RESISTOR NETWORK 27K X 4	1
R07	PW0103-	Top Adj. .3 dia 10 K	1
R08	PW0103-	Top Adj. .3 dia 10 K	1
R09	RV1814-	POT; PANEL MOUNT 10K /FRONT PANEL	1
R10	RV1814-	POT; PANEL MOUNT 10K /FRONT PANEL	1
R10	RV1803-	POT; PANEL MOUNT 10K;NAV VOLUME	1
R11	RS0180-	RES; SMT; FILM; 18 Ohm	1
R12	RS0180-	RES; SMT; FILM; 18 Ohm	1
R13	RS0180-	RES; SMT; FILM; 18 Ohm	1
R14	RS0180-	RES; SMT; FILM; 18 Ohm	1
R15	RS0180-	RES; SMT; FILM; 18 Ohm	1
R16	RS0180-	RES; SMT; FILM; 18 Ohm	1
R17	RS0180-	RES; SMT; FILM; 18 Ohm	1
R18	RS0180-	RES; SMT; FILM; 18 Ohm	1
R19	RS0180-	RES; SMT; FILM; 18 Ohm	1
R20	RS0180-	RES; SMT; FILM; 18 Ohm	1
R21	RS0180-	RES; SMT; FILM; 18 Ohm	1
R22	RS0180-	RES; SMT; FILM; 18 Ohm	1
R23	RS0180-	RES; SMT; FILM; 18 Ohm	1
R24	RS0180-	RES; SMT; FILM; 18 Ohm	16
R25	RS0180-	RES; SMT; FILM; 18 Ohm	1
R26	RS0180-	RES; SMT; FILM; 18 Ohm	1
R27	RS0470-	RES; SMT; FILM; 47 ohm,1206, 5%	1
R28	RS0470-	RES; SMT; FILM; 47 ohm,1206, 5%	1
R29	RS0470-	RES; SMT; FILM; 47 ohm,1206, 5%	1
R30	RS0470-	RES; SMT; FILM; 47 ohm,1206, 5%	1
R31	RS0470-	RES; SMT; FILM; 47 ohm,1206, 5%	1
R32	RS0470-	RES; SMT; FILM; 47 ohm,1206, 5%	1
R33	RS0470-	RES; SMT; FILM; 47 ohm,1206, 5%	1
R34	RS0470-	RES; SMT; FILM; 47 ohm,1206, 5%	1
R35	RS0470-	RES; SMT; FILM; 47 ohm,1206, 5%	1
R36	RS0470-	RES; SMT; FILM; 47 ohm,1206, 5%	1
R37	RS0470-	RES; SMT; FILM; 47 ohm,1206, 5%	1
R38	RS0470-	RES; SMT; FILM; 47 ohm,1206, 5%	1

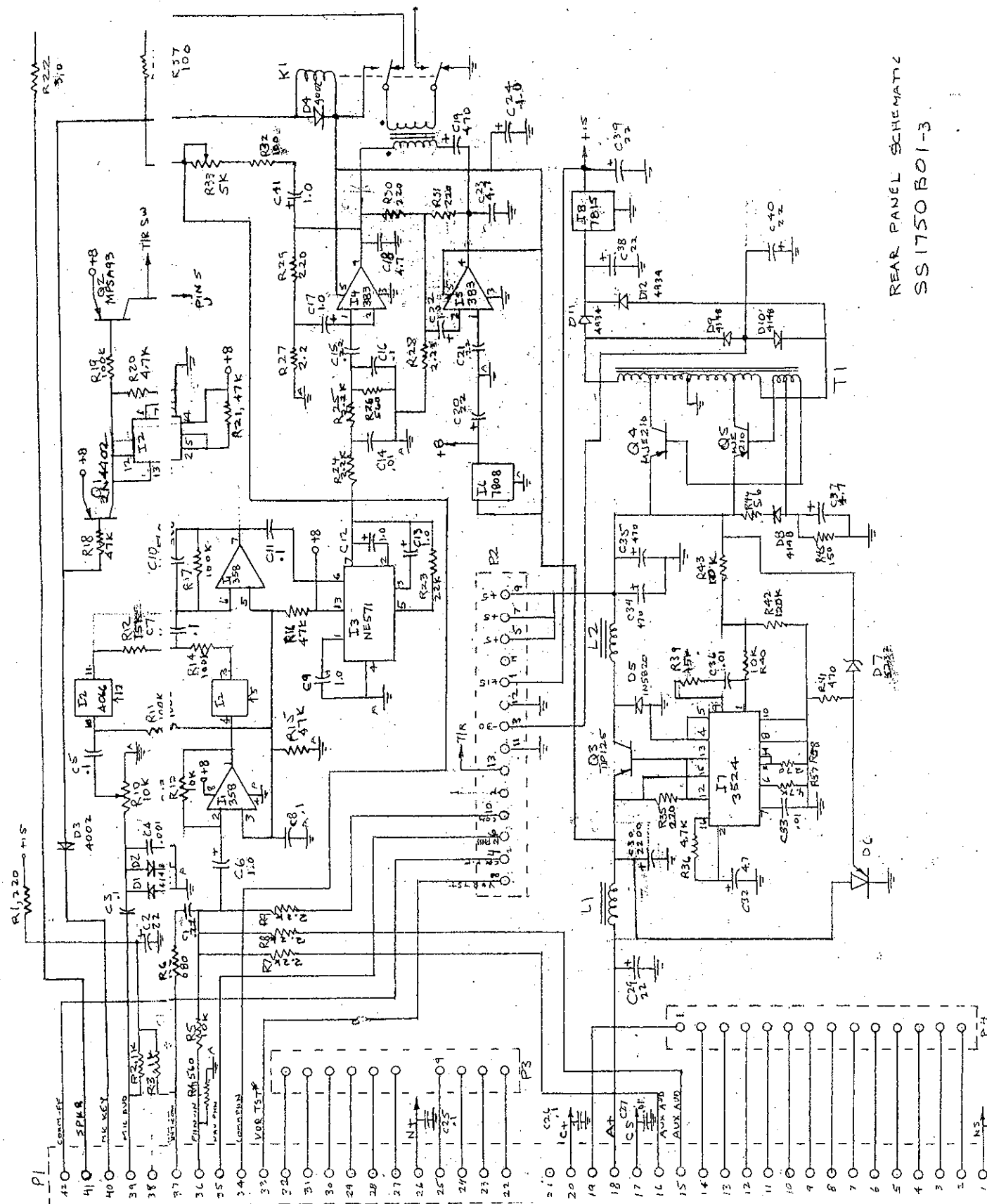
DISPLAY; MX170B, 385, 12

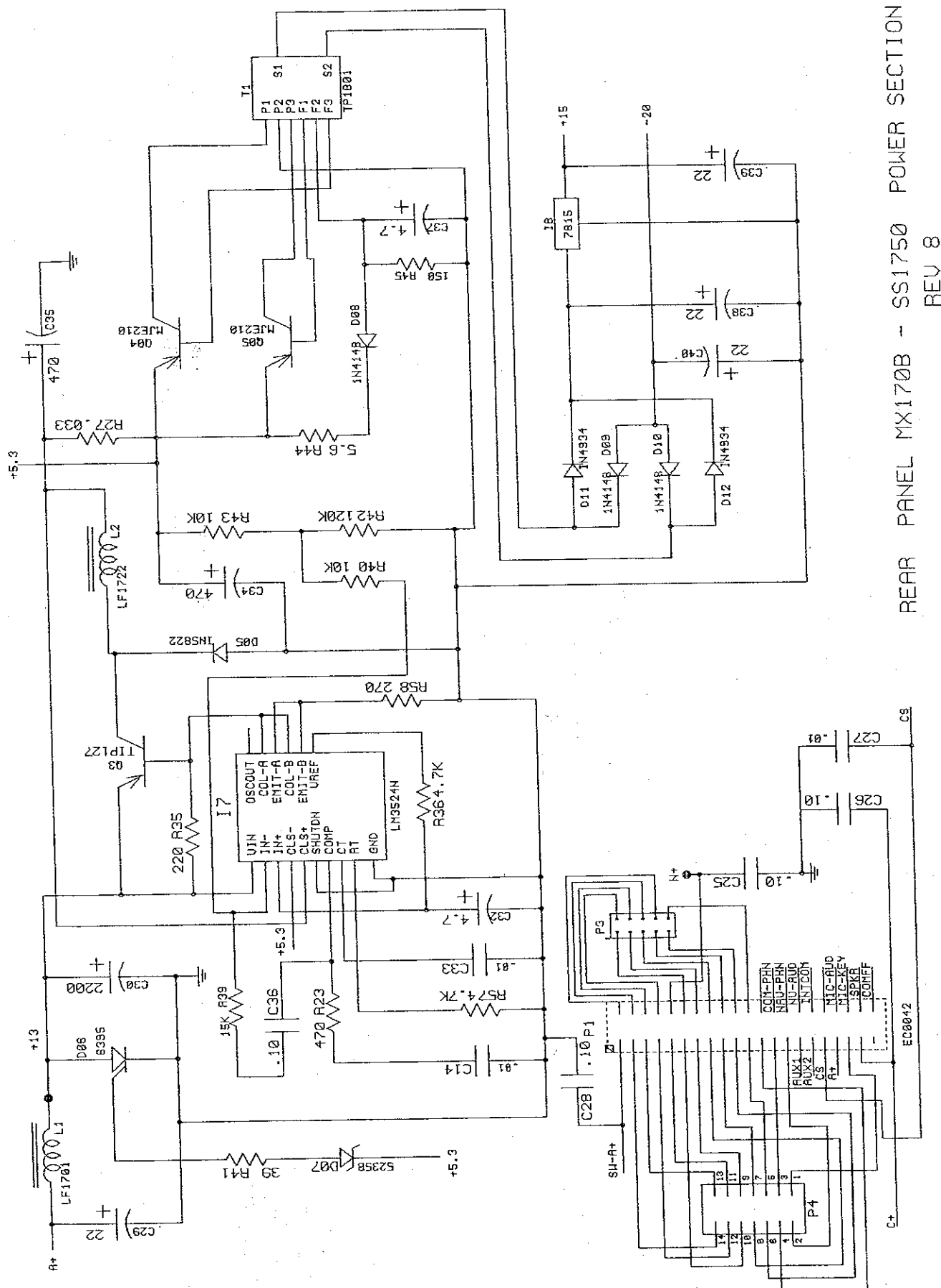
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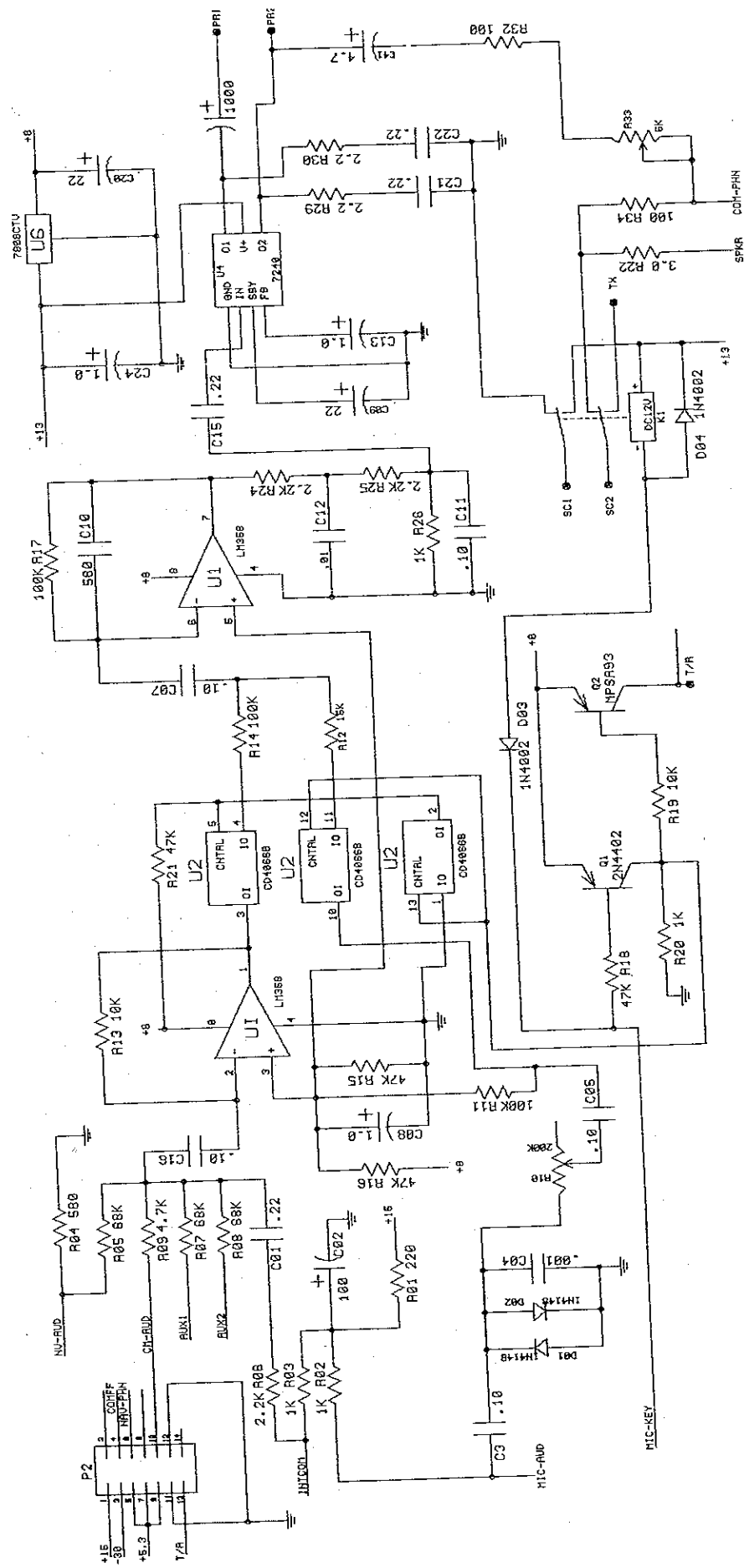
Ref#	Part #	Description	Qty
R39	RS0470-	RES; SMT; FILM; 47 ohm, 1206, 5%	1
R40	RS0470-	RES; SMT; FILM; 47 ohm, 1206, 5%	1
R41	RS0470-	RES; SMT; FILM; 47 ohm, 1206, 5%	1
R42	RS0470-	RES; SMT; FILM; 47 ohm, 1206, 5%	1
S01	SW1700-1	SWITCHES 12 POS; ROTARY	1
S02	SW1700-1	SWITCHES 12 POS; ROTARY	1
S03	SW1701-	SWITCHES PUSH BUTTON; MINI	1
S04	SW1701-	SWITCHES PUSH BUTTON; MINI	1
S05	SW1701-	SWITCHES PUSH BUTTON; MINI	1







REAR PANEL MX170B - SS1750 POWER SECTION
REV 8



REAR PANEL MX170B - SS1750 AUDIO SECTION
REV 8

MX170B REAR PANEL

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Ref#	Part #	Description	Qty
01	SM1755-	SHEET METAL REAR PANEL; MX170B	1
02	NB404P-	FASTENERS 4-40x1/4 Ph Pan; MS51957-1	4
03	NB400K-	FASTENERS 4-40 KEPS NUT	2
04	NB1488-	FASTENERS SOLDER LUG	1
05	NB408P-	FASTENERS 4-40 x 1/2 PAN HD	3
06	NB410P-	FASTENERS 4-40 X 5/8 PAN HD	1
07	NB620W-	FASTENERS 1/4 FLAT WASHER, NAS620C41	2
08	EC1706-	CONNECTOR HOUSING; 4 PIN	1
09	HS1008-	SPACER 3/16 HEX x1"; 4-40 THD	1
10	MP1051-	MISC. PARTS NYLON SHOULDER WASHER	3
11	NB402W-	FASTENERS #4 SPLIT LOCK WASHER	6
12	MP1052-	MISC. PARTS MICA INSULATOR	3
13	HM1755-	HARDWARE; MACHINE HEAT SINK; 170B (SM)	1
14	NB412P-	FASTENERS 4-40 X 3/4 Pan Head	1
15	NB401W-	FASTENERS #4 NYLON FLAT WASHER	2
16	HM1754-	HARDWARE; MACHINE HEAT SINK 170B; LG	1
17	NB400N-	FASTENERS 4-40 SM PATRN NUT, NAS-671	2
18	EC1806-	CONNECTOR CRIMP PINS; SMALL	1
19	HM1756-	HARDWARE; MACHINE MTG TAB; 170B	1
20	PC1750-8	PCB REAR PANEL; 170B	1
21	NB405F-	FASTENERS 4-40 X 5/16 PH FL, MS24693	2
C01	CR2242-	CAP; MONO-CERAMIC .22 uF; 100V	1
C02	CE1013-	CAP; ALUM ELECT. 100 UF; 16 V; .20 Dia	1
C03	CR1043-	CAP; MONO-CERAMIC .1uF; 50V	1
C04	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C05	CR1043-	CAP; MONO-CERAMIC .1uF; 50V	1
C06	CT1052-	CAP; TANTALUM 1.0/35V; RADIAL	1
C07	CR1043-	CAP; MONO-CERAMIC .1uF; 50V	1
C08	CT4752-	CAP; TANTALUM 4.7UF/20V; RADIAL	1
C09	CT1051-	CAP; TANTALUM 1.0/35V; AXIAL	1
C10	CR5616-	CAP; MONO-CERAMIC 560 PF; 100V	1
C11	CR1043-	CAP; MONO-CERAMIC .1uF; 50V	1
C12	CT1052-	CAP; TANTALUM 1.0/35V; RADIAL	1
C13	CT1052-	CAP; TANTALUM 1.0/35V; RADIAL	1
C14	CR1033-	CAP; MONO-CERAMIC .01uF; 100V	1
C15	CR2242-	CAP; MONO-CERAMIC .22 uF; 100V	1
C16	CR1043-	CAP; MONO-CERAMIC .1uF; 50V	1
C17	CT1052-	CAP; TANTALUM 1.0/35V; RADIAL	1
C18	CT4752-	CAP; TANTALUM 4.7UF/20V; RADIAL	1
C19	CE1081-	CAP; ALUM ELECT. 1000/6.3-10V; RADIAL	1
C20	CE2262-	CAP; ALUM ELECT. 22/50V;RADIAL	1
C21	CR2242-	CAP; MONO-CERAMIC .22 uF; 100V	1
C22	CT1052-	CAP; TANTALUM 1.0/35V; RADIAL	1
C23	CT4752-	CAP; TANTALUM 4.7UF/20V; RADIAL	1
C24	CT1052-	CAP; TANTALUM 1.0/35V; RADIAL	1
C25	CR1043-	CAP; MONO-CERAMIC .1uF; 50V	1
C26	CR1043-	CAP; MONO-CERAMIC .1uF; 50V	1
C27	CF1233-	CAPACITOR; FILM .012 uF; 50 VDC	1
C28	CR1043-	CAP; MONO-CERAMIC .1uF; 50V	1
C29	CE2262-	CAP; ALUM ELECT. 22/50V;RADIAL	1

MX170B REAR PANEL

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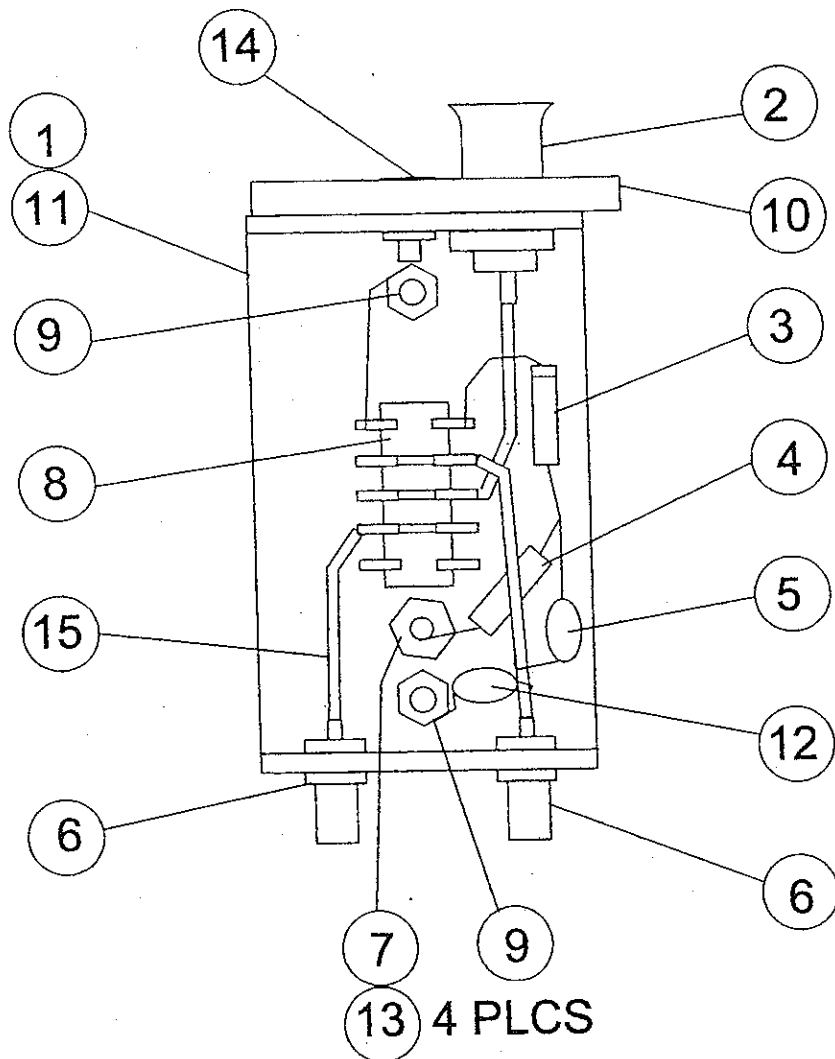
Ref#	Part #	Description	Qty
C30	CE2283-	CAP; ALUM ELECT. 2200/35-50V; RADIAL	1
C32	CT4752-	CAP; TANTALUM 4.7UF/20V; RADIAL	1
C33	CR1033-	CAP; MONO-CERAMIC .01uF; 100V	1
C34	CE4772-	CAP; ALUM ELECT. 470/6.3-10V; RADIAL	1
C35	CE4772-	CAP; ALUM ELECT. 470/6.3-10V; RADIAL	1
C36	CR1043-	CAP; MONO-CERAMIC .1uF; 50V	1
C37	CT4752-	CAP; TANTALUM 4.7UF/20V; RADIAL	1
C38	CE2262-	CAP; ALUM ELECT. 22/50V;RADIAL	1
C39	CE2262-	CAP; ALUM ELECT. 22/50V;RADIAL	1
C41	CT4752-	CAP; TANTALUM 4.7UF/20V; RADIAL	1
D01	DD4148-	DIODE 1N4148	1
D02	DD4148-	DIODE 1N4148	1
D03	DD4148-	DIODE 1N4148	1
D04	DD4002-	DIODE 1N4002	1
D05	DD5822-	DIODE 1N5822	1
D06	DD6395-	DIODE SCR; 2N6395 or 2N6504	1
D07	DD5235-	DIODE ZENER; 1N5235	1
D08	DD4148-	DIODE 1N4148	1
D09	DD4148-	DIODE 1N4148	1
D11	DD4934-	DIODE 1N4934	1
D12	DD4934-	DIODE 1N4934	1
I01	IM0358-	INT. CKT.; MISC. LM358N (not ST)	1
I02	IC4066-	INT. CKT; CMOS 14066	1
I03	IM0571-	INT. CKT.; MISC. 571	1
I04	IM0383-	INT. CKT.; MISC.	1
I05	IM0383-	INT. CKT.; MISC.	1
I06	IM7808-	INT. CKT.; MISC. REGULATOR; 8V 7808	1
I07	IM3524-	INT. CKT.; MISC. 3524;LINFINITY ONLY	1
I08	IM7815-	INT. CKT.; MISC. REGULATOR; 15V 7815	1
K01	KA1701-	RELAY 170B REAR PANEL RELAY	1
L01	LF1701-	INDUCTOR; FIXED	1
L02	LF1722-	INDUCTOR; FIXED	1
P1	EC1701-	CONNECTOR 42 PIN CONN; MALE	1
P2	ECGP14-	CONNECTOR 14 PIN Board Plug	1
P3	ECGP10-	CONNECTOR 10 PIN BOARD PLUG	1
P4	EC1002-	CONNECTOR 14 PIN; RIBBON CONN	1
P5	EC1706-	CONNECTOR HOUSING; 4 PIN	1
Q01	QX4402-	TRANSISTOR 2N4402	1
Q02	QX0A93-	TRANSISTOR MPSA93	1
Q03	QX0127-	TRANSISTOR TIP127, PNP Darlington, 10	1
Q04	QX0210-	TRANSISTOR MJE210	1
Q05	QX0210-	TRANSISTOR MJE210	1
R01	RC0221-	RESISTOR; CARB. 220 Ohm; 5%; 1/4 watt	1
R02	RC0102-	RESISTOR; CARB. 1 Kohm; 5%; 1/4 watt	1
R04	RC0561-	RESISTOR; CARB. 560 Ohm; 5%; 1/4 watt	1
R05	RC0683-	RESISTOR; CARB. 68 Kohm; 5%; 1/4 watt	1
R06	RC0222-	RESISTOR; CARB. 2.2 Kohm; 5%; 1/4 watt	1
R07	RC0683-	RESISTOR; CARB. 68 Kohm; 5%; 1/4 watt	1
R08	RC0683-	RESISTOR; CARB. 68 Kohm; 5%; 1/4 watt	1
R09	RC0472-	RESISTOR; CARB. 4.7 Kohm; 5%; 1/4 watt	1

MX170B REAR PANEL

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Ref#	Part #	Description	Qty
R22	RR1700-	RESISTOR NETWORK 3 OHM WIRE WOUND	1
R23	RC0471-	RESISTOR; CARB. 470 Ohm; 5%; 1/4 watt	1
R24	RC0222-	RESISTOR; CARB. 2.2 Kohm; 5%; 1/4 watt	1
R25	RC0222-	RESISTOR; CARB. 2.2 Kohm; 5%; 1/4 watt	1
R26	RC0102-	RESISTOR; CARB. 1 Kohm; 5%; 1/4 watt	1
R27	MSW294-		1
R29	RC02R2-	RESISTOR; CARB. 2.2 OHM 1/4W 5%	1
R30	RC02R2-	RESISTOR; CARB. 2.2 OHM 1/4W 5%	1
R31	RC0221-	RESISTOR; CARB. 220 Ohm; 5%; 1/4 watt	1
R32	RC0101-	RESISTOR; CARB. 100 Ohm; 5%; 1/4 watt	1
R33	PQ0502-	POT; TRIMMER SIDE ADJ. 5K	1
R34	RC0101-	RESISTOR; CARB. 100 Ohm; 5%; 1/4 watt	1
R35	RC0221-	RESISTOR; CARB. 220 Ohm; 5%; 1/4 watt	1
R36	RC0472-	RESISTOR; CARB. 4.7 Kohm; 5%; 1/4 watt	1
R39	RC0153-	RESISTOR; CARB. 15 Kohm; 5%; 1/4 watt	1
R40	RC0103-	RESISTOR; CARB. 10 Kohm; 5%; 1/4 watt	1
R41	RC0390-	RESISTOR; CARB. 39 OHM; 1/4WATT 5%	1
R42	RC0124-	RESISTOR; CARB. 120K 1/4W 5%	1
R43	RC0103-	RESISTOR; CARB. 10 Kohm; 5%; 1/4 watt	1
R44	RC05R6-	RESISTOR; CARB. 5.6 Ohm; 5% 1/4 watt	1
R45	RC0151-	RESISTOR; CARB. 150 Ohm; 5%; 1/4 watt	1
R57	RC0472-	RESISTOR; CARB. 4.7 Kohm; 5%; 1/4 watt	1
R58	RC0271-	RESISTOR; CARB. 270 Ohm; 5%; 1/4 watt	1
U01	IM0358-	INT. CKT.; MISC. LM358N (not ST)	1
U02	IC4066-	INT. CKT; CMOS 14066	1
U04	IM7240-	INT. CKT.; MISC. AUDIO AMPLIFIER - 12 V	1
U06	IM7808-	INT. CKT.; MISC. REGULATOR; 8V 7808	1
U07	IM3524-	INT. CKT.; MISC. 3524; LINFINITY ONLY	1
U08	IM7815-	INT. CKT.; MISC. REGULATOR; 15V 7815	1
-01	MP1039-	MISC. PARTS POT CORE, 2616 3C8	4
-02	MP1139-	MISC. PARTS BOBBIN; 2616	2
-03	MP1141-	MISC. PARTS BOBBIN; 1811	1
-04	MP1041-	MISC. PARTS POT CORE; 1811	2



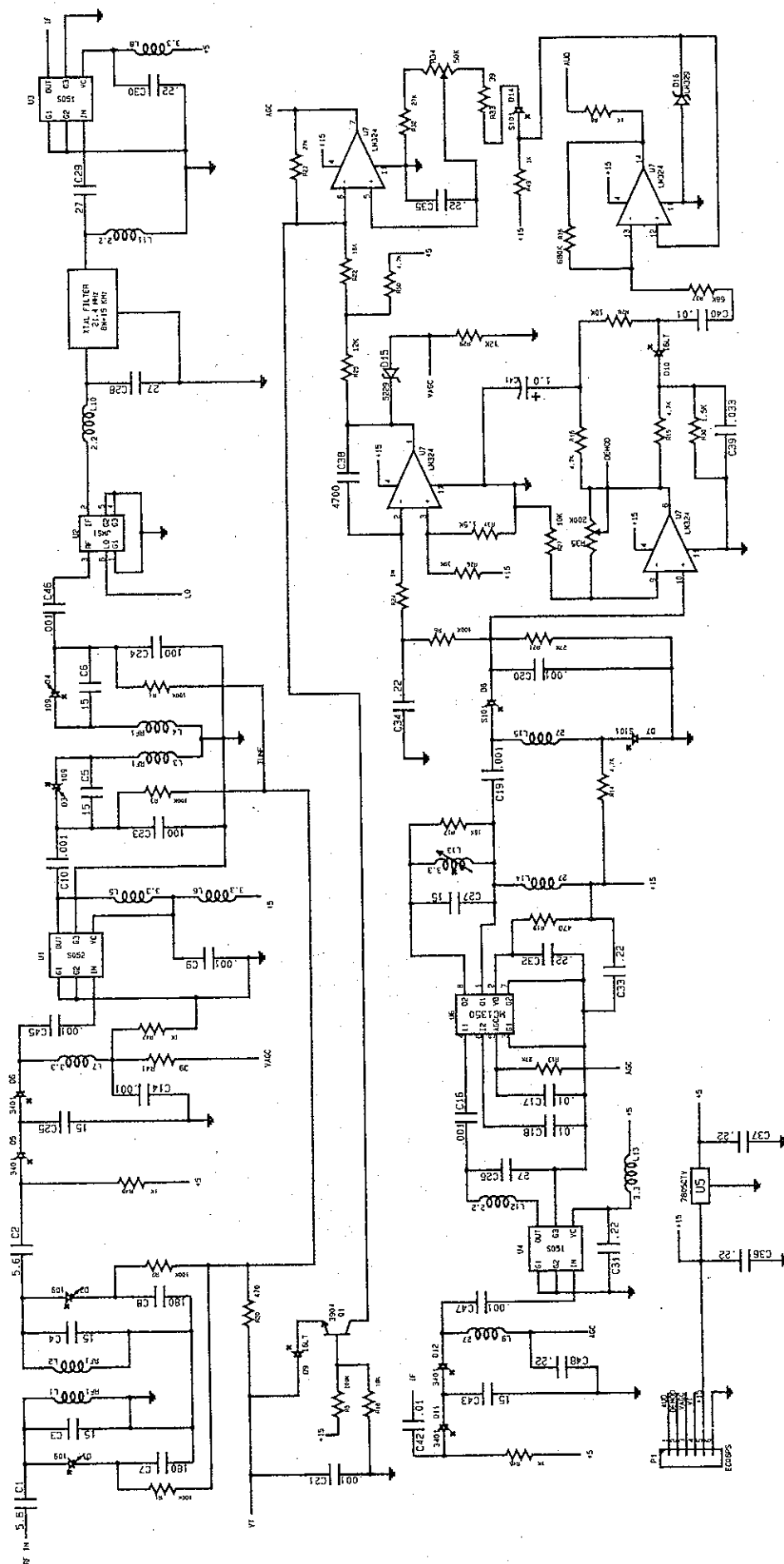
SS1731	SCALE	TOLERANCES .XX +/- .015 .XXX +/- .007 ANGLES +/- 1 DEG Hole dia: +/- .002	TKM, Inc SCOTTSDALE, ARIZONA		
	MAT'L		SWITCH, T/R, MX170B		
	FINISH	DRAWN BY WM	DATE 7-21-00	SS1731	REV 1
		APPROVED <i>[Signature]</i>			
			APPROVED	USED ON	SHEET 1 OF 1

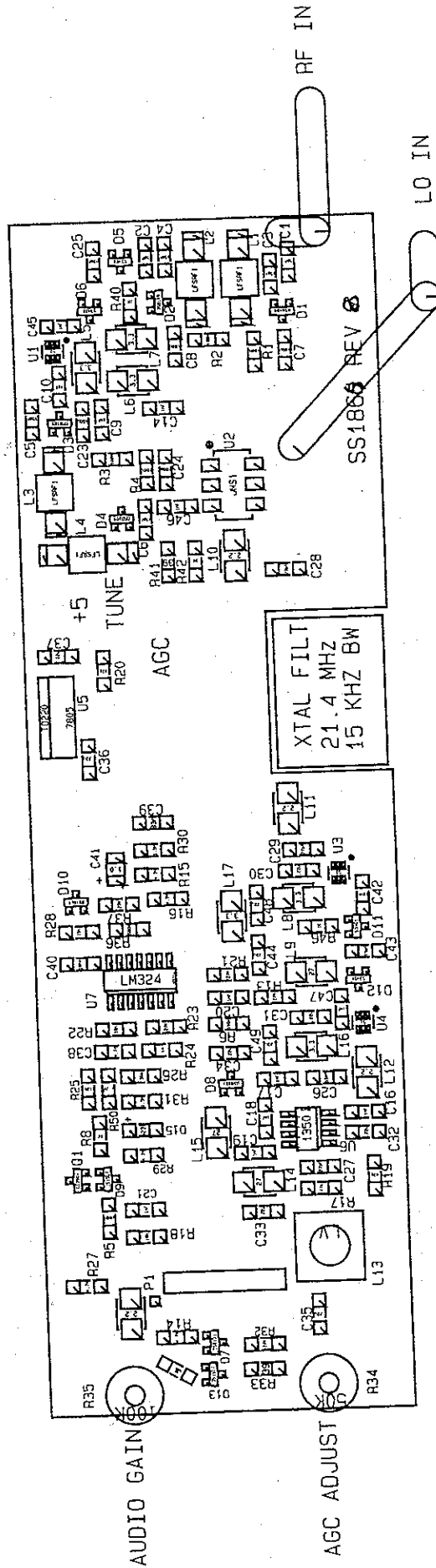
T/R SWITCH; MX170B

SS1731-1

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Ref#	Part #	Description	Qty
01	SM1752-1	SHEET METAL CASE; T/R MX170B	1
02	EC1022-	CONNECTOR COAX CONN; UG/1094; SHORT	1
03	DD4148-	DIODE 1N4148	1
04	LF1053-	INDUCTOR; FIXED 1 uH; T/R	1
05	CR2R73-	CAP; MONO-CERAMIC 2.7 Pf; 200V; Radial	1
06	EC1703-	CONNECTOR CONN; SMA; PANEL MT.	2
07	CD1023-	CAPACITOR; FEED THRU	1
08	KA1804-	RELAY 9V T/R RELAY	1
09	HS1817-	SPACER BOARD, .64"	2
10	HM1751-3	HARDWARE; MACHINE 170B T/R MTG BLOCK	1
11	SM1753-	SHEET METAL COVER; T/R MX170B	1
12	CM1506-	CAP; MICA 15 pF, 300 V	1
13	NB403P-	FASTENERS 4-40x3/16 Ph Pan, MS51957-	4
14	NB404F-	FASTENERS 4-40x1/4, Ph Fl 100, MS246	1
15	WI18BR-	WIRE #18 AWG; BARE	1





COMM RECEIVER SS1866 REV 8

RECEIVER; COMM (GREEN)

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Ref #	Part #	Description	Qty
01	PC1866-7	PCB RECEIVER; COMM-GREEN, NAV-BLUE	1
02	HS1816-	SPACER/STANDOFF STANDOFF; 4-40 THD	6
03	SM1840-2	SHEET METAL CASE; MODULE	1
04	SM1841-1	SHEET METAL COVER; MODULE	1
C01	CS05R6-	CAPACITOR; SMT; CER 5.6pF; 100V; 1206	1
C02	CS05R6-	CAPACITOR; SMT; CER 5.6pF; 100V; 1206	1
C03	CS0150-	CAPACITOR; SMT; CER 15pf; 100V; 1206	1
C04	CS0150-	CAPACITOR; SMT; CER 15pf; 100V; 1206	1
C05	CS0150-	CAPACITOR; SMT; CER 15pf; 100V; 1206	1
C06	CS0150-	CAPACITOR; SMT; CER 15pf; 100V; 1206	1
C07	CS0181-	CAPACITOR; SMT; CER 180PF; 100V; 1206	1
C08	CS0181-	CAPACITOR; SMT; CER 180PF; 100V; 1206	1
C09	CS0102-	CAPACITOR; SMT; CER .001 uF; 100V; 1206	1
C10	CS0102-	CAPACITOR; SMT; CER .001 uF; 100V; 1206	1
C14	CS0102-	CAPACITOR; SMT; CER .001 uF; 100V; 1206	1
C16	CS0102-	CAPACITOR; SMT; CER .001 uF; 100V; 1206	1
C17	CS0103-	CAPACITOR; SMT; CER .01 uF; 100V; 1206	1
C18	CS0103-	CAPACITOR; SMT; CER .01 uF; 100V; 1206	1
C19	CS0102-	CAPACITOR; SMT; CER .001 uF; 100V; 1206	1
C20	CS0102-	CAPACITOR; SMT; CER .001 uF; 100V; 1206	1
C21	CS0102-	CAPACITOR; SMT; CER .001 uF; 100V; 1206	1
C23	CS0101-	CAPACITOR; SMT; CER 100PF; 100V; 1206	1
C24	CS0101-	CAPACITOR; SMT; CER 100PF; 100V; 1206	1
C25	CS0150-	CAPACITOR; SMT; CER 15pf; 100V; 1206	1
C26	CS0150-	CAPACITOR; SMT; CER 15pf; 100V; 1206	1
C27	CS0270-	CAPACITOR; SMT; CER 27 PF; 50V; 1206	1
C28	CS0220-	CAPACITOR; SMT; CER 22 PF; 100V	1
C29	CS0220-	CAPACITOR; SMT; CER 22 PF; 100V	1
C30	CS0224-	CAPACITOR; SMT; CER .22 uF; 50 V; 1206 case	1
C31	CS0224-	CAPACITOR; SMT; CER .22 uF; 50 V; 1206 case	1
C32	CS0224-	CAPACITOR; SMT; CER .22 uF; 50 V; 1206 case	1
C33	CS0224-	CAPACITOR; SMT; CER .22 uF; 50 V; 1206 case	1
C34	CX0105-	CAPACITOR; SMT; TANTALUM 1.0 uF; 16V	1
C35	CS0224-	CAPACITOR; SMT; CER .22 uF; 50 V; 1206 case	1
C36	CS0224-	CAPACITOR; SMT; CER .22 uF; 50 V; 1206 case	1
C37	CS0224-	CAPACITOR; SMT; CER .22 uF; 50 V; 1206 case	1
C38	CF4733-	CAPACITOR; FILM .047/63V	1
C39	CS0333-	CAPACITOR; SMT; CER .033 uF; 100V; 1206	1
C40	CS0103-	CAPACITOR; SMT; CER .01 uF; 100V; 1206	1
C41	CX0105-	CAPACITOR; SMT; TANTALUM 1.0 uF; 16V	1
C42	CS0103-	CAPACITOR; SMT; CER .01 uF; 100V; 1206	1
C43	CS0150-	CAPACITOR; SMT; CER 15pf; 100V; 1206	1
C44	CS0224-	CAPACITOR; SMT; CER .22 uF; 50 V; 1206 case	1
C45	CS0102-	CAPACITOR; SMT; CER .001 uF; 100V; 1206	1
C46	CS0102-	CAPACITOR; SMT; CER .001 uF; 100V; 1206	1
C47	CS0102-	CAPACITOR; SMT; CER .001 uF; 100V; 1206	1
C48	CS0224-	CAPACITOR; SMT; CER .22 uF; 50 V; 1206 case	1
C49	CS0224-	CAPACITOR; SMT; CER .22 uF; 50 V; 1206 case	1
D01	DS0109-	DIODE; SMT MMBV109	1
D02	DS0109-	DIODE; SMT MMBV109	1

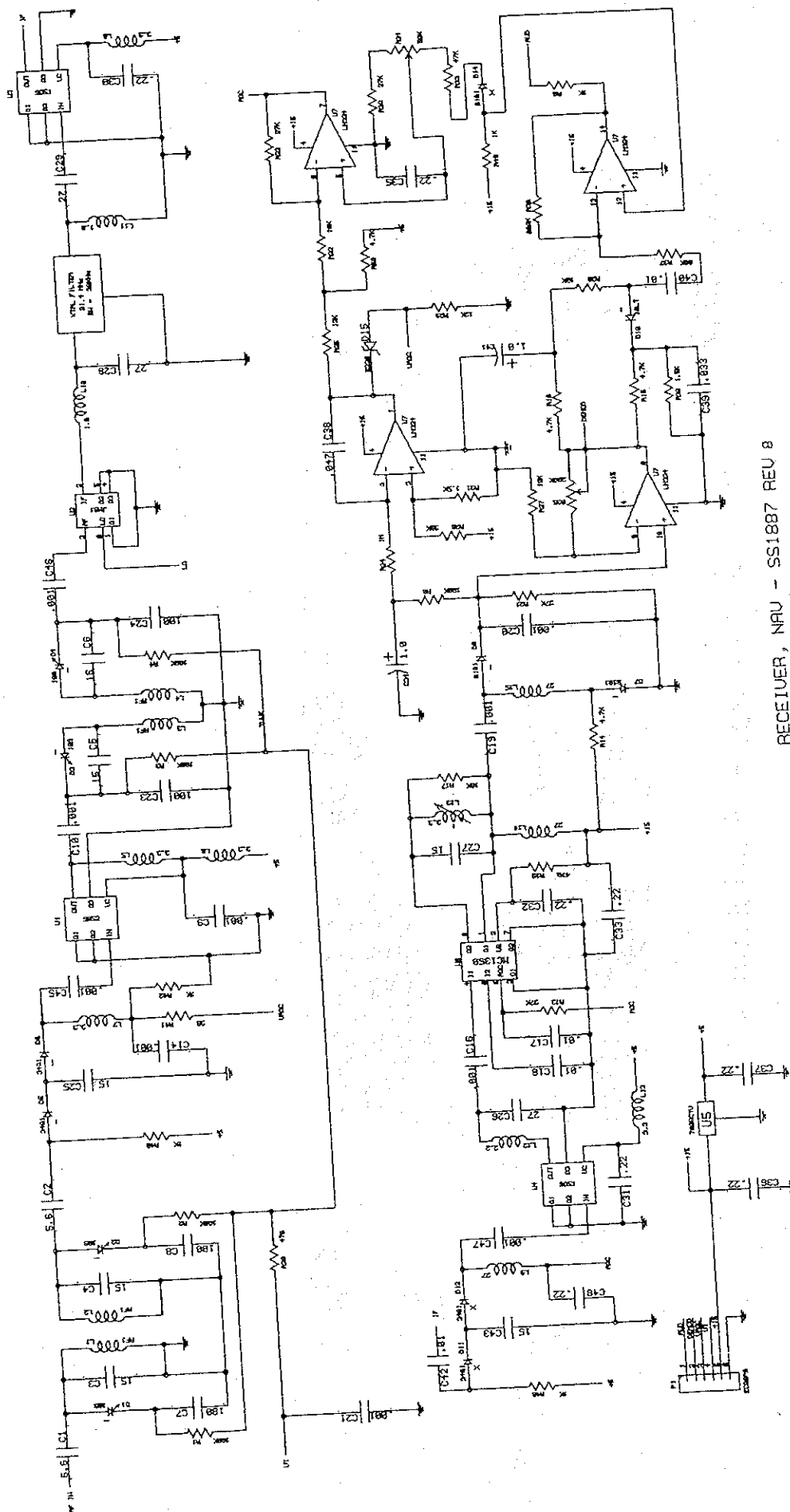
Ref #	Part #	Description	Qty
D03	DS0109-	DIODE; SMT MMBV109	1
D04	DS0109-	DIODE; SMT MMBV109	1
D05	DS3401-	DIODE; SMT MMBV3401	1
D06	DS3401-	DIODE; SMT MMBV3401	1
D07	DS0101-	DIODE; SMT MMBD101	1
D08	DS0101-	DIODE; SMT MMBD101	1
D10	DS0016-	DIODE; SMT BAS16	1
D11	DS3401-	DIODE; SMT MMBV3401	1
D12	DS3401-	DIODE; SMT MMBV3401	1
D14	DS0016-	DIODE; SMT BAS16	1
D15	DS5230-	DIODE; SMT 1N5230; SMT	1
D16	DD0329-	DIODE LM329	1
I01	IS0052-	INT. CKT.; SMT 52063	1
I02	ISJMS1-	INT. CKT.; SMT MIXER; JMS-1	1
I03	IS0051-	INT. CKT.; SMT 51063	1
I04	IS0051-	INT. CKT.; SMT 51063	1
I05	IM7805-	INT. CKT.; MISC. REGULATOR; 5V 7805	1
I06	IS1350-	INT. CKT.; SMT 1350; SMT	1
I07	IS0324-	INT. CKT.; SMT LM324; SMT	1
L05	LS03R3-	INDUCTOR; FIXED; SMT 3.3 uH; 10%; SMT	1
L06	LS03R3-	INDUCTOR; FIXED; SMT 3.3 uH; 10%; SMT	1
L07	LS03R3-	INDUCTOR; FIXED; SMT 3.3 uH; 10%; SMT	1
L08	LS03R3-	INDUCTOR; FIXED; SMT 3.3 uH; 10%; SMT	1
L09	LS0270-	INDUCTOR; FIXED; SMT 27 uH; 10% SMT	1
L10	LS02R2-	INDUCTOR; FIXED; SMT 2.2 uH; 10%; SMT	1
L11	LS02R2-	INDUCTOR; FIXED; SMT 2.2 uH; 10%; SMT	1
L12	LS02R2-	INDUCTOR; FIXED; SMT 2.2 uH; 10%; SMT	1
L13	LA1701-	COIL/COILFORM 3.3 uH; RX	1
L14	LS0270-	INDUCTOR; FIXED; SMT 27 uH; 10% SMT	1
L15	LS0270-	INDUCTOR; FIXED; SMT 27 uH; 10% SMT	1
L16	LS03R3-	INDUCTOR; FIXED; SMT 3.3 uH; 10%; SMT	1
L17	LS03R3-	INDUCTOR; FIXED; SMT 3.3 uH; 10%; SMT	1
R01	RS0104-	RESISTOR; SMT; CARBON FILM 100K; 1/4W 5%; 1206	1
R02	RS0104-	RESISTOR; SMT; CARBON FILM 100K; 1/4W 5%; 1206	1
R03	RS0104-	RESISTOR; SMT; CARBON FILM 100K; 1/4W 5%; 1206	1
R04	RS0104-	RESISTOR; SMT; CARBON FILM 100K; 1/4W 5%; 1206	1
R06	RS0104-	RESISTOR; SMT; CARBON FILM 100K; 1/4W 5%; 1206	1
R08	RS0102-	RESISTOR; SMT; CARBON FILM 1K; 1/4W 5%; 1206	1
R13	RS0273-	RESISTOR; SMT; CARBON FILM 27K; 1/4W 5%; 1206	1
R14	RS0472-	RESISTOR; SMT; CARBON FILM 4.7K; 1/4W 5%; 1206	1
R15	RS0472-	RESISTOR; SMT; CARBON FILM 4.7K; 1/4W 5%; 1206	1
R16	RS0472-	RESISTOR; SMT; CARBON FILM 4.7K; 1/4W 5%; 1206	1
R17	RS0473-	RESISTOR; SMT; CARBON FILM 47K; 1/4W 5%; 1206	1
R19	RS0471-	RESISTOR; SMT; CARBON FILM 470 OHM; 1/4W 5%; 1206	1
R20	RS0471-	RESISTOR; SMT; CARBON FILM 470 OHM; 1/4W 5%; 1206	1
R21	RS0273-	RESISTOR; SMT; CARBON FILM 27K; 1/4W 5%; 1206	1
R22	RS0183-	RESISTOR; SMT; CARBON FILM 18K; 1/4W 5%; 1206	1
R23	RS0273-	RESISTOR; SMT; CARBON FILM 27K; 1/4W 5%; 1206	1
R24	RS0105-	RESISTOR; SMT; CARBON FILM 1 MEG; 1/4W 5%; 1206	1
R25	RS0123-	RESISTOR; SMT; CARBON FILM 12K; 1/4W 5%; 1206	1

RECEIVER; COMM (GREEN)

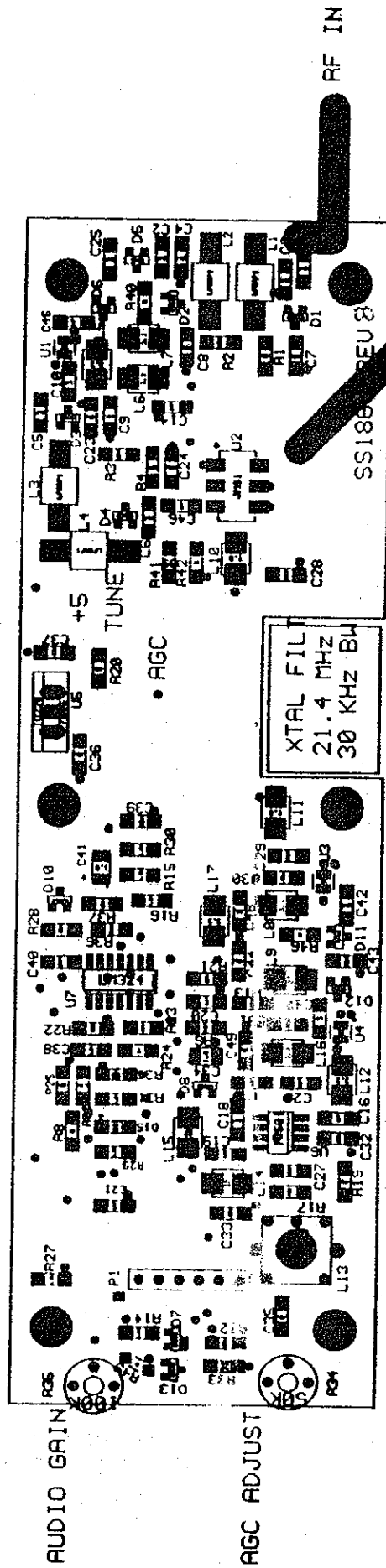
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Ref #	Part #	Description	Qty
R26	RS3922-	RESISTOR; SMT; CARBON FILM 39.2K; 1/4W 5%; 1206	1
R27	RS0103-	RESISTOR; SMT; CARBON FILM 10K; 1/4W 5%; 1206	1
R28	RS0103-	RESISTOR; SMT; CARBON FILM 10K; 1/4W 5%; 1206	1
R29	RS0472-	RESISTOR; SMT; CARBON FILM 4.7K; 1/4W 5%; 1206	1
R30	RS0152-	RESISTOR; SMT; CARBON FILM 1.5K; 1/4W 5%; 1206	1
R31	RS0152-	RESISTOR; SMT; CARBON FILM 1.5K; 1/4W 5%; 1206	1
R32	RS0273-	RESISTOR; SMT; CARBON FILM 27K; 1/4W 5%; 1206	1
R33	RS0473-	RESISTOR; SMT; CARBON FILM 47K; 1/4W 5%; 1206	1
R34	PW0503-	Pot. Top Adjust .3 Dia 50K	1
R35	PW0204-	Pot. Top Adjust .3 Dia 200K	1
R36	RS0684-	RESISTOR; SMT; CARBON FILM 680K; 1/4W 5%; 1206	1
R37	RS0683-	RESISTOR; SMT; CARBON FILM 68K; 1/4W 5%; 1206	1
R40	RS0102-	RESISTOR; SMT; CARBON FILM 1K; 1/4W 5%; 1206	1
R41	RS0390-	RESISTOR; SMT; CARBON FILM 39 OHM; 1/4W 5%; 1206	1
R42	RS0102-	RESISTOR; SMT; CARBON FILM 1K; 1/4W 5%; 1206	1
R46	RS0102-	RESISTOR; SMT; CARBON FILM 1K; 1/4W 5%; 1206	1
R49	RS0102-	RESISTOR; SMT; CARBON FILM 1K; 1/4W 5%; 1206	1
R50	RS0472-	RESISTOR; SMT; CARBON FILM 4.7K; 1/4W 5%; 1206	1
X01	XT2130-	CRYSTAL; QUARTZ FILTER; NAV	1



RECEIVER, NAV - SS1887 REV 8

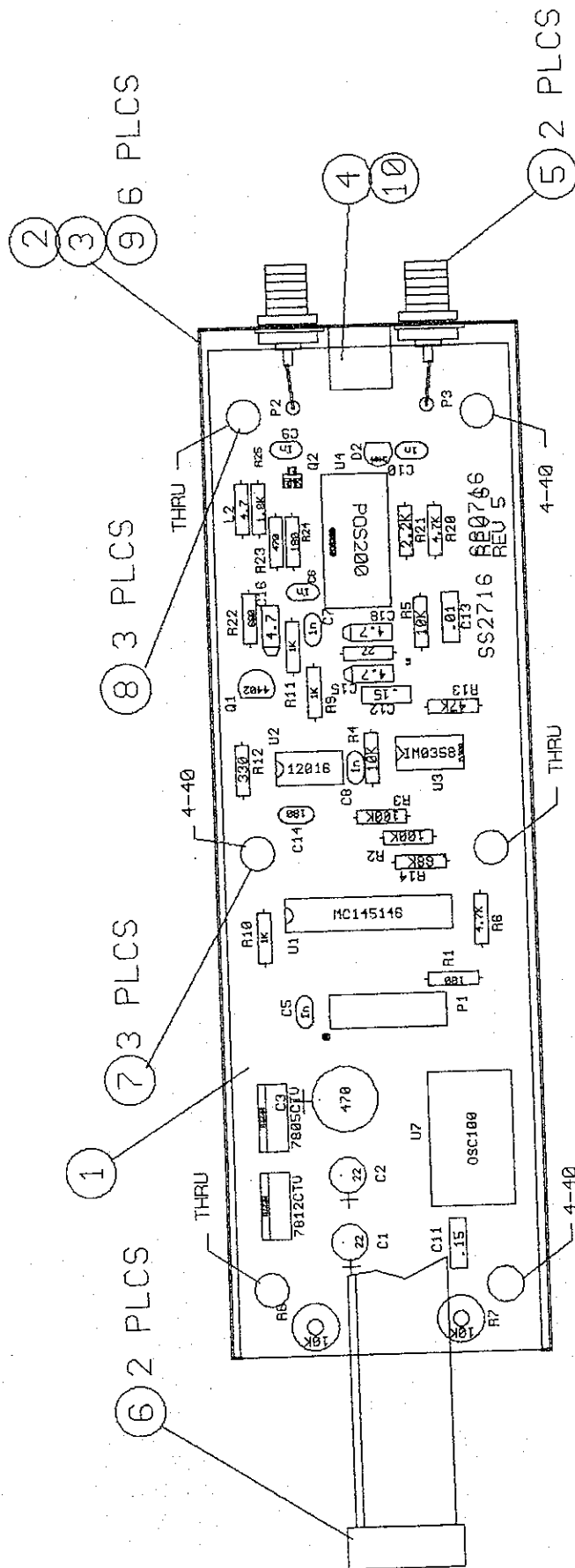


NAV RECEIVER - SS1867 REV 8

Ref #	Part #	Description	Qty
01	PC1866-7	PCB RECEIVER; COMM-GREEN, NAV-BLUE	1
02	HS1816-	HARDWARE; SPACER/STANDOFF	6
03	SM1840-2	STANDOFF; 4-40 THD	1
04	SM1841-1	SHEET METAL CASE; MODULE	1
C01	CS05R6-	SHEET METAL COVER; MODULE	1
C02	CS05R6-	CAPACITOR; SMT; CER 5.6pF; 100V; 1206	1
C03	CS0150-	CAPACITOR; SMT; CER 5.6pF; 100V; 1206	1
C04	CS0150-	CAPACITOR; SMT; CER 15pf; 100V; 1206	1
C05	CS0150-	CAPACITOR; SMT; CER 15pf; 100V; 1206	1
C06	CS0150-	CAPACITOR; SMT; CER 15pf; 100V; 1206	1
C07	CS0181-	CAPACITOR; SMT; CER 15pf; 100V; 1206	1
C08	CS0181-	CAPACITOR; SMT; CER 180PF; 100V; 1206	1
C09	CS0102-	CAPACITOR; SMT; CER 180PF; 100V; 1206	1
C10	CS0102-	CAPACITOR; SMT; CER .001 uF; 100V; 1206	1
C14	CS0102-	CAPACITOR; SMT; CER .001 uF; 100V; 1206	1
C16	CS0102-	CAPACITOR; SMT; CER .001 uF; 100V; 1206	1
C17	CS0103-	CAPACITOR; SMT; CER .01 uF; 100V; 1206	1
C18	CS0103-	CAPACITOR; SMT; CER .01 uF; 100V; 1206	1
C19	CS0102-	CAPACITOR; SMT; CER .001 uF; 100V; 1206	1
C20	CS0102-	CAPACITOR; SMT; CER .001 uF; 100V; 1206	1
C21	CS0102-	CAPACITOR; SMT; CER .001 uF; 100V; 1206	1
C23	CS0101-	CAPACITOR; SMT; CER 100PF; 100V; 1206	1
C24	CS0101-	CAPACITOR; SMT; CER 100PF; 100V; 1206	1
C25	CS0150-	CAPACITOR; SMT; CER 15pf; 100V; 1206	1
C26	CS0150-	CAPACITOR; SMT; CER 15pf; 100V; 1206	1
C27	CS0270-	CAPACITOR; SMT; CER 27 PF; 50V; 1206	1
C28	CS0220-	CAPACITOR; SMT; CER 22 PF; 100V	1
C29	CS0220-	CAPACITOR; SMT; CER 22 PF; 100V	1
C30	CS0224-	CAPACITOR; SMT; CER .22 uF; 50V; 1206	1
C31	CS0224-	CAPACITOR; SMT; CER .22 uF; 50V; 1206	1
C32	CS0224-	CAPACITOR; SMT; CER .22 uF; 50V; 1206	1
C33	CS0224-	CAPACITOR; SMT; CER .22 uF; 50V; 1206	1
C34	CX0105-	CAPACITOR; SMT; TANTALUM 1.0 uF; 16V	1
C35	CS0224-	CAPACITOR; SMT; CER .22 uF; 50V; 1206	1
C36	CS0224-	CAPACITOR; SMT; CER .22 uF; 50V; 1206	1
C37	CS0224-	CAPACITOR; SMT; CER .22 uF; 50V; 1206	1
C38	CS0473-	CAPACITOR; SMT; CER .047 uF; 100V	1
C39	CS0333-	CAPACITOR; SMT; CER .033 uF; 100V; 1206	1
C40	CS0103-	CAPACITOR; SMT; CER .01 uF; 100V; 1206	1
C41	CX0105-	CAPACITOR; SMT; TANTALUM 1.0 uF; 16V	1
C42	CS0103-	CAPACITOR; SMT; CER .01 uF; 100V; 1206	1
C43	CS0150-	CAPACITOR; SMT; CER 15pf; 100V; 1206	1
C44	CS0224-	CAPACITOR; SMT; CER .22 uF; 50V; 1206	1
C45	CS0102-	CAPACITOR; SMT; CER .001 uF; 100V; 1206	1
C46	CS0102-	CAPACITOR; SMT; CER .001 uF; 100V; 1206	1
C47	CS0102-	CAPACITOR; SMT; CER .001 uF; 100V; 1206	1
C49	CS0224-	CAPACITOR; SMT; CER .22 uF; 50V; 1206	1
D01	DS0109-	DIODE; SMT MMBV109	1
D02	DS0109-	DIODE; SMT MMBV109	1
D03	DS0109-	DIODE; SMT MMBV109	1
D04	DS0109-	DIODE; SMT MMBV109	1
D05	DS3401-	DIODE; SMT MMBV3401	1
D06	DS3401-	DIODE; SMT MMBV3401	1
D07	DS0101-	DIODE; SMT MMBD101	1
D08	DS0101-	DIODE; SMT MMBD101	1

Ref #	Part #	Description	Qty
D10	DS0016-	DIODE; SMT BAS16	1
D11	DS3401-	DIODE; SMT MMBV3401	1
D12	DS3401-	DIODE; SMT MMBV3401	1
D14	DS0016-	DIODE; SMT BAS16	1
D15	DS5230-	DIODE; SMT 1N5230; SMT	1
D16	DD0329-	DIODE LM329	1
I01	IS0052-	INT. CKT.; SMT 52063	1
I02	ISJMS1-	INT. CKT.; SMT MIXER; JMS-1	1
I03	IS0051-	INT. CKT.; SMT 51063	1
I04	IS0051-	INT. CKT.; SMT 51063	1
I05	IM7805-	INT. CKT.; MISC. REGULATOR; 5V 7805	1
I06	IS1350-	INT. CKT.; SMT 1350; SMT	1
I07	IS0324-	INT. CKT.; SMT LM324; SMT	1
L05	LS03R3-	INDUCTOR; FIXED; SMT 3.3 uH; 10%; SMT	1
L06	LS03R3-	INDUCTOR; FIXED; SMT 3.3 uH; 10%; SMT	1
L07	LS03R3-	INDUCTOR; FIXED; SMT 3.3 uH; 10%; SMT	1
L08	LS03R3-	INDUCTOR; FIXED; SMT 3.3 uH; 10%; SMT	1
L09	LS0270-	INDUCTOR; FIXED; SMT 27 uH; 10% SMT	1
L10	LS02R2-	INDUCTOR; FIXED; SMT 2.2 uH; 10%; SMT	1
L11	LS02R2-	INDUCTOR; FIXED; SMT 2.2 uH; 10%; SMT	1
L12	LS02R2-	INDUCTOR; FIXED; SMT 2.2 uH; 10%; SMT	1
L13	LA1701-	COIL/COILFORM 3.3 uH; RX	1
L14	LS0270-	INDUCTOR; FIXED; SMT 27 uH; 10% SMT	1
L15	LS0270-	INDUCTOR; FIXED; SMT 27 uH; 10% SMT	1
L16	LS03R3-	INDUCTOR; FIXED; SMT 3.3 uH; 10%; SMT	1
L17	LS03R3-	INDUCTOR; FIXED; SMT 3.3 uH; 10%; SMT	1
R01	RS0104-	RESISTOR; SMT; CARBON FILM 100K; 1/4W 5%; 1206	1
R02	RS0104-	RESISTOR; SMT; CARBON FILM 100K; 1/4W 5%; 1206	1
R03	RS0104-	RESISTOR; SMT; CARBON FILM 100K; 1/4W 5%; 1206	1
R04	RS0104-	RESISTOR; SMT; CARBON FILM 100K; 1/4W 5%; 1206	1
R06	RS0104-	RESISTOR; SMT; CARBON FILM 100K; 1/4W 5%; 1206	1
R08	RS0102-	RESISTOR; SMT; CARBON FILM 1K; 1/4W 5%; 1206	1
R13	RS0273-	RESISTOR; SMT; CARBON FILM 27K; 1/4W 5%; 1206	1
R14	RS0472-	RESISTOR; SMT; CARBON FILM 4.7K; 1/4W 5%; 1206	1
R15	RS0472-	RESISTOR; SMT; CARBON FILM 4.7K; 1/4W 5%; 1206	1
R16	RS0472-	RESISTOR; SMT; CARBON FILM 4.7K; 1/4W 5%; 1206	1
R17	RS0473-	RESISTOR; SMT; CARBON FILM 47K; 1/4W 5%; 1206	1
R19	RS0471-	RESISTOR; SMT; CARBON FILM 470 OHM; 1/4W 5%; 1206	1
R20	RS0471-	RESISTOR; SMT; CARBON FILM 470 OHM; 1/4W 5%; 1206	1
R21	RS0273-	RESISTOR; SMT; CARBON FILM 27K; 1/4W 5%; 1206	1
R22	RS0183-	RESISTOR; SMT; CARBON FILM 18K; 1/4W 5%; 1206	1
R23	RS0273-	RESISTOR; SMT; CARBON FILM 27K; 1/4W 5%; 1206	1
R24	RS0105-	RESISTOR; SMT; CARBON FILM 1 MEG; 1/4W 5%; 1206	1
R25	RS0123-	RESISTOR; SMT; CARBON FILM 12K; 1/4W 5%; 1206	1
R26	RS3922-	RESISTOR; SMT; CARBON FILM 39.2K; 1/4W 5%; 1206	1
R27	RS0103-	RESISTOR; SMT; CARBON FILM 10K; 1/4W 5%; 1206	1
R28	RS0103-	RESISTOR; SMT; CARBON FILM 10K; 1/4W 5%; 1206	1
R29	RS0472-	RESISTOR; SMT; CARBON FILM 4.7K; 1/4W 5%; 1206	1
R30	RS0152-	RESISTOR; SMT; CARBON FILM 1.5K; 1/4W 5%; 1206	1
R31	RS0152-	RESISTOR; SMT; CARBON FILM 1.5K; 1/4W 5%; 1206	1
R32	RS0273-	RESISTOR; SMT; CARBON FILM 27K; 1/4W 5%; 1206	1
R33	RS0473-	RESISTOR; SMT; CARBON FILM 47K; 1/4W 5%; 1206	1
R34	PM0503-	POT; TRIMMER MINI; TOP ADJ 50K	1
R35	PM0204-	POT; TRIMMER MINI; TOP ADJ 200K	1
R36	RS0684-	RESISTOR; SMT; CARBON FILM 680K; 1/4W 5%; 1206	1

Ref #	Part #	Description	Qty
R37	RS0683-	RESISTOR; SMT; CARBON FILM 68K; 1/4W 5%; 1206	1
R40	RS0102-	RESISTOR; SMT; CARBON FILM 1K; 1/4W 5%; 1206	1
R41	RS0390-	RESISTOR; SMT; CARBON FILM 39 OHM; 1/4W 5%; 1206	1
R42	RS0102-	RESISTOR; SMT; CARBON FILM 1K; 1/4W 5%; 1206	1
R46	RS0102-	RESISTOR; SMT; CARBON FILM 1K; 1/4W 5%; 1206	1
R50	RS0472-	RESISTOR; SMT; CARBON FILM 4.7K; 1/4W 5%; 1206	1
X01	XT2130-	CRYSTAL; QUARTZ FILTER; NAV	1



MOUNT BOARD WITH 3 4-40 X 3/16 FLAT HEAD SCREWS (NB403F).
 ATTACH COVER WITH 3 4-40 X 3/16 FLAT HEAD SCREWS AND ONE 4-40 X 3/16 PAN HEAD SCREW.
 SOLDER GROUND STRAP AS SHOWN.

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COMM SYNTHESIZER

SS2716-5

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Ref#	Part #	Description	Qty
01	PC2716-5	PCB SYNTHESIZER; COMM	1
02	SM1840-3	SHEET METAL CASE; MODULE	1
03	SM1841-3	SHEET METAL COVER; MODULE	1
04	SM1814-	SHEET METAL BRACKET, GROUNDING, SYNTH.	1
05	EC1703-	CONNECTOR CONN; SMA; PANEL MT.	2
06	EC1002-	CONNECTOR 14 PIN; RIBBON CONN	2
07	HS1816-	SPACER STANDOFF; 4-40 THD	3
08	HS1815-2	SPACER STANDOFF; THRU HOLE	3
09	NB403F-	FASTENERS 4-40x3/16 P100 SS	6
10	NB404P-	FASTENERS 4-40x1/4 PP SS	1
C01	CE2262-	CAP; ALUM ELECT. 22/50V; RADIAL	1
C02	CE2262-	CAP; ALUM ELECT. 22/50V; RADIAL	1
C03	CE4772-	CAP; ALUM ELECT. 470/6.3-10V; RADIAL	1
C05	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C06	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C07	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C08	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C09	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C10	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C11	CF1543-	CAPACITOR; FILM .15/63V	1
C12	CF1543-	CAPACITOR; FILM .15/63V	1
C13	CF1033-	CAPACITOR; FILM .01/63	1
C14	CR1816-	CAP; MONO-CERAMIC 180 pF; 100V	1
C15	CT4751-	CAP; TANTALUM 4.7UF/20V; AXIAL	1
C16	CT4751-	CAP; TANTALUM 4.7UF/20V; AXIAL	1
C18	CT4751-	CAP; TANTALUM 4.7UF/20V; AXIAL	1
D2	DD3404-	DIODE MPN3404 PIN DIODE	1
I01	IM5146-	INT. CKT.; MISC. 145156	1
I02	IM2016-	INT. CKT.; MISC. 12016	1
I03	IM0358-	INT. CKT.; MISC. LM358N (not ST)	1
I04	IM7812-	INT. CKT.; MISC. REGULATOR; 12V 7812	1
I05	IM7805-	INT. CKT.; MISC. REGULATOR; 5V 7805	1
L02	LF04R7-	INDUCTOR; FIXED 4.7 uH; SM	1
L03	LF0273-	INDUCTOR; FIXED 27 uH; SM	1
P1	ECGP14-	CONNECTOR 14 PIN Board Plug	1
Q01	QX4403-	TRANSISTOR	1
Q02	QX0911-	TRANSISTOR MPS911	1
R01	RC0181-	RESISTOR; CARB. 180 Ohm; 5%; 1/4 watt	1
R02	RC0104-	RESISTOR; CARB. 100K 5% 1/4W	1
R03	RC0104-	RESISTOR; CARB. 100K 5% 1/4W	1
R04	RC0103-	RESISTOR; CARB. 10 Kohm; 5%; 1/4 watt	1
R05	RC0103-	RESISTOR; CARB. 10 Kohm; 5%; 1/4 watt	1
R06	RC0472-	RESISTOR; CARB. 4.7 Kohm; 5%; 1/4 watt	1
R07	PW0103-	Top Adj. .3 dia 10 K	1
R08	PW0103-	Top Adj. .3 dia 10 K	1
R09	RC0102-	RESISTOR; CARB. 1 Kohm; 5%; 1/4 watt	1
R10	RC0102-	RESISTOR; CARB. 1 Kohm; 5%; 1/4 watt	1
R11	RC0102-	RESISTOR; CARB. 1 Kohm; 5%; 1/4 watt	1
R12	RC0331-	RESISTOR; CARB. 330 Ohm; 5%; 1/4 watt	1
R13	RC0473-	RESISTOR; CARB. 47 Kohm; 5%; 1/4 watt	1

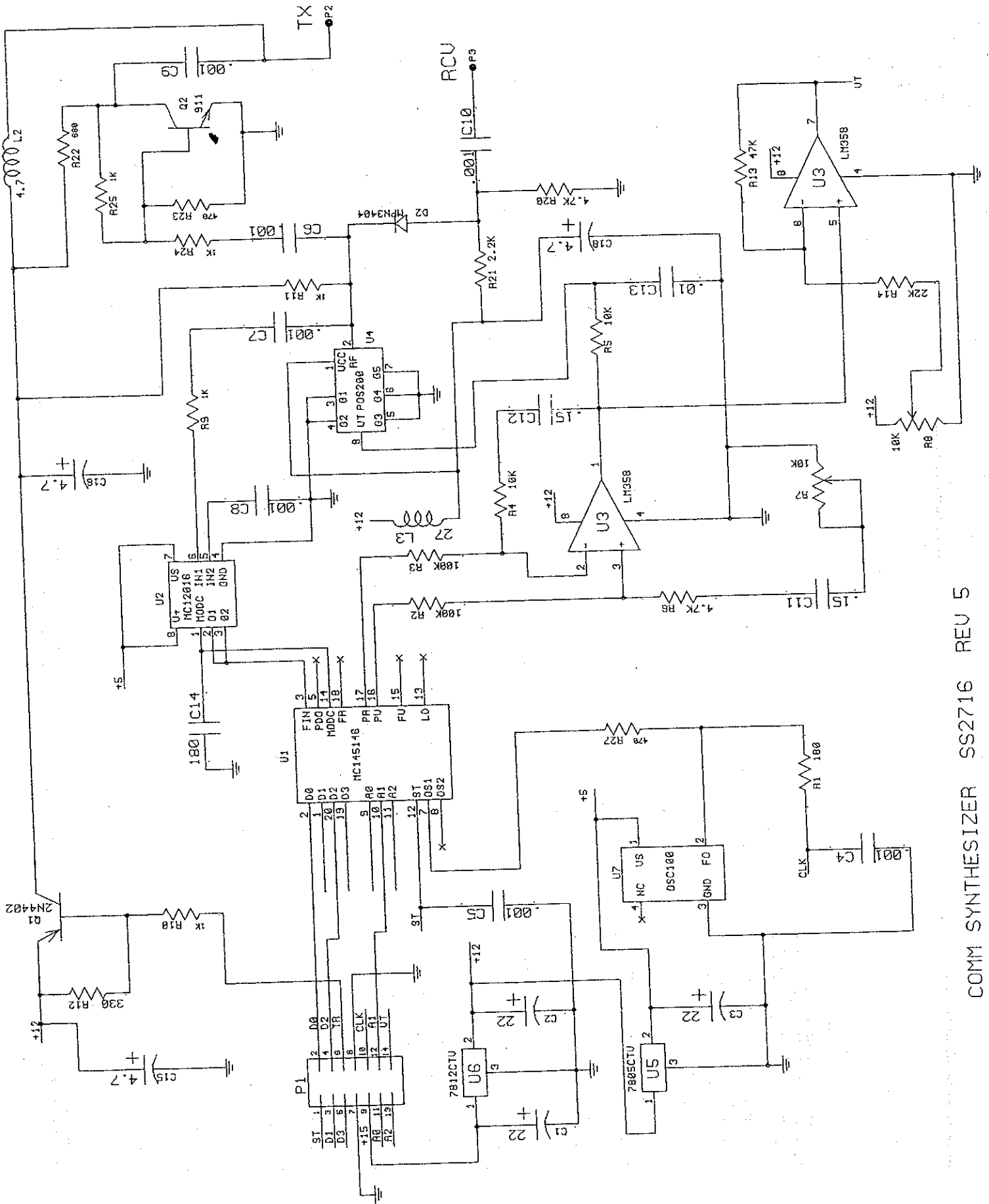
COMM SYNTHESIZER

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Ref#	Part #	Description	Qty
01	PC2716-5	PCB SYNTHESIZER; COMM	1
02	SM1840-3	SHEET METAL CASE; MODULE	1
03	SM1841-3	SHEET METAL COVER; MODULE	1
04	SM1814-	SHEET METAL BRACKET, GROUNDING, SYNTH.	1
05	EC1703-	CONNECTOR CONN; SMA; PANEL MT.	2
06	EC1002-	CONNECTOR 14 PIN; RIBBON CONN	2
07	HS1816-	SPACER STANDOFF; 4-40 THD	3
08	HS1815-2	SPACER STANDOFF; THRU HOLE	3
09	NB403F-	FASTENERS 4-40x3/16 Ph Fl 100, MS246	6
10	NB404P-	FASTENERS 4-40x1/4 Ph Pan, MS51957-1	1
C01	CE2262-	CAP; ALUM ELECT. 22/50V; RADIAL	1
C02	CE2262-	CAP; ALUM ELECT. 22/50V; RADIAL	1
C03	CE4772-	CAP; ALUM ELECT. 470/6.3-10V; RADIAL	1
C05	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C06	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C07	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C08	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C09	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C10	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C11	CF1543-	CAPACITOR; FILM .15/63V	1
C12	CF1543-	CAPACITOR; FILM .15/63V	1
C13	CF1033-	CAPACITOR; FILM .01/63	1
C14	CR1816-	CAP; MONO-CERAMIC 180 pF; 100V	1
C15	CT4751-	CAP; TANTALUM 4.7UF/20V; AXIAL	1
C16	CT4751-	CAP; TANTALUM 4.7UF/20V; AXIAL	1
C18	CT4751-	CAP; TANTALUM 4.7UF/20V; AXIAL	1
D2	DD3404-	DIODE MPN3404 PIN DIODE	1
I01	IM5146-	INT. CKT.; MISC. 145156	1
I02	IM2016-	INT. CKT.; MISC. 12016	1
I03	IM0358-	INT. CKT.; MISC. LM358N (not ST)	1
I04	IM7812-	INT. CKT.; MISC. REGULATOR; 12V 7812	1
I05	IM7805-	INT. CKT.; MISC. REGULATOR; 5V 7805	1
L02	LF04R7-	INDUCTOR; FIXED 4.7 uH; SM	1
L03	LF0273-	INDUCTOR; FIXED 27 uH; SM	1
P1	ECCGP14-	CONNECTOR 14 PIN Board Plug	1
Q01	QX4402-	TRANSISTOR 2N4402	1
Q02	QX0911-	TRANSISTOR MPS911	1
R01	RC0181-	RESISTOR; CARB. 180 Ohm; 5%; 1/4 watt	1
R02	RC0104-	RESISTOR; CARB. 100K 5% 1/4W	1
R03	RC0104-	RESISTOR; CARB. 100K 5% 1/4W	1
R04	RC0103-	RESISTOR; CARB. 10 Kohm; 5%; 1/4 watt	1
R05	RC0103-	RESISTOR; CARB. 10 Kohm; 5%; 1/4 watt	1
R06	RC0472-	RESISTOR; CARB. 4.7 Kohm; 5%; 1/4 watt	1
R07	PW0103-	Top Adj. .3 dia 10 K	1
R08	PW0103-	Top Adj. .3 dia 10 K	1
R09	RC0102-	RESISTOR; CARB. 1 Kohm; 5%; 1/4 watt	1
R10	RC0102-	RESISTOR; CARB. 1 Kohm; 5%; 1/4 watt	1
R11	RC0102-	RESISTOR; CARB. 1 Kohm; 5%; 1/4 watt	1
R12	RC0331-	RESISTOR; CARB. 330 Ohm; 5%; 1/4 watt	1
R13	RC0473-	RESISTOR; CARB. 47 Kohm; 5%; 1/4 watt	1

Ref#	Part #	Description	Qty
R14	RC0683-	RESISTOR; CARB. 68 Kohm; 5%; 1/4 watt	1
R20	RC0472-	RESISTOR; CARB. 4.7 Kohm; 5%; 1/4 watt	1
R21	RC0222-	RESISTOR; CARB. 2.2 Kohm; 5%; 1/4 watt	1
R22	RC0681-	RESISTOR; CARB. 680 Ohm; 5%; 1/4 watt	1
R23	RC0471-	RESISTOR; CARB. 470 Ohm; 5%; 1/4 watt	1
R24	RC0181-	RESISTOR; CARB. 180 Ohm; 5%; 1/4 watt	1
R25	RC0182-	RESISTOR; CARB. 1.8 Kohm; 5%; 1/4 watt	1
U04	XT1200-	CRYSTAL; QUARTZ POS-200	1
U07	XT1000-	CRYSTAL; QUARTZ 1.0 MHZ OSC.	1



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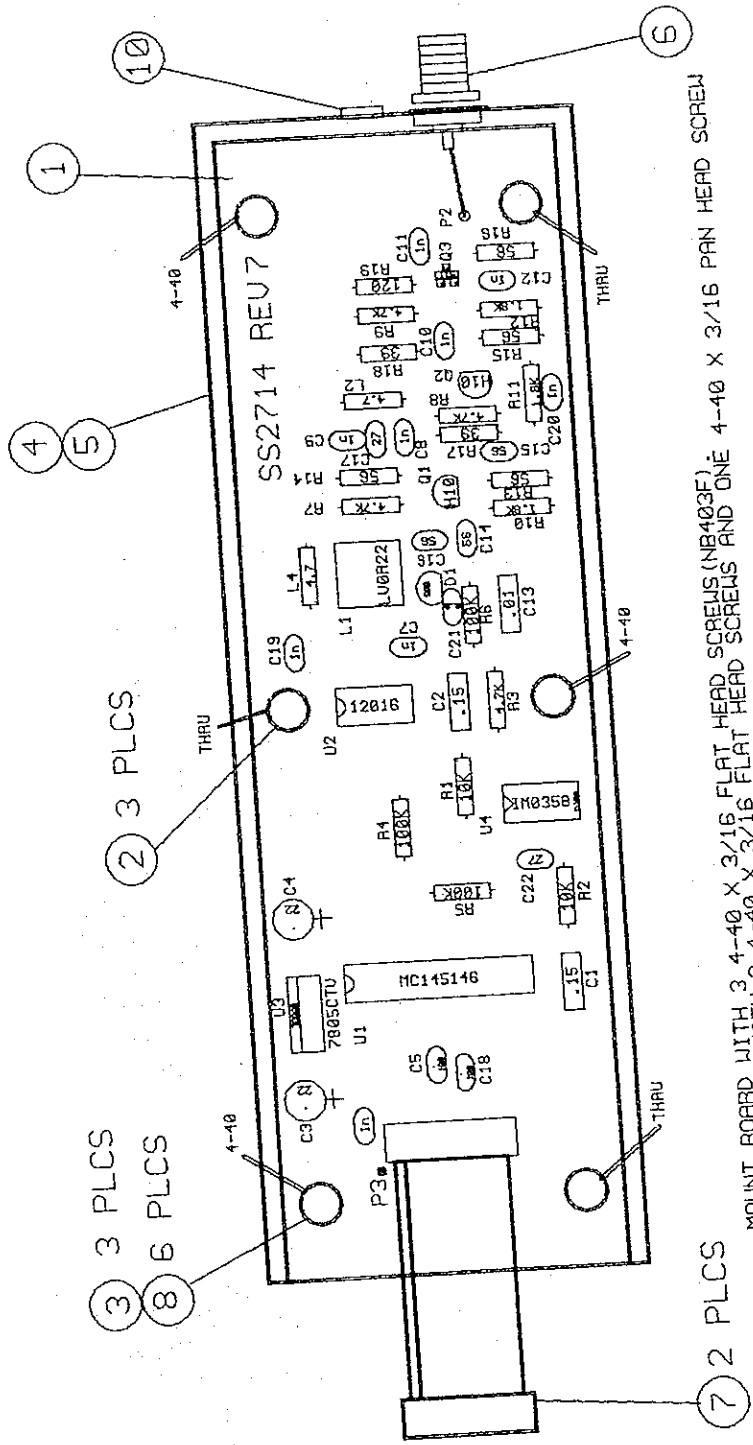
Ref #	Part #	Description	Qty
01	PC2716-3	PCB SYNTHESIZER; COMM	1
02	HS1816-	SPACER/STANDOFF STANDOFF; 4-40 THD	3
03	HS1815-	SPACER/STANDOFF STANDOFF; THRU HOLE	3
04	EC1002-	CONNECTOR 14 PIN; RIBBON CONN	2
C01	CE2262-	CAPACITOR; ALUM ELECT. 22/50V; RADIAL	1
C02	CE2262-	CAPACITOR; ALUM ELECT. 22/50V; RADIAL	1
C03	CE4772-	CAPACITOR; ALUM ELECT. 470/6.3-10V; RADIAL	1
C05	CR1024-	CAPACITOR; MONO. CERAMIC .001uF; 100V	1
C06	CR1024-	CAPACITOR; MONO. CERAMIC .001uF; 100V	1
C07	CR1024-	CAPACITOR; MONO. CERAMIC .001uF; 100V	1
C08	CR1024-	CAPACITOR; MONO. CERAMIC .001uF; 100V	1
C09	CR1024-	CAPACITOR; MONO. CERAMIC .001uF; 100V	1
C10	CR1024-	CAPACITOR; MONO. CERAMIC .001uF; 100V	1
C11	CF1543-	CAPACITOR; FILM .15/63V	1
C12	CF1543-	CAPACITOR; FILM .15/63V	1
C13	CF1033-	CAPACITOR; FILM .01/63	1
C14	CR1816-	CAPACITOR; MONO. CERAMIC 180 pF; 100V	1
C15	CT4751-	CAPACITOR; TANTALUM 4.7UF/20V; AXIAL	1
C16	CT4751-	CAPACITOR; TANTALUM 4.7UF/20V; AXIAL	1
C18	CT4751-	CAPACITOR; TANTALUM 4.7UF/20V; AXIAL	1
D02	DD3700-	DIODE MPN3700	1
I01	IM5146-	INT. CKT.; MISC. 145156	1
I02	IM2016-	INT. CKT.; MISC. 12016	1
I03	IM0358-	INT. CKT.; MISC. LM358	1
I04	IM7812-	INT. CKT.; MISC. REGULATOR; 12V 7812	1
I05	IM7805-	INT. CKT.; MISC. REGULATOR; 5V 7805	1
L02	LF04R7-	INDUCTOR; FIXED 4.7 uH; SM	1
L03	LF0273-	INDUCTOR; FIXED 27 uH; SM	1
Q01	QX4402-	TRANSISTOR 2N4402	1
Q02	QX0911-	TRANSISTOR MPS911	1
R01	RC0181-	RESISTOR; CARBON FILM 180 Ohm; 5%; 1/4 watt	1
R02	RC0104-	RESISTOR; CARBON FILM 100K 5% 1/4W	1
R03	RC0104-	RESISTOR; CARBON FILM 100K 5% 1/4W	1
R04	RC0103-	RESISTOR; CARBON FILM 10 Kohm; 5%; 1/4 watt	1
R05	RC0103-	RESISTOR; CARBON FILM 10 Kohm; 5%; 1/4 watt	1
R06	RC0472-	RESISTOR; CARBON FILM 4.7 Kohm; 5%; 1/4 watt	1
R07	PW0103-	Pot. Top Adjust .3 Dia 10 K	1
R08	PW0103-	Pot. Top Adjust .3 Dia 10 K	1
R09	RC0102-	RESISTOR; CARBON FILM 1 Kohm; 5%; 1/4 watt	1
R10	RC0102-	RESISTOR; CARBON FILM 1 Kohm; 5%; 1/4 watt	1
R11	RC0102-	RESISTOR; CARBON FILM 1 Kohm; 5%; 1/4 watt	1
R12	RC0331-	RESISTOR; CARBON FILM 330 Ohm; 5%; 1/4 watt	1
R13	RC0473-	RESISTOR; CARBON FILM 47 Kohm; 5%; 1/4 watt	1
R14	RC0683-	RESISTOR; CARBON FILM 68 Kohm; 5%; 1/4 watt	1
R20	RC0472-	RESISTOR; CARBON FILM 4.7 Kohm; 5%; 1/4 watt	1
R21	RC0222-	RESISTOR; CARBON FILM 2.2 Kohm; 5%; 1/4 watt	1
R22	RC0681-	RESISTOR; CARBON FILM 680 Ohm; 5%; 1/4 watt	1
R23	RC0471-	RESISTOR; CARBON FILM 470 Ohm; 5%; 1/4 watt	1
R24	RC0181-	RESISTOR; CARBON FILM 180 Ohm; 5%; 1/4 watt	1
R25	RC0182-	RESISTOR; CARBON FILM 1.8 Kohm; 5%; 1/4 watt	1

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Ref #	Part #	Description	Qty
U04	XT1200-	CRYSTAL; QUARTZ POS-200	1
U07	XT1000-	CRYSTAL; QUARTZ 1.0 MHZ OSC.	1



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Ref#	Part #	Description	Qty
01	PC2714-6	PCB SYNTHESIZER; NAV	1
02	HS1815-2	SPACER STANDOFF; THRU HOLE	3
03	HS1816-	SPACER STANDOFF; 4-40 THD	3
04	SM1840-3	SHEET METAL CASE; MODULE	1
05	SM1841-3	SHEET METAL COVER; MODULE	1
06	EC1703-	CONNECTOR CONN; SMA; PANEL MT.	1
07	EC1002-	CONNECTOR 14 PIN; RIBBON CONN	2
08	NB403F-	FASTENERS 4-40x3/16 P100 SS	6
09	MP1053-	MISC. PARTS PIN HEADERS; GOLD; DUAL RO	1
10	NB403P-	FASTENERS 4-40x3/16 PP SS	1
C01	CF1543-	CAPACITOR; FILM .15/63V	1
C02	CF1543-	CAPACITOR; FILM .15/63V	1
C03	CE2262-	CAP; ALUM ELECT. 22/50V;RADIAL	1
C04	CE2262-	CAP; ALUM ELECT. 22/50V;RADIAL	1
C05	CR1014-	CAP; MONO-CERAMIC 100 PF; 100V	1
C06	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C07	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C08	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C09	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C10	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C11	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C12	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C13	CF1033-	CAPACITOR; FILM .01/63	1
C14	CR5603-	CAP; MONO-CERAMIC 56 PF; 100v	1
C15	CR5603-	CAP; MONO-CERAMIC 56 PF; 100v	1
C16	CR5603-	CAP; MONO-CERAMIC 56 PF; 100v	1
C17	CR2703-	CAP; MONO-CERAMIC 27 PF, 100V radial	1
C18	CS0470-	CAP; SMT; CER; 47pF; 100V; 1206	1
C19	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C20	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C21	CR6R84-	CAP; MONO-CERAMIC 6.8 PF, 100V, 5%	1
C22	CR2703-	CAP; MONO-CERAMIC 27 PF, 100V radial	1
D01	DD0209-	DIODE MV209	1
L01	LF2714-	INDUCTOR; FIXED .15 uH Adjustable Coil	1
L02	LF04R7-	INDUCTOR; FIXED 4.7 uH; SM	1
L03	LF04R7-	INDUCTOR; FIXED 4.7 uH; SM	1
Q01	QX0H10-	TRANSISTOR MPSH10	1
Q02	QX0H10-	TRANSISTOR MPSH10	1
Q03	QX0911-	TRANSISTOR MPS911	1
R01	RC0103-	RESISTOR; CARB. 10 Kohm; 5%; 1/4 watt	1
R02	RC0103-	RESISTOR; CARB. 10 Kohm; 5%; 1/4 watt	1
R03	RC0472-	RESISTOR; CARB. 4.7 Kohm; 5%; 1/4 watt	1
R04	RC0104-	RESISTOR; CARB. 100K 5% 1/4W	1
R05	RC0104-	RESISTOR; CARB. 100K 5% 1/4W	1
R06	RC0104-	RESISTOR; CARB. 100K 5% 1/4W	1
R07	RC0472-	RESISTOR; CARB. 4.7 Kohm; 5%; 1/4 watt	1
R08	RC0472-	RESISTOR; CARB. 4.7 Kohm; 5%; 1/4 watt	1
R09	RC0472-	RESISTOR; CARB. 4.7 Kohm; 5%; 1/4 watt	1
R10	RC0182-	RESISTOR; CARB. 1.8 Kohm; 5%; 1/4 watt	1
R11	RC0182-	RESISTOR; CARB. 1.8 Kohm; 5%; 1/4 watt	1

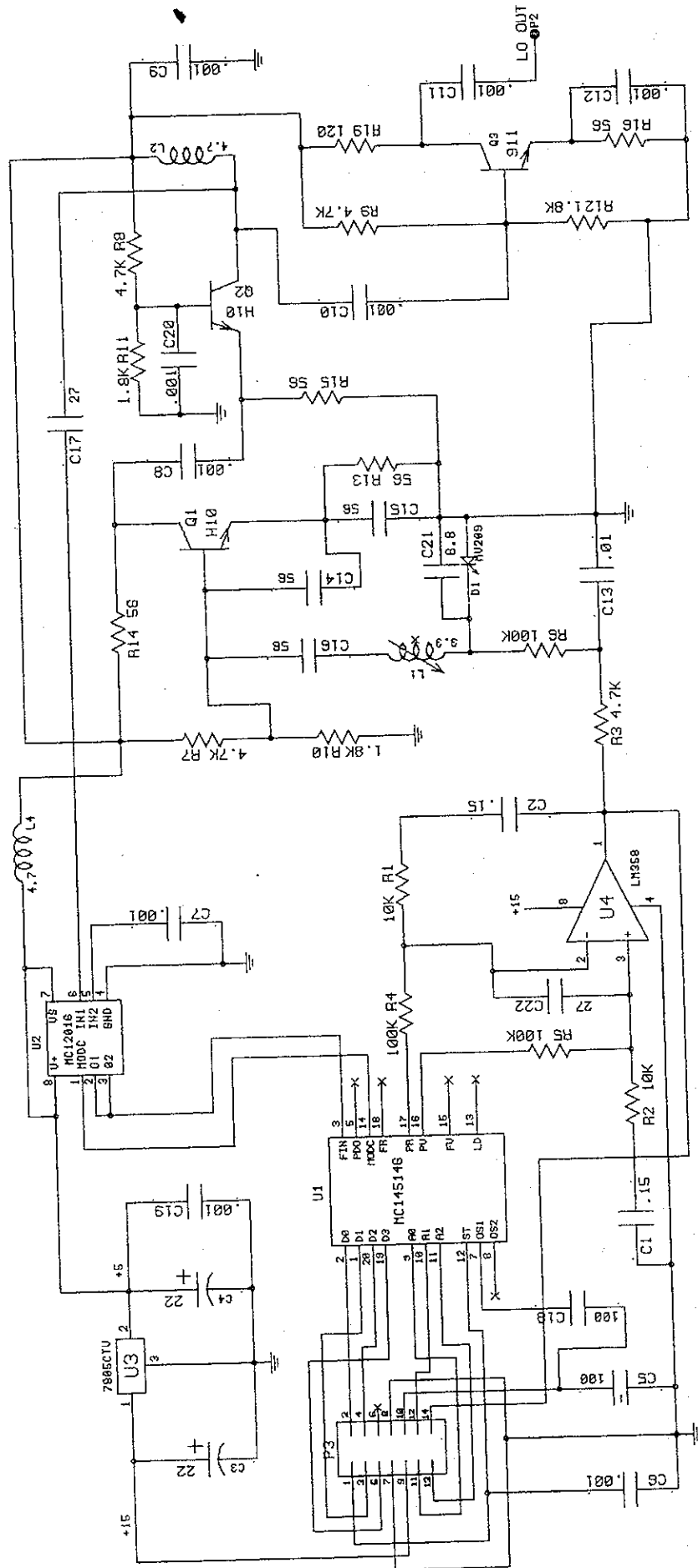
Ref#	Part #	Description	Qty
01	PC2714-6	PCB SYNTHESIZER; NAV	1
02	HS1815-2	SPACER STANDOFF; THRU HOLE	3
03	HS1816-	SPACER STANDOFF; 4-40 THD	3
04	SM1840-3	SHEET METAL CASE; MODULE	1
05	SM1841-3	SHEET METAL COVER; MODULE	1
06	EC1703-	CONNECTOR CONN; SMA; PANEL MT.	1
07	EC1002-	CONNECTOR 14 PIN; RIBBON CONN	2
08	NB403F-	FASTENERS 4-40x3/16 Ph Fl 100, MS246	6
09	MP1053-	MISC. PARTS PIN HEADERS; GOLD; DUAL RO	1
10	NB403P-	FASTENERS 4-40x3/16 Ph Pan, MS51957-	1
C01	CF1543-	CAPACITOR; FILM .15/63V	1
C02	CF1543-	CAPACITOR; FILM .15/63V	1
C03	CE2262-	CAP; ALUM ELECT. 22/50V; RADIAL	1
C04	CE2262-	CAP; ALUM ELECT. 22/50V; RADIAL	1
C05	CR1014-	CAP; MONO-CERAMIC 100 PF; 100V	1
C06	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C07	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C08	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C09	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C10	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C11	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C12	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C13	CF1033-	CAPACITOR; FILM .01/63	1
C14	CR5603-	CAP; MONO-CERAMIC 56 PF; 100V	1
C15	CR5603-	CAP; MONO-CERAMIC 56 PF; 100V	1
C16	CR5603-	CAP; MONO-CERAMIC 56 PF; 100V	1
C17	CR2703-	CAP; MONO-CERAMIC 27 PF, 100V radial	1
C18	CS0470-	CAP; SMT; CER; 47pF; 100V; 1206	1
C19	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C20	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C21	CR6R84-	CAP; MONO-CERAMIC 6.8 PF, 100V, 5%	1
D01	DD0209-	DIODE MV209	1
L01	LF2714-	INDUCTOR; FIXED .15 uH Adjustable Coil	1
L02	LF04R7-	INDUCTOR; FIXED 4.7 uH; SM	1
L03	LF04R7-	INDUCTOR; FIXED 4.7 uH; SM	1
Q01	QX0H10-	TRANSISTOR MPSH10	1
Q02	QX0H10-	TRANSISTOR MPSH10	1
Q03	QX0911-	TRANSISTOR MPS911	1
R01	RC0103-	RESISTOR; CARB. 10 Kohm; 5%; 1/4 watt	1
R02	RC0103-	RESISTOR; CARB. 10 Kohm; 5%; 1/4 watt	1
R03	RC0103-	RESISTOR; CARB. 10 Kohm; 5%; 1/4 watt	1
R04	RC0104-	RESISTOR; CARB. 100K 5% 1/4W	1
R05	RC0104-	RESISTOR; CARB. 100K 5% 1/4W	1
R06	RC0104-	RESISTOR; CARB. 100K 5% 1/4W	1
R07	RC0472-	RESISTOR; CARB. 4.7 Kohm; 5%; 1/4 watt	1
R08	RC0472-	RESISTOR; CARB. 4.7 Kohm; 5%; 1/4 watt	1
R09	RC0472-	RESISTOR; CARB. 4.7 Kohm; 5%; 1/4 watt	1
R10	RC0182-	RESISTOR; CARB. 1.8 Kohm; 5%; 1/4 watt	1
R11	RC0182-	RESISTOR; CARB. 1.8 Kohm; 5%; 1/4 watt	1
R12	RC0182-	RESISTOR; CARB. 1.8 Kohm; 5%; 1/4 watt	1

NAV SYNTHESIZER

SS2714-6

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Ref#	Part #	Description	Qty
01	PC2714-6	PCB SYNTHESIZER; NAV	1
02	HS1815-2	SPACER STANDOFF; THRU HOLE	3
03	HS1816-	SPACER STANDOFF; 4-40 THD	3
04	SM1840-3	SHEET METAL CASE; MODULE	1
05	SM1841-3	SHEET METAL COVER; MODULE	1
06	EC1703-	CONNECTOR CONN; SMA; PANEL MT.	1
07	EC1002-	CONNECTOR 14 PIN; RIBBON CONN	2
08	NB403F-	FASTENERS 4-40x3/16 Ph Fl 100, MS246	6
09	MP1053-	MISC. PARTS PIN HEADERS; GOLD; DUAL RO	1
10	NB403P-	FASTENERS 4-40x3/16 Ph Pan, MS51957-	1
C01	CF1543-	CAPACITOR; FILM .15/63V	1
C02	CF1543-	CAPACITOR; FILM .15/63V	1
C03	CE2262-	CAP; ALUM ELECT. 22/50V; RADIAL	1
C04	CE2262-	CAP; ALUM ELECT. 22/50V; RADIAL	1
C05	CR1014-	CAP; MONO-CERAMIC 100 PF; 100V	1
C06	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C07	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C08	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C09	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C10	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C11	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C12	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C13	CF1033-	CAPACITOR; FILM .01/63	1
C14	CR2703-	CAP; MONO-CERAMIC 27 PF, 100V radial	1
C15	CR2703-	CAP; MONO-CERAMIC 27 PF, 100V radial	1
C16	CR5603-	CAP; MONO-CERAMIC 56 PF; 100V	1
C17	CR2703-	CAP; MONO-CERAMIC 27 PF, 100V radial	1
C18	CS0470-	CAP; SMT; CER; 47pF; 100V; 1206	1
C19	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
C20	CR1024-	CAP; MONO-CERAMIC .001uF; 100V	1
D01	DD0209-	DIODE MV209	1
L01	LF2714-	INDUCTOR; FIXED .15 uH Adjustable Coil	1
L02	LF04R7-	INDUCTOR; FIXED 4.7 uH; SM	1
L03	LF04R7-	INDUCTOR; FIXED 4.7 uH; SM	1
Q01	QX0H10-	TRANSISTOR MPSH10	1
Q02	QX0H10-	TRANSISTOR MPSH10	1
Q03	QX0911-	TRANSISTOR MPS911	1
R01	RC0103-	RESISTOR; CARB. 10 Kohm; 5%; 1/4 watt	1
R02	RC0103-	RESISTOR; CARB. 10 Kohm; 5%; 1/4 watt	1
R03	RC0103-	RESISTOR; CARB. 10 Kohm; 5%; 1/4 watt	1
R04	RC0104-	RESISTOR; CARB. 100K 5% 1/4W	1
R05	RC0104-	RESISTOR; CARB. 100K 5% 1/4W	1
R06	RC0104-	RESISTOR; CARB. 100K 5% 1/4W	1
R07	RC0472-	RESISTOR; CARB. 4.7 Kohm; 5%; 1/4 watt	1
R08	RC0472-	RESISTOR; CARB. 4.7 Kohm; 5%; 1/4 watt	1
R09	RC0472-	RESISTOR; CARB. 4.7 Kohm; 5%; 1/4 watt	1
R10	RC0182-	RESISTOR; CARB. 1.8 Kohm; 5%; 1/4 watt	1
R11	RC0182-	RESISTOR; CARB. 1.8 Kohm; 5%; 1/4 watt	1
R12	RC0182-	RESISTOR; CARB. 1.8 Kohm; 5%; 1/4 watt	1
R13	RC0560-	RESISTOR; CARB. 56 OHM; 1/4W 5%	1



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Ref#	Part #	Description	Qty
R12	RC0182-	RESISTOR; CARB. 1.8 Kohm; 5%; 1/4 watt	1
R13	RC0560-	RESISTOR; CARB. 56 OHM; 1/4W 5%	1
R14	RC0560-	RESISTOR; CARB. 56 OHM; 1/4W 5%	1
R15	RC0560-	RESISTOR; CARB. 56 OHM; 1/4W 5%	1
R16	RC0560-	RESISTOR; CARB. 56 OHM; 1/4W 5%	1
R17	RC0390-	RESISTOR; CARB. 39 OHM; 1/4WATT 5%	1
R18	RC0390-	RESISTOR; CARB. 39 OHM; 1/4WATT 5%	1
U01	IM5146-	INT. CKT.; MISC. 145156	1
U02	IM2016-	INT. CKT.; MISC. 12016	1
U03	IM7805-	INT. CKT.; MISC. REGULATOR; 5V 7805	1
U04	IM0358-	INT. CKT.; MISC. LM358N (not ST)	1

Ref#	Part #	Description	Qty
R13	RC0560-	RESISTOR; CARB. 56 OHM; 1/4W 5%	1
R14	RC0560-	RESISTOR; CARB. 56 OHM; 1/4W 5%	1
R15	RC0560-	RESISTOR; CARB. 56 OHM; 1/4W 5%	1
R16	RC0560-	RESISTOR; CARB. 56 OHM; 1/4W 5%	1
R17	RC0390-	RESISTOR; CARB. 39 OHM; 1/4WATT 5%	1
R18	RC0390-	RESISTOR; CARB. 39 OHM; 1/4WATT 5%	1
U01	IM5146-	INT. CKT.; MISC. 145156	1
U02	IM2016-	INT. CKT.; MISC. 12016	1
U03	IM7805-	INT. CKT.; MISC. REGULATOR; 5V 7805	1
U04	IM0358-	INT. CKT.; MISC. LM358N (not ST)	1

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Ref#	Part #	Description	Qty
R14	RC0560-	RESISTOR; CARB. 56 OHM; 1/4W 5%	1
R15	RC0560-	RESISTOR; CARB. 56 OHM; 1/4W 5%	1
R16	RC0560-	RESISTOR; CARB. 56 OHM; 1/4W 5%	1
R17	RC0390-	RESISTOR; CARB. 39 OHM; 1/4WATT 5%	1
R18	RC0390-	RESISTOR; CARB. 39 OHM; 1/4WATT 5%	1
U01	IM5146-	INT. CKT.; MISC. 145156	1
U02	IM2016-	INT. CKT.; MISC. 12016	1
U03	IM7805-	INT. CKT.; MISC. REGULATOR; 5V 7805	1
U04	IM0358-	INT. CKT.; MISC. LM358	1