

**STORNOPHONE 9000
FIXED RADIO STATION
MODULE MANUAL**

66 - 88 MHz

138 - 174 MHz

403 - 470 MHz

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**66 - 88 MHz
MODULE MANUAL**

138 - 174 MHz

403 - 470 MHz

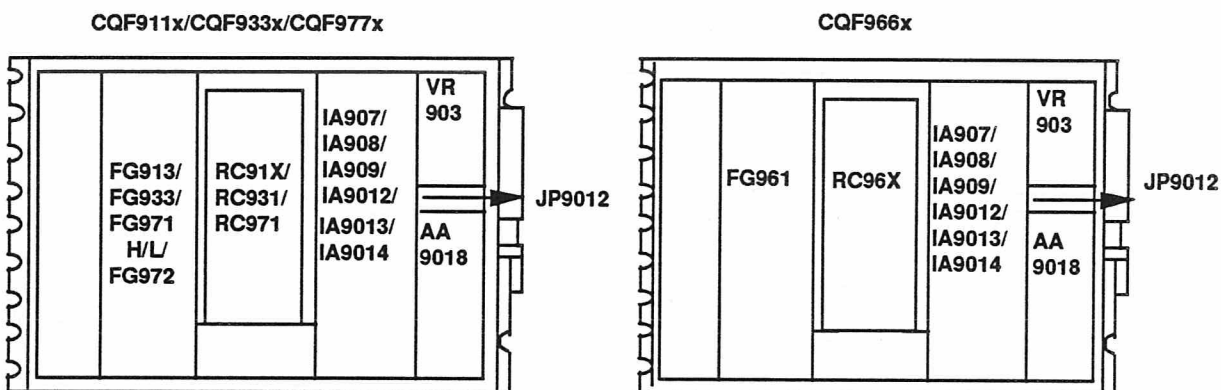
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COLOUR CODE**

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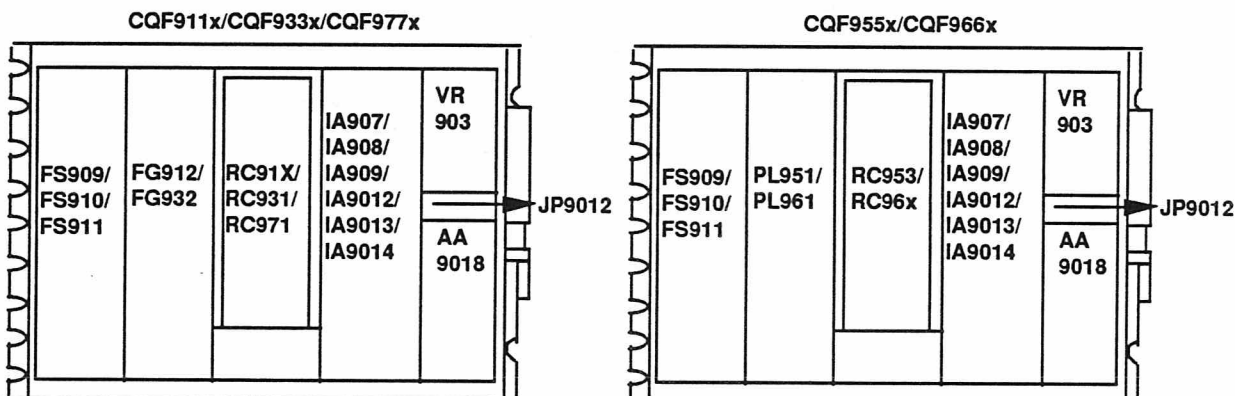
MULTIPLIER VERSION



IF AMPLIFIER MODULE	CHANNEL SPACING
IA907 / IA9012	25.0 kHz
IA908 / IA9013	20.0 kHz
IA909 / IA9014	12.5 kHz

RX CONVERTER MODULE	HIGH INTERMODULATION ATT.	HIGH SENSITIVITY (ONLY SIMPLEX)
RC911	X	
RC912		X
RC931	X	
RC953	X	
RC969	X	
RC962		X
RC971	X	

SYNTHESIZER VERSION

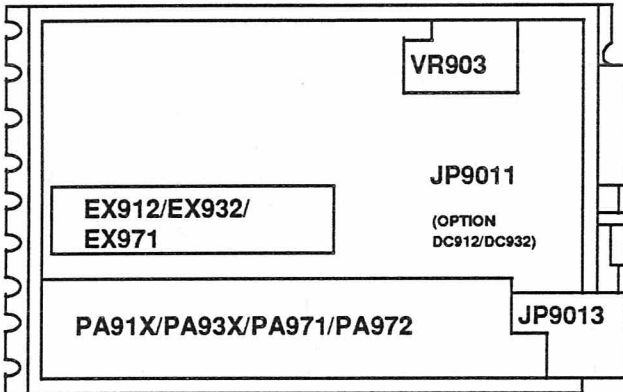


FREQ. SYNTH. MODULE	CHANNEL SPACING
FS909	12.5kHz
FS9010	20.0kHz
FS9011	25.0 kHz

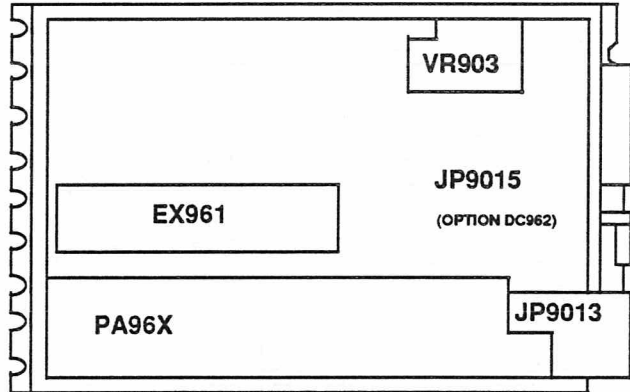
TRANSMITTER

MULTIPLIER VERSION

CQF911x / CQF933x / CQF977x

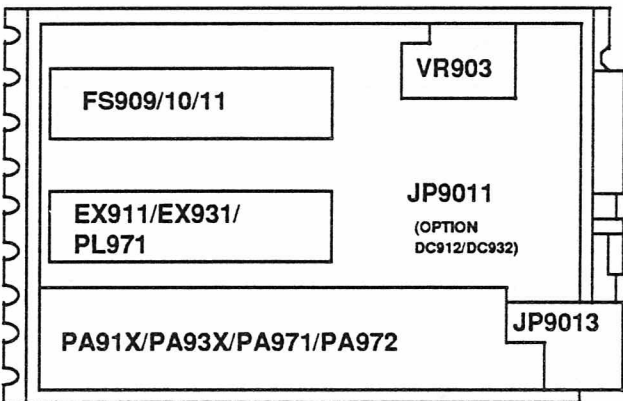


CQF966x

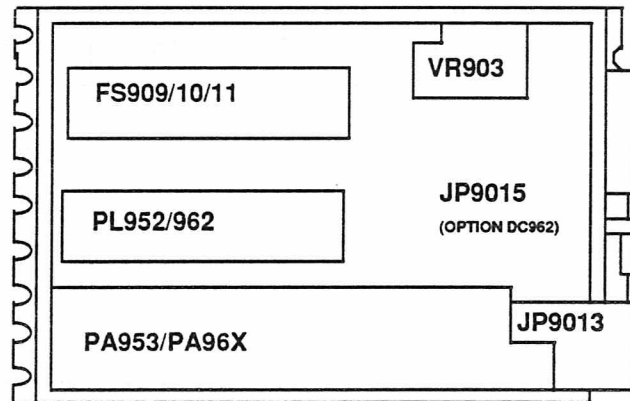


SYNTHESIZER VERSION

CQF911x / CQF933x / CQF977x



CQF955x / CQF966x



FREQ. SYNTH. MODULE	CHANNEL SPACING
FS909	12.5 kHz
FS9010	20.0 kHz
FS9011	25.0 kHz

AA901/AA902

AUDIO PROCESSOR MICROMODULE

The audio processor micromodule, AA901 is for use in 20/25 kHz equipment and AA902 is for use in 12.5 kHz equipment. It contains a preemphasis circuit, an audio amplifier, a limiter, a channel guard level control, and two roll-off filters. The circuitry shapes the audio properly to produce a phase-modulated carrier when used in conjunction with a frequency modulated oscillator, and limits the deviation to be within the values required by the authorities. An audio input is provided prior to the pre-emphasis and limiting circuits, and a channel guard tone input is provided after these circuits.

The microphone bias is provided via the TX Audio pin.

The audio micromodule which is a plug-in type utilizes a quad-op-amp to provide the necessary gain. The microphone signal is fed to the first amplifier through a passive pre-emphasis network to achieve a rising

audio characteristic which is needed with the true FM oscillator. The oscillator thus produces a phase-modulated type of signal. Limiting diodes are used to ensure the second amplifier is not being over driven.

The second amplifier performs the actual audio limiting by using biased diodes in the feedback network. If the audio signals exceed a pre-set level these diodes will conduct and prevent any further increase of the output.

After the limiter, the signal passes a roll-off filter which prevents interference on adjacent channels by limiting the audio frequencies above 3 kHz. This filter is an active type and utilizes the other two op-amps contained in the IC.

Channel Guard signals are applied before the roll-off filter and their amplitude must be adjusted separately to produce the correct modulation.

TECHNICAL SPECIFICATIONS

Input voltage

9.0 V DC $\pm 5\%$

Load impedance

2.2 Kohm AC/DC min.

Output voltage

6.6 V peak to peak max.

3.3 V peak to peak min.

for 1.0 V rms into mike input at 1000 Hz

Current consumption

4 mA max. (mike excluded)

Transmit audio response

6 dB octave relative to 1000 Hz

AA901:

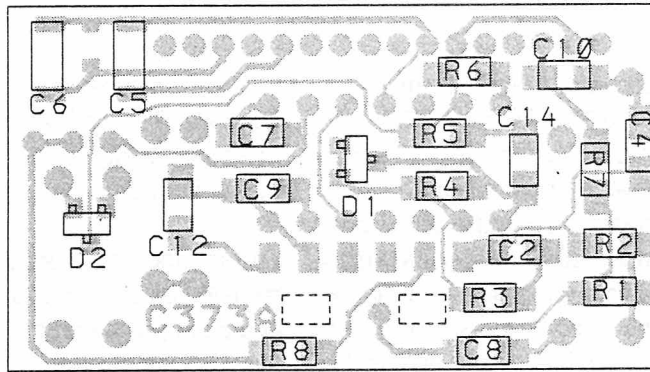
Mike input	300 Hz - 3000 Hz:	+1, -3 dB
	400 Hz - 2700 Hz:	+1, -1.5 dB

AA902:

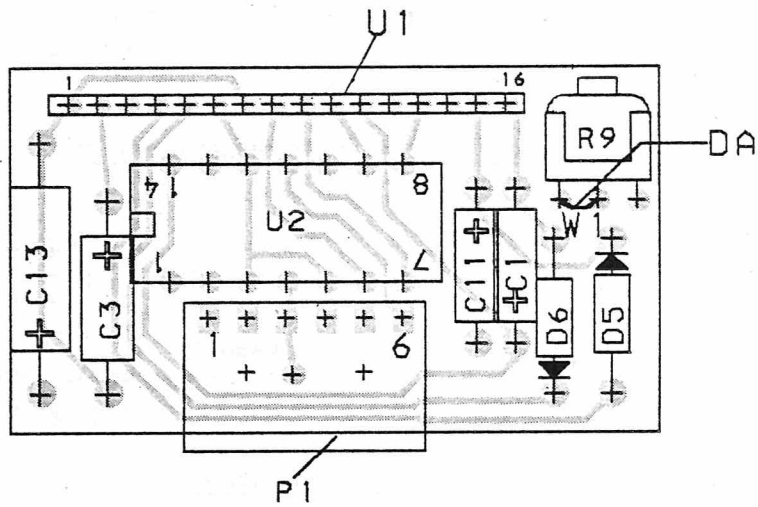
Mike input	300 Hz - 2550 Hz:	+1, -3 dB
	3000 Hz:	+1, -4.5 dB

Distorsion

Less than 1% for 1000 Hz at threshold



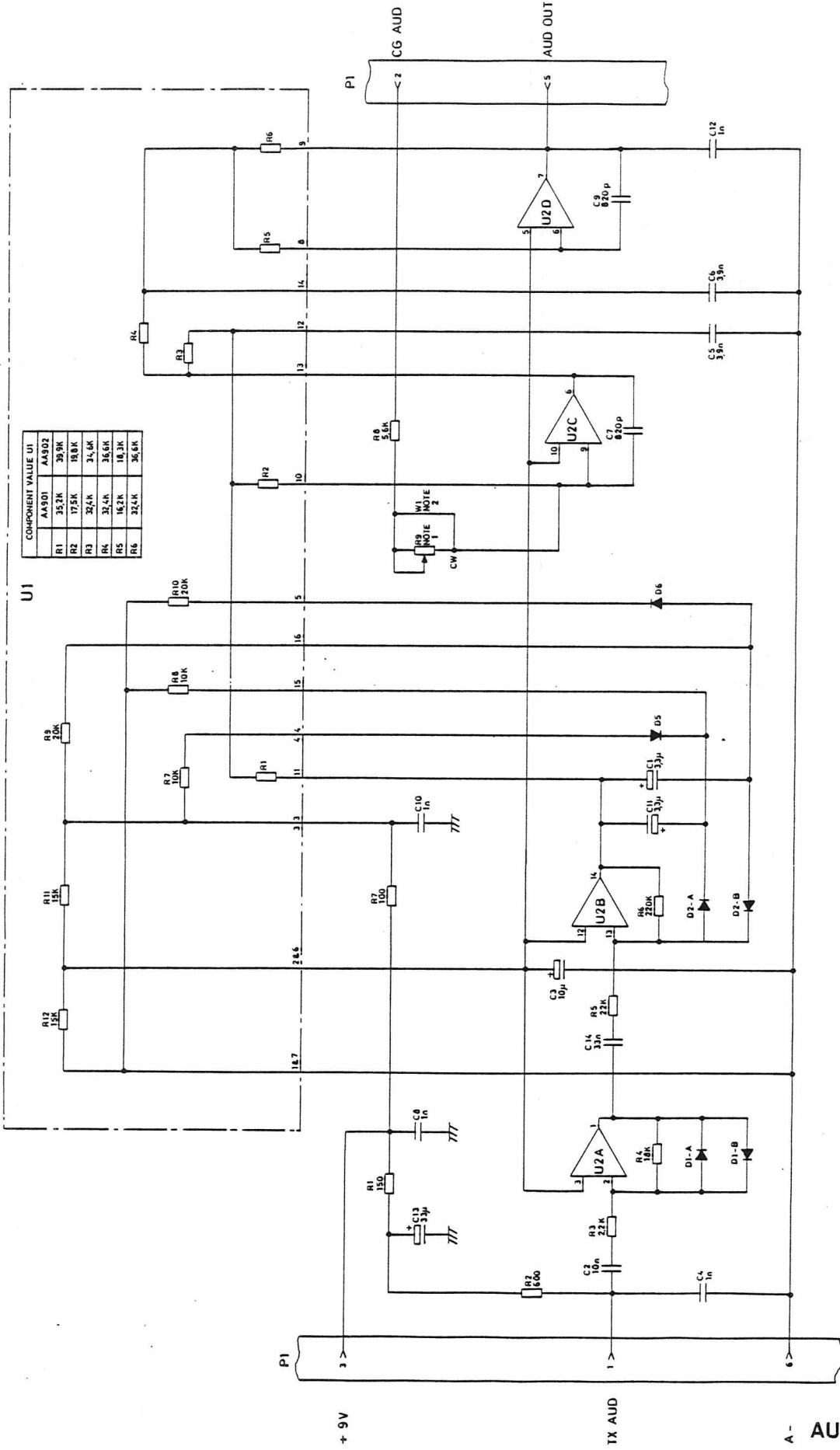
BACKSIDE OF BOARD



FRONTSIDE OF BOARD

**AUDIO PROCESSOR AA901-2
COMPONENT LAYOUT**

D403.786/2



NOTE 1: R9 PRESENT FOR CG LEVEL ADJUST (5K-500K)
 NOTE 2: W1 PRESENT WITHOUT CG LEVEL ADJUST

A - AUDIO PROCESSOR
 AA901, AA902
 D402.918/6

PARTS LIST FOR AUDIO PROCESSOR AA901/AA902

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GTN6106A	D900072G1 AA901 W.CG LEVEL ADJ.			
	GTN6107A	D900072G2 AA902 W.CG LEVEL ADJ.			
	0102720B96	D900071G1 BD F. AA901 (A)			
	0102720B97	D900071G2 BD F. AA902 (B)			
C01	B800650P15	CAP TA 3.3 UF 20% 10V			
C02	A700011P8	CAP CER CL2 10N 20% 50V			
C03	B800650P16	CAP TA 10 UF 20% 10V			
C04	A700058P5	CAP CER 1NF 50V			
C05	A700010P25	CAP CER NPO 3N9 5% 50V			
C06	A700010P25	CAP CER NPO 3N9 5% 50V			
C07	A700010P9	CAP CER 820PF 50V			
C08	A700058P5	CAP CER 1NF 50V			
C09	A700010P9	CAP CER 820PF 50V			
C10	A700010P11	CAP CER 1NF 50V			
C11	B800650P15	CAP TA 3.3 UF 20% 10V			
C12	A700058P5	CAP CER 1NF 50V			
C13	B800650P17	CAP TA 33 UF 20% 10V			
C14	A700058P120	CAP CER 33 NF 5% U4			
D01	A700053P1	DIO SI BAV99			
D02	A700053P1	DIO SI BAV99			
D05	A700028P1	DIO SI SIG 1N4148			
D06	A700028P1	DIO SI SIG 1N4148			
P01	A701486P5	CONN			
R01	J707685P151	RES MFLM 150R 5% 1/8W			
R02	J707685P561	RES MFLM 560R 5% 1/8W			
R03	J707385P222	RES MFILM 2K2 5% 1/8W			
R04	J707385P183	RES MFILM 18K 5% 1/8W			
R05	J707385P223	RES MFILM 22K 5% 1/8W			
R06	J707385P224	RES MFILM 220K 5% 1/8W			
R07	J707385P101	RES MFILM 100R 5% 1/8W			
R08	J707385P562	RES MFILM 5K6 5% 1/8W			
R09	A701275P1	RES VAR CERM 500K 0.5W			
U1	D900290G1	NET RES (A)			
U1	D900290G2	NET RES (B)			
U2	A701789P3	INT CKT LIN LM224			
		NON REFERENCED ITEMS:			
	A701680P2	INS			
	B800586P1	HOLDER MLD			
	C850517P5	CAN			
	C850688P1R3	RETAINER			

AA9018

AUDIO AMPLIFIER

The AA9018 is a line amplifier and squelch circuit for use in base station receivers. The amplifier is built on a wiring board with a connector for the receiver mother board. The circuit consists of a gated audio amplifier and a squelch micromodule type SQ903.

The amplifier circuit has two gated outputs, a non-deemphased output (B) and a transformer coupled line output (A), and a non-gated non-deemphased output (C).

The signal from the discriminator is applied to both the squelch input and the amplifier input.

A low pass filter removes noise signal and the signal is then deemphased and fed to the line amplifier. Two gate transistors are used to control the signal to outputs A and B. The output is disabled when the gate terminal is pulled to chassis.

The AF line level is adjustable with potentiometer R8.

SPECIFICATIONS

Supply voltage

+9 V

Current drain

less than 30 mA

AF input impedance

22 Kohm (1000 Hz)

AF input level

300 mV r.m.s.

AF OUTPUT A; DEEMPHASED

Output level

1.1 V r.m.s. adjustable

Output impedance

600 ohm

Load impedance

600 ohm

Frequency characteristic

- 6 dB/octave +1/-3 dB 300 - 3000 Hz
- 18 dB/octave above 3000 Hz
- 6 dB/octave +1/-1.5 dB 400 - 2700 Hz

AF OUTPUT B; NON-DEEMPHASED

Output level

300 mV r.m.s.

Output impedance

approx. 0 ohm

Load impedance

min. 2 Kohm

Frequency characteristic

Flat +1/-3 dB 50 - 3000
-18 dB/octave above 3000 Hz

AF OUTPUT C; NON-DEEMPHASED

Output level

300 mV r.m.s.

Output impedance

approx. 0 ohm

Load impedance

min. 2 Kohm

Frequency characteristic

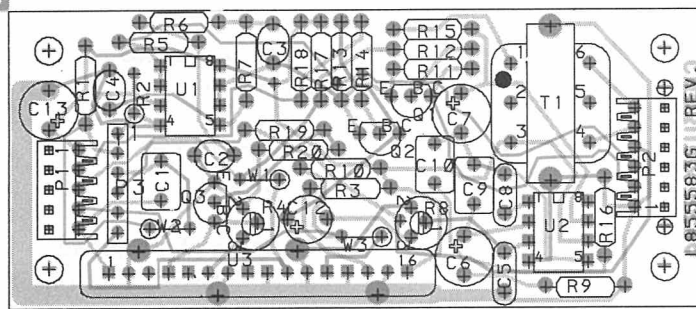
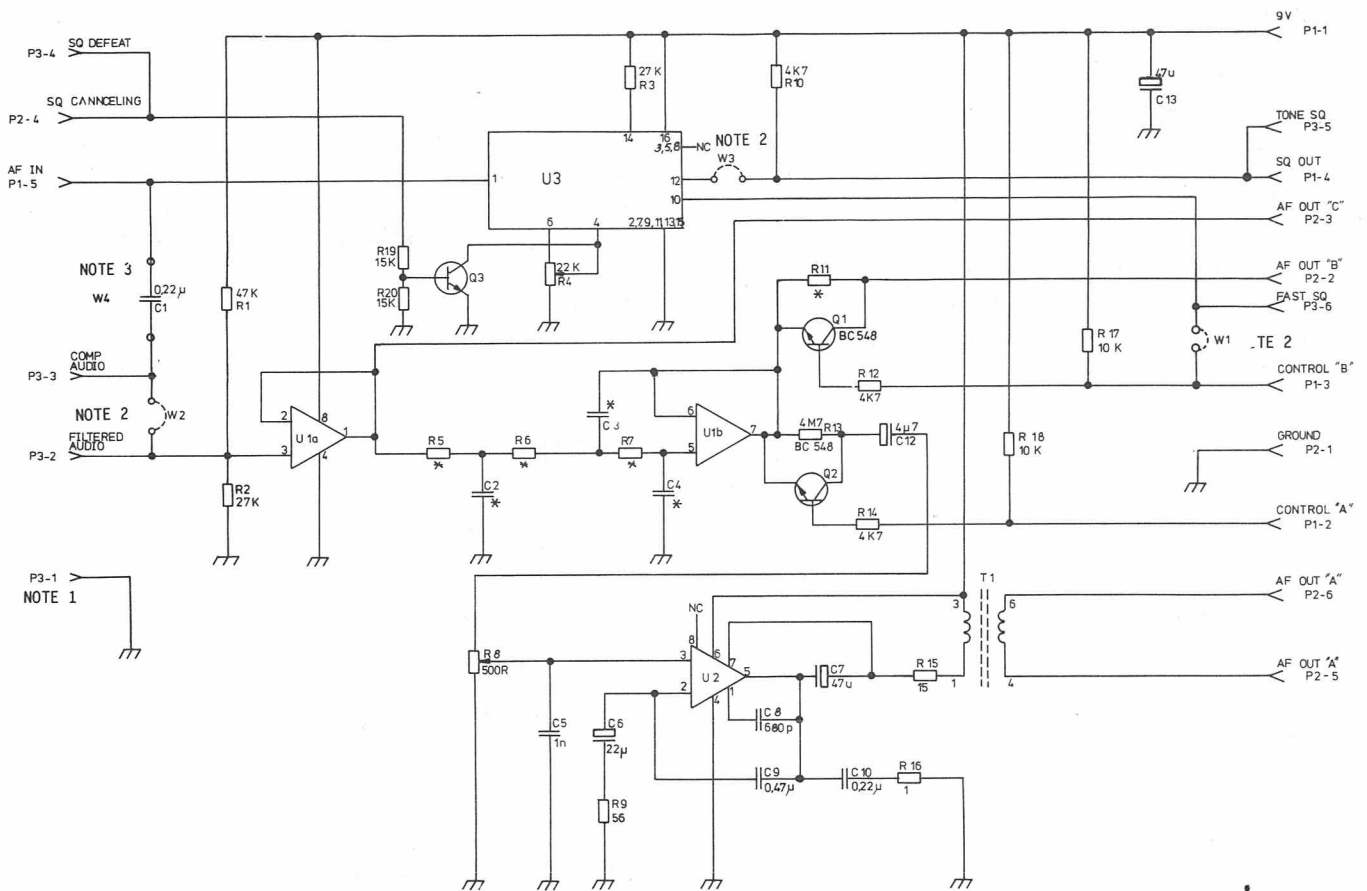
Flat +1/-3 dB 50 - 150 kHz

Dimensions

38 x 89 mm

Temperature range

-40°C to +85°C



NOTES:

1. P3 IS USED TO INTERFACE PRIVATE LINE EQUIPMENT.
2. W1 IS MOUNTED, WHEN GATING OF NON-DE -EMPHASIZED ("AF OUT -B") IS TO BE CONTROLLED BY THE "FAST SQ" SIGNAL. W2 AND W3 ARE TO BE USED TOGETHER WITH CG9010 (PRIVATE LINE MODULE). IN AA9022 THE COMPONENTS C1, Q1, R12, R17 AND W1 ARE OMITTED AND C1 IS REPLACED BY W4.

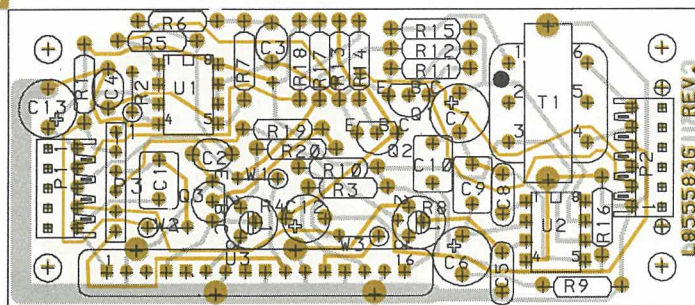
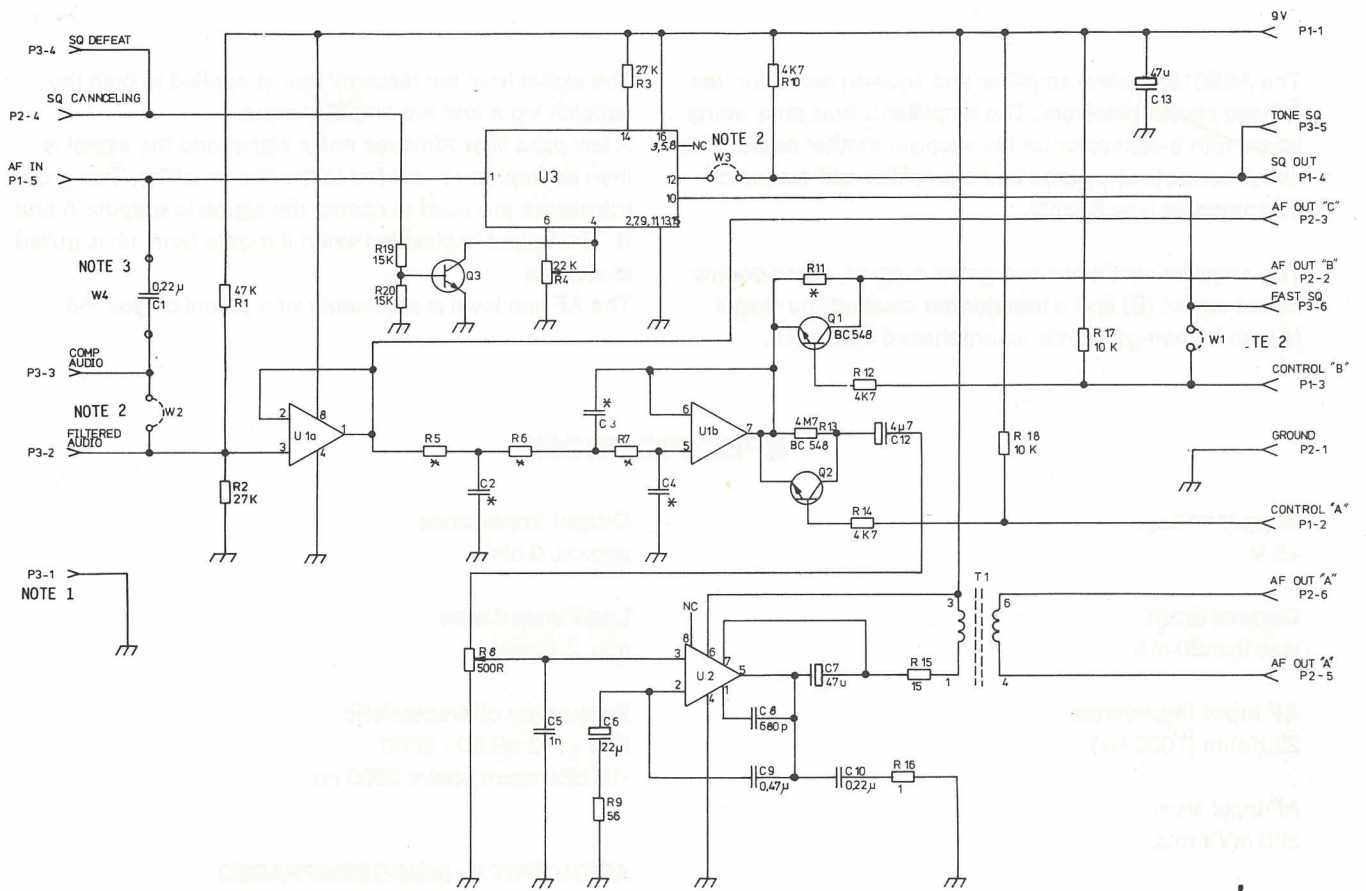
* SEE PARTSLIST X403.893.

CODE NO.	MODULE	BD REV.
L855590G1 - GRN6129A	AA9018	1/C
L855590G2	AA9022	1

AUDIO AMPLIFIER AA9018/AA9022

D403.859/7

AUDIO AMPLIFIER



NOTES:

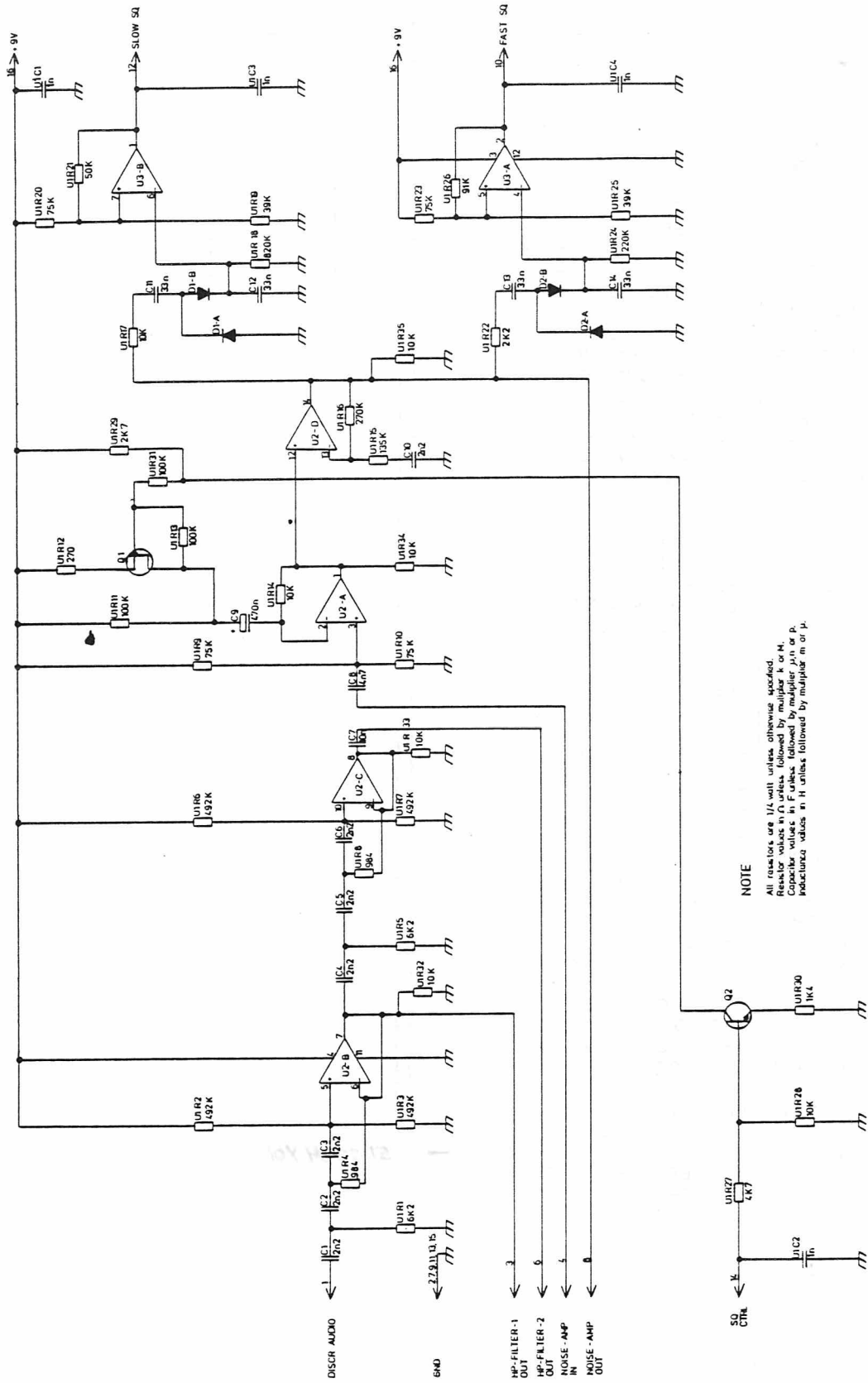
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* SEE PARTSLIST X403.893.

CODE NO.	MODULE	BD REV.
L855590G1 - GRN6129A	AA9018	1/C
L855590G2	AA9022	1

AUDIO AMPLIFIER AA9018/AA9022

D403.859/7



NOTE
 All resistors are 1/4 watt unless otherwise specified.
 Resistor values in Ω unless followed by multiplier k or M.
 Capacitor values in F unless followed by multiplier μ , n, or p.
 Inductor values in H unless followed by multiplier m or μ .

SQUELCH CIRCUIT SQ903

CODE NO. M905752G1 - 0102720B13

D403.674/2

PARTS LIST FOR AUDIO AMPLIFIER AA9018 BD REV.1/C & AA9022 BD REV.1

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GRN6129A L855583G2	L855583G1 AA9018 (A) AA9022 (B)			
C001	J707412P11	CAP,PYES 220N , 10% (A)			
C002	A700234P5	CAP,PYES 4N7 , 10% (A)			
C002	J710299P4	CAP,CER,NPO 1N8 , 5% (B)			
C003	A700234P7	CAP,PYES 10N , 10% (A)			
C003	J710299P6	CAP,CER,NPO 2N7 , 5% (B)			
C004	A700234P1	CAP,PYES 1N0 , 10% (A)			
C004	J710299P2	CAP,CER,NPO 560P , 5% (B)			
C005	A700233P7	CAP,CER,CL2 1N , 20%			
C006	2313749C48	CAP,TA,SOL 22U , 16V			
C007	J707444P17	CAP,TA,SOL 47U , 10V			
C008	A700233P6	CAP,CER,CL2 680P , 20%			
C009	J707412P13	CAP,PYES 470N , 10%			
C010	J707412P11	CAP,PYES 220N , 10%			
C012	2313749D72	CAP,TA,SOL 4U7 , 35V			
C013	J707444P17	CAP,TA,SOL 47U , 10V			
P001	A700041P4	CONN,PWB,FEM 05-CKT			
P002	A700041P5	CONN,PWB,FEM 06-CKT			
P003	J706788P106	CONN,PWB,MALE 06-CKT (A)			
P003	J708925P1	CONN PT, 6 PINS L-9.70MM (B)			
Q001	J707511P2	TSTR,NPN,SI BC 548C			
Q002	J707511P2	TSTR,NPN,SI BC 548C			
Q003	J707511P2	TSTR,NPN,SI BC 548C			
R001	A700019P57	RES,DEPC,1/4W 47K , 5%			
R002	A702110P54	RES,DEPC,1/4W 27K , 5%			
R003	A700019P54	RES,DEPC,1/4W 27K , 5%			
R004	A700016P5	RES,VAR,CERM 20K , 10%			
R005	A700019P49	RES,DEPC,1/4W 10K , 5% (A)			
R005	A701250P30	RES,MFLM,1/4W 20K0 , 1% (B)			
R006	A700019P49	RES,DEPC,1/4W 10K , 5% (A)			
R006	A701250P330	RES,MFLM,1/4W 20K0 , 1% (B)			
R007	A700019P49	RES,DEPC,1/4W 10K , 5% (A)			
R007	A701250P330	RES,MFLM,1/4W 20K0 , 1% (B)			
R008	A700016P9	RES,VAR,CERM 500R , 10%			
R009	A700019P22	RES,DEPC,1/4W 56R , 5%			
R010	A700019P45	RES,DEPC,1/4W 4K7 , 5%			
R011	A700019P81	RES,DEPC,1/4W 4M7 , 10% (A)			
R011	A700019P1	RES,DEPC,1/4W 1R0 , 5% (B)			
R012	A700019P45	RES,DEPC,1/4W 4K7 , 5%			
R013	A700019P81	RES,DEPC,1/4W 4M7 , 10%			
R014	A700019P45	RES,DEPC,1/4W 4K7 , 5%			
R015	A700019P15	RES,DEPC,1/4W 15R , 5%			
R016	A700019P1	RES,DEPC,1/4W 1R0 , 5%			
R017	A700019P49	RES,DEPC,1/4W 10K , 5%			
R018	A700019P49	RES,DEPC,1/4W 10K , 5%			
R019	A700019P51	RES,DEPC,1/4W 15K , 5%			
R020	A700019P51	RES,DEPC,1/4W 15K , 5%			
T001	J708384P1	TRANSFORMER AUDIO			
U001	A700086P2	IC,LIN,OP-AMP 1458			
U002	J707451P1	IC,LIN,AF-AMP 820			
U003	0102720B13	M905752G1 INT CKT ASM SQ 903 —	51-25 04 Y01		
W001	A702110P1	RES,DEPC,1/4W 1R0 , 5%			
W002	A702110P1	RES,DEPC,1/4W 1R0 , 5%			
W003	A702110P1	RES,DEPC,1/4W 1R0 , 5%			
	8402003U72A	L855584P17 BD PW			

AS9X2

ANTENNA SWITCH

AS9x2 is an electric antenna switch used in simplex CQF9000 base stations.

The module is used in radios up to 40 Watt and connects antenna to either the receiver input or the transmitter output.

CIRCUIT DESCRIPTION

An electronic switch circuit forward or reverse biases the different diodes so that the RF-circuit either directs the signal from the antenna to the receiver input or from the transmitter output to the antenna.

D1, D2 and D3 are low-harmonic PIN-diodes where D3 is placed in the receiver branch to increase the isolation from transmitter to receiver when the switch is in mode.

In receiver mode L3-C3-C4 constitutes a lowpass filter due to D1 and D2 being reverse biased and D3 forward biased.

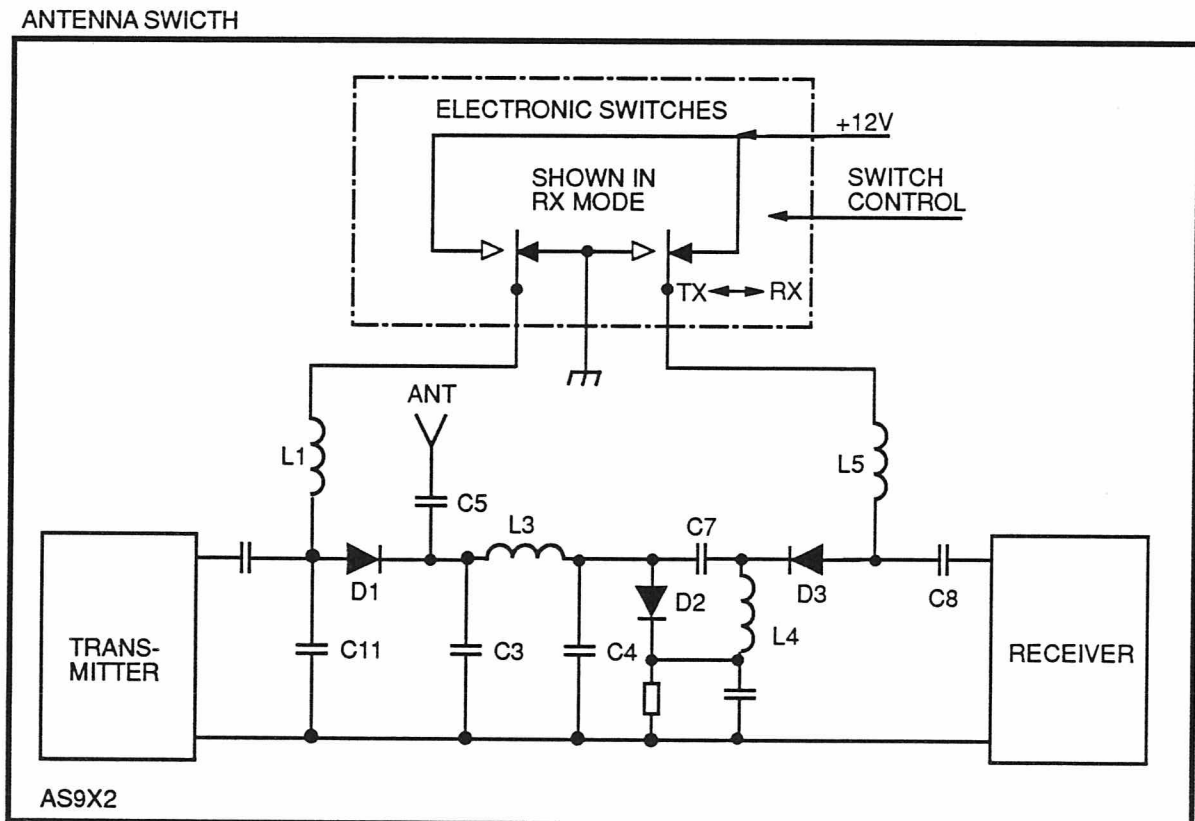
The receiver signal is then able to pass from the

antenna through C5-L3-C7-D3 and C8 to the receiver input.

In transmit mode D1 and D2 are forward biased and D3 reverse biased. D2 short-circuits capacitor C4 and L3-C3 constitutes a parallel resonance circuit with high impedance to the RF signal.

Capacitor C11 is in parallel with C3 and the transmitter signal is able to pass through D1 and C5 to the antenna.

The switch circuit comprises a current limiter (Q3-R10) to prevent damage to the antenna switch if the center conductor of the transmitter cable is accidentally shorted to ground.



SPECIFICATIONS

AS912 138 MHz to 174 MHz
AS932 66 MHz to 88 MHz
AS962 360 MHz to 410 MHz and 403 MHz to 470 MHz

Maximum transmitted power
40 Watt

Antenna impedance
Max. 50 ohm nominal

VSWR
1.4:1

TX (PA output) impedance
Max. 50 ohm nominal

VSWR
1.4:1

RX (Receiver input) impedance
Max. 50 ohm nominal

VSWR
1.3:1

Power supply (A+)
9.0 V to 16.6 V

Attack time (Switching of TX to antenna)
<10 μ S

Release time (Switching of RX to antenna)
>5 mS

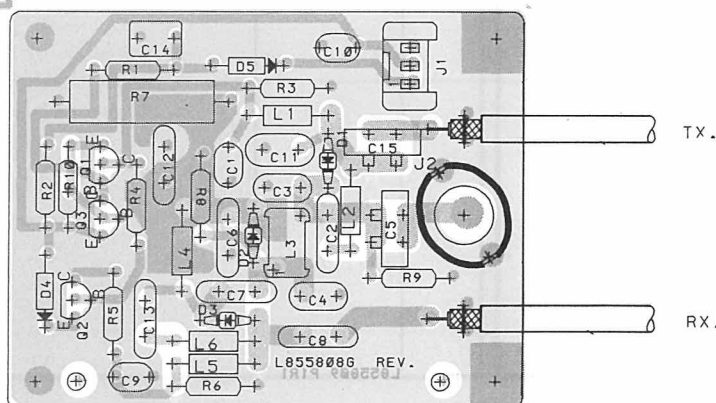
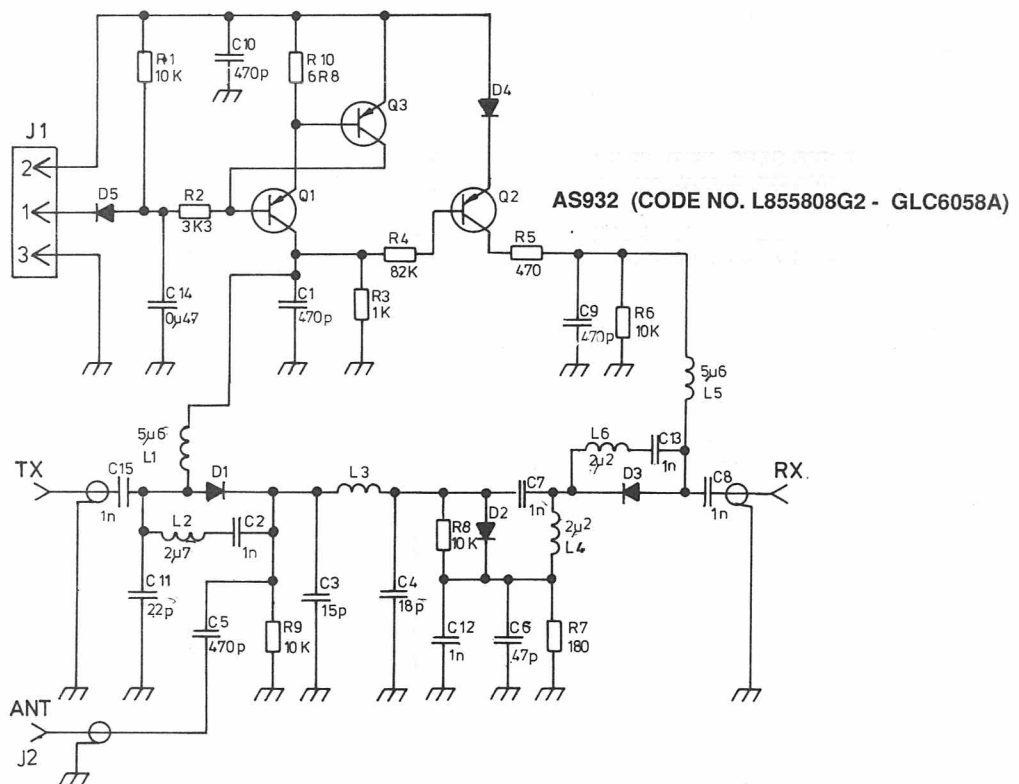
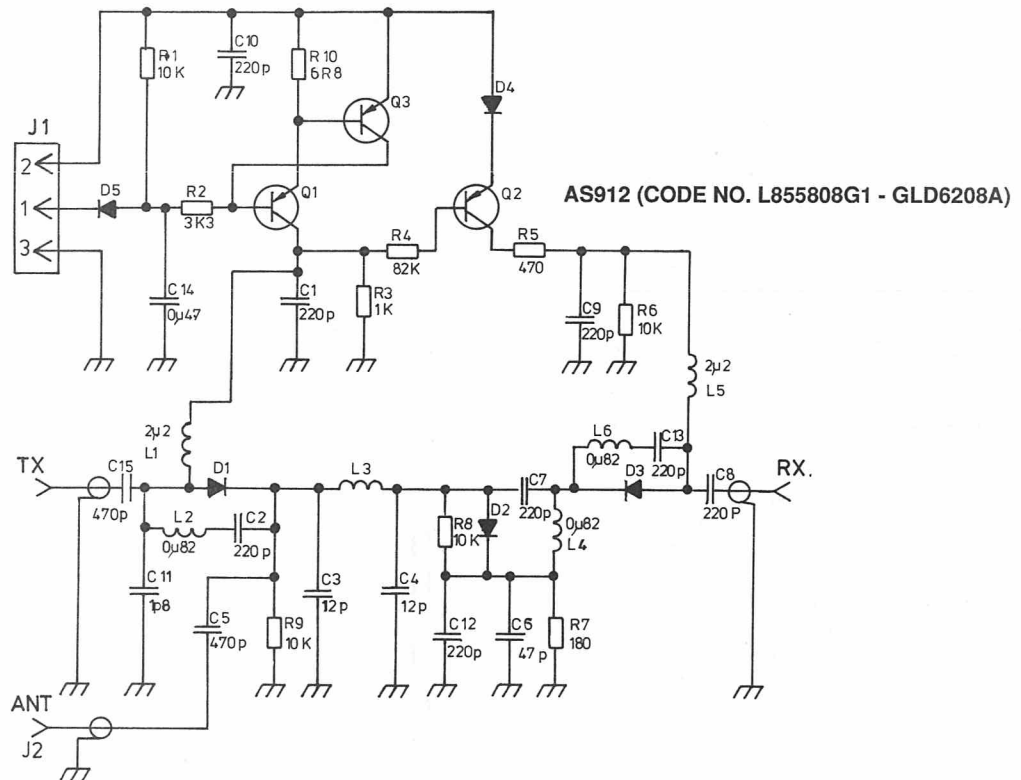
TX and RX connected to antenna

	TX	RX
Insertion loss (typical)	0.6 dB	0.7 dB
Isolation	>35 dB	>20 dB
Intermodulation Att.		>95 dB
Harmonic distortion	<-90 dB	
Current consumption	<90 mA	>25 mA
	(A+ = 13.6 V)	

Dimensions

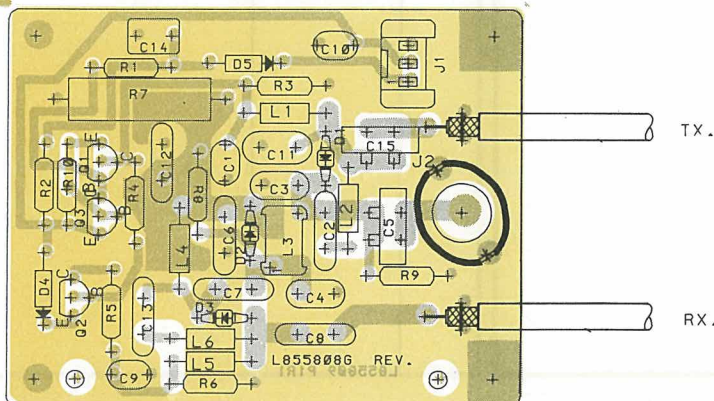
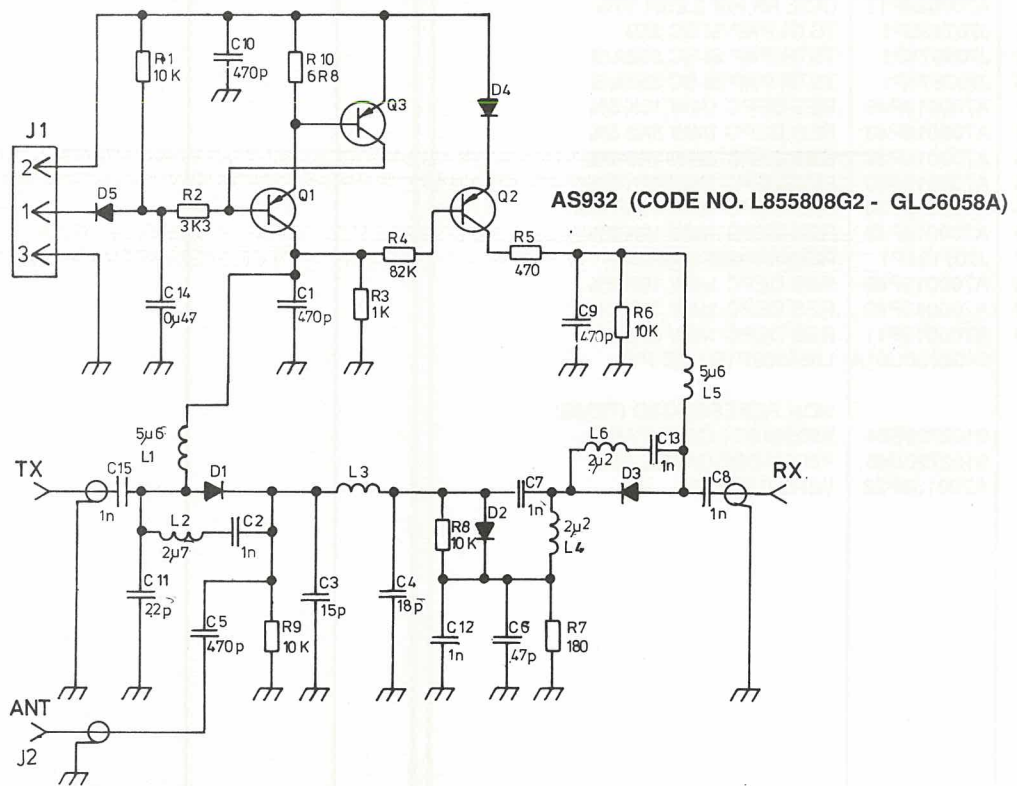
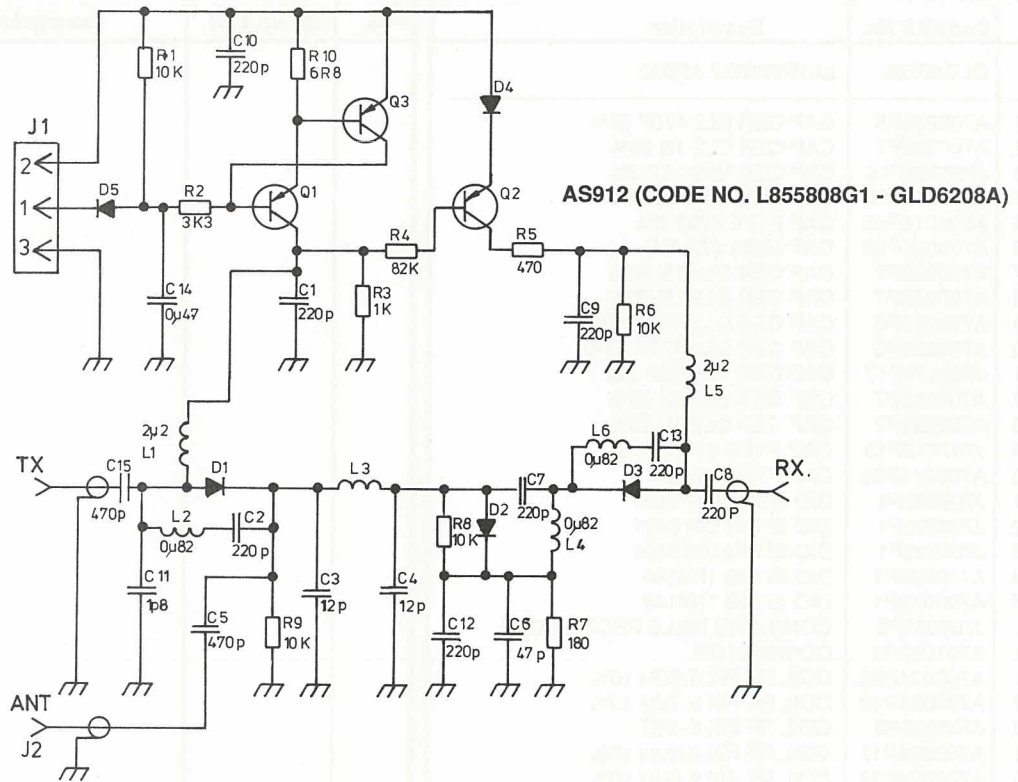
Length 71 mm
Width 56 mm

Temperature range
-40°C to +85°C



ANTENNA SWITCH AS912/932

D403.872/3

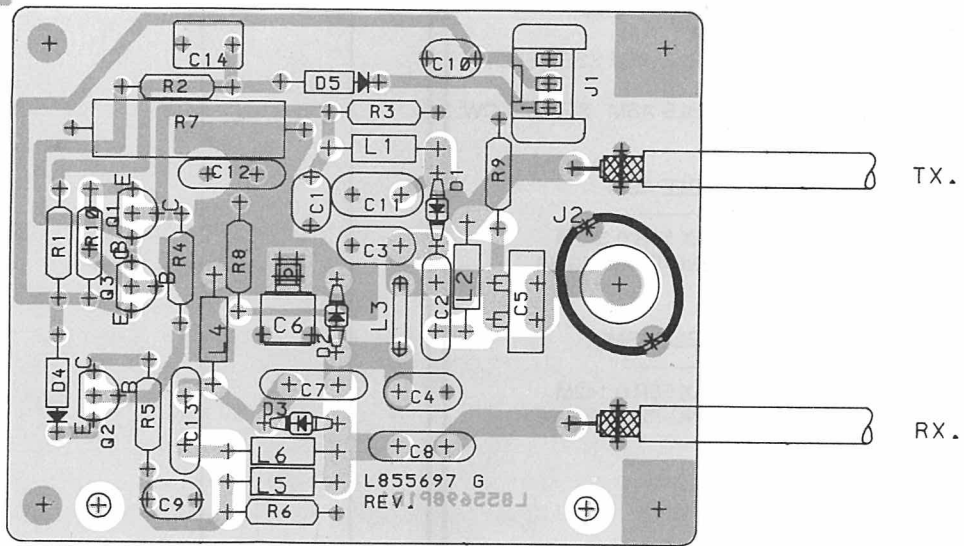
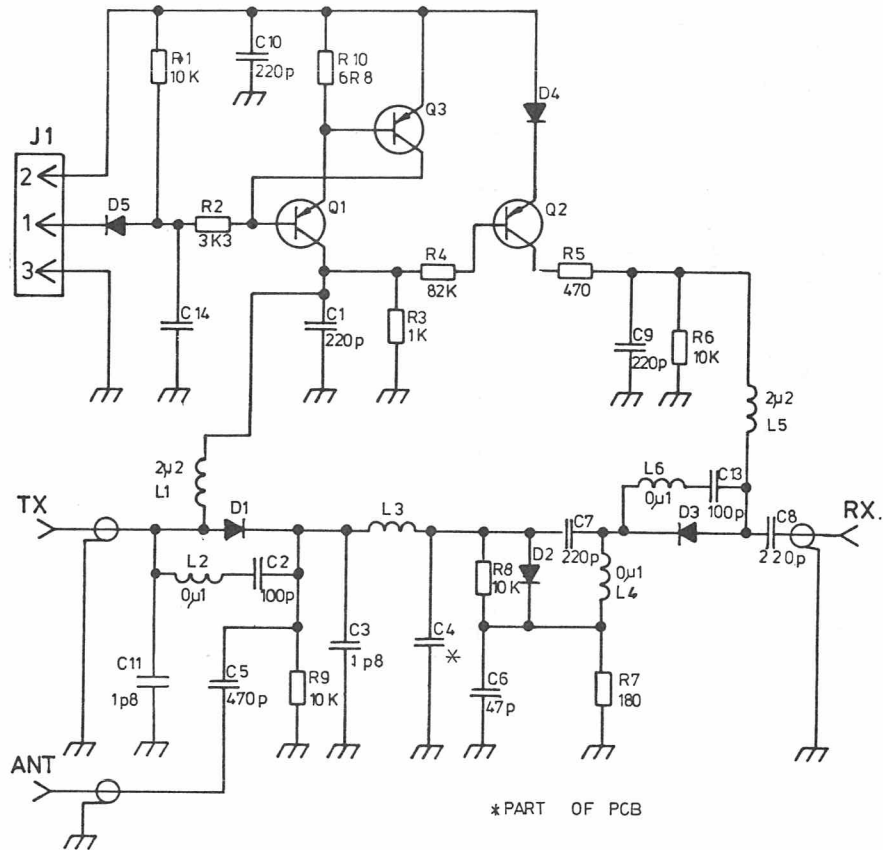


ANTENNA SWITCH AS912/932

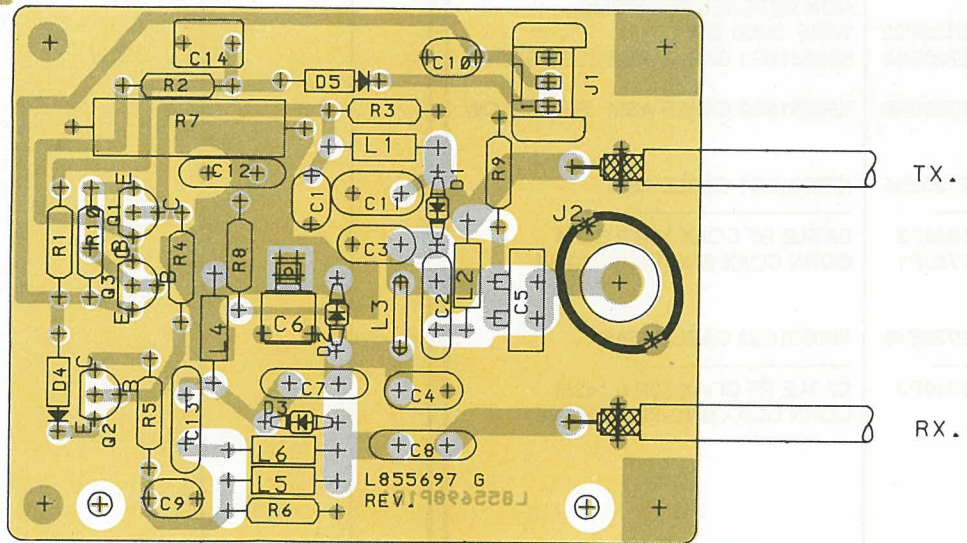
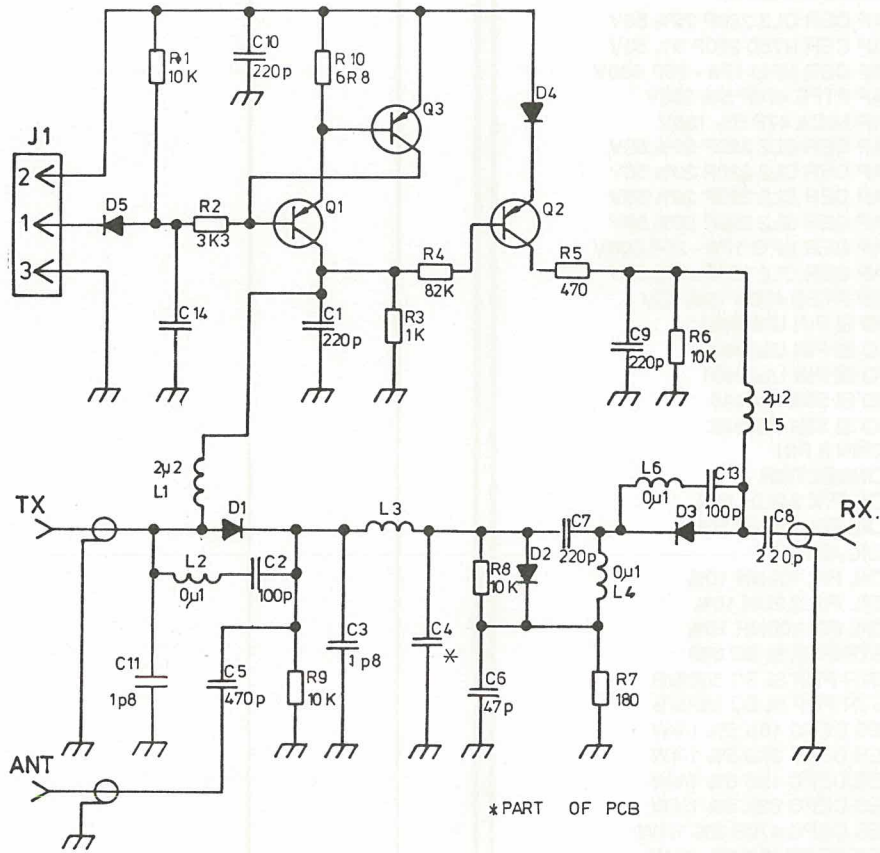
D403.872/3

PARTS LIST FOR ANTENNA SWITCH AS932

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GLC6058A	L8550808G2 AS932			
C001	A700233P5	CAP CER CL2 470P 20%			
C002	A700233P7	CAP CER CL2 1N 20%			
C003	J706079P15	CAP CER NPO 15P 5%			
C004	J706079P16	CAP CER NPO 18P 5%			
C005	A700015P45	CAP PTFE 470P 5%			
C006	A700006P26	CAP MICA 47P 5%			
C007	A700233P7	CAP CER CL2 1N 20%			
C008	A700233P7	CAP CER CL2 1N 20%			
C009	A700233P5	CAP CER CL2 470P 20%			
C010	A700233P5	CAP CER CL2 470P 20%			
C011	J706079P17	CAP CER NPO 22P 5%			
C012	A700233P7	CAP CER CL2 1N 20%			
C013	A700233P7	CAP CER CL2 1N 20%			
C014	J707412P13	CAP PYES 470N 10%			
C015	A700015P53	CAP PTFE 1N 5%			
D001	J706892P1	DIO SI PIN UM 9401			
D002	J706892P1	DIO SI PIN UM 9401			
D003	J706892P1	DIO SI PIN UM 9401			
D004	A700028P1	DIO SI SIG 1N4148			
D005	A700028P1	DIO SI SIG 1N4148			
J001	J708068P3	CONN PWB MALE RECP 03-CKT			
J002	A701097G1	CONNECTOR			
L001	A700024P22	COIL RF FIX 5.6UH 10%			
L002	A700024P18	COIL RF FIX 2.7UH 10%			
L003	J706085P8	COIL RF FIX 8-1/2T			
L004	A700024P17	COIL RF FIX 2.2UH 10%			
L005	A700024P22	COIL RF FIX 5.6UH 10%			
L006	A700024P17	COIL RF FIX 2.2UH 10%			
Q001	J707435P1	TSTR PNP SI BC 369			
Q002	J707674P1	TSTR PNP SI BC 558A/B			
Q003	J707674P1	TSTR PNP SI BC 558A/B			
R001	A700019P49	RES DEPC 1/4W 10K 5%			
R002	A700019P43	RES DEPC 1/4W 3K3 5%			
R003	A700019P37	RES DEPC 1/4W 1K0 5%			
R004	A700019P60	RES DEPC 1/4W 82K 5%			
R005	A700019P33	RES DEPC 1/4W 470R 5%			
R006	A700019P49	RES DEPC 1/4W 10K 5%			
R007	J707134P1	RES WW 3W 180R 5%			
R008	A700019P49	RES DEPC 1/4W 10K 5%			
R009	A700019P49	RES DEPC 1/4W 10K 5%			
R010	A700019P11	RES DEPC 1/4W 6R8 5%			
	8402050U01A	L855809P1R1 BD PW			
		NON REFERENCED ITEMS:			
	0102720B84	K805618G1 CABLE ASM			
	0102720B46	K805618G2 CABLE ASM			
	A700133P22	WIRE 0.800 DIA			



ANTENNA SWITCH AS962
CODE NO. L855697G3 - GLE6200A D403.871/2



ANTENNA SWITCH AS962
CODE NO. L855697G3 -
GLE6200A D403.871/2

PARTS LIST FOR ANTENNA SWITCH AS962

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GLE6200A	L855697G3 AS962 CPNT BD PW			
C001	A700233P3	CAP CER CL2 220P 20% 50V			
C002	A700235P29	CAP CER N750 220P 5% 50V			
C003	J706079P4	CAP CER NPO 1P8 - 25P 500V			
C005	A700015P45	CAP PTFE 470P 5% 250V			
C006	A700006P26	CAP MICA 47P 5% 100V			
C007	A700233P3	CAP CER CL2 220P 20% 50V			
C008	A700233P3	CAP CER CL2 220P 20% 50V			
C009	A700233P3	CAP CER CL2 220P 20% 50V			
C010	A700233P3	CAP CER CL2 220P 20% 50V			
C011	J706079P4	CAP CER NPO 1P8 - 25P 500V			
C013	A700233P1	CAP CER CL2 100P 20% 50V			
C014	J707412P13	CAP PYES 470N 10% 63V			
D001	J706892P1	DIO SI PIN UM 9401			
D002	J706892P1	DIO SI PIN UM 9401			
D003	J706892P1	DIO SI PIN UM 9401			
D004	A700028P1	DIO SI SIG 1N4148			
D005	A700028P1	DIO SI SIG 1N4148			
J001	J708068P3	CONN 3 PIN			
J002	A701097G1	CONNECTOR			
L001	A700024P17	COIL FIX 2,2UH 10%			
L002	A700024P1	COIL FIX 100NH 10%			
L003	J707777P1	COIL AIR			
L004	A700024P1	COIL FIX 100NH 10%			
L005	A700024P17	COIL FIX 2,2UH 10%			
L006	A700024P1	COIL FIX 100NH 10%			
Q001	J707435P1	TSTR PNP SI BC 369			
Q002	J707674P1	TSTR PNP SI BC 558A/B			
Q003	J707674P1	TSTR PNP SI BC 558A/B			
R001	A700019P49	RES DEPC 10K 5% 1/4W			
R002	A700019P43	RES DEPC 3K3 5% 1/4W			
R003	A700019P37	RES DEPC 1K0 5% 1/4W			
R004	A700019P60	RES DEPC 82K 5% 1/4W			
R005	A700019P33	RES DEPC 470R 5% 1/4W			
R006	A700019P49	RES DEPC 10K 5% 1/4W			
R007	J707134P1	RES DEPOS 180 OHM 3W			
R008	A700019P49	RES DEPC 10K 5% 1/4W			
R009	A700019P49	RES DEPC 10K 5% 1/4W			
R010	A700019P11	RES DEPC 6R8 5% 1/4W			
	8402003U77A	L855698P1R1 BD PW			
	A700133P22	NON REFERENCED ITEMS: WIRE, 0.800 DIA			
	0102720B84	K805618G1 CABLE ASM SEE BELOW:			
	0102720B46	K805618G2 CABLE ASM SEE BELOW:			
	0102720B84	K805618G1 CABLE ASM			
	J706049P3	CABLE RF COAX 50R 0,322M			
	J707750P1	CONN COAX BNC-PLUG UG 88			
	0102720B46	K805618G2 CABLE ASM			
	J706049P3	CABLE RF COAX 50R 0,142M CONN COAX BNC-PLUG UG 88			

BF931

BRANCHING FILTER

The duplex filter BF931 is used to avoid interference between the receiver and the transmitter when they are connected to the same antenna. The filter is tunable within the frequency band 68 - 88 MHz.

The spacing between RX and TX frequencies is 4 - 10 MHz and the design allows the TX frequency to be placed above or below the RX frequency without changing terminals.

The filter contains up to 8 helical resonators, up to 5 in the TX branch and up to 3 in the RX branch.

The number of resonators used for a certain application will depend on the spacing between RX and TX frequencies.

The duplex filter is built as a double notch filter:

In the RX section there is a notch on the TX frequency to prevent the transmitter signal from entering the receiver.

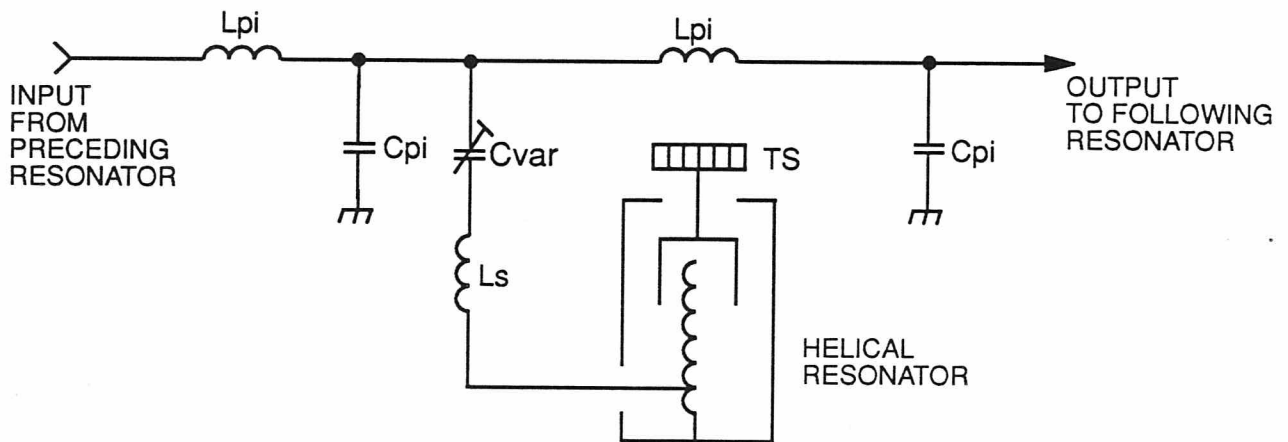
In the TX section there is a notch on the RX frequency to prevent the TX sideband noise from entering the receiver.

The two sections are coupled to the antenna through two quarter-wave lines, which isolate the two sections from each other.

The principle is the same in all the resonators. In each resonator there is a helical coil L_p which is tuned to the desired parallel resonant frequency with a slug symbolized with TS. Near the bottom of the helical coil there is a tap which is connected to a printed coil L_s on a printed wiring board. Together with the helical L_p , L_s and the variable capacitor C_{var} provides the series resonant frequency on both sides of the parallel resonances.

The pi-network $C_{pi} + L_{pi}$ which gives the connector to the adjacent resonators is working as a quarter-wave line and is made with printed coils and discrete capacitor on the wiring board.

The design with one common printed board for all 8 resonators gives a filter with very few components.



TECHNICAL SPECIFICATIONS

Frequency range (tunable)
68 - 88 MHz

Frequency separation
±4 - 10 MHz

Nominal impedance
50 ohm, input/output

Power input
<40 W

VSWR
Max. 1.5

Temperature range
-40°C to +85°C (ambient)

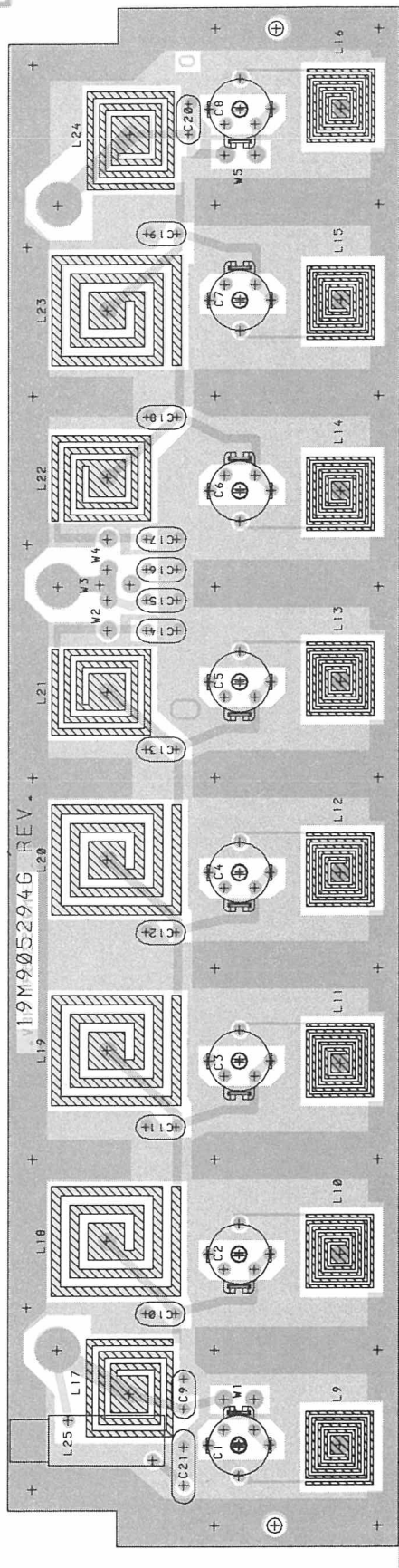
Inserting loss

Frequency separation	Bandwidth	at +25°C
TX:		
4 - 7 MHz	0.7 MHz	<1.8 dB
7 - 10 MHz	1.0 MHz	<1.6 dB

RX:		
4 - 7 MHz	0.7 MHz	<1.4 dB
7 - 10 MHz	1.0 MHz	<1.2 dB

Frequency Attenuation	Bandwidth	at +25°C
TX in RX branch:		
4 - 7 MHz	0.7 MHz	>40 dB
7 - 10 MHz	1.0 MHz	>40 dB

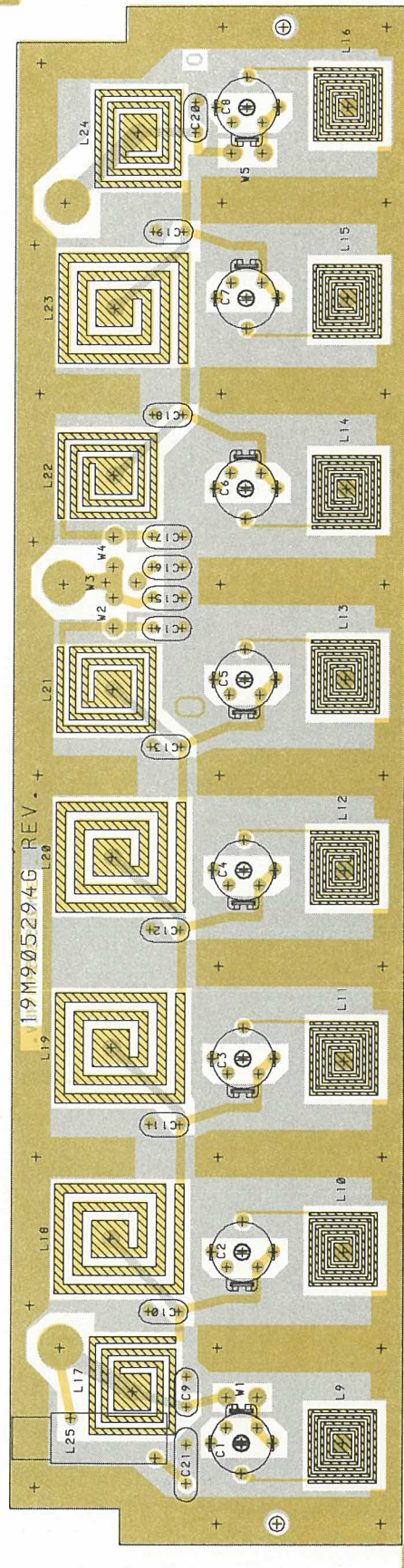
RX in TX branch:		
4 - 7 MHz	0.7 MHz	>70 dB
7 - 10 MHz	1.0 MHz	>70 dB



**BRANCHING FILTER BF931
COMPONENT LAYOUT**

D405.632

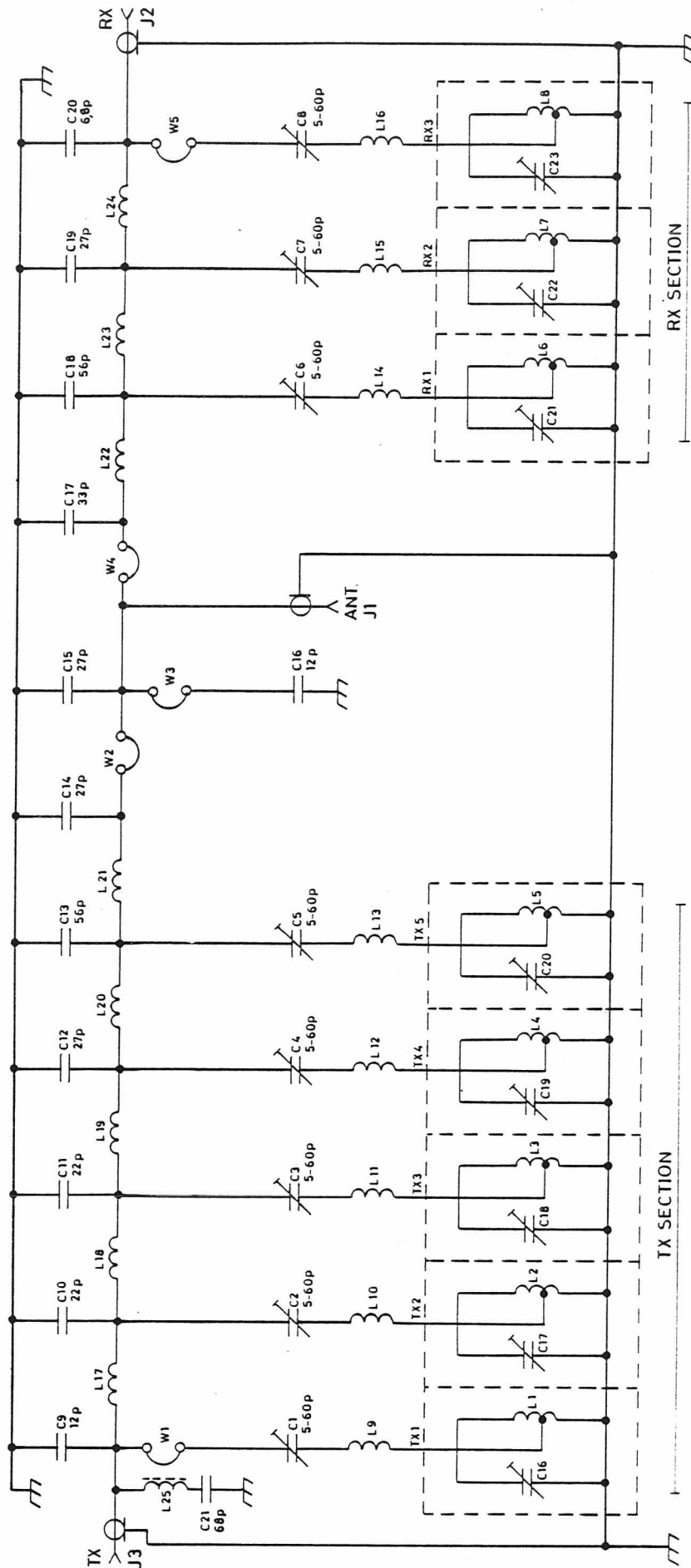
CODE NO. L855335G1 - GFC6118A



**BRANCHING FILTER BF931
COMPONENT LAYOUT**

D405.632

CODE NO. L855335G1 - GFC6118A



L9 - L24 : PART OF PWB
 C16 - C23 : CORE TUNING

BRANCHING FILTER BF931

CODE NO. L855335G1 - GFC6118A

D403.204/4

PARTS LIST FOR BRANCHING FILTER BF931

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GFC6118A	L855335G1 BF931			
	0102721B42	M905294G1 CPNT BD PW FOR BF931			
C016	J706794P1	CORE TUNING			
C017	J706794P1	CORE TUNING			
C018	J706794P1	CORE TUNING			
C019	J706794P1	CORE TUNING			
C020	J706794P1	CORE TUNING			
C021	J706794P1	CORE TUNING			
C022	J706794P1	CORE TUNING			
C023	7602531N01	J706794P1 CORE TUNING			
J001	A701097G1	CONNECTOR			
J002	A701097G1	CONNECTOR			
J003	A701097G1	CONNECTOR			
W001	J706451P1	WIRE STRAP			
W002	J706451P1	WIRE STRAP			
W003	J706451P1	WIRE STRAP			
W004	J706451P1	WIRE STRAP			
W005	3002495N01	J706451P1 WIRE STRAP			
		NON REFERENCED ITEMS			
	J707755G3	NUT M12			
	0102721B26	K805315G1 COVER ASM			
	L855293P1	SHIELD			
	M905248G1	ASM HSG			
	0102721B42	M905294G1 CPNT BD PW FOR BF931			
C001	J706080P1	CAP VAR FILM 5.0/60 PF			
C002	J706080P1	CAP VAR FILM 5.0/60 PF			
C003	J706080P1	CAP VAR FILM 5.0/60 PF			
C004	J706080P1	CAP VAR FILM 5.0/60 PF			
C005	J706080P1	CAP VAR FILM 5.0/60 PF			
C006	J706080P1	CAP VAR FILM 5.0/60 PF			
C007	J706080P1	CAP VAR FILM 5.0/60 PF			
C008	2002414N01	J706080P1 CAP VAR FILM 5.0/60 PF			
C009	J706079P109	CAP CER N1500 12P 5%			
C010	J706079P112	CAP CER N1500 22P 5%			
C011	J706079P112	CAP CER N1500 22P 5%			
C012	J706079P113	CAP CER N1500 27P 5%			
C013	J706079P117	CAP CER N1500 56P 5%			
C014	J706079P113	CAP CER N1500 27P 5%			
C015	J706079P113	CAP CER N1500 27P 5%			
C016	J706079P109	CAP CER N1500 12P 5%			
C017	J706079P114	CAP CER N1500 33P 5%			
C018	J706079P117	CAP CER N1500 56P 5%			
C019	J706079P113	CAP CER N1500 27P 5%			
C020	J706079P106	CAP CER N1500 6P8 25P			
C021	J706079P201	CAP CER N150 68P 5%			
L025	J706847P1	COIL RF VAR 17-1/2 T			
	8402003U53A	M905295P1 BD PW			

BF911

BRANCHING FILTER

The branching filter (duplexer) allows the receiver and transmitter in a duplex radio to be connected to the same antenna.

The BF911 is tunable within the frequency band 146 - 174 MHz.

The spacing between the receiver RX channels and the transmitter TX channels can be 4.5 MHz to 12 MHz and the TX channels may be placed above or below the RX channels without rearranging the filter terminals.

The filter contains up to 8 helical resonators, up to 5 in the TX branch and up to 3 in the RX branch.

The number of resonators used for a certain application will depend on the spacing between RX and TX frequencies.

The duplex filter is built as a double notch filter:

In the RX section there is a notch on the TX frequency to prevent the transmitter signal from entering the receiver.

In the TX section there is a notch on the RX frequency to prevent the TX sideband noise from entering the

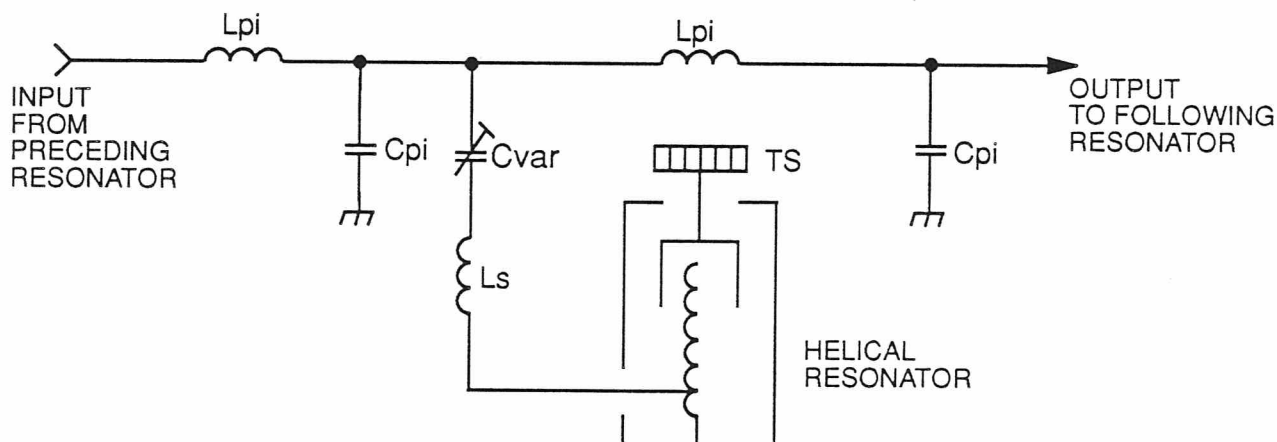
receiver.

The two sections are coupled to the antenna through two quarter-wave lines, which isolate the two sections from each other.

The principle is the same in all the resonators. In each resonator there is a helical coil L_p which is tuned to the desired parallel resonant frequency with a slug symbolized with TS. Near the bottom of the helical coil there is a tap which is connected to a printed coil L_s on a printed wiring board. Together with the helical L_p , L_s and the variable capacitor C_{var} provides the series resonant frequency on both sides of the parallel resonances.

The pi-network $C_{pi} + L_{pi}$ which gives the connector to the adjacent resonators is working as a quarter-wave line and is made with printed coils and discrete capacitor on the wiring board.

The design with one common printed board for all 8 resonators gives a filter with very few components.



TECHNICAL SPECIFICATIONS

Frequency range (tunable)

146 - 174 MHz

Frequency separation

±4.5 - 12 MHz

Nominal impedance

50 ohm, input/output

Power input

<40 W

Frequency stability

40 ppm/°C

VSWR

Max. 1.5

Temperature range

-40°C to +85°C (ambient)

Dimensions

LxWxH: 256 x 52 x 70 mm

Weight

1.4 kg

Inserting loss

Frequency separation Bandwidth at +25°C

TX:

4.5 - 8 MHz 0.9-1.2 MHz <1.8 dB

8 - 12 MHz 1.2 MHz <1.5 dB

RX:

4.5 - 8 MHz 0.9-1.2 MHz <1.6 dB

8 - 12 MHz 1.2 MHz <1.4 dB

Frequency Attenuation Bandwidth at +25°C

TX in RX branch:

4.5 - 8 MHz 0.9-1.2 MHz >40 dB

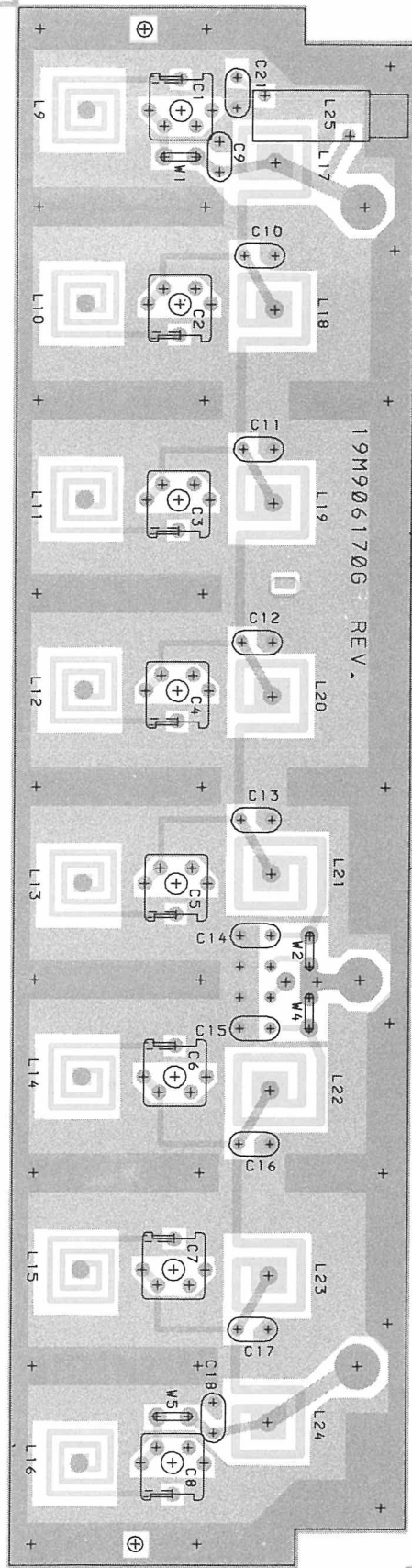
8 - 12 MHz 1.2 MHz >40 dB

21.4 MHz >15 dB

RX in TX branch:

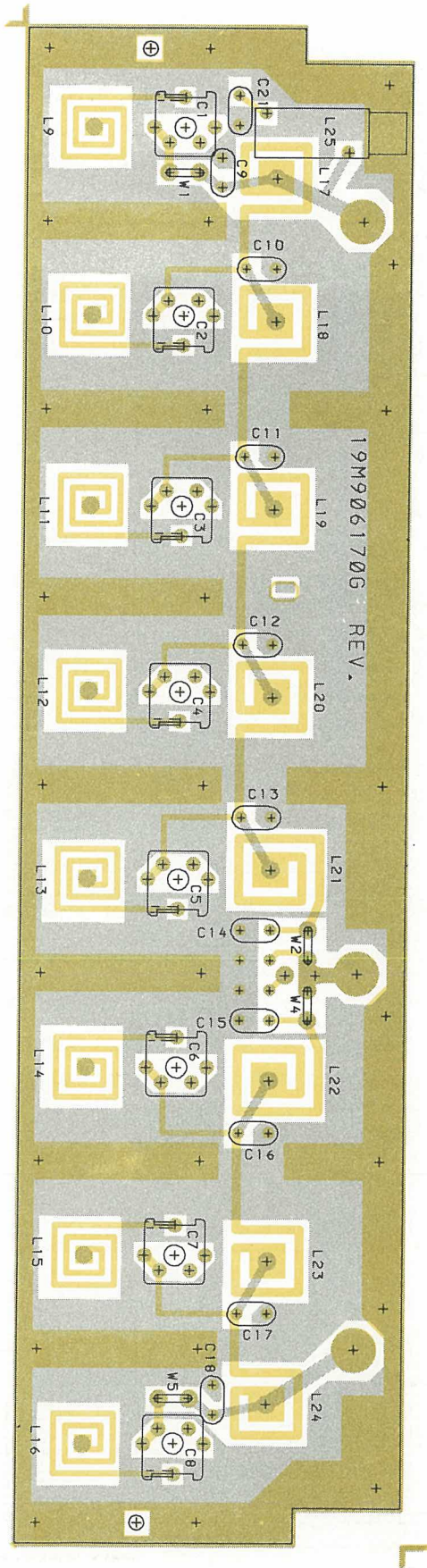
4.5 - 8 MHz 0.9-1.2 MHz >70 dB

8 - 12 MHz 1.2 MHz >70 dB



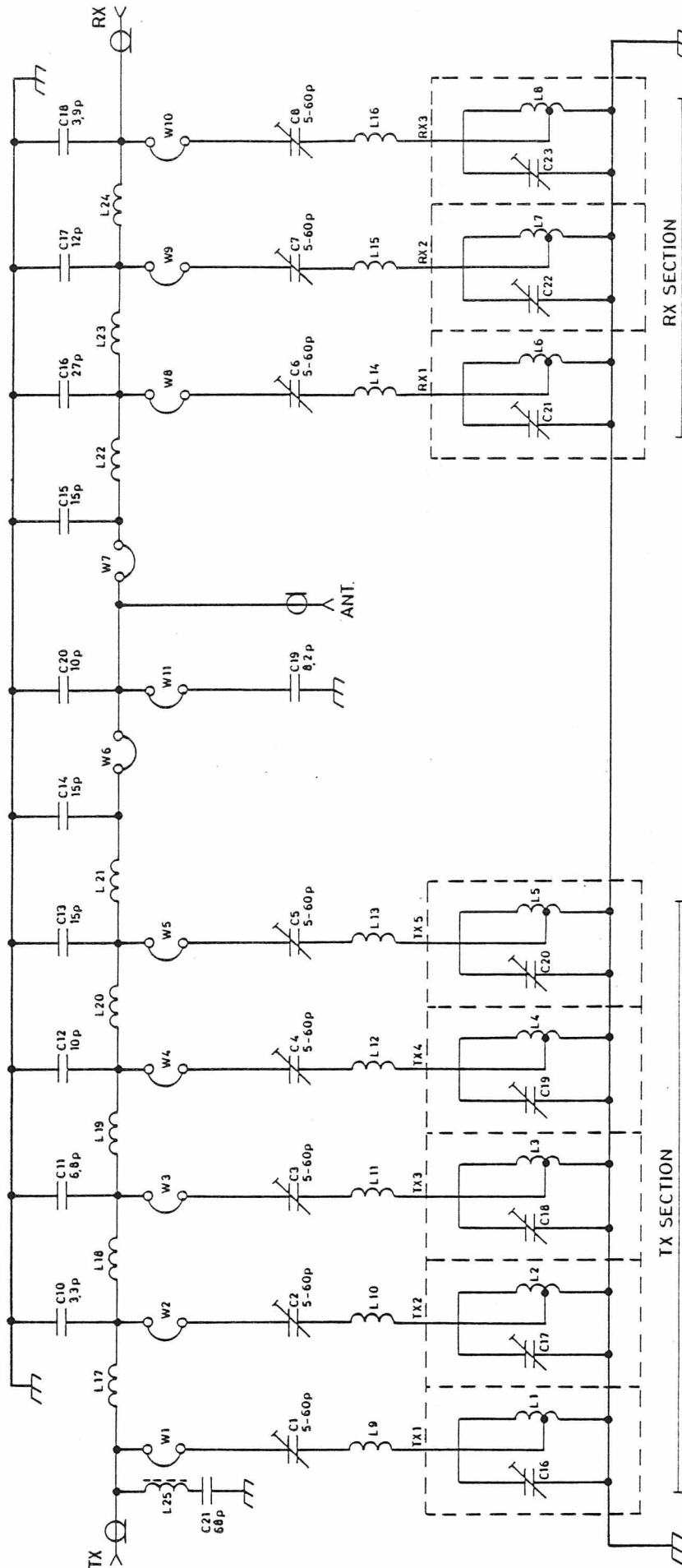
**BRANCHING FILTER BF911
COMPONENT LAYOUT**

D405.636



**BRANCHING FILTER BF911
COMPONENT LAYOUT**

D405.636



L9-L24 : PART OF PWB
 C16-C26 : CORE TUNING

BRANCHING FILTER BF911

D403.153/2

PARTS LIST FOR BRANCHING FILTER BF911

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GFD6125A	L855061G1 BF911			
A001	0102721B45	M905197G1 ASM BD PW			
C016	J706139P1	CORE TUNING			
C017	J706139P1	CORE TUNING			
C018	J706139P1	CORE TUNING			
C019	J706139P1	CORE TUNING			
C020	J706139P1	CORE TUNING			
C021	J706139P1	CORE TUNING			
C022	J706139P1	CORE TUNING			
C023	J706139P1	CORE TUNING			
J001	A701097G1	CONNECTOR			
J002	A701097G1	CONNECTOR			
J003	A701097G1	CONNECTOR			
W001	J706451P1	WIRE,STRAP			
W002	J706451P1	WIRE,STRAP			
W003	J706451P1	WIRE,STRAP			
W004	J706451P1	WIRE,STRAP			
W005	J706451P1	WIRE,STRAP			
		NON REFERENCED ITEMS:			
	J707755G2	NUT M11 (8 used)			
	L855293P1	SHIELD			
	0102721B27	K805202G1 ASM COV COIL			
	1502300Y03	M905248G3 ASM HSG			
	A700036P406	SCR,PAN HD M-3.0X 6.0 (44 used)			
A001	0102721B45	M905198P1 BD PW			
C001	J706080P1	CAP,VAR,FILM 5.0/57 PF			
C002	J706080P1	CAP,VAR,FILM 5.0/57 PF			
C003	J706080P1	CAP,VAR,FILM 5.0/57 PF			
C004	J706080P1	CAP,VAR,FILM 5.0/57 PF			
C005	J706080P1	CAP,VAR,FILM 5.0/57 PF			
C006	J706080P1	CAP,VAR,FILM 5.0/57 PF			
C007	J706080P1	CAP,VAR,FILM 5.0/57 PF			
C008	J706080P1	CAP,VAR,FILM 5.0/57 PF			
C010	J706079P102	CAP,CER,N1500 3P3 , 25P			
C011	J706079P106	CAP,CER,N1500 6P8 , 25P			
C012	J706079P108	CAP,CER,N1500 10P , 5%			
C013	J706079P110	CAP,CER,N1500 15P , 5%			
C014	J706079P110	CAP,CER,N1500 15P , 5%			
C015	J706079P110	CAP,CER,N1500 15P , 5%			
C016	J706079P113	CAP,CER,N1500 27P , 5%			
C017	J706079P109	CAP,CER,N1500 12P , 5%			
C018	J706079P103	CAP,CER,N1500 3P9 , 25P			
C019	J706079P107	CAP,CER,N1500 8P2 , 25P			
C020	J706079P108	CAP,CER,N1500 10P , 5%			
C021	J706079P201	CAP,CER,N150 68P , 5%			
L025	J706847P1	COIL,RF,VAR 17-1/2T			
	8402003U52A	BD PW			

BF961

BRANCHING FILTER

The duplex filter BF961 is used to avoid interference between the receiver and the transmitter when they are connected to the same antenna. The filter is tunable within the frequency band 403 - 470 MHz.

The spacing between RX and TX frequencies is 4.5 - 15 MHz and the design allows the TX frequency to be placed above or below the RX frequency without changing terminals.

The filter contains up to 8 helical resonators, up to 5 in the TX branch and up to 3 in the RX branch.

The number of resonators used for a certain application will depend on the spacing between RX and TX frequencies.

The duplex filter is built as a double notch filter:

In the RX section there is a notch on the TX frequency to prevent the transmitter signal from entering the receiver.

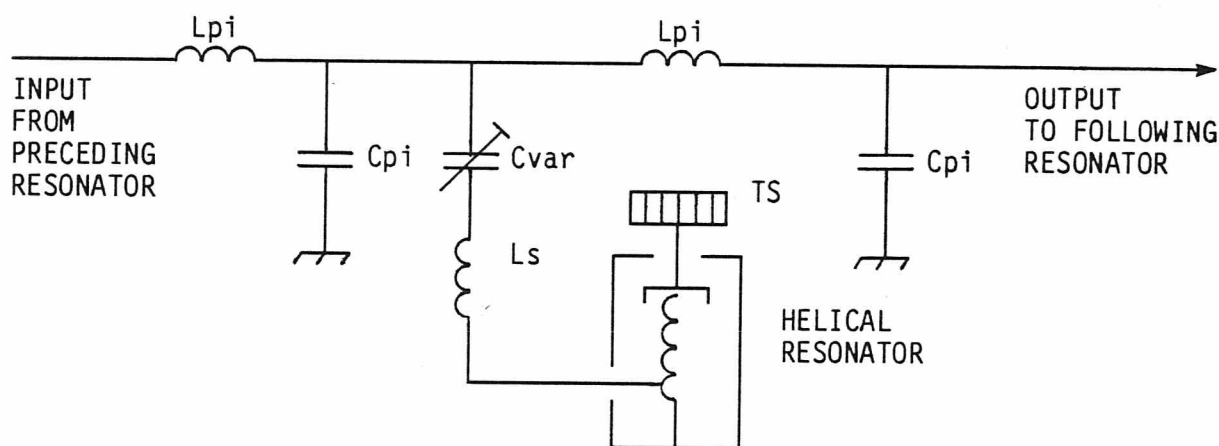
In the TX section there is a notch on the RX frequency to prevent the TX sideband noise from entering the receiver.

The two sections are coupled to the antenna through two quarter-wave lines, which isolate the two sections from each other.

The principle is the same in all the resonators. In each resonator there is a helical coil L_p which is tuned to the desired parallel resonant frequency with a slug symbolized with TS. Near the bottom of the helical coil there is a tap which is connected to a printed coil L_s on a printed wiring board. Together with the helical L_p , L_s and the variable capacitor C_{var} provides the series resonant frequency on both sides of the parallel resonances.

The pi-network $C_{pi} + L_{pi}$ which gives the connector to the adjacent resonators is working as a quarter-wave line and is made with printed coils and discrete capacitor on the wiring board.

The design with one common printed board for all 8 resonators gives a filter with very few components.



TECHNICAL SPECIFICATIONS

Frequency range (tunable)
403 - 470 MHz

Frequency separation
±4.5 - 15 MHz

Nominal impedance
50 ohm, input/output

Power input
<60 W

VSWR
Max. 1.5

Temperature range
-40°C to +85°C (ambient)

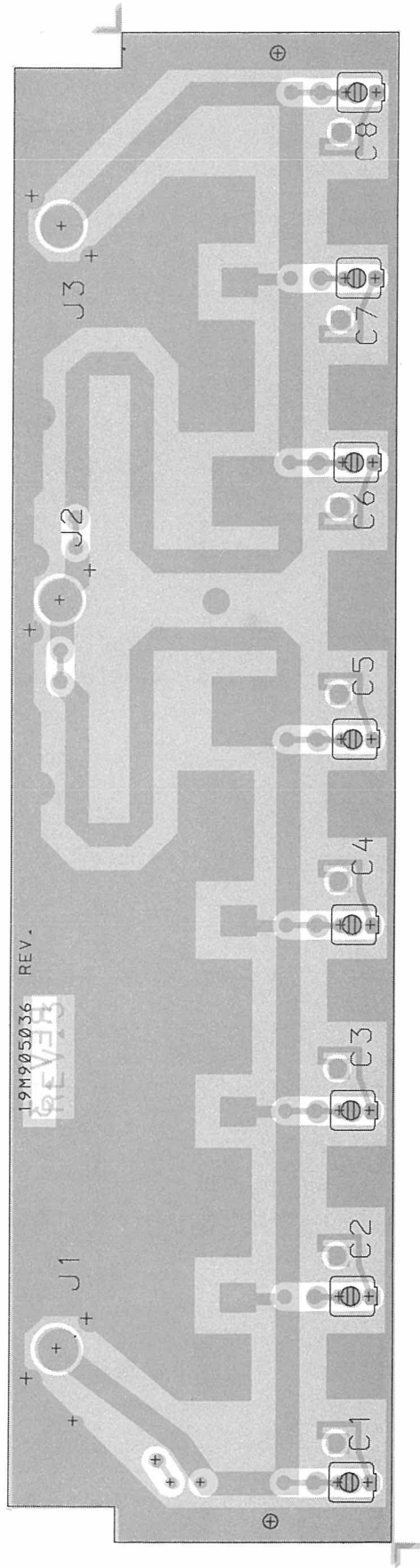
Inserting loss

Frequency separation	Bandwidth	at +25°C
TX:		
4.5 - 8 MHz	0.8 MHz	<1.5 dB
8 - 15 MHz	2.0 MHz	<1.3 dB

RX:		
4.5 - 8 MHz	0.8 MHz	<1.2 dB
8 - 15 MHz	2.0 MHz	<1.0 dB

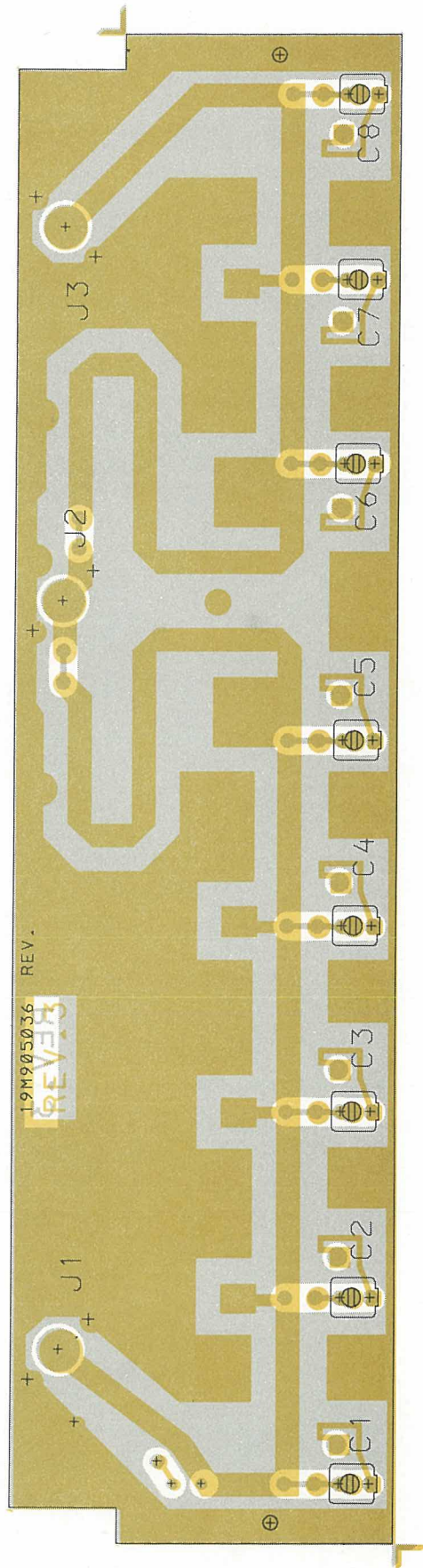
Frequency Attenuation	Bandwidth	at +25°C
TX in RX branch:		
4.5 - 8 MHz	0.8 MHz	>30 dB
8 - 15 MHz	2.0 MHz	>30 dB

RX in TX branch:		
4.5 - 8 MHz	0.8 MHz	>70 dB
8 - 15 MHz	2.0 MHz	>70 dB



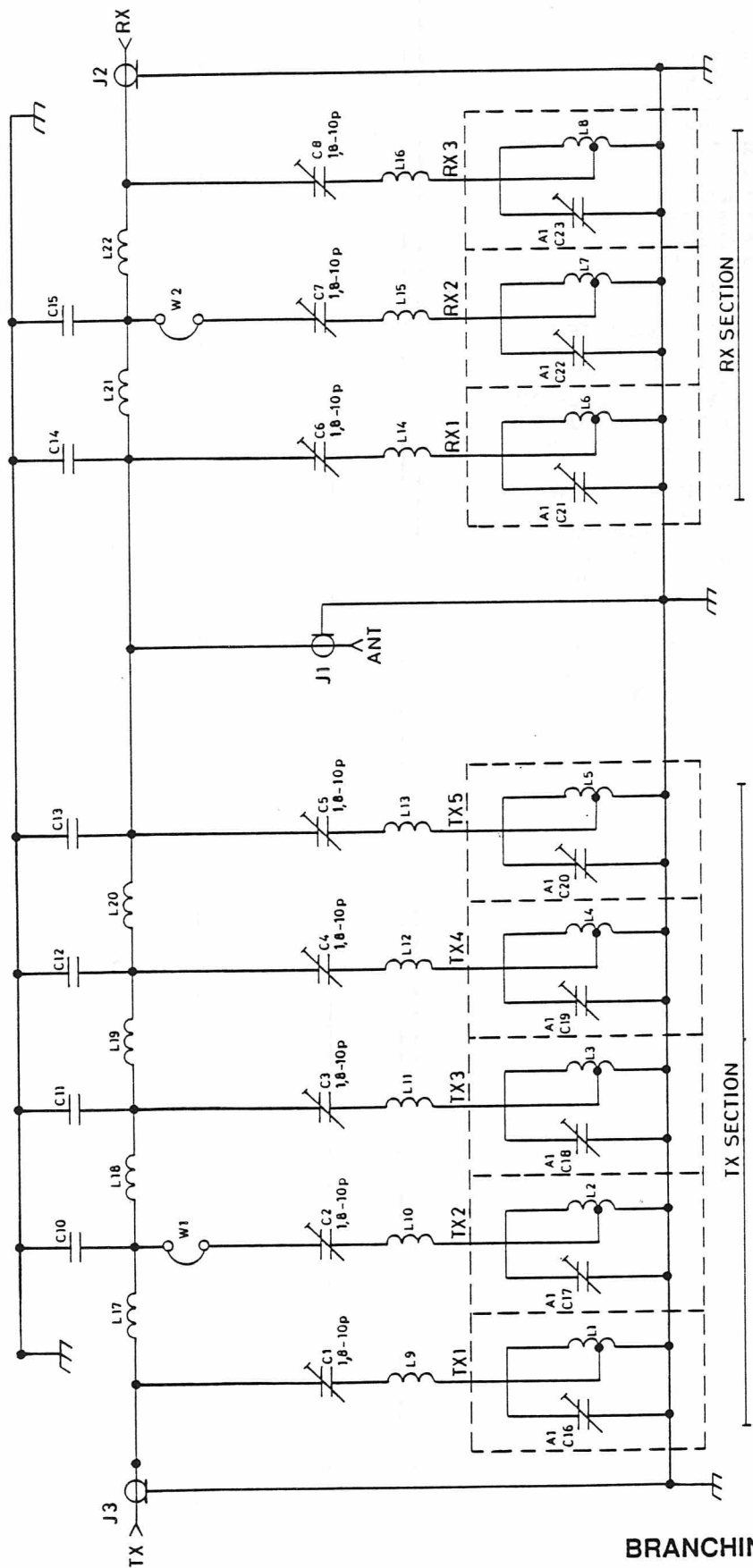
**BRANCHING FILTER BF961
COMPONENT LAYOUT**

D405.630



**BRANCHING FILTER BF961
COMPONENT LAYOUT**

D405.630



W1, W2 INSERTED FOR DUPLEX SPACING 4.5 - 8.0 MHz

C10-C15 : PART OF PWB
 L9 - L22 : PART OF PWB
 A1 C16-C23 : CORE TUNING

BRANCHING FILTER BF961

CODE NO. M905071G1 - GFE6128A REV.B D403.181/7

PARTS LIST FOR BRANCHING FILTER BF961

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GFE6128A	M905071G1 BF961			
A01	0102720B50	M905036G1 CPNT BD PW SEE BELOW:			
C16	J706139P1	CORE TUN.			
C17	J706139P1	CORE TUN.			
C18	J706139P1	CORE TUN.			
C19	J706139P1	CORE TUN.			
C20	J706139P1	CORE TUN.			
C21	J706139P1	CORE TUN.			
C22	J706139P1	CORE TUN.			
C23	J706139P1	CORE TUN.			
J01	A701097G1	CONNECTOR			
J02	A701097G1	CONNECTOR			
J03	A701097G1	CONNECTOR			
W01	J706451G1	WIRE, STRAP			
W02	J706451G1	WIRE, STRAP			
		NON REFERENCED ITEMS:			
	0202372Y02	J707755G2 NUT, M11			
	L855293P1	SHIELD			
	0102720B43	K805018G1 ASM. COVER FOR COIL			
	1502370Y01	M905027G1 ASM.HOUSING			
	A700036P406	SCREW PAN HD. M3.0 x 6.0MM			
A01	0102720B50	M905036G1 ASM PD PW			
C01	J706003P1	CAP VAR 1.8/10PF 200V			
C02	J706003P1	CAP VAR 1.8/10PF 200V			
C03	J706003P1	CAP VAR 1.8/10PF 200V			
C04	J706003P1	CAP VAR 1.8/10PF 200V			
C05	J706003P1	CAP VAR 1.8/10PF 200V			
C06	J706003P1	CAP VAR 1.8/10PF 200V			
C07	J706003P1	CAP VAR 1.8/10PF 200V			
C08	J706003P1	CAP VAR 1.8/10PF 200V			
	8402003U55A	M905037P1R3 BD PW			

CG9010

CHANNEL GUARD

The module CG9010 is an optional board which provides the CQF9000 radio with a Continuous Tone Controlled Squelch System (CTCSS). The module provides a decode function only, using the standard integrated circuit FX365J to detect the channel guard tones. Tone frequencies are selected, via a six out of eight

position Dip switch, from an internal preprogrammed tone table in the FX365J. The tone frequencies range from 67 Hz to 250 Hz in 37 steps. On board as well as remote disable control of the decoder is provided. A decode switch-off delay of approximately 500 ms can be set on board (S8) to enable use together with radios inhibiting channel guard transmission during selective calling.

CIRCUIT DESCRIPTION

POWER SUPPLY

The input voltage (9.0 V reg.) from pin 3 is further regulated down to 5 V by U1, an integrated circuit 78L05. The 5 volt is the only voltage supply used on board.

X-TAL CLOCK OSCILLATOR

U3 is a small integrated circuit oscillator with a built-in frequency divider. The output frequency is 1.0 MHz.

DECODER IC, FX365J

The FX365J (U2) is a CMOS CTCSS encoder/decoder used to generate and detect the 38 sub-audible tones. The sub-audible tone encode/decode functions, are all derived from the 1.0 MHz clock oscillator, and are selected by means of six sections of the Dip switch S1. Refer to table 1.

For detection of a correct CTCSS tone an audio switch in the speech path is activated. Channel monitoring is achieved by use of the "push to listen" input. The decoder has an on board switch capacitor high-pass filter used to attenuate the CTCSS tones in the speech path.

The encoder function is not used.

RX AUDIO AMPLIFIER MUTE

When no correct CTCSS tone is received the TONE DECODER O/P, U2 pin 13, is high and the collector of Q5 is low. Thus, the audio amplifier on the AA9018 board is muted via J1 pin 5.

RX DECODE DISABLE

An input "high" signal on SQ CANCEL, J1 pin 4, makes Q2 conducting with a charging of C5 to +5_Volt as a result. This voltage overrides the tone squelch detect signal on U2 pin 14 (cmp input). A successful detect, or a SQ CANCEL input signal, will open the internal audio gate of U2, light the LED D3 and also open, via Q5, the audio gate in the associated radio. SQ CANCEL can be left open.

For service purpose the switch S7, in "open" position, has the same function as the SQ CANCEL. This is true only if the link W1 is installed (note 3).

FAST SQUELCH INPUT

A logic "low" input to FAST SQ I/P J1 pin 6 will cause Q3 to conduct. Consequently C5 will be discharged through R6. This results in a faster tone squelch action. The fast squelch action will be overridden by the SQ CANCEL function.

When unused the FAST SQ I/P J1 pin 6 can be left floating or open circuit.

	Nominal Frequency	FX335 Frequency	fo%	Switch							
				8	7	6	5	4	3	2	1
XZ	67.0	67.05	+0.07	X	X	1	1	1	1	1	1
WB	71.9	71.90	0.0	X	X	0	1	1	1	1	1
XA	74.4	74.35	-0.07	X	X	1	1	1	1	1	0
WA	77.0	76.96	-0.05	X	X	0	0	1	1	1	1
XB	79.7	79.77	+0.09	X	X	1	1	1	1	0	1
WB	82.5	82.59	+0.11	X	X	0	1	1	1	1	0
YZ	85.4	85.38	-0.02	X	X	1	1	1	1	0	0
YA	88.5	88.61	+0.12	X	X	0	0	1	1	1	0
YB	91.5	91.58	+0.09	X	X	1	1	1	0	1	1
ZZ	94.8	94.76	-0.04	X	X	0	1	1	1	0	1
ZA	97.4	97.29	-0.11	X	X	1	1	1	0	1	0
ZB	100.0	99.96	-0.04	X	X	0	0	1	1	0	1
1Z	103.5	103.43	-0.07	X	X	0	1	1	1	0	0
1A	107.2	107.15	-0.05	X	X	0	0	1	1	0	0
1B	110.9	110.77	-0.12	X	X	0	1	1	0	1	1
2A	114.8	114.64	-0.14	X	X	0	0	1	0	1	1
2B	118.8	118.80	0.0	X	X	0	1	1	0	1	0
3Z	123.0	122.80	-0.16	X	X	0	0	1	0	1	0
3A	127.3	127.08	-0.17	X	X	0	1	1	0	0	1
3B	131.8	131.67	-0.10	X	X	0	0	1	0	0	1
4Z	136.5	136.61	+0.08	X	X	0	1	1	0	0	0
4A	141.3	141.32	+0.01	X	X	0	0	1	0	0	0
4B	146.2	146.37	+0.12	X	X	0	1	0	1	1	1
5Z	151.4	151.09	-0.21	X	X	0	0	0	1	1	1
5A	156.7	156.88	+0.11	X	X	0	1	0	1	1	0
5B	162.2	162.31	+0.07	X	X	0	0	0	1	1	0
6Z	167.9	168.14	+0.14	X	X	0	1	0	1	0	1
6A	173.8	173.48	-0.18	X	X	0	0	0	1	0	1
6B	179.9	180.15	+0.14	X	X	0	1	0	1	0	0
7Z	186.2	186.29	+0.05	X	X	0	0	0	1	0	0
7A	192.8	192.86	+0.03	X	X	0	1	0	0	1	1
M1	203.5	203.65	+0.07	X	X	0	0	0	0	1	1
M2	210.7	210.17	-0.25	X	X	0	1	0	0	1	0
	241.7					0	1	0	0	0	0

1 = Switch open=off 0 = Switch closed=on X = Do not care

Table 1. Frequency programming table

Sw 8 : Delay after = off No delay after end detect = on
 end detect

Sw 7 : Disable CG = off Enable CG = on

INSTRUCTION FOR CG9010 WORKING AS REVERSE

The CG9010 placed in the CQF9000 is able to work as reverse meaning that channel guard tone will close the audio path instead of opening the audio path. When the channel guard tone is moved or is different from the selected channel guard tone (chosen on S1), the audio path will open.

The LED D3 will be lit when the channel guard tone closes the audio path.

CHANGES IN MODULE AA9018:

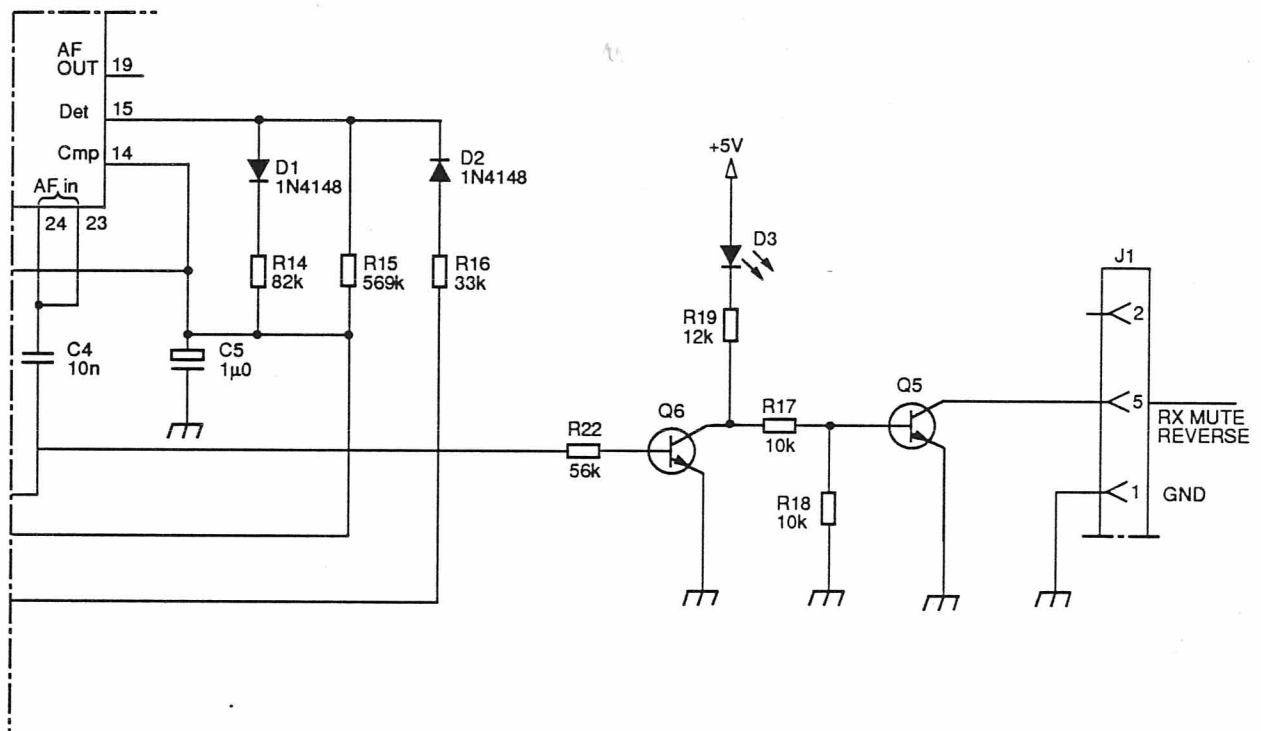
Normally, the strap W2 is removed when CTCSS

(CG9010) is used. When the CTCSS has to work as reverse, the strap W2 must be strapped.

CHANGES IN MODULE CG9010:

The capacitor C8 must be removed. Then audio path will not pass through the CG9010, but because of the strap W2 in the AA9018, the audio path will bypass the CG9010.

RX MUTE: has to work reverse. This is obtained by connecting R22 = 56k and Q6 as shown on the diagram below.



SPECIFICATIONS

Input voltage

9.0 VDC \pm 0.15 VDC.

Current drain

15 mA maximum.

8 mA minimum.

Decode sensitivity level

10 - 35 mV

Decode bandwidth

\pm 2.5% maximum, \pm 1.0% minimum

Decode response time

250 mS maximum

Decode squelch time, S8 on

105 mS maximum

Decode squelch time, S8 off

500 mS minimum, 1000 mS maximum

Fast SQ I/P response time

2 mS maximum

RX mute

Muted: 0.5 VDC max.
Un-muted: 8 VDC min.

Frequency stability

$\pm 0.2\%$.

Tone reject filter response

-30 dB or more at 70 Hz - 210 Hz
0 dB ± 1.0 dB at 300 Hz - 3000 Hz.

Tone reject filter distortion

2.0% max.

Temperature range

-30°C to +60°C.

Humidity

90% humidity at 50°C.

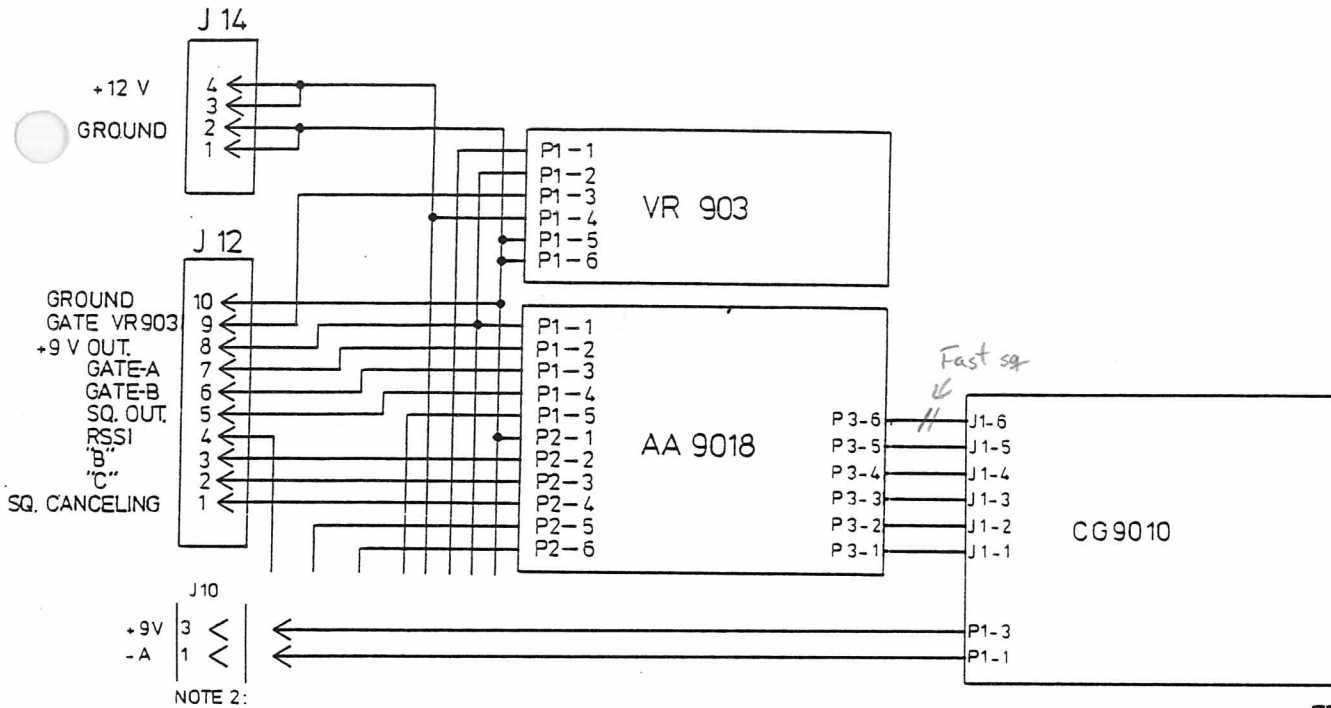


FIGURE 1.

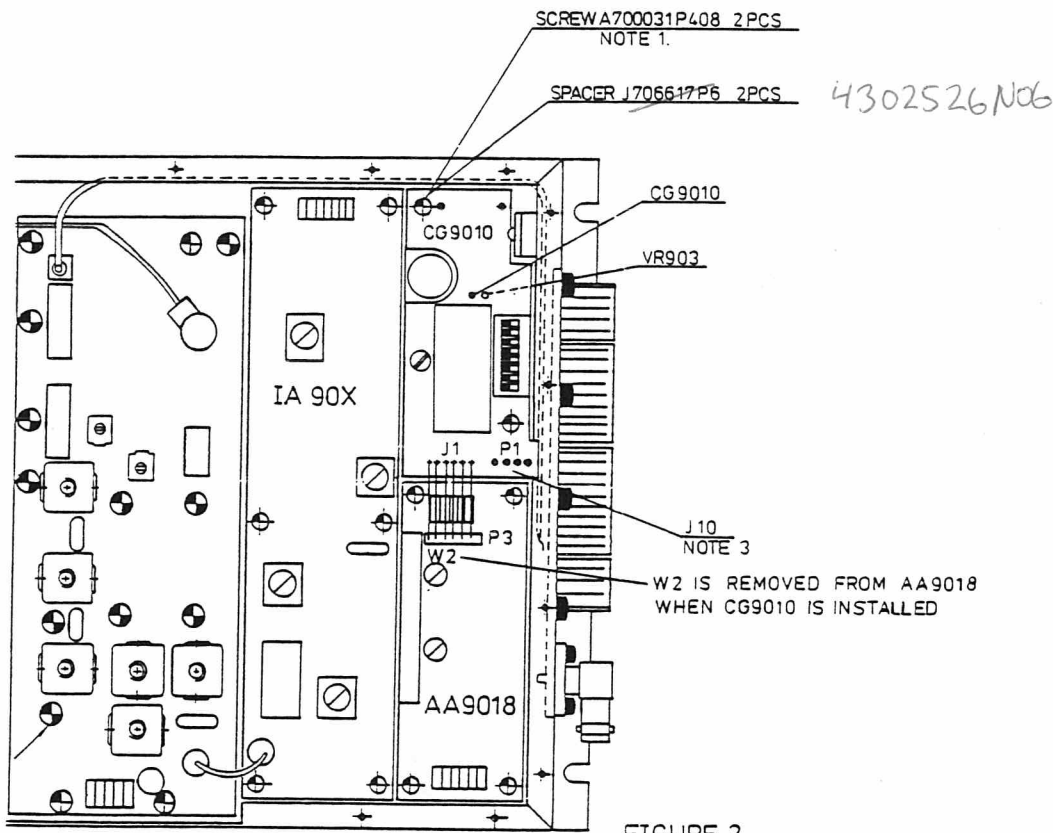


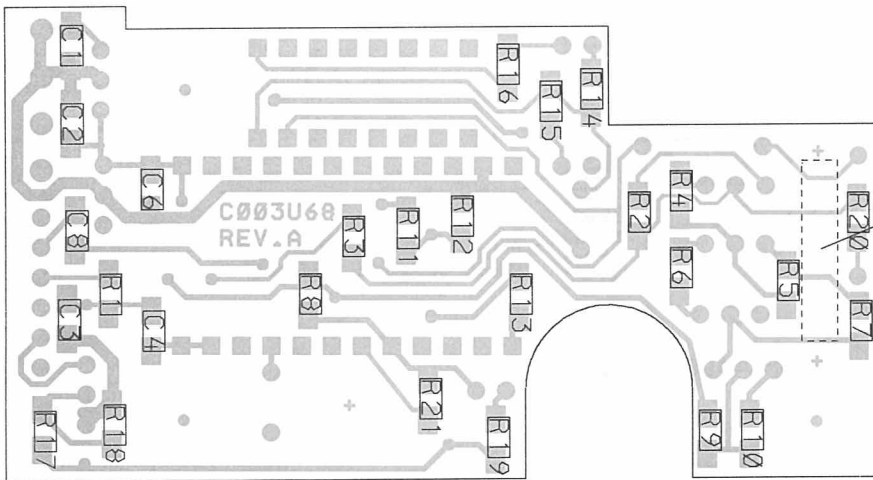
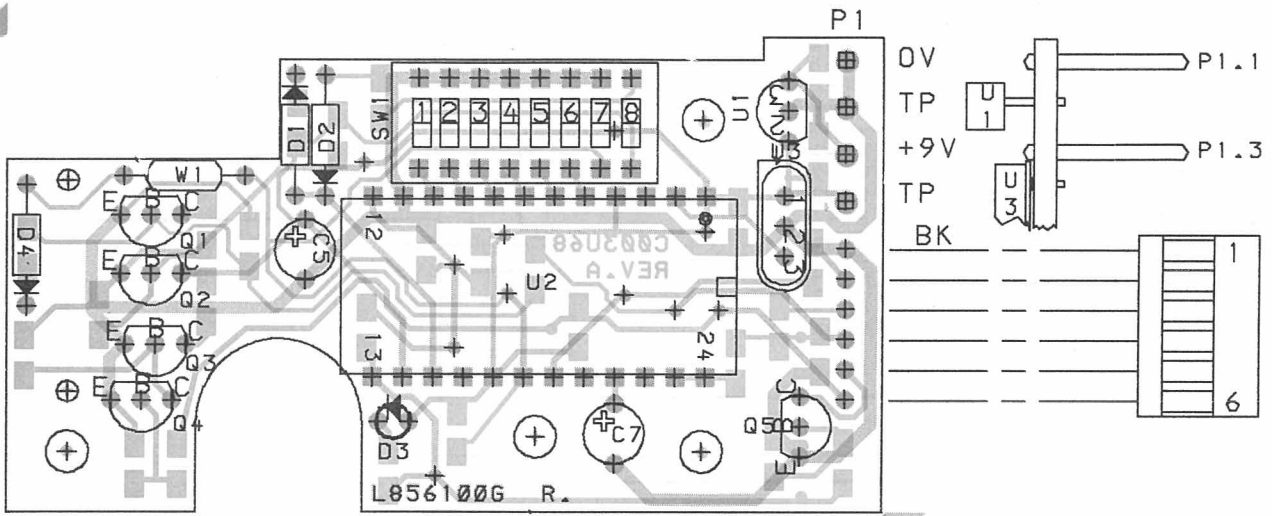
FIGURE 2.

NOTES:

1. For mounting CG9010 the two diagonal placed screws in VR903, is removed and replaced by two spacer J706617P6.
2. Power Supply (+9 V and GND) is taken from central metering connector J1 pin 1 and pin 3.
3. When CG9010 is mounted, access to central metering connector J1 is difficult.

MOUNTING INSTRUCTION
FOR CG9010

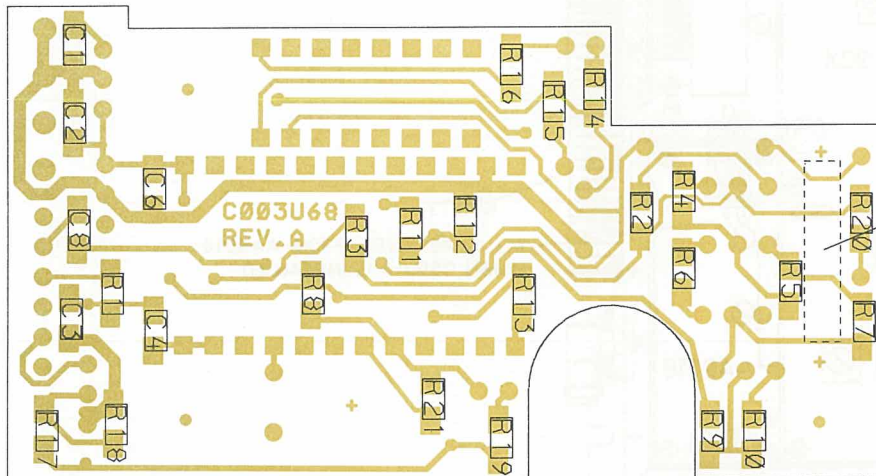
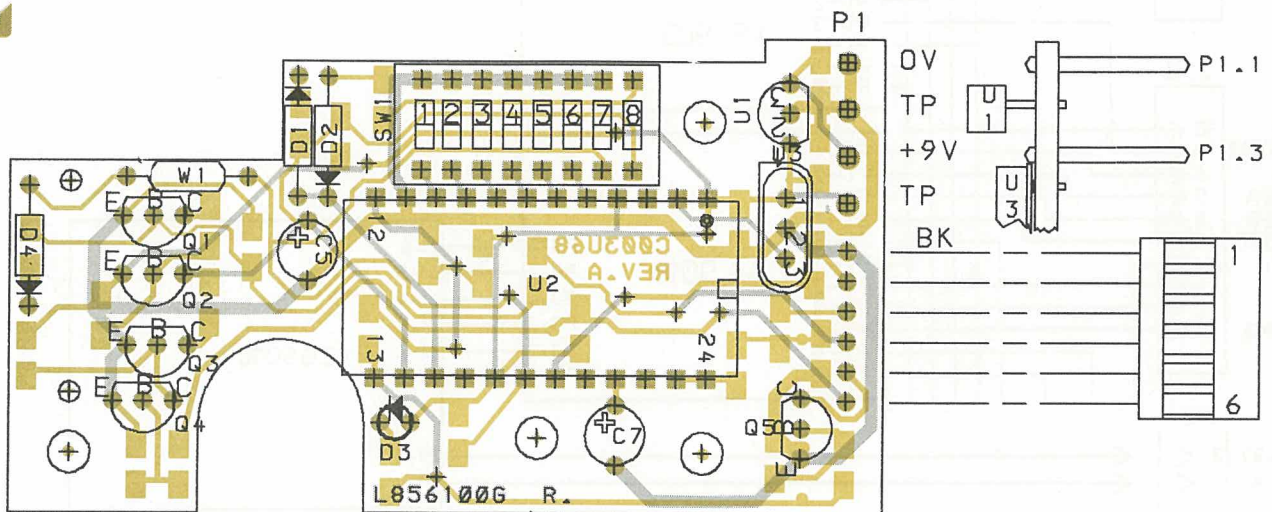
M405.500



CHANNEL GUARD CG9010
COMPONENT LAYOUT

D405.099/2

CODE NO. L856100G1 - GLN7064A



RESTRICTED AREA.

**CHANNEL GUARD CG9010
COMPONENT LAYOUT**

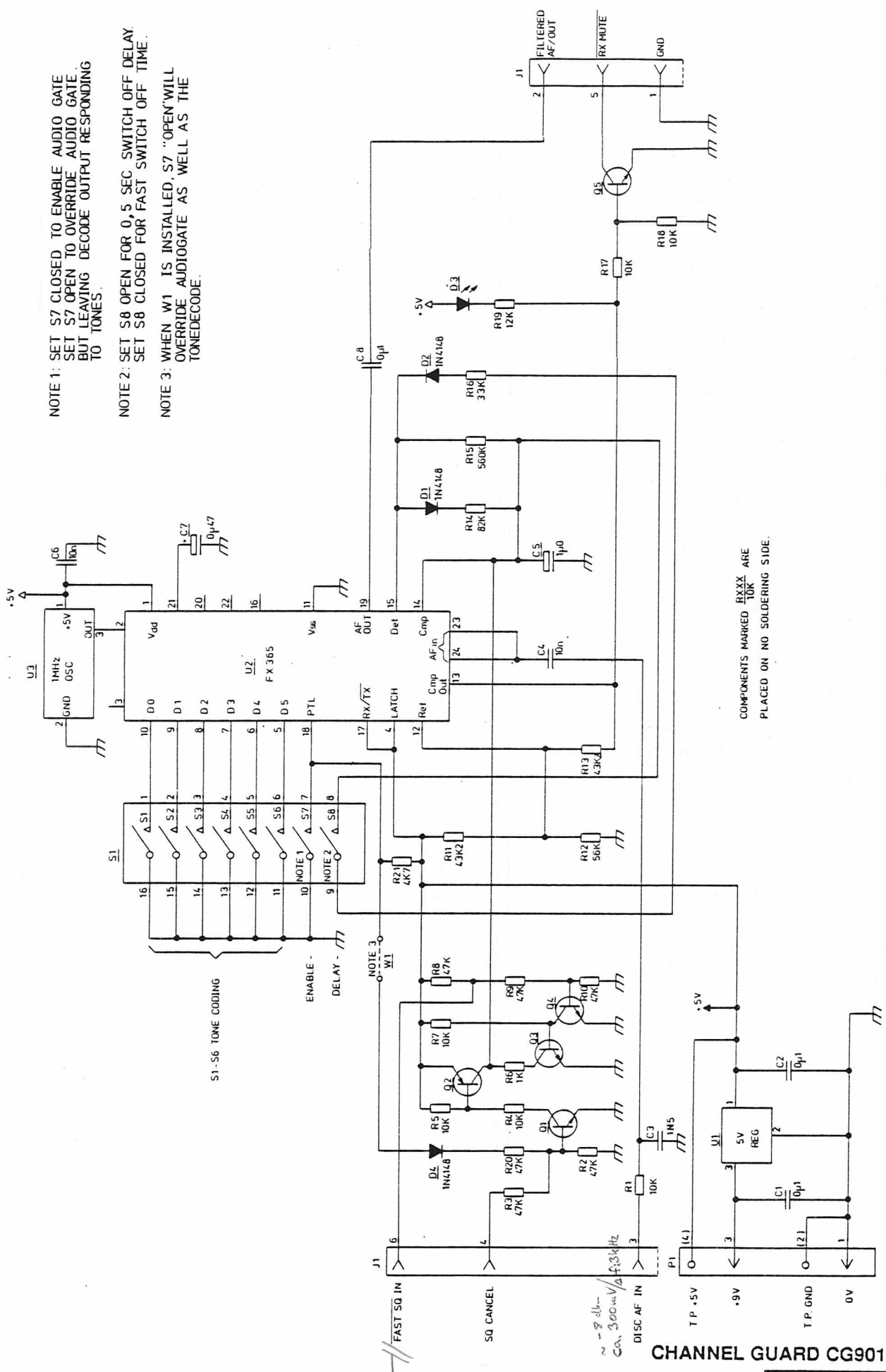
D405.099/2

CODE NO. L856100G1 - GLN7064A

NOTE 1: SET S7 CLOSED TO ENABLE AUDIO GATE
 SET S7 OPEN TO OVERRIDE AUDIO GATE
 BUT LEAVING DECODE OUTPUT RESPONDING
 TO TONES.

NOTE 2: SET S8 OPEN FOR 0,5 SEC SWITCH OFF DELAY.
 SET S8 CLOSED FOR FAST SWITCH OFF TIME.

NOTE 3: WHEN W1 IS INSTALLED, S7 "OPEN" WILL
 OVERRIDE AUDIOGATE AS WELL AS THE
 TONEDECODE.



COMPONENTS MARKED RXX ARE
 PLACED ON NO SOLDERING SIDE.

CHANNEL GUARD CG9010
 CODE NO. L856100G1 - GLN7064A
 D405.098/2

PARTS LIST FOR CHANNEL GUARD CG9010 BD REV.0

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GLN7064A	L856100G1 CG 9010			
C001	2113741B69	CAP,CER,CL2 100N , 5%			
C002	2113741B69	CAP,CER,CL2 100N , 5%			
C003	2113741B25	CAP,CER,CL2 1N5 , 5%			
C004	2113741B45	CAP,CER,CL2 10N , 5%			
C005	2313749D52	CAP,TA,SOL 1U , 35V			
C006	2113741B45	CAP,CER,CL2 10N , 5%			
C007	2313749D36	CAP,TA,SOL 0U47, 35V			
C008	2113741B69	CAP,CER,CL2 100N , 5%			
D001	A700028P1	DIO,SI,SIG 1N4148			
D002	A700028P1	DIO,SI,SIG 1N4148			
D003	J708000P5	DIO,OPTO RD,LS3140-L			
D004	A700028P1	DIO,SI,SIG 1N4148			
P001	A701785P4	CONTACT			
Q001	J707511P1	TSTR,NPN,SI BC 548A/B			
Q002	J707674P1	TSTR,PNP,SI BC 558A/B			
Q003	J707511P1	TSTR,NPN,SI BC 548A/B			
Q004	J707511P1	TSTR,NPN,SI BC 548A/B			
Q005	J707511P1	TSTR,NPN,SI BC 548A/B			
R001	0611077A98	RES,MFLM,1/8W 10K , 5%			
R002	0611077B15	RES,MFLM,1/8W 47K , 5%			
R003	0611077B15	RES,MFLM,1/8W 47K , 5%			
R004	0611077A98	RES,MFLM,1/8W 10K , 5%			
R005	0611077A98	RES,MFLM,1/8W 10K , 5%			
R006	0611077A74	RES,MFLM,1/8W 1K0 , 5%			
R007	0611077A98	RES,MFLM,1/8W 10K , 5%			
R008	0611077B15	RES,MFLM,1/8W 47K , 5%			
R009	0611077B15	RES,MFLM,1/8W 47K , 5%			
R010	0611077B15	RES,MFLM,1/8W 47K , 5%			
R011	0611077G53	RES,MFLM,1/8W 43K2 , 1%			
R012	0611077B17	RES,MFLM,1/8W 56K , 5%			
R013	0611077G53	RES,MFLM,1/8W 43K2 , 1%			
R014	0611077B21	RES,MFLM,1/8W 82K , 5%			
R015	0611077B41	RES,MFLM,1/8W 560K , 5%			
R016	0611077B11	RES,MFLM,1/8W 33K , 5%			
R017	0611077A98	RES,MFLM,1/8W 10K , 5%			
R018	0611077A98	RES,MFLM,1/8W 10K , 5%			
R019	0611077B01	RES,MFLM,1/8W 12K , 5%			
R020	0611077B15	RES,MFLM,1/8W 47K , 5%			
R021	0611077A90	RES,MFLM,1/8W 4K7 , 5%			
S001	J706340P3	SW,DIP 08-CKT			
U001	J706031P3	IC,LIN,VR,FIX 78L05AC			
U002	J710714P1	IC,CODEC 365			
U003	J710535P2	OSC,CRY,CMOS 1.0000MHZ			
W001	A700184P1	RES,WIRE JMPR OR JUMPER			
	8402003U68A	BOARD PW CG9010			
		NON REFERENCED ITEMS:			
	0102721B65	K806000G1 CABLE ASM			
	J706617P6	SPACER (2 used)			
	A700031P408	SCR,PAN HD M-3.0X 8.0 (2 used)			

302526N06

CG9011

CHANNEL GUARD

This module (CG9011) is an optional board which provides the CQF9000 radio with a Continuous Tone Controlled Squelch System (CTCSS) as described in EIA Standard RS-220, or in MPT 1306. The module provides encode only (transmitter) function using a standard integrated circuit FX335J to produce the channel guard tones.

Tone frequencies are selected, via a six out of eight position DIL switch, from an internal preprogrammed tone table in the FX335J. The tone frequencies range from 67 Hz to 250 Hz in 37 steps.

CIRCUIT DESCRIPTION

POWER SUPPLY

The input voltage (9.0 V reg.) from pin 3 is further regulated down to 5 V by U1, an integrated circuit 78L05. The 5 volt are the only voltage supply used on board.

X-TAL CLOCK OSCILLATOR

U3 is a small integrated circuit oscillator with built-in frequency divider. The output frequency is 1.0 MHz.

ENCODER/DECODER IC, FX335J

The FX335J (U2) is a CMOS CTCSS encoder/decoder used to generate and detect the 38 sub-audible tones. The sub-audible tone encode functions, are all derived

from the 1.0 MHz clock oscillator and are selected by means of six sections of the DIL switch S1. Refer to table 2.

CG ENABLE

Channel guard encoder is enabled when U2 pin 17 is at logic "0". This can be done on-board by means of S1.7 ENABLE. When S1.7 is open and S1.8 is closed, remote control of the CG output is possible from CG ENABLE J1 pin 2. External control of the CG module requires modification of the JP9011 wiring.

CTCSS TONE OUTPUT LEVEL

The channel guard tone frequency deviation can be adjusted by potentiometer R3. Output from module is CG AUDIO OUT J1 pin 1.

SPECIFICATIONS

Input voltage

9.0 VDC \pm 0.15 VDC.

Current drain

15 mA maximum.

Encode output level

77.5 mV RMS minimum at 67 Hz to 210.7 Hz. Equal to -20 dBm.

Encode tone distortion

2.0% max.

Frequency stability

\pm 0.2%.

Temperature range

-30°C to +60°C.

Humidity

90% humidity at 50°C.

Nominal Frequency	FX335 Frequency	fo%	Switch							
			8	7	6	5	4	3	2	1
67.0	67.05	+0.07	X	X	1	1	1	1	1	1
71.9	71.90	0.0	X	X	0	1	1	1	1	1
74.4	74.35	-0.07	X	X	1	1	1	1	1	0
77.0	76.96	-0.05	X	X	0	0	1	1	1	1
79.7	79.77	+0.09	X	X	1	1	1	1	0	1
82.5	82.59	+0.11	X	X	0	1	1	1	1	0
85.4	85.38	-0.02	X	X	1	1	1	1	0	0
88.5	88.61	+0.12	X	X	0	0	1	1	1	0
91.5	91.58	+0.09	X	X	1	1	1	0	1	1
94.8	94.76	-0.04	X	X	0	1	1	1	0	1
97.4	97.29	-0.11	X	X	1	1	1	0	1	0
100.0	99.96	-0.04	X	X	0	0	1	1	0	1
103.5	103.43	-0.07	X	X	0	1	1	1	0	0
107.2	107.15	-0.05	X	X	0	0	1	1	0	0
110.9	110.77	-0.12	X	X	0	1	1	0	1	1
114.8	114.64	-0.14	X	X	0	0	1	0	1	1
118.8	118.80	0.0	X	X	0	1	1	0	1	0
123.0	122.80	-0.16	X	X	0	0	1	0	1	0
127.3	127.08	-0.17	X	X	0	1	1	0	0	1
131.8	131.67	-0.10	X	X	0	0	1	0	0	1
136.5	136.61	+0.08	X	X	0	1	1	0	0	0
141.3	141.32	+0.01	X	X	0	0	1	0	0	0
146.2	146.37	+0.12	X	X	0	1	0	1	1	1
151.4	151.09	-0.21	X	X	0	0	0	1	1	1
156.7	156.88	+0.11	X	X	0	1	0	1	1	0
162.2	162.31	+0.07	X	X	0	0	0	1	1	0
167.9	168.14	+0.14	X	X	0	1	0	1	0	1
173.8	173.48	-0.18	X	X	0	0	0	1	0	1
179.9	180.15	+0.14	X	X	0	1	0	1	0	0
186.2	186.29	+0.05	X	X	0	0	0	1	0	0
192.8	192.86	+0.03	X	X	0	1	0	0	1	1
203.5	203.65	+0.07	X	X	0	0	0	0	1	1
210.7	210.17	-0.25	X	X	0	1	0	0	1	0

1 = Switch open=*OFF* 0 = Switch closed=*ON* X = Do not care

Table 2. Frequency programming table

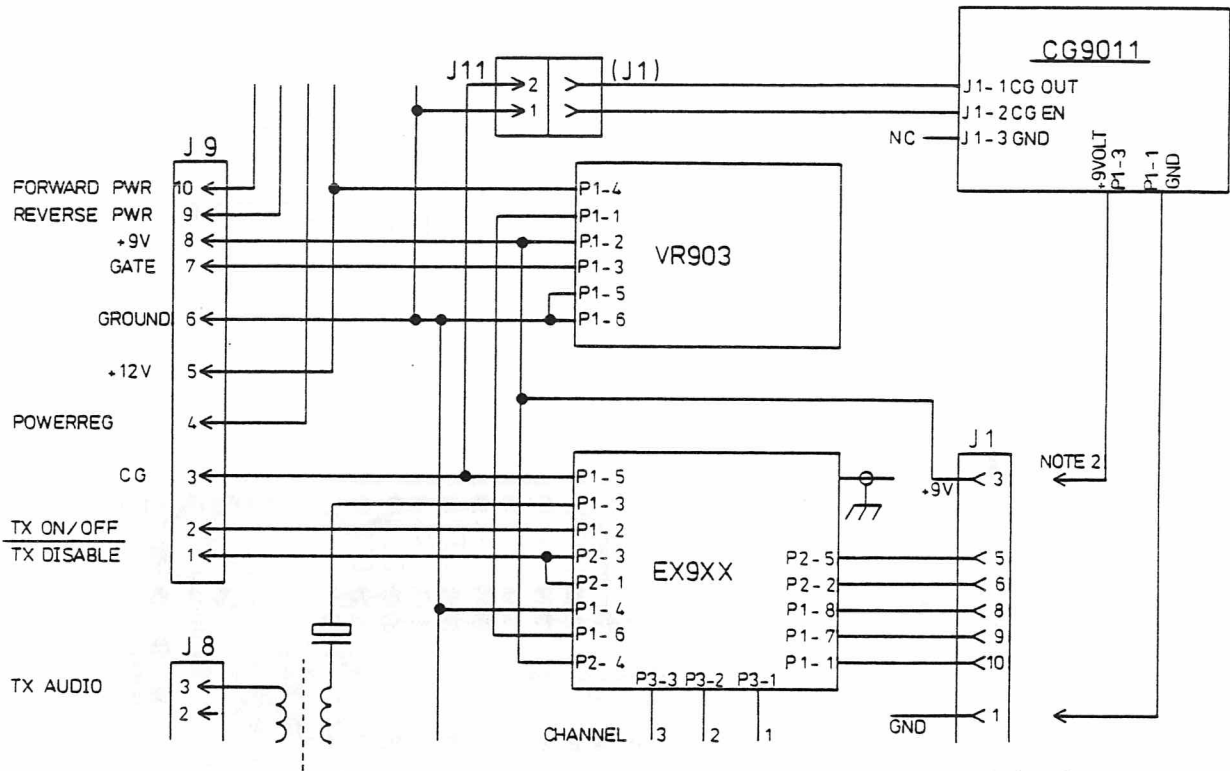


FIGURE 1:

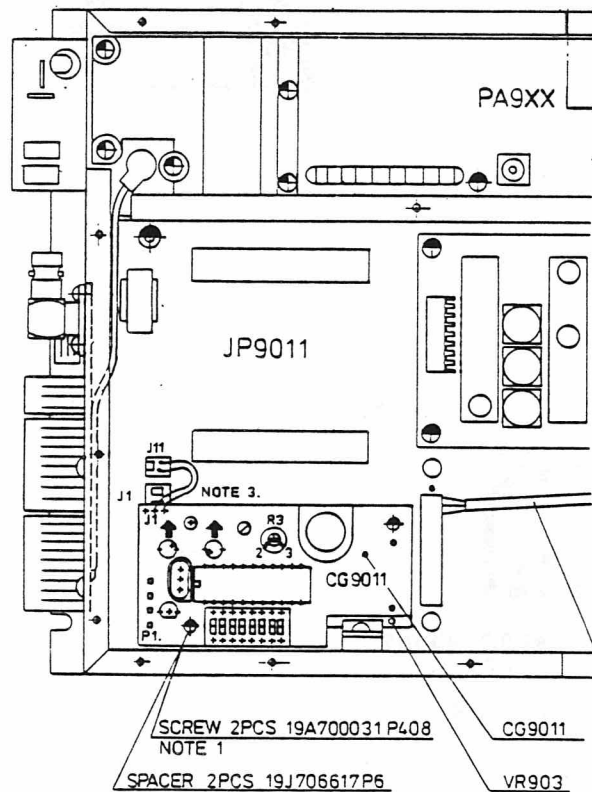


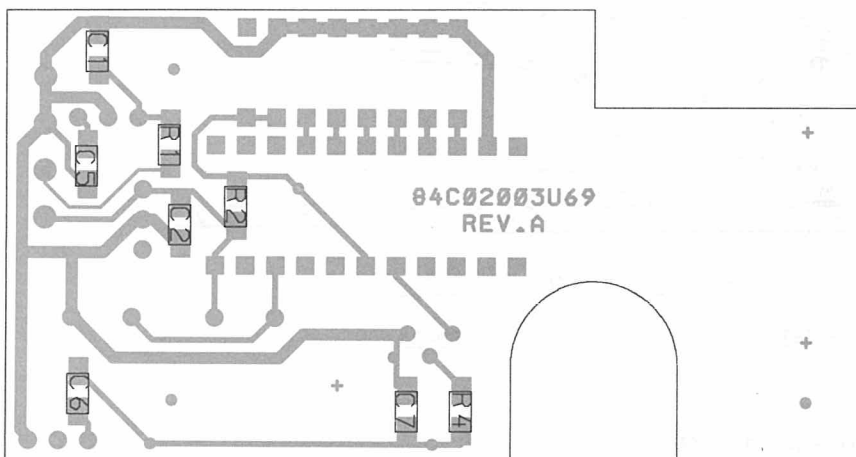
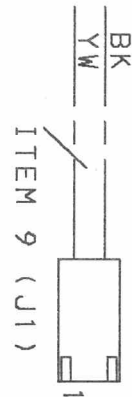
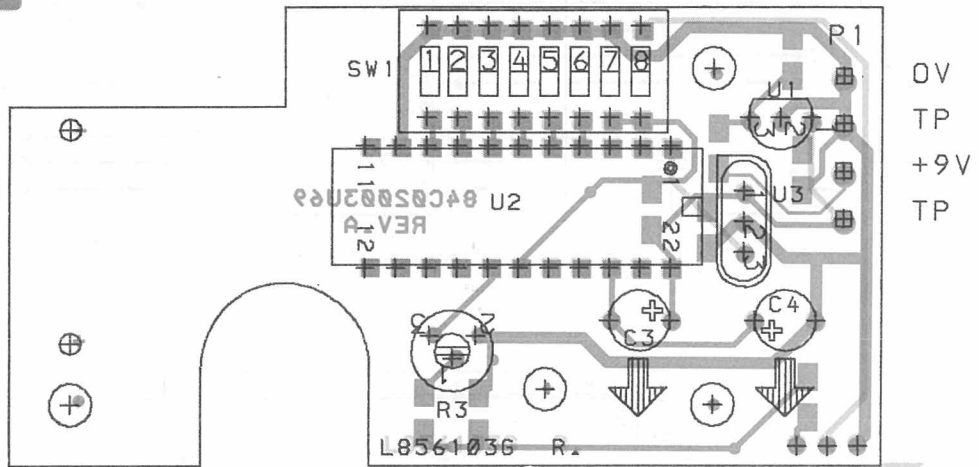
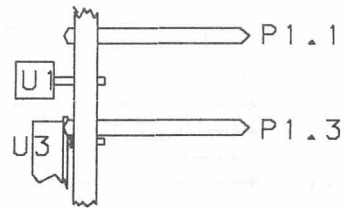
FIGURE 2:

NOTES:

1. For mounting CG9011 the two diagonal placed screws in VR903, is removed and replaced by two spacer J706617P6.
2. Power Supply (+9 V and GND) is taken from central metering connector J1 pin 1 and pin 3.
3. When CG9011 is mounted, access to central metering connector J1 is difficult.

MOUNTING INSTRUCTION
FOR CG9011

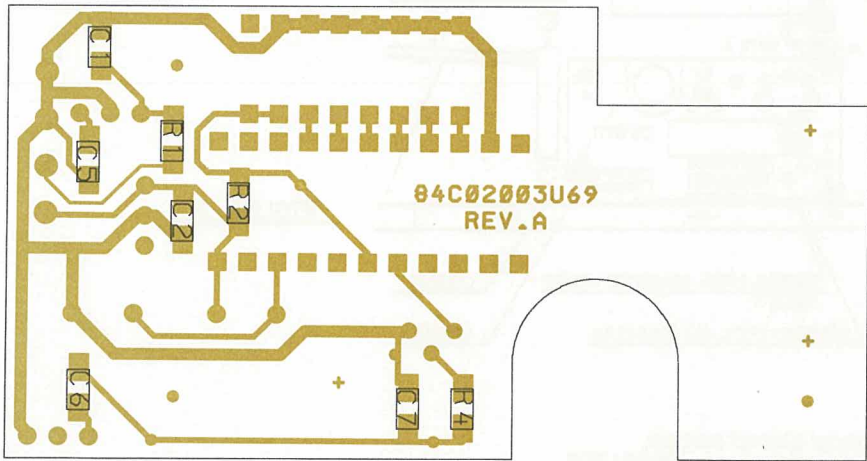
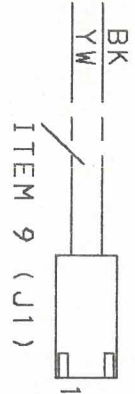
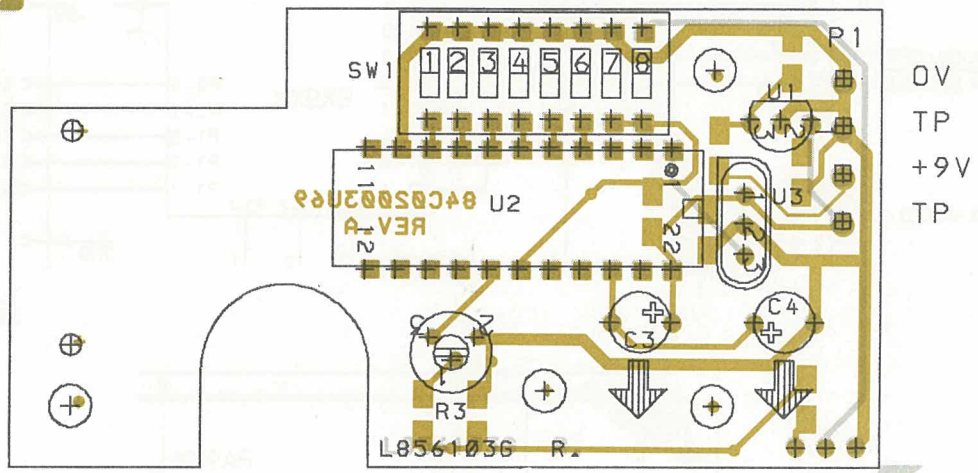
M405.501



**CHANNEL GUARD CG9011
COMPONENT LAYOUT**

D405.097/2

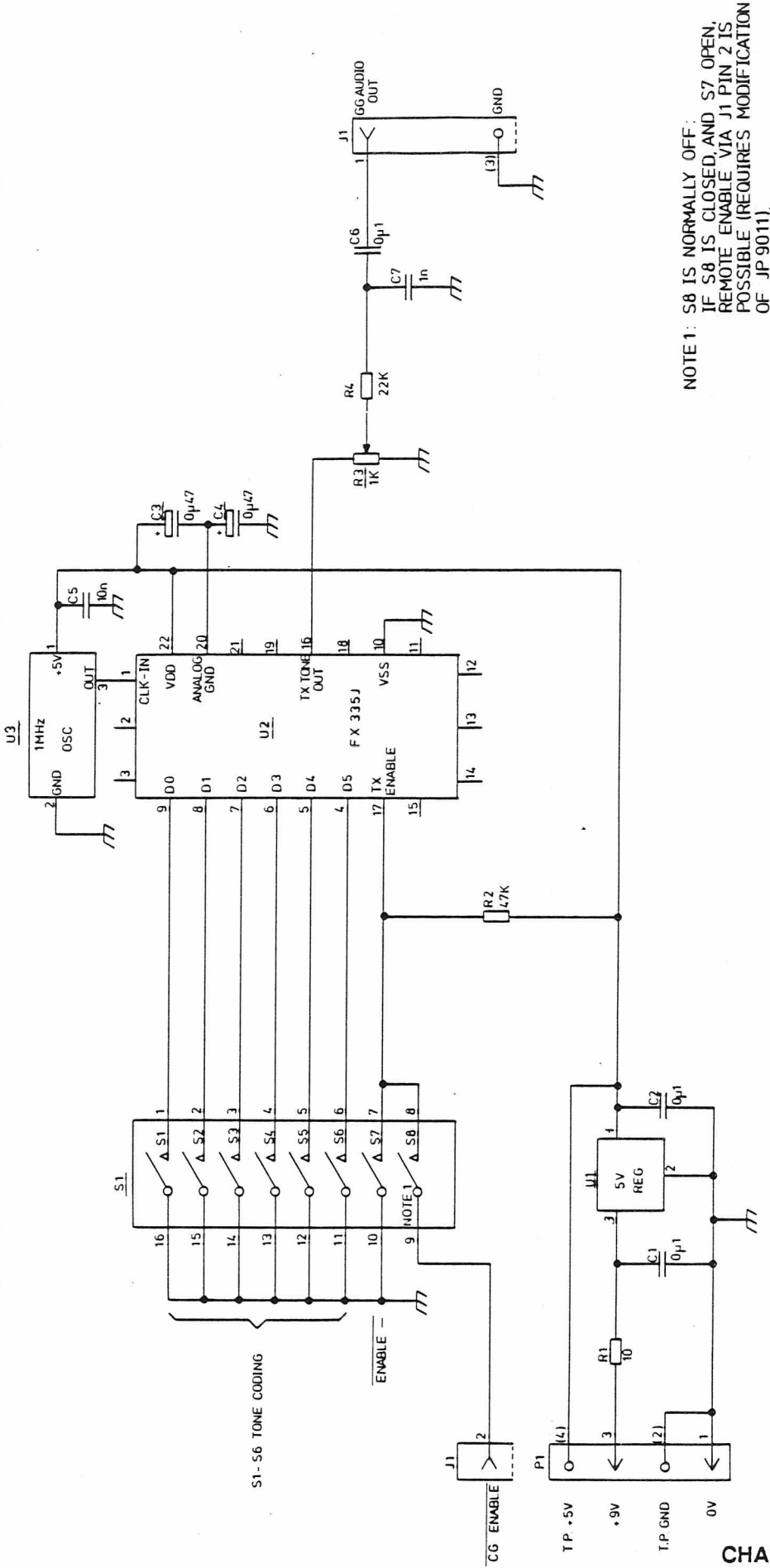
CODE NO. L856103G1 - GLN7065A



**CHANNEL GUARD CG9011
COMPONENT LAYOUT**

D405.097/2

CODE NO. L856103G1 - GLN7065A



NOTE 1: S8 IS NORMALLY OFF.
 IF S8 IS CLOSED, AND S7 OPEN,
 REMOTE ENABLE VIA J1 PIN 2 IS
 POSSIBLE (REQUIRES MODIFICATION
 OF JP 9011).

COMPONENTS MARKED $\frac{RXXX}{10K}$ ARE
 PLACED ON NO SOLDERING SIDE.

CHANNEL GUARD CG9011

CODE NO. L856103G1 - GLN7065A

D405.096/2

PARTS LIST FOR CHANNEL GUARD CG9011 BD REV.0

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GLN7065A	L856103G1 CG9011			
C001	2113741B69	CAP,CER,CL2 100N , 5%			
C002	2113741B69	CAP,CER,CL2 100N , 5%			
C003	2313749D36	CAP,TA,SOL 0U47, 35V			
C004	2313749D36	CAP,TA,SOL 0U47, 35V			
C005	2113741B45	CAP,CER,CL2 10N , 5%			
C006	2113741B69	CAP,CER,CL2 100N , 5%			
C007	2113741B21	CAP,CER,CL2 1N0 , 5%			
P001	A701785P4	CONTACT			
R001	0611077A26	RES,MFLM,1/8W 10R0 , 5%			
R002	0611077B15	RES,MFLM,1/8W 47K , 5%			
R003	A700016P1	RES,VAR,CERM 1K0 , 10%			
R004	0611077B07	RES,MFLM,1/8W 22K , 5%			
S001	J706340P3	SW,DIP 08-CKT			
U001	J706031P3	IC,LIN,VR,FIX 78L05AC			
U002	J710538P1	IC,CODEC 335			
U003	J710535P2	OSC,CRY,CMOS 1.0000MHZ			
	8402003U69A	BOARD PW CG9011			
		NON REFERENCED ITEMS:			
	J710717G1	CABLE ASM			
	J706617P6	SPACER (2 used)			
	A700031P408	SCR,PAN HD M-3.0X 8.0 (2 used)			

DC9X2

DIRECTIONAL COUPLER

DC9X2 is used in CQF9xxx to avoid signal intermodulation. The module is mounted in the TX-tray behind the branching filter.

DC9x2 consist of a circulator, a resistor, 6 variable capacitors for matching the circulator to the terminals and a filter for damping harmonic products.

Each frequency band has its particular DC module.

-DC912 VHF band 138 - 174 MHz
-DC932 VHF band 66 - 88 MHz
-DC962 UHF band 403 - 470 MHz

SPECIFICATIONS

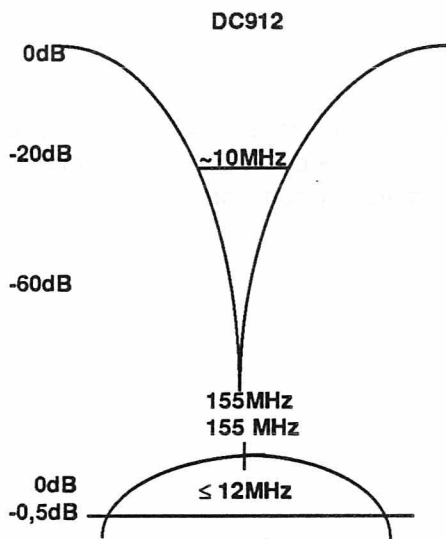
Input impedance
50 ohm

Max. power handling
25 W

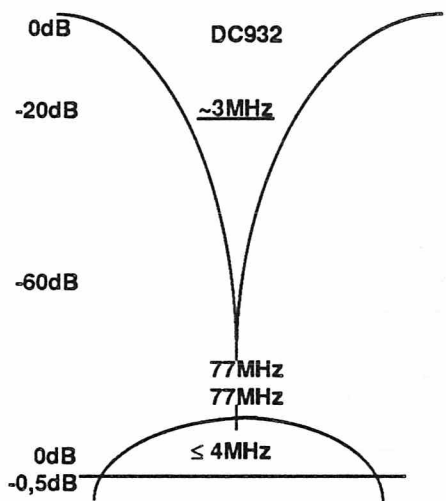
Output impedance
50 ohm

Temperature
from -40°C to +85°C

	DC912	DC932	DC962
Bandwidth	6 MHz	2 MHz	15 MHz
Insertion loss	≤0.7 dB	≤1.0 dB	≤0.6 dB
Isolation, room temperature	≥20 dB	≥20 dB	≥20 dB
Isolation, extreme temperature	≥16 dB	≥12 dB	≥16 dB

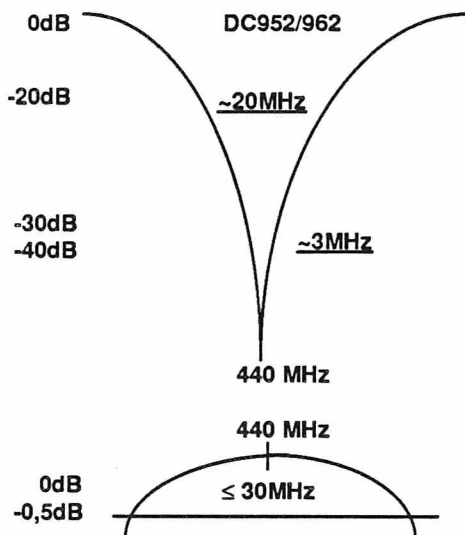


TYPICAL FILTER CURVE FROM ANTENNA TO TRANSMITTER



TYPICAL FILTER CURVE FROM TRANSMITTER TO ANTENNA

TYPICAL FILTER CURVE FROM ANTENNA TO TRANSMITTER



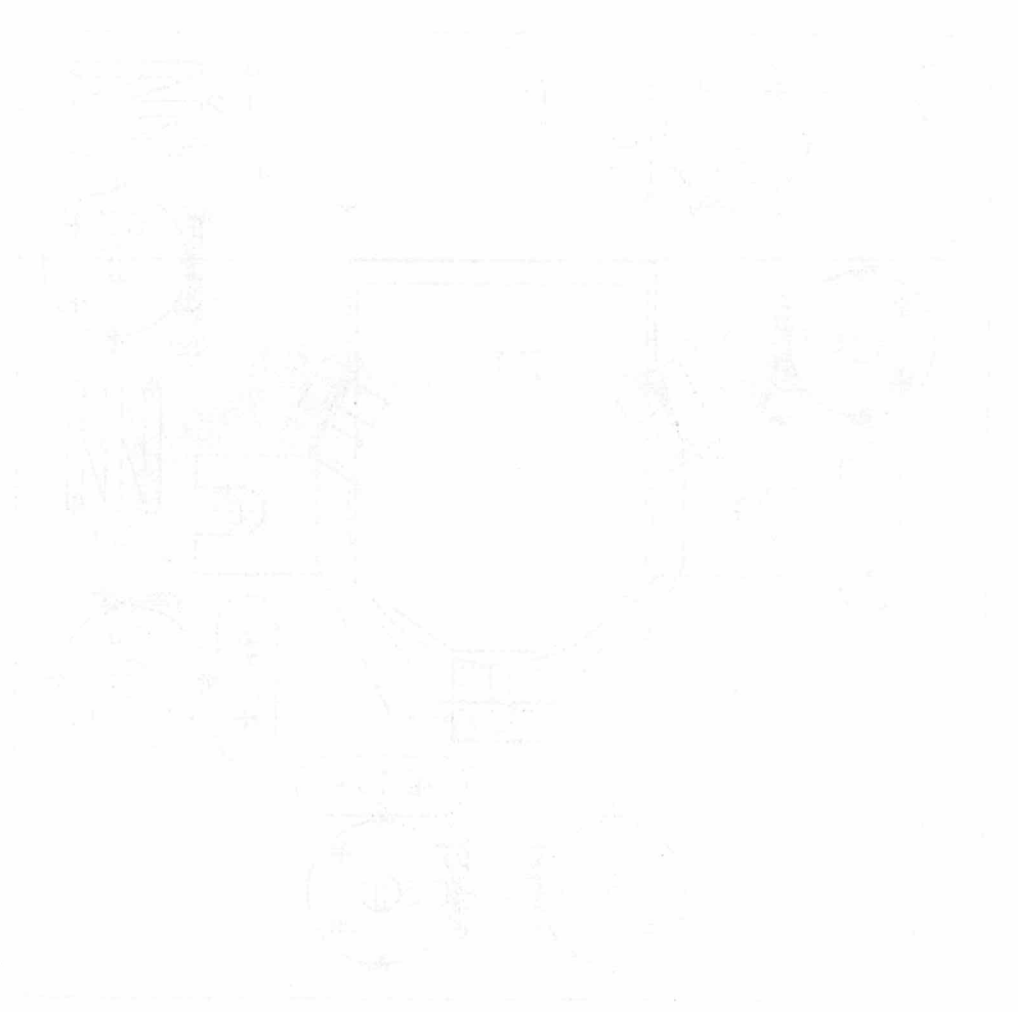
TYPICAL FILTER CURVE FROM TRANSMITTER TO ANTENNA

TYPICAL FILTER CURVE FROM ANTENNA TO TRANSMITTER

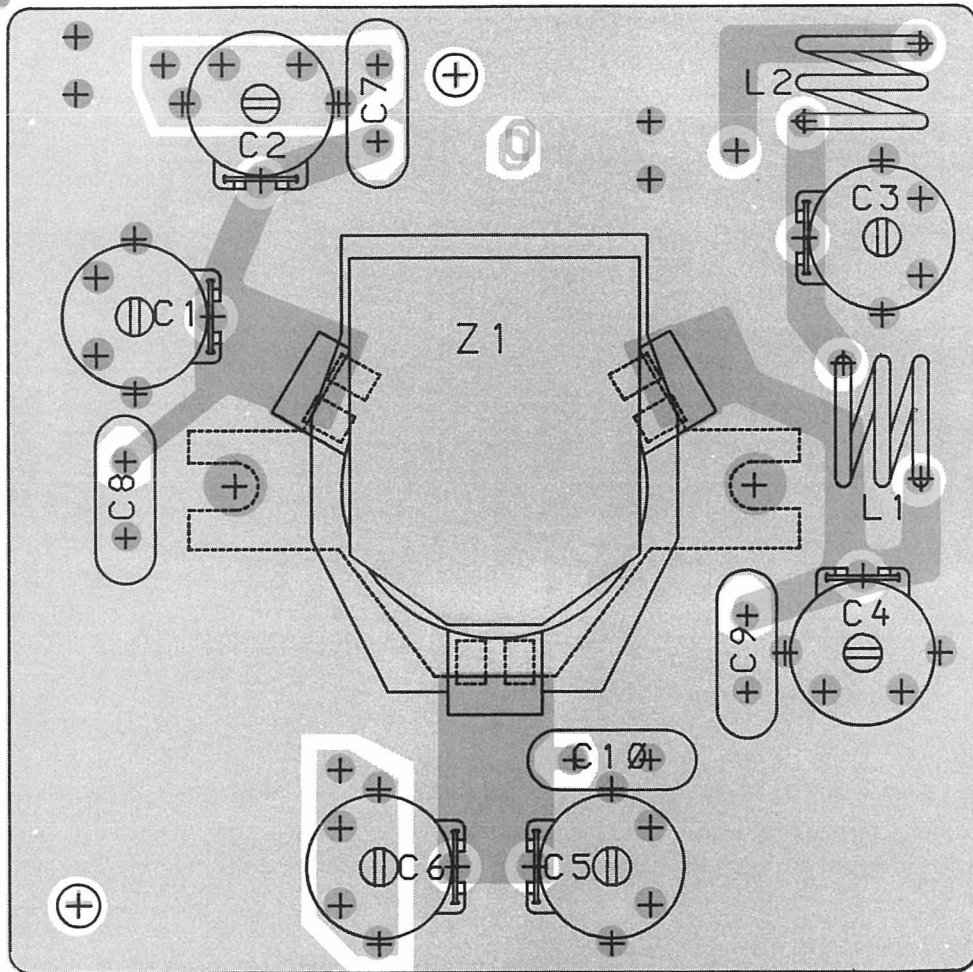
TYPICAL FILTER CURVE FROM TRANSMITTER TO ANTENNA

FILTER CURVE DC912/932/952/962

D404.206



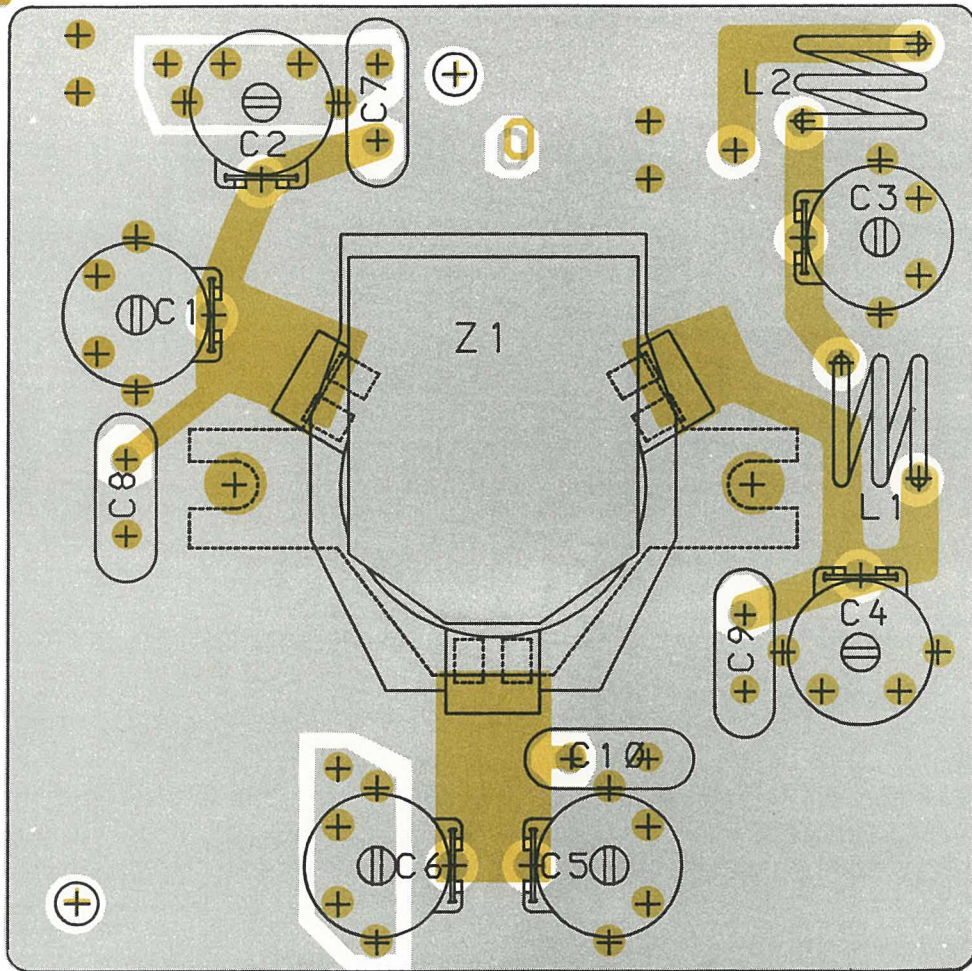
REV. 01	10/15/00	REVISED SCHEMATIC
REV. 02	03/10/01	REVISED SCHEMATIC
REV. 03	03/10/01	REVISED SCHEMATIC
REV. 04	03/10/01	REVISED SCHEMATIC
REV. 05	03/10/01	REVISED SCHEMATIC
REV. 06	03/10/01	REVISED SCHEMATIC
REV. 07	03/10/01	REVISED SCHEMATIC
REV. 08	03/10/01	REVISED SCHEMATIC
REV. 09	03/10/01	REVISED SCHEMATIC
REV. 10	03/10/01	REVISED SCHEMATIC



MODULE CODE NO.	MOUNTED BOARD CODE NO.	
GFD6126A - L855802 G2	L855262 G1 - 0102720B12	DC91x
GFC6119A - L855802 G3	L855262 G2 - 0102720B55	DC93x

DIRECTIONAL COUPLER DC911/912/931/932
COMPONENT LAYOUT

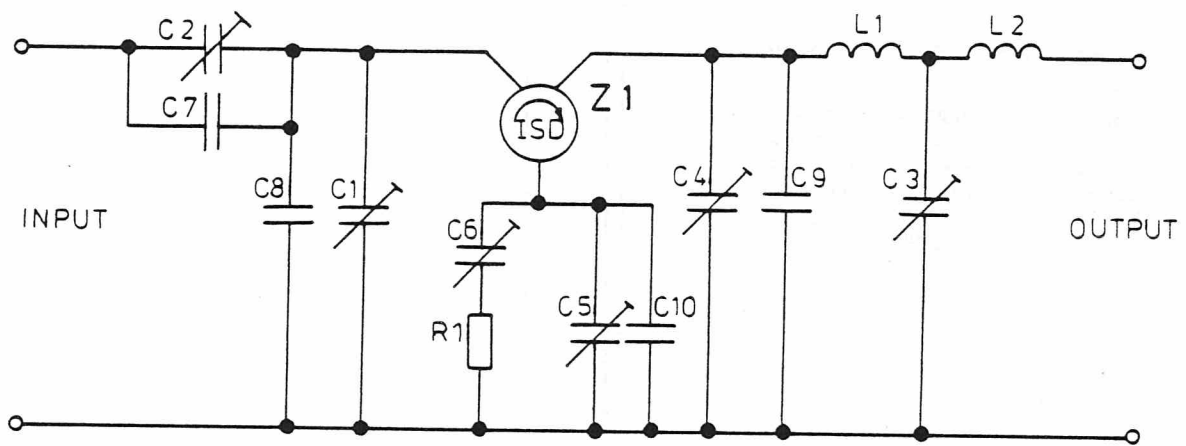
D403.755/3



MODULE CODE NO.	MOUNTED BOARD CODE NO.	
GFD6126A - L855802 G2	L855262 G1 - 0102720B12	DC91x
GFC6119A - L855802 G3	L855262 G2 - 0102720B55	DC93x

**DIRECTIONAL COUPLER DC911/912/931/932
COMPONENT LAYOUT**

D403.755/3



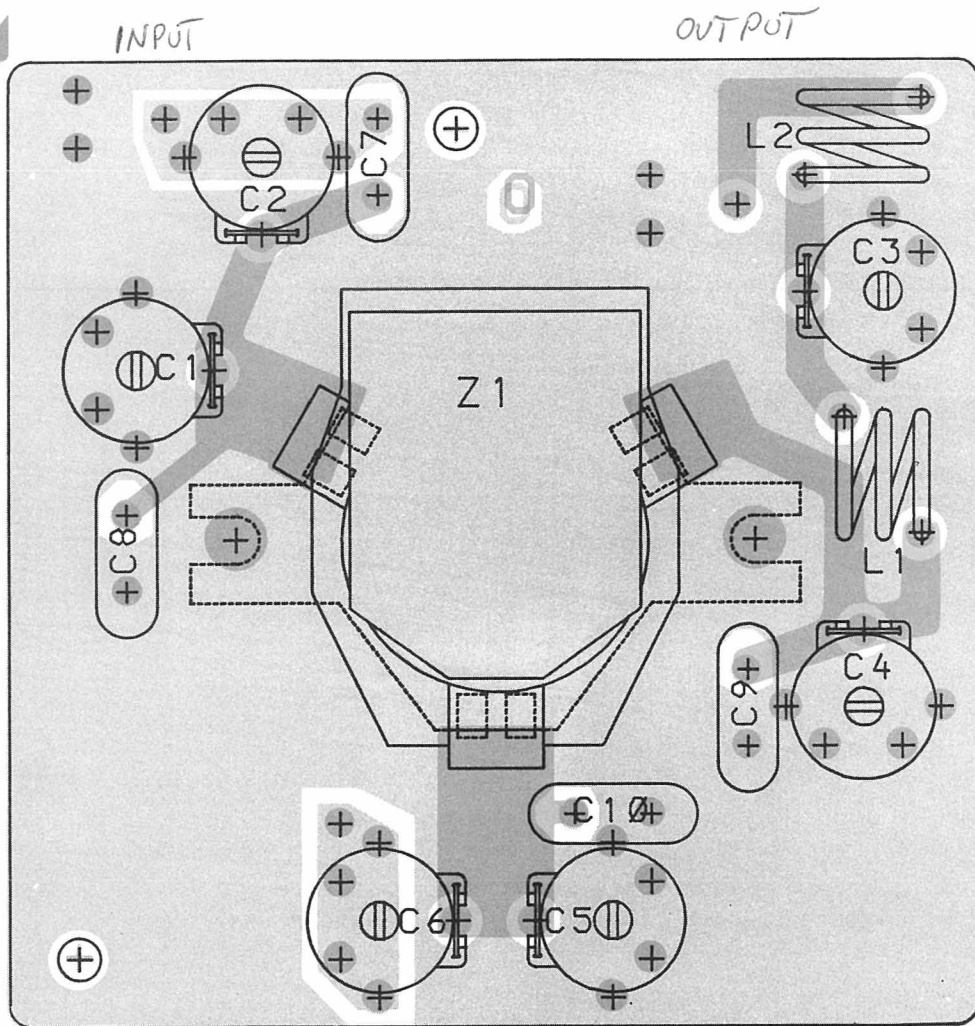
MODULE CODE NO.	MOUNTED BOARD CODE NO.	
L855802G3 - GFC6119A	L855262G2 - 0102720B55	DC93x

DIRECTIONAL COUPLER DC931/932

D403.753/3

PARTS LIST FOR DIRECTIONAL COUPLER DC932

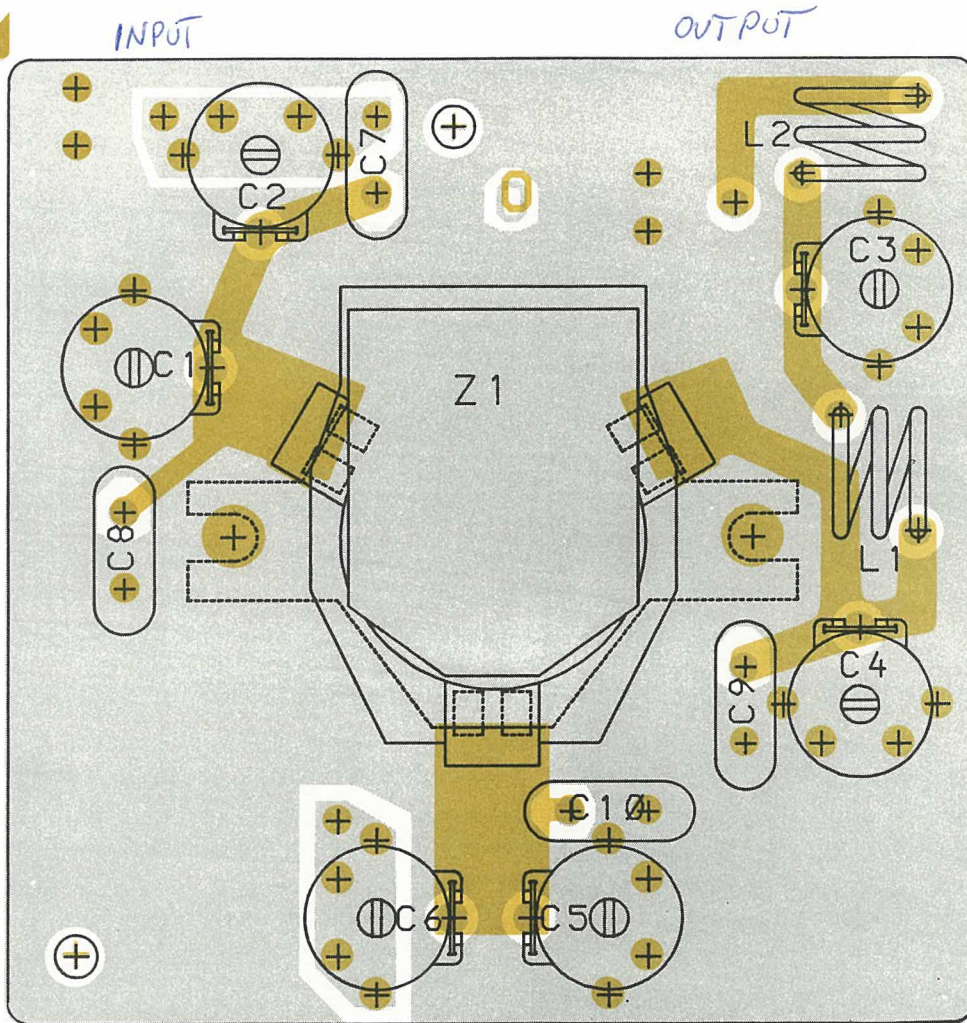
Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GFC6119A	L855802G3 DC932			
A001 W001 W002	0102720B55 J708816P2 J708947P1 0102721B68 A700036P408 J706076P5	L855262G2 COMP BD PW DC931 CABLE ASSY RF,COAX CABLE RF K805282G1 HT SK ASM SCR,PAN HD M-3.0X 8.0 (2 used) WASH,SPG 3.2X 6.4 (2 used)			
A001	0102720B55	L855262G2 COMP BD PW DC931			
Z01 C01 C02 C03 C04 C05 C06 C07 C08 C09 C10 L01 L02	J707237P1 J707274P2 J707274P2 J706080P1 J707274P2 J707274P2 J707274P2 J706079P301 J706079P302 J706079P301 J706079P302 J707253P1 J707253P1 8402050U06A	CIRCULATOR,RF 68-150 MHZ CAP,VAR,FILM 9.0/120 PF CAP,VAR,FILM 9.0/120 PF CAP,VAR,FILM 5.0/57 PF CAP,VAR,FILM 9.0/120 PF CAP,VAR,FILM 9.0/120 PF CAP,VAR,FILM 9.0/120 PF CAP,CER,N750 82P , 5% CAP,CER,N750 100P , 5% CAP,CER,N750 82P , 5% CAP,CER,N750 100P , 5% COIL COIL L855263P1 BD PW			
	0102721B68	K805282G1 HT SK ASM			
U01	0102721B37 K806307G1 J707137P1 A700036P304	J707159G1 INT CKT ASM EXTRUSION DRILLED SPRING SCREW PAN HD M-2.5x 4.0 (2 used)			



MODULE CODE NO.	MOUNTED BOARD CODE NO.	
GFD6126A - L855802 G2	L855262 G1 - 0102720B12	DC91x
GFC6119A - L855802 G3	L855262 G2 - 0102720B55	DC93x

DIRECTIONAL COUPLER DC911/912/931/932
COMPONENT LAYOUT

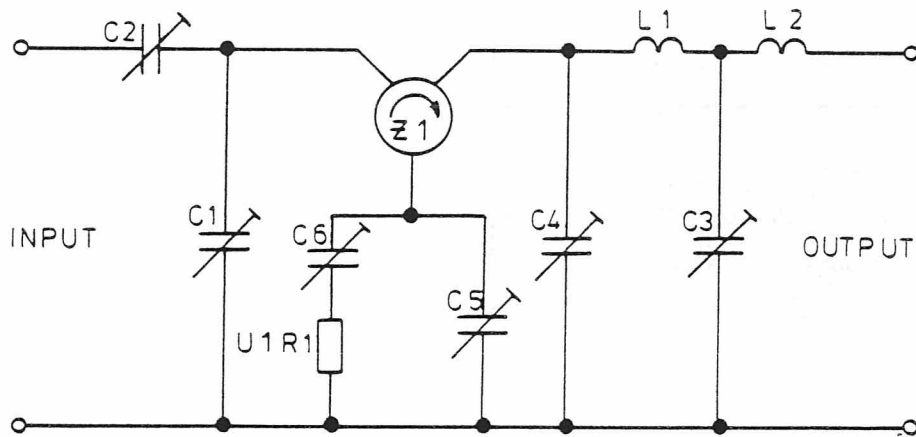
D403.755/3



MODULE CODE NO.	MOUNTED BOARD CODE NO.	
GFD6126A - L855802 G2	L855262 G1 - 0102720B12	DC91x
GFC6119A - L855802 G3	L855262 G2 - 0102720B55	DC93x

DIRECTIONAL COUPLER DC911/912/931/932
COMPONENT LAYOUT

D403.755/3



C1-2-3-4 just. til min. insertion loss →
 C5-6 —||— max. attenuation. ←

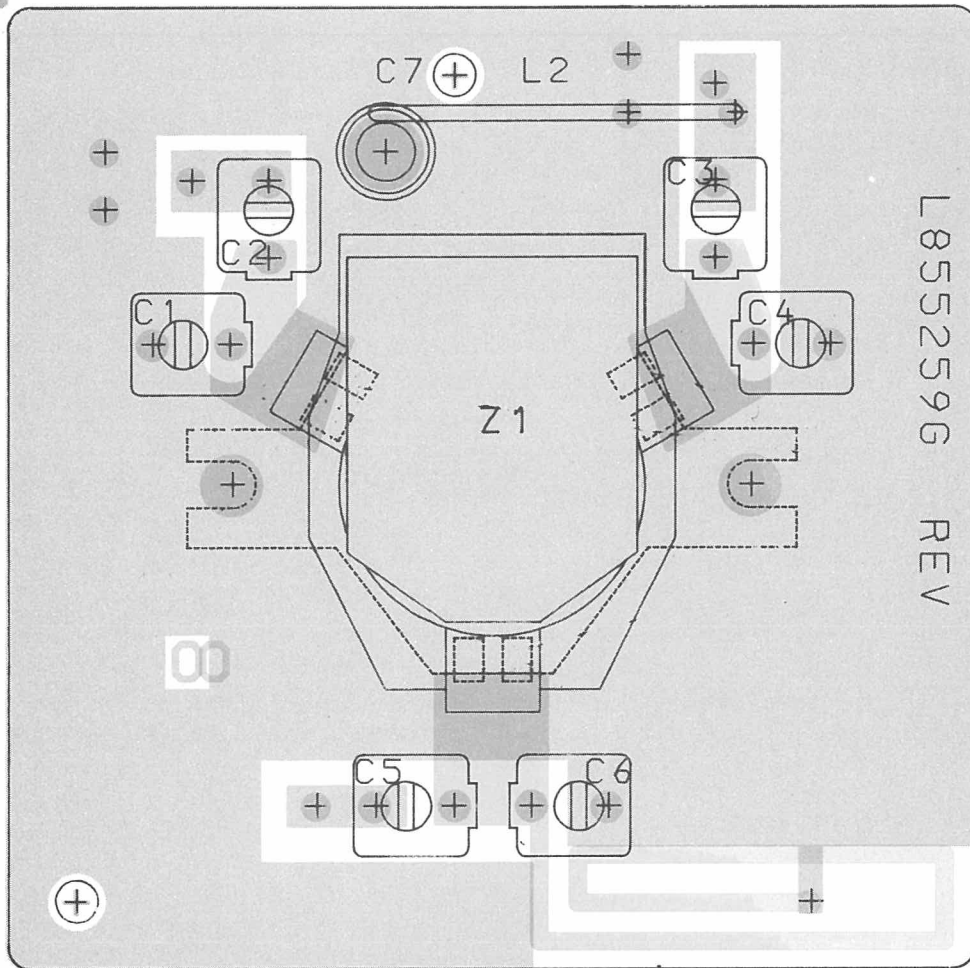
MODULE CODE NO.	MOUNTED BOARD CODE NO.	
L855802 G2 - GFD6126A	L855262 G1 - 0102720B12	DC91x

DIRECTIONAL COUPLER DC911/912

D403.754/3

PARTS LIST FOR DIRECTIONAL COUPLER DC912

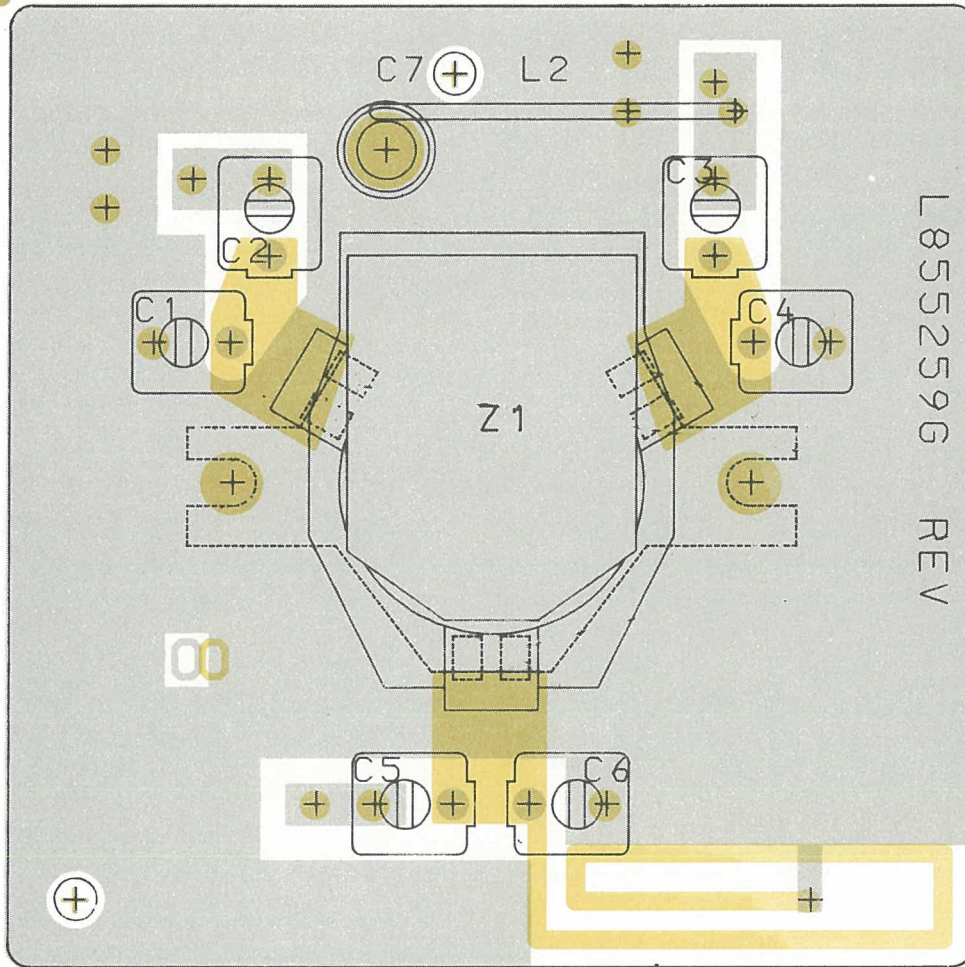
Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GFD6126A	L855802G2 DC912			
A001	0102720B12	L855262G1 COMP BD PW			
W001	J708816P2	CABLE ASSY RF COAX			
W002	J708947P1	CABLE RF			
	0102721B68	K805282G1 HT SK ASM			
	A700036P408	SCR PAN HD M-3.0X 8.0 (2 used)			
	J706076P5	WASH SPG .2X 6.4 (2 used)			
A001	0102720B12	L855262G1 COMP BD PW			
A001	J707237P2	CIRCULATOR RF 140-260 MHz			
C001	J706080P1	CAP VAR FILM 5.0/57 PF			
C002	J706080P1	CAP VAR FILM 5.0/57 PF			
C003	J706080P2	CAP VAR FILM 4.0/37 PF			
C004	J706080P1	CAP VAR FILM 5.0/57 PF			
C005	J706080P1	CAP VAR FILM 5.0/57 PF			
C006	J706080P2	CAP VAR FILM 4.0/37 PF			
L001	J707253P2	COIL			
L002	J707253P2	COIL			
	8402050U06A	L855263P1 BD PW			
	0102721B68	K805282G1 HEAT SINK ASM.			
U001	0102721B37	J707159G1 INT CKT ASM			
	K805307G1	EXTRUSION DRILLED			
	J707137P1	SPRING			
	A700036P405	SCR PAN HD M-3.0X 5.0 (2 used)			



MODULE CODE NO.	MOUNTED BOARD CODE NO.	
L855802G4 - GFE6131A.	L855259G2 - 0102720B62	DC95x
L855802G1- GFE6130A.	L855259G1 - 0102720B52	DC96x

**DIRECTIONAL COUPLER DC951/952/961/962
COMPONENT LAYOUT**

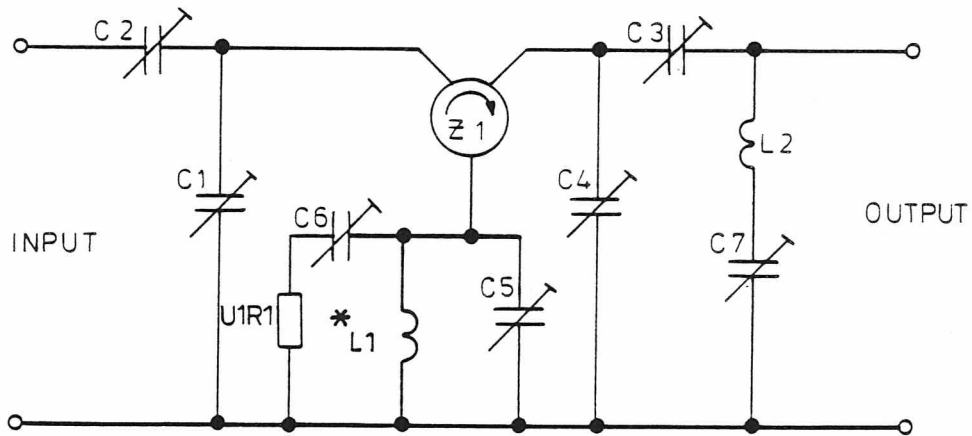
D404.215/2



MODULE CODE NO.	MOUNTED BOARD CODE NO.	
L855802G4 - GFE6131A.	L855259G2 - 0102720B62	DC95x
L855802G1- GFE6130A.	L855259G1 - 0102720B52	DC96x

**DIRECTIONAL COUPLER DC951/952/961/962
COMPONENT LAYOUT**

D404.215/2



* PART OF PWB

MODULE CODE NO.	MOUNTED BOARD CODE NO.	
GFE6131A - L855802G4	L855259 G2- 0102720B62	DC95x
GFE6130A - L855802G1	L855259 G1- 0102720B52	DC96x

DIRECTIONAL COUPLER DC951/952/961/962

D403.752/3

PARTS LIST FOR DIRECTIONAL COUPLER DC962 BD REV.0

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GFE6131A	L855802G1 DC962			
A001	L855259G1	COMP BD PW SEE BELOW:			
W001	J708816P2	CABLE ASM., RF, COAX			
W002	J708947P1	CABLE ASM., RF			
	0102721B68	NON REFERENCED ITEMS: K805282G1 HEAT SINK ASM SEE BELOW:			
	A700036P408	SCR, PAN HD. M3. x 8.0			
	J706076P5	WASH., SPG. 3.2 X 6.4			
A001	L855259G1	COMP. BD PW			
C01	J706003P3	CAP VAR FILM 1.2/3.5P 200V			
C02	J706003P1	CAP VAR FILM 1.8/10P 200V			
C03	J706003P2	CAP VAR FILM 2.0/18P 200V			
C04	J706003P3	CAP VAR FILM 1.2/3.5P 200V			
C05	J706003P1	CAP VAR FILM 1.8/10P 200V			
C06	J706003P1	CAP VAR FILM 1.8/10P 200V			
C07	J707266P1	CAP VAR CER 0.6/3.5P 160V			
L02	J707254P1	COIL, RF			
Z01	J707237P3	CIRCULATOR, RF 230-470MHz			
	8402003U82A	L855260P1R0 BD PW			
	0102721B68	K805282G1 ASM HEAT SINK			
U01	0102721B37	J707159G1 INT CKT ASM			
	K805307G1	NON REFERENCED ITEMS: EXTRUSION DRILLED			
	J707137P1	SPRING			
	A700036P405	SCREW PAN HD M3.0 x 5.0 (2 used)			

EX931

TRANSMITTER EXCITER

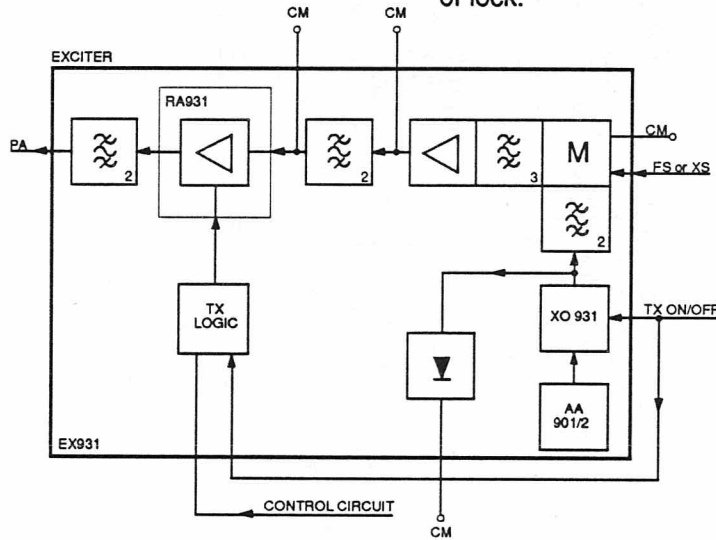
The EX931 is used in duplex radios and provide the signal to drive the power amplifier.

It includes the micromodules AA901/AA902 audio processor, the crystal oscillator XO931 and the RF amplifier RA931.

The exciter signal is generated by mixing the reference frequency signal with a crystal oscillator signal in a

balanced J-FET mixes and filtering and amplifying the output signal to a level adequate to drive the power amplifier, approx. 400 mW.

A switch circuit is used to turn the module on and the control input-TX disable is wired together with the lock signal of the frequency synthesizer so that it is impossible to transmit while the frequency synthesizer is out of lock.



CM = CENTRAL METERING

TECHNICAL SPECIFICATIONS

Channel guard input level

For $\Delta f = 0.75$ kHz
300 mV ± 2 dB

AF input with preemphasis

For $\Delta f = 3$ kHz, $f_{mod} = 1$ kHz
100 mV ± 2 dB

AF input impedance

600 ohm

TX ON/OFF

<0.8 V/open coll.

RF output level

25.5 to 28.5 dBm

RF nominal impedance

50 ohm

RF load impedance

50 ohm

TX status

<5 V/<0.45 mA

Supply voltage

9 V $\pm 5\%$

XO Voltage

9 V $\pm 0.5\%$

Current consumption

(without XO's and AA)
<300 mA

Output frequency

66 - 88 MHz

Max. channel spacing

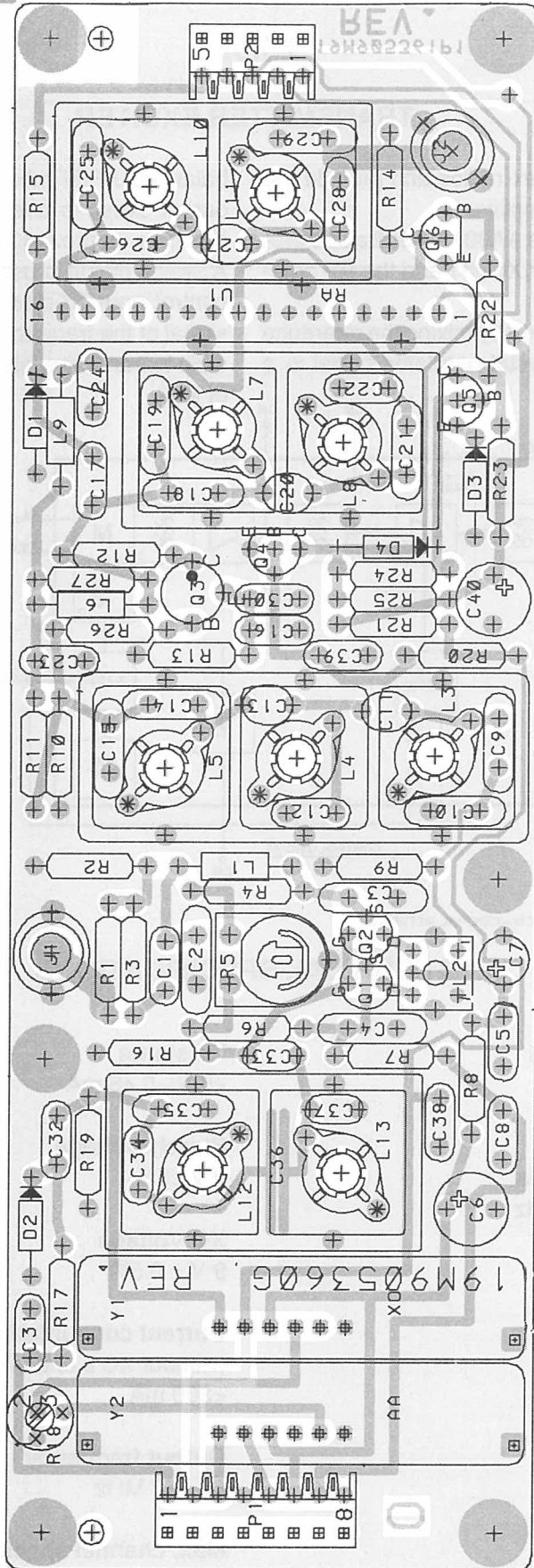
3.2 MHz

AF distortion (EIA)

<2%

Temperature range

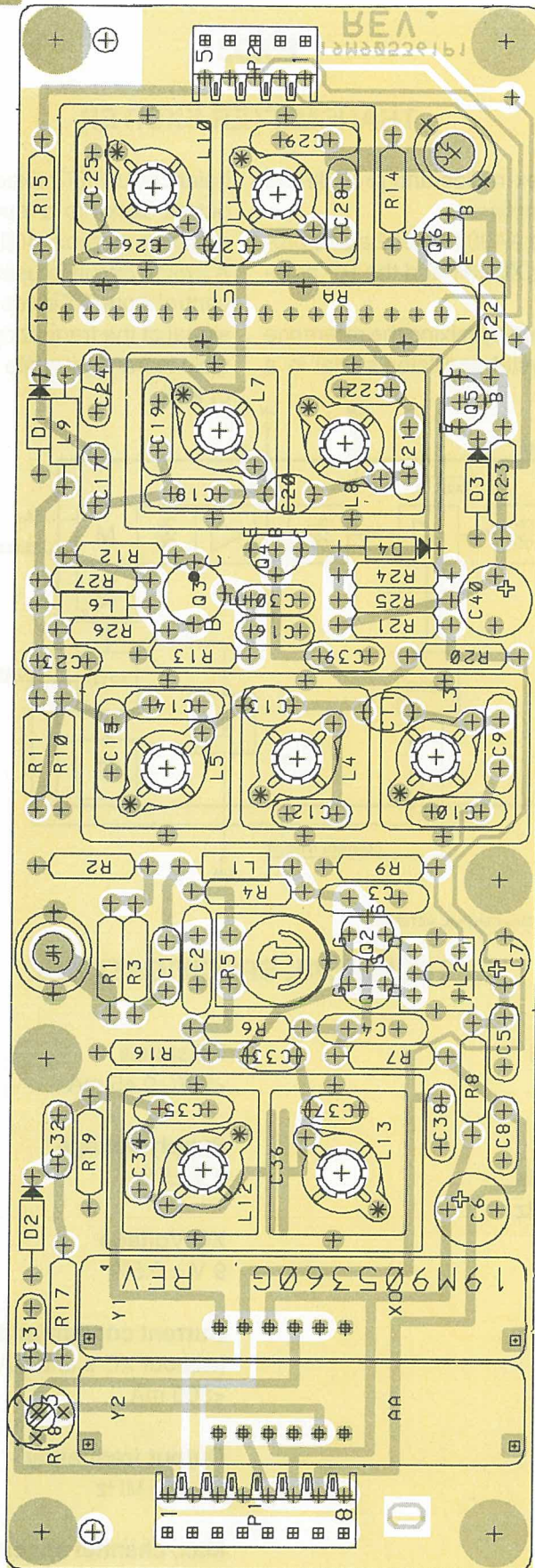
-40°C to +85°C



**EXCITER EX931
COMPONENT LAYOUT**

D403.269/2

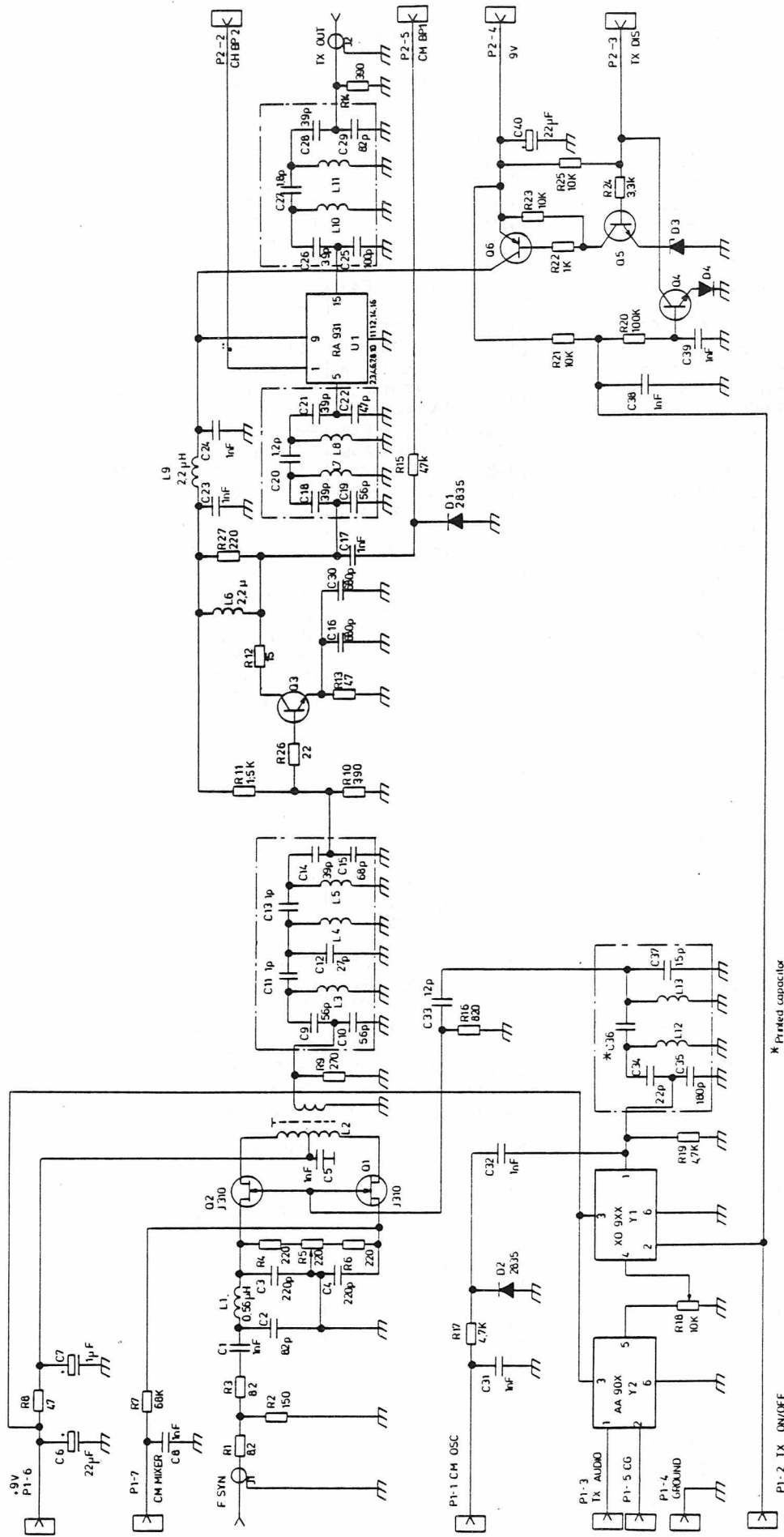
CODE NO. M905360G1 - GTC6116A



**EXCITER EX931
COMPONENT LAYOUT**

D403.269/2

CODE NO. M905360G1 - GTC6116A



* Printed capacitor

EXCITER EX931

D403.196/3

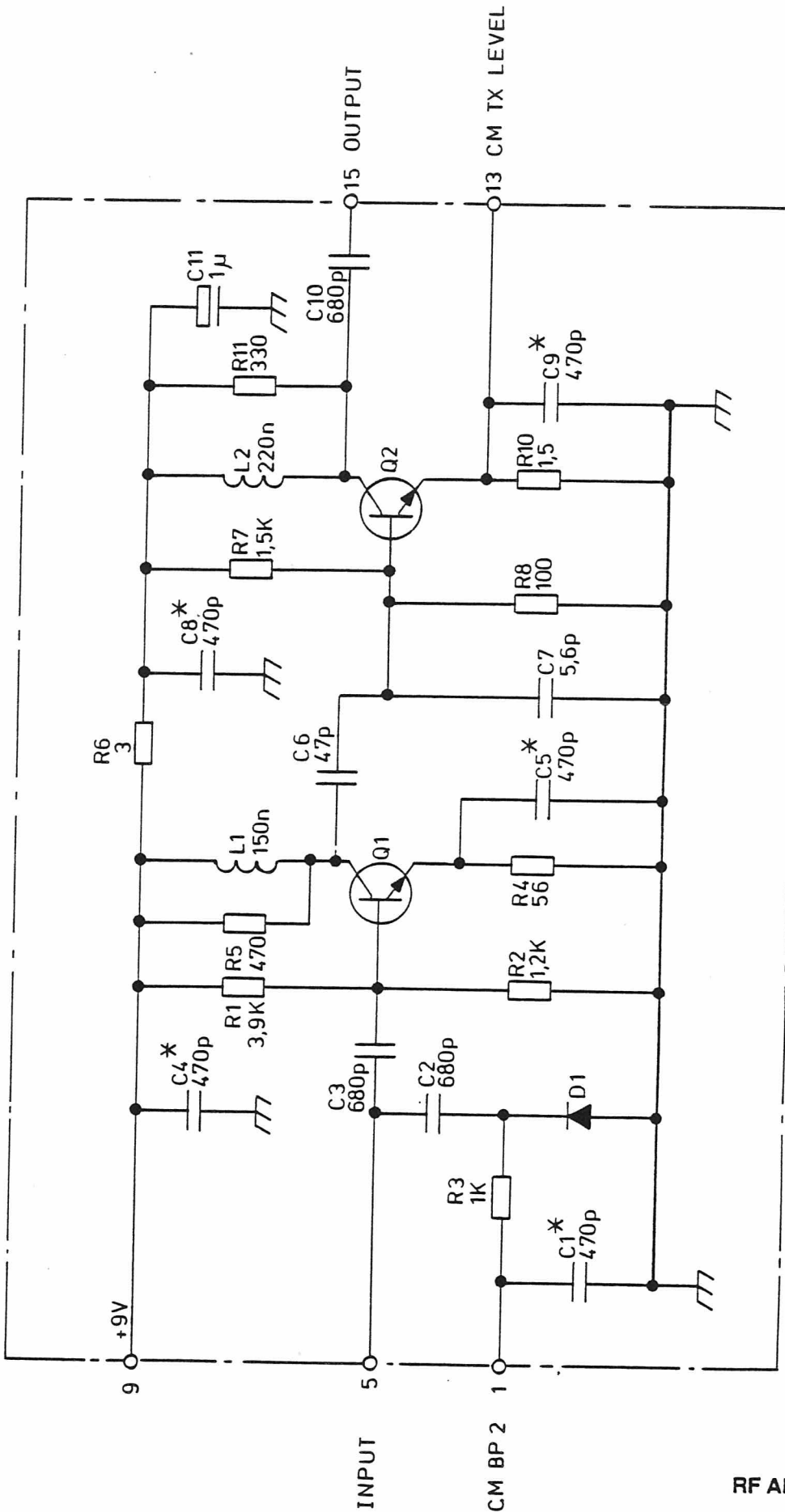
CODE NO. M905360G1 - GTC6116A

PARTS LIST FOR EXCITER EX931

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GTC6116A	M905360G1 EX 931			
C01	A700233P7	CAP CER CL2 1N 20% 50V	R09	A700019P30	RES DEPC 270R 5% 1/4W
C02	A700235P24	CAP CER N150 82P 5% 50V	R10	A700019P32	RES DEPC 390R 5% 1/4W
C03	A700235P29	CAP CER N750 220P 5% 50V	R11	A700019P39	RES DEPC 1K5 5% 1/4W
C04	A700235P29	CAP CER N750 220P 5% 50V	R12	A700019P15	RES DEPC 15R 5% 1/4W
C05	A700233P7	CAP CER CL2 1N 20% 50V	R13	A700019P21	RES DEPC 47R 5% 1/4W
C06	2313749C48	CAP TA SOL 22U 20% 16V	R14	A700019P32	RES DEPC 390R 5% 1/4W
C07	2313749D52	CAP TA SOL 1U 20% 35V	R15	A700019P57	RES DEPC 47K 5% 1/4W
C08	A700233P7	CAP CER CL2 1N 20% 50V	R16	A700019P36	RES DEPC 820R 5% 1/4W
C09	A700235P27	CAP CER N150 56P 5% 50V	R17	A700019P45	RES DEPC 4K7 5% 1/4W
C10	A700235P22	CAP CER N150 56P 5% 50V	R18	A700016P4	RES VAR CERM 10K 10% 1/2W
C11	A700235P1	CAP CER NPO 1P0 .25P 50V	R19	A700019P45	RES DEPC 4K7 5% 1/4W
C12	A700235P18	CAP CER N150 27P 5% 50V	R20	A700019P61	RES DEPC 100K 5% 1/4W
C13	A700235P1	CAP CER NPO 1P0 .25P 50V	R21	A700019P49	RES DEPC 10K 5% 1/4W
C14	A700235P20	CAP CER N150 39P 5% 50V	R22	A700019P37	RES DEPC 1K0 5% 1/4W
C15	A700235P23	CAP CER N150 68P 5% 50V	R23	A700019P49	RES DEPC 10K 5% 1/4W
C16	A700233P6	CAP CER CL2 680P 20% 50V	R24	A700019P43	RES DEPC 3K3 5% 1/4W
C17	A700233P7	CAP CER CL2 1N 20% 50V	R25	A700019P49	RES DEPC 10K 5% 1/4W
C18	A700235P20	CAP CER N150 39P 5% 50V	R26	A700019P17	RES DEPC 22R 5% 1/4W
C19	A700235P22	CAP CER N150 56P 5% 50V	R27	A700019P29	RES DEPC 220R 5% 1/4W
C20	A700235P2	CAP CER NPO 1P2 .25P 50V	U01	0102721B43	M905410G1, RA 931 , RF-AMPLIFIER (see below)
C21	A700235P20	CAP CER N150 39P 5% 50V		8402050U02A	M9—P1R0 BD PW., REVISION NO.:0
C22	A700235P21	CAP CER N150 47P 5% 50V			NON REFERENCED ITEMS:
C23	A700233P7	CAP CER CL2 1N 20% 50V		J706759P2	SHIELD, MODIF.-
C24	A700233P7	CAP CER CL2 1N 20% 50V		J706758P3	SHIELD, MODIF.-
C25	A700235P25	CAP CER N150 100P 5% 50V		J706759P5	SHIELD, MODIF.-
C26	A700235P20	CAP CER N150 39P 5% 50V		A700090P4	CONTACT (4 used)
C27	A700235P4	CAP CER N150 1P8 .25P 50V		A701329P2	CONTACT PWB MALE L=11.69MM (12 used)
C28	A700235P20	CAP CER N150 39P 5% 50V			SHIELD, MODIF.-
C29	A700235P24	CAP CER N150 82P 5% 50V		J706759P3	CAN
C30	A700233P6	CAP CER CL2 680P 20% 50V		J706527P1	
C31	A700233P7	CAP CER CL2 1N 20% 50V			
C32	A700233P7	CAP CER CL2 1N 20% 50V			
C33	A700235P14	CAP CER N150 12P 5% 50V			
C34	A700235P17	CAP CER N150 22P 5% 50V	U001	0102721B43	M905410G1: RA 931, (MICRO MODULE)
C35	A700235P28	CAP CER N750 180P 5% 50V			
C37	A700235P15	CAP CER N150 15P 5% 50V			
C38	A700233P7	CAP CER CL2 1N 20% 50V	C002	A700011P2	CAP CER CL2 680P 20% 50V
C39	A700233P7	CAP CER CL2 1N 20% 50V	C003	A700011P2	CAP CER CL2 680P 20% 50V
C40	2313749C48	CAP TA SOL 22U 20% 20V	C006	A700007P45	CAP CER NPO 47P 5% 50V
D01	A700047P1	DIO SI SIG 2835	C007	A700007P10	CAP CER NPO 5P6 0.5P 50V
D02	A700047P1	DIO SI SIG 2835	C010	A700011P2	CAP CER CL2 680P 20% 50V
D03	A700025P3	DIO SI ZENR 3V3 5% 0,4W	C011	A700045P6	CAP TA SOL 1U0 20% 10V
J01	A700171P2	CONN PWB FEM PHONO	D001	A700155P1	DIO SI SIG BAT 18
J02	A700171P2	CONN PWB FEM PHONO	L001	A700021P7	COIL RF 150NH
L01	A700024P10	COIL FIX 560NH 10%	L002	A700021P9	COIL RF 220NH
L02	K805140G2	ASM COIL	Q001	J706148P1	TSTR NPN SI BFR 53
L03	J706975G14	COIL ASM	Q002	J706013P1	TSTR NPN SI BFQ 18A
L04	J706975G14	COIL ASM	U001	0102721B06	M905409G1, INT CKT F. RA 931
L05	J706975G14	COIL ASM			NON REFERENCED ITEMS:
L06	A700024P17	COIL FIX 2,2UH 10%		C850517P2	HOUSING
L07	J706975G14	COIL ASM		M905917P1	RETAINER
L08	J706975G14	COIL ASM		A701597P1	ACRYLIC CONEL
L09	A700024P17	COIL FIX 2,2UH 10%			
L10	J706975G14	COIL ASM			
L11	J706975G14	COIL ASM			
L12	J706975G14	COIL ASM			
L13	J706975G14	COIL ASM			
P01	A700041P4	CONN PWB FEM 05 CKT			
P02	A700041P7	CONN PWB FEM 08 CKT			
Q01	A700060P2	TSTR JFET SI J310			
Q02	A700060P2	TSTR JFET SI J310			
Q03	J706011P1	TSTR NPN SI BFR 91			
Q04	J707511P1	TSTR NPN SI BC 548A/B			
Q05	J707511P1	TSTR NPN SI BC 548A/B			
Q06	J707435P1	TSTR PNP SI BC 369			
R01	A700019P12	RES DEPC 8R2 5% 1/4W			
R02	A700019P27	RES DEPC 150R 5% 1/4W			
R03	A700019P12	RES DEPC 8R2 5% 1/4W			
R04	A700019P29	RES DEPC 220R 5% 1/4W			
R05	J706042P2	RES VAR 220 OHM 0.1W			
R06	A700019P29	RES DEPC 220R 5% 1/4W			
R07	A700019P59	RES DEPC 68K 5% 1/4W			
R08	A700019P21	RES DEPC 47R 5% 1/4W			

X404.080/2

DATE: 09/20/90



X PRINTED CAPACITORS

PIN - 2, 3, 4, 6, 7, 8, 10, 11, 12, 14, 16 ARE GROUNDED

RF AMPLIFIER RA931

CODE NO. M905410 - 0102721B43

D403.199/3

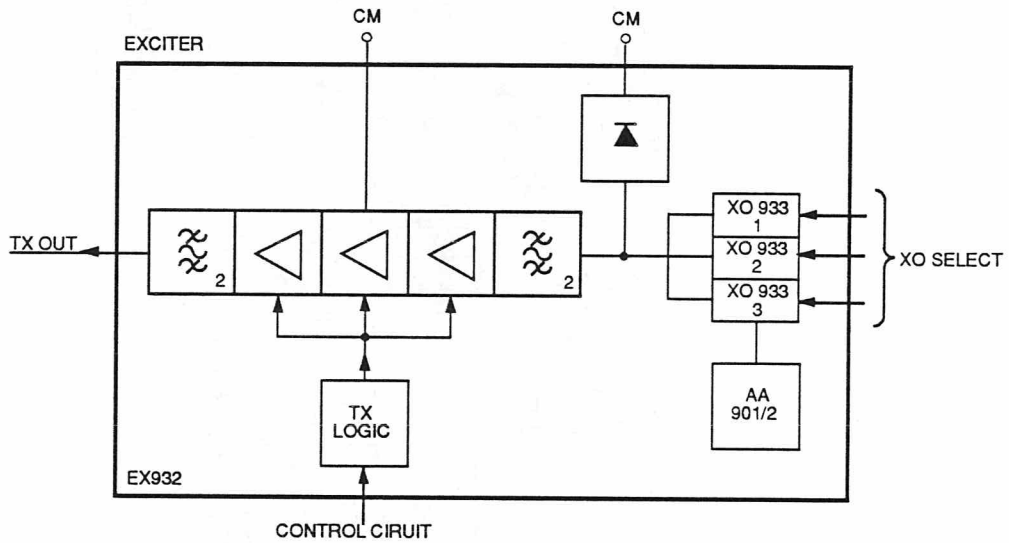
EX932

TRANSMITTER EXCITER

EX932 is used in the 900 multiplier radios and in the frequency range 68 - 88 MHz.

EX932 supplies the PA with a modulated RF signal. The frequency range is 68 - 88 MHz and the maximum number of channel frequencies is 3.

Each channel frequency is generated in a plug-in crystal oscillator (XO). Maximum frequency spacing of the 2 channels is 2 MHz. If only one XO is used, it shall be placed as XO no. 1 and it will be on continuously. If two or three XO's are used, W1 is disconnected and the channel frequency is selected from P3.



TECHNICAL SPECIFICATIONS

Channel guard input level

for $\Delta f = 0.75$ kHz
300 mV ± 2 dB

AF input with preemphasis

for $\Delta f = 3$ kHz, $f_{mod} = 1$ kHz
100 mV ± 2 dB

AF input impedance

600 ohm

TX ON/OFF

<0.8 V/open coll.

RF output level

25 to 28 dBm

RF nominal impedance

50 ohm

RF load impedance

50 ohm

TX status

<5 V/0.8 - 1.5 mA

Supply voltage

9 V $\pm 5\%$

XO voltage

9 V $\pm 0.5\%$

Current consumption

(without XO's and AA)
<250 mA

Output frequency

66 - 88 MHz

Max. channel spacing

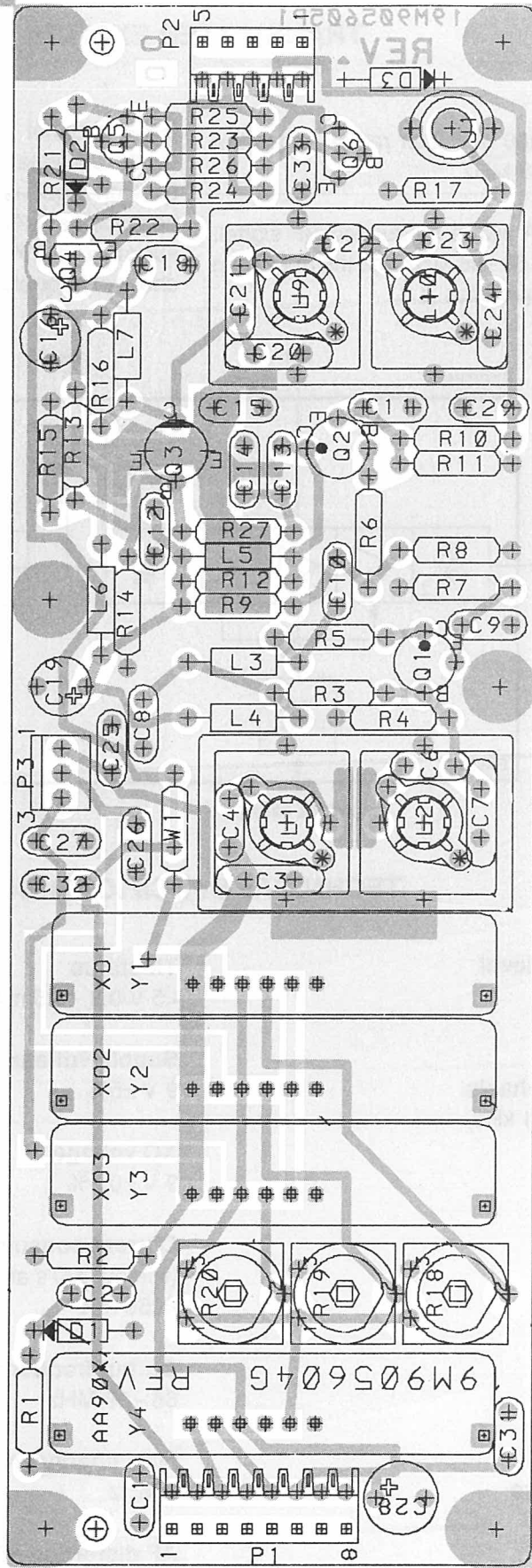
2 MHz

AF distortion (EIA)

<2%

Temperature range

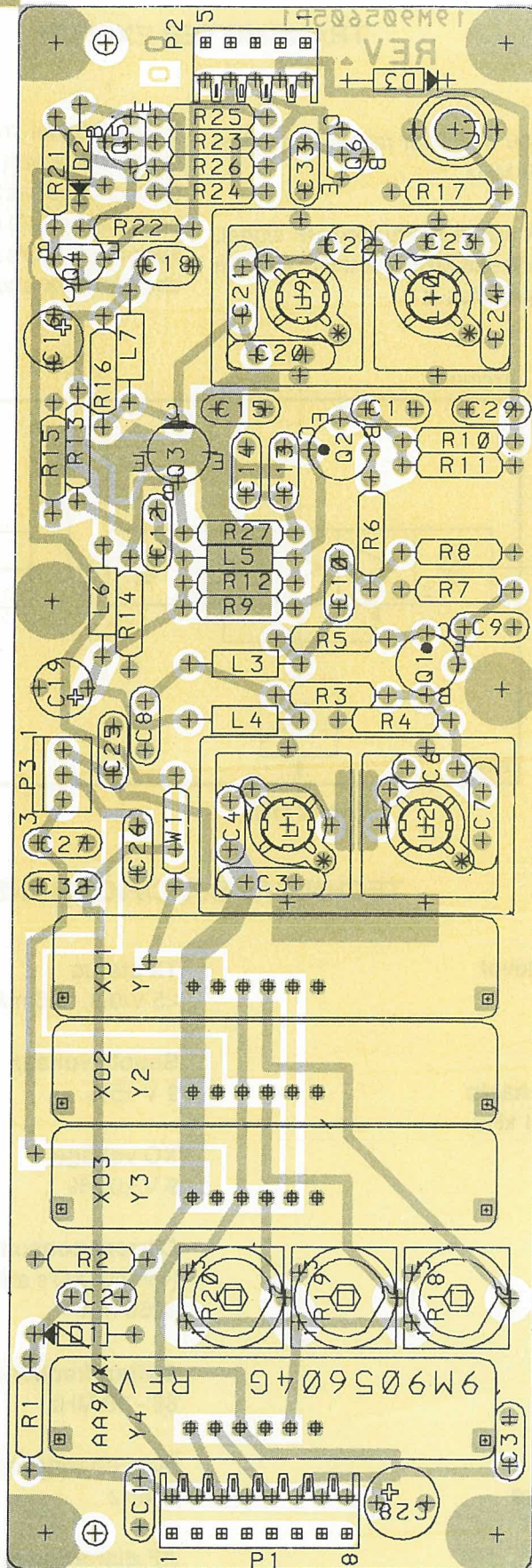
-40°C to +85°C



EXCITER EX932
COMPONENT LAYOUT

7.8 D403.393/2

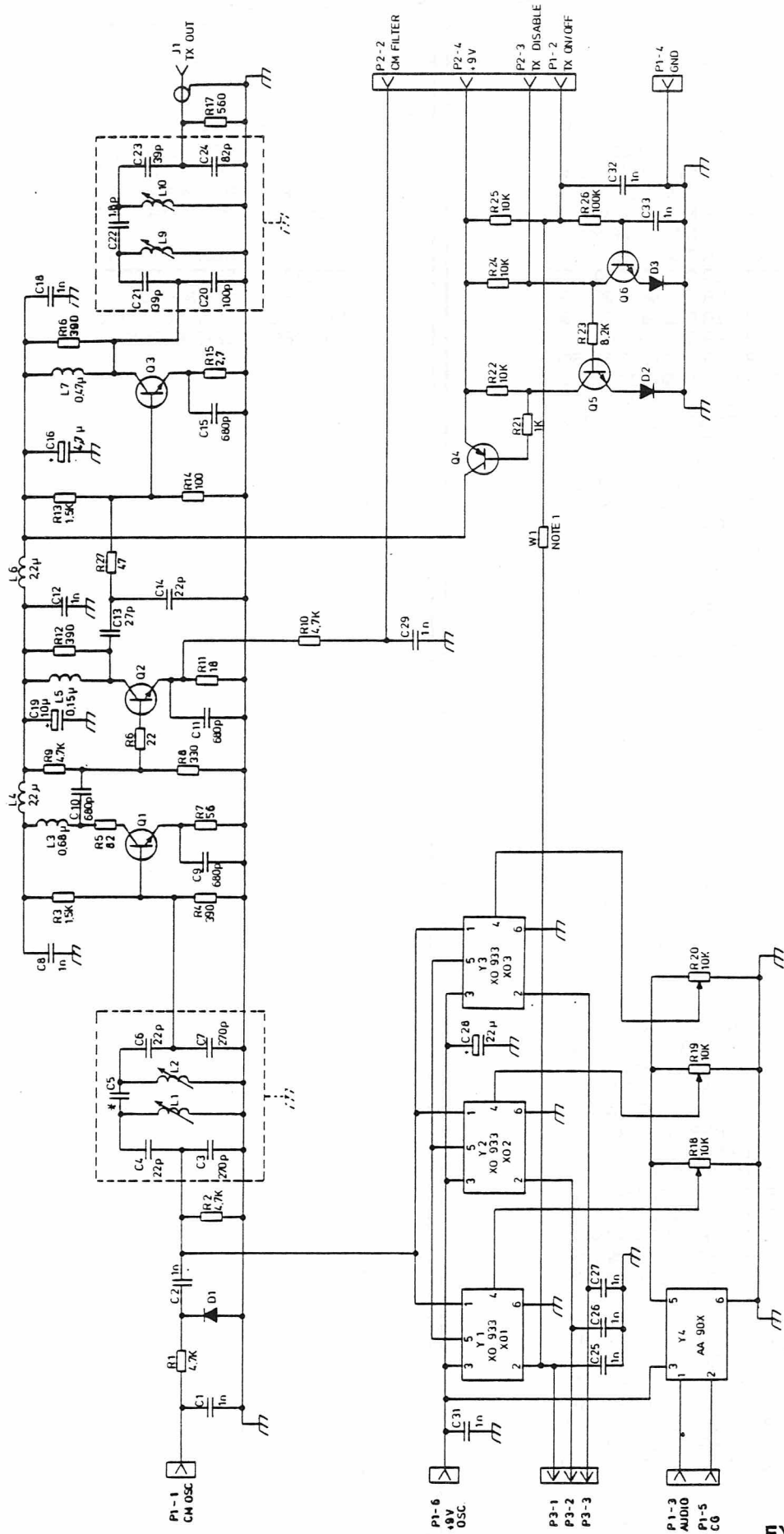
CODE NO. M905604G1 - GTC6117A



EXCITER EX932
COMPONENT LAYOUT

7.8 D403.393/2

CODE NO. M905604G1 - GTC6117A



* PRINTED BOARD CAPACITOR.

NOTE
1. W1 ARE REMOVED WHEN MORE
THAN ONE XO ARE MOUNTED.

EXCITER EX932

D403.386/2

CODE NO. M905604G1 - GTC6117A

PARTS LIST FOR EXCITER EX932

Pos	Code/Kit No.	Description
	GTC6117A	M905604G1 EX 932
C01	A700233P7	CAP CER CL2 1N 20% 50V
C02	A700233P7	CAP CER CL2 1N 20% 50V
C03	A700235P30	CAP CER N750 270P 5% 50V
C04	A700235P17	CAP CER N150 22P 5% 50V
C06	A700235P17	CAP CER N150 22P 5% 50V
C07	A700235P30	CAP CER N750 270P 5% 50V
C08	A700233P7	CAP CER CL2 1N 20% 50V
C09	A700233P6	CAP CER CL2 680P 20% 50V
C10	A700233P6	CAP CER CL2 680P 20% 50V
C11	A700233P6	CAP CER CL2 680P 20% 50V
C12	A700233P7	CAP CER CL2 1N 20% 50V
C13	A700235P18	CAP CER N150 27P 5% 50V
C14	A700235P17	CAP CER N150 22P 5% 50V
C15	A700233P6	CAP CER CL2 680P 20% 50V
C16	2313749D72	CAP TA SOL 4U7 20% 35V
C18	A700233P7	CAP CER CL2 1N 20% 50V
C19	2313749C40	CAP TA SOL 10U 20% 20V
C20	A700235P25	CAP CER N150 100P 5% 50V
C21	A700235P20	CAP CER N150 39P 5% 50V
C22	A700235P20	CAP CER N150 39P 5% 50V
C22	A700235P4	CAP CER N150 1P8 .25P 50V
C24	A700235P24	CAP CER N150 82P 5% 50V
C25	A700233P7	CAP CER CL2 1N 20% 50V
C26	A700233P7	CAP CER CL2 1N 20% 50V
C27	A700233P7	CAP CER CL2 1N 20% 50V
C28	2313749C48	CAP TA SOL 22U 20% 20V
C29	A700233P7	CAP CER CL2 1N 20% 50V
C31	A700233P7	CAP CER CL2 1N 20% 50V
C32	A700233P7	CAP CER CL2 1N 20% 50V
C33	A700233P7	CAP CER CL2 1N 20% 50V
D01	A700047P1	DIO SI SIG 2835
D02	A700028P1	DIO SI SIG 1N4148
J01	A700171P2	CONN PWB FEM PHONO
L01	J706975G3	COIL ASM
L02	J706975G3	COIL ASM
L03	A700024P11	COIL FIX 680NH 10%
L04	A700024P17	COIL FIX 2,2UH 10%
L05	A700024P3	COIL FIX 150NH 10%
L06	A700024P17	COIL FIX 2,2UH 10%
L07	A700024P9	COIL FIX 470NH 10%
L09	J706975G14	COIL ASM
L10	J706975G14	COIL ASM
P01	A700041P7	CONN PWB FEM 08 CKT
P02	A700041P4	CONN PWB FEM 05 CKT
P03	A700072P29	CONN PWB MALE 03 CKT
Q01	J706514P1	TSTR NPN SI BFW 92
Q02	J706012P1	TSTR NPN SI BFR 96
Q03	A701940P1	TSTR NPN SI RF-PWR 0.4W
Q04	J707435P1	TSTR PNP SI BC 369
Q05	J707511P1	TSTR NPN SI BC 548A/B
Q06	J707511P1	TSTR NPN SI BC 548A/B
R01	A700019P45	RES DEPC 4K7 5% 1/4W
R02	A700019P45	RES DEPC 4K7 5% 1/4W
R03	A700019P39	RES DEPC 1K5 5% 1/4W
R04	A700019P32	RES DEPC 390R 5% 1/4W
R05	A700019P24	RES DEPC 82R 5% 1/4W
R06	A700019P17	RES DEPC 22R 5% 1/4W
R07	A700019P22	RES DEPC 56R 5% 1/4W
R08	A700019P31	RES DEPC 330R 5% 1/4W
R09	A700019P45	RES DEPC 4K7 5% 1/4W
R10	A700019P45	RES DEPC 4K7 5% 1/4W
R11	A700019P16	RES DEPC 18R 5% 1/4W
R12	A700019P32	RES DEPC 390R 5% 1/4W
R13	A700019P39	RES DEPC 1K5 5% 1/4W
R14	A700019P25	RES DEPC 100R 5% 1/4W
R15	A700019P6	RES DEPC 2R7 5% 1/4W
R16	A700019P32	RES DEPC 390R 5% 1/4W
R17	A700019P34	RES DEPC 560R 5% 1/4W
R18	A700185P4	RES VAR 10K0 20% 0,33W
R19	A700185P4	RES VAR 10K0 20% 0,33W
R20	A700185P4	RES VAR 10K0 20% 0,33W
R21	A700019P37	RES DEPC 1K0 5% 1/4W
R22	A700019P49	RES DEPC 10K 5% 1/4W

Pos	Code/Kit No.	Description
R23	A700019P48	RES DEPC 8K2 5% 1/4W
R24	A700019P49	RES DEPC 10K 5% 1/4W
R25	A700019P49	RES DEPC 10K 5% 1/4W
R26	A700019P61	RES DEPC 100K 5% 1/4W
R27	A700019P21	RES DEPC 47R 5% 1/4W
W01	A700184P1	RES WIRE JMPR
	8402003U95A	M9----P1R0 BD PW., REVISION NO.:0
		NON REFERENCED ITEMS:
	J706759P2	SHIELD, MODIF.-
	A701329P2	CONN PWB MALE L11.69MM (24 used)
	A701785P2	CONTACT (4 used)
	J706759P8	SHIELD, MODIF.-

X403.081/2

DATE: 09/20/90

EX911

TRANSMITTER EXCITER

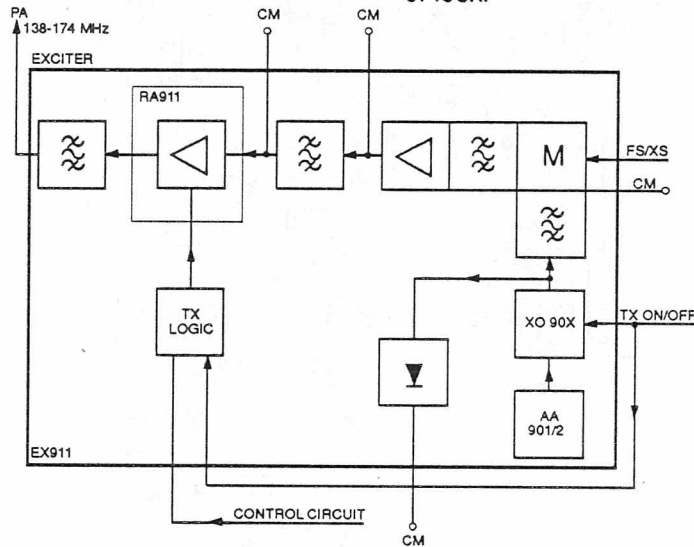
The EX931 is used in duplex radios and provide the signal to drive the power amplifier.

It includes the micromodules AA901/AA902 audio processor, the crystal oscillator XO9xx and the RF amplifier RA911.

The exciter signal is generated by mixing the reference frequency signal with a crystal oscillator signal in a

balanced J-FET mixes and filtering and amplifying the output signal to a level adequate to drive the power amplifier, approx. 400 mW.

A switch circuit is used to turn the module on and the control input-TX disable is wired together with the lock signal of the frequency synthesizer so that it is impossible to transmit while the frequency synthesizer is out of lock.



CM = CENTRAL METERING

TECHNICAL SPECIFICATIONS

Channel guard input level

For $\Delta f = 0.75$ kHz
300 mV ± 2 dB

AF input with preemphasis

For $\Delta f = 3$ kHz, $f_{mod} = 1$ kHz
100 mV ± 2 dB

AF input impedance

600 ohm

TX ON/OFF

<0.8 V/open coll.

RF output level

24.5 to 27.5 dBm

RF nominal impedance

50 ohm

RF load impedance

50 ohm

TX status

<5 V/<0.45 mA

Supply voltage

9 V $\pm 5\%$

XO Voltage

9 V $\pm 0.5\%$

Current consumption

(without XO's and AA)
<300 mA

Output frequency

138 - 174 MHz

Max. channel spacing

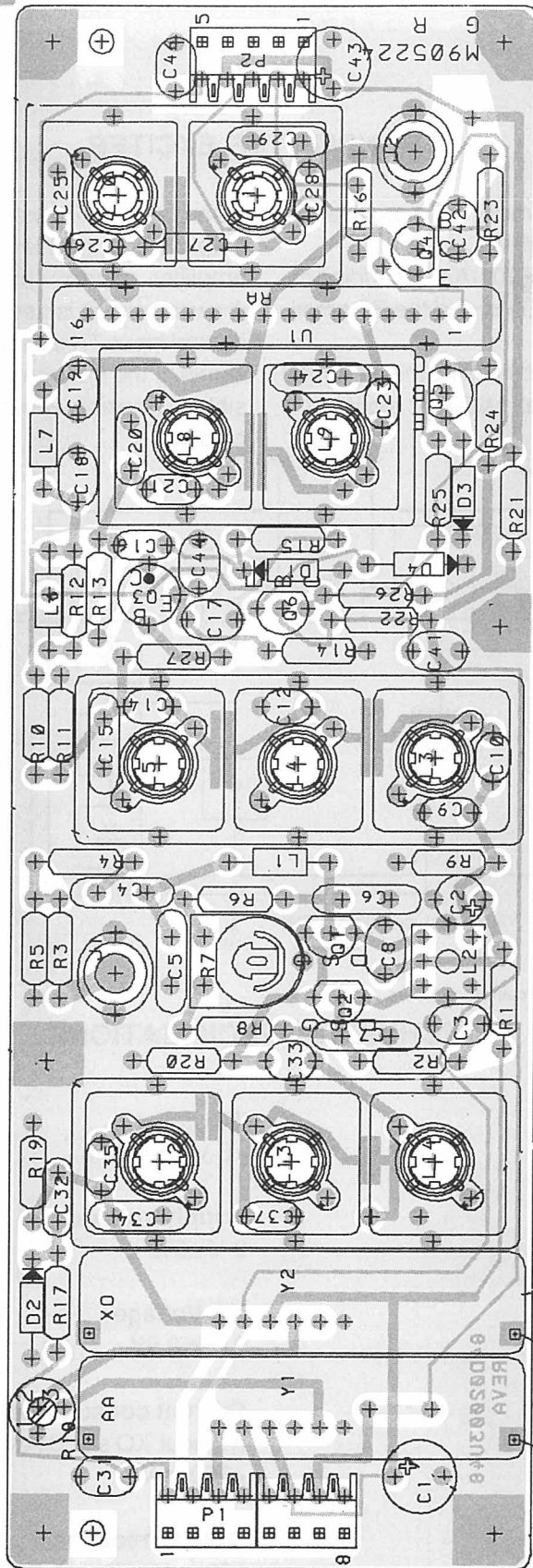
3.5 MHz

AF distortion (EIA)

<2%

Temperature range

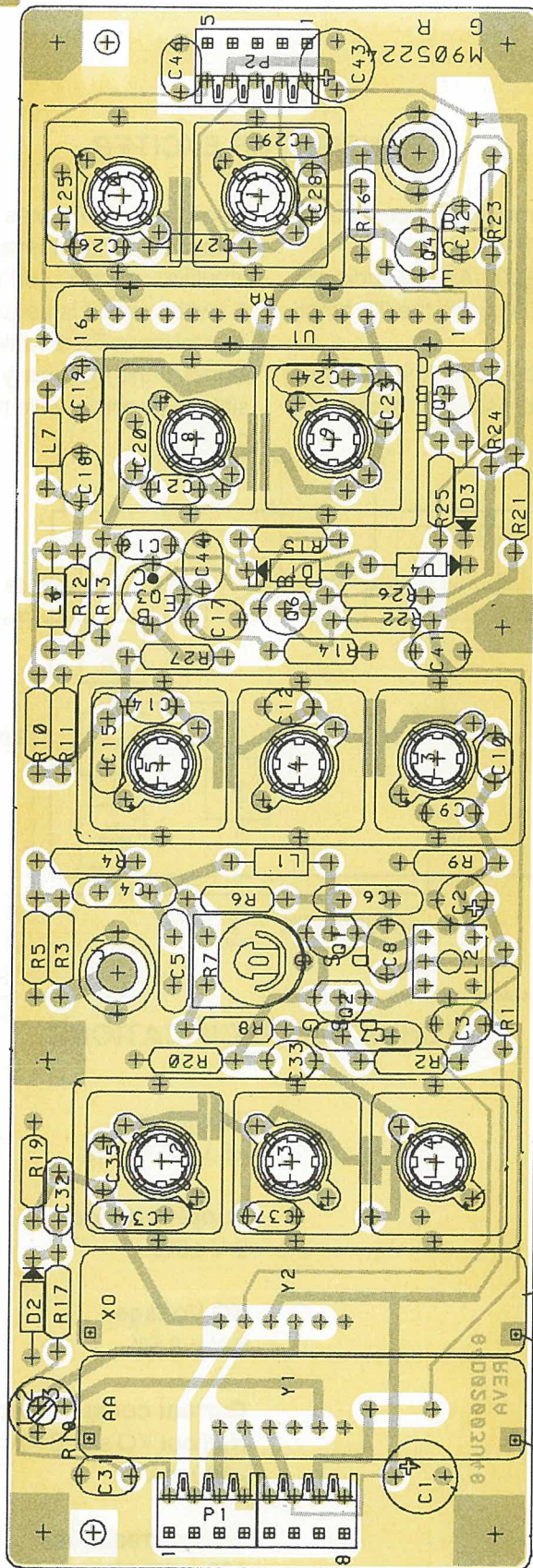
-40°C to +85°C



**EXCITER EX911
COMPONENT LAYOUT**

D403.422/4

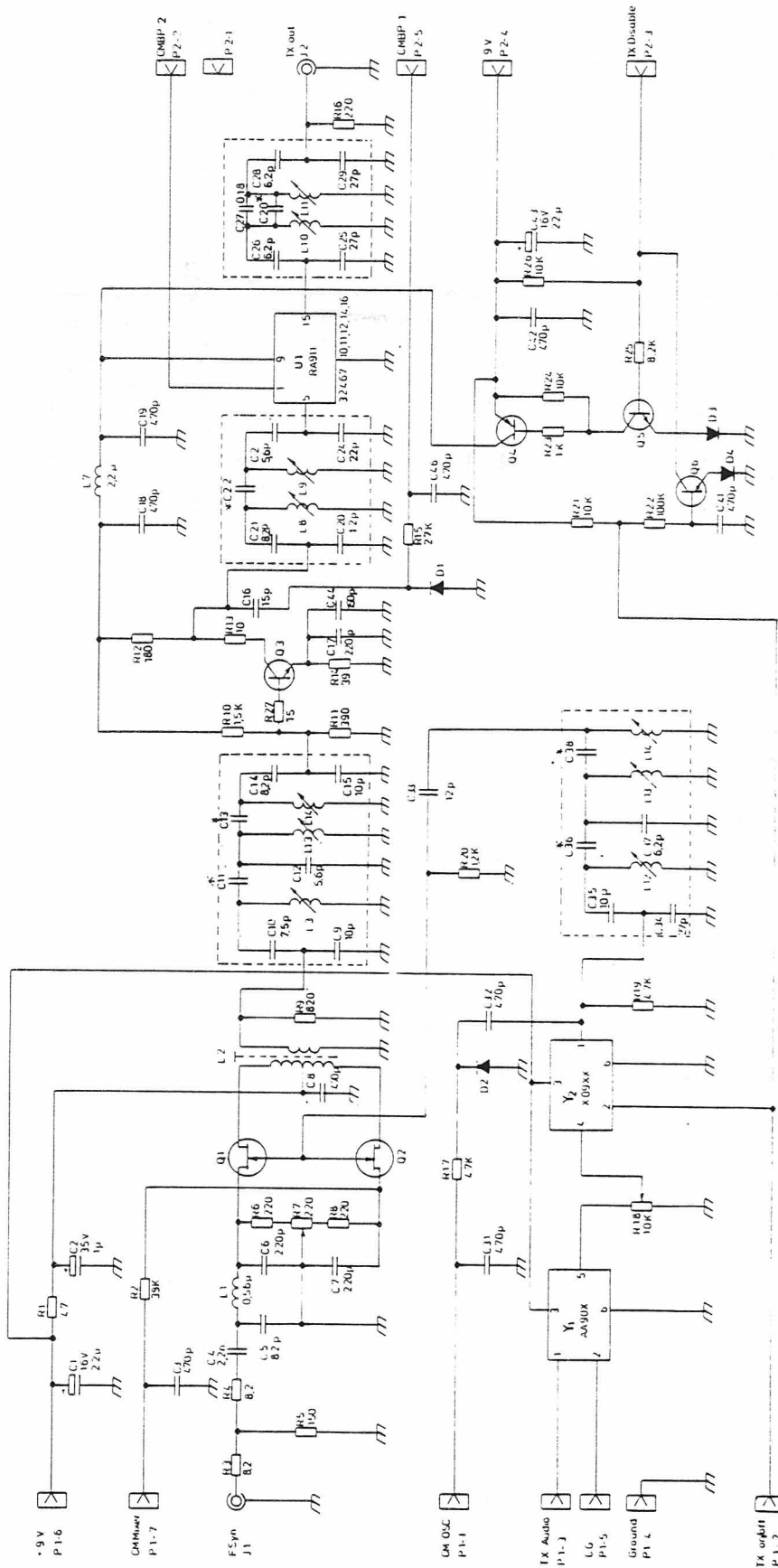
M905224G1 - GTD6138A



**EXCITER EX911
COMPONENT LAYOUT**

D403.422/4

M905224G1 - GTD6138A



EXCITER EX911

CODE NO. M905224G1 - GTD6138A

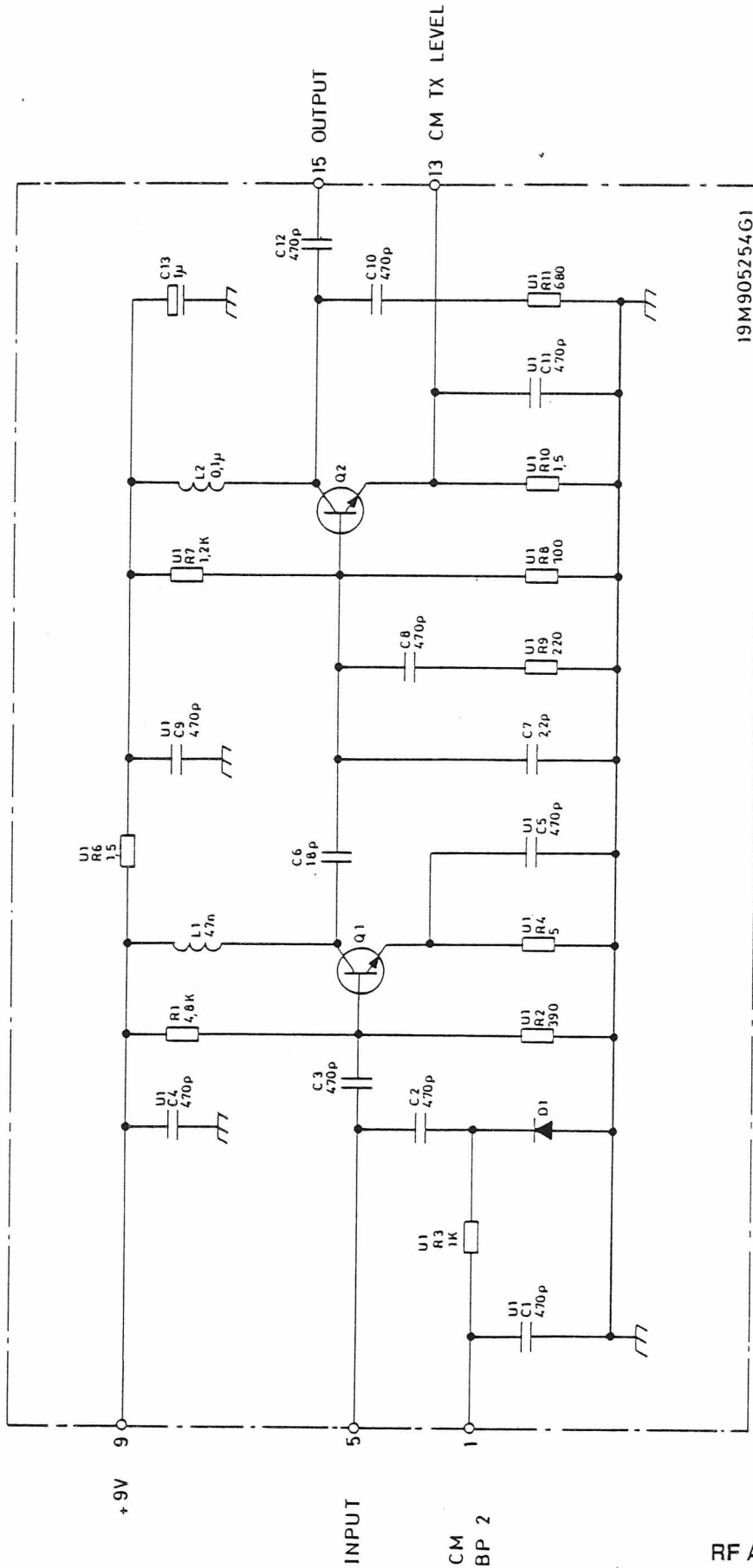
D403.156/5

PARTS LIST FOR EXCITER EX911

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GTD6138A	M905224G1 EX911			
C01	2313749C48	CAP TA 22MF 20V	R11	A700019P32	RES DEPOS 390OHM 0.25W
C02	2313749D52	CAP TA 1MF 35V	R12	A700019P28	RES DEPOS 180 OHM 0,25W
C03	A700233P5	CAP CER 470PF 50V	R13	A700019P13	RES DEPOS 10 OHM 0,25W
C04	A700233P9	CAP CER 2,2NF 50V	R14	A700019P20	RES DEPOS 39 OHM 0,25W
C05	A700235P24	CAP CER 82PF 50V	R15	A700019P54	RES DEPOS 27K 0.25W
C06	A700235P29	CAP CER 220PF 50V	R16	A700019P29	RES DEPOS 220 OHM 0,25W
C07	A700235P29	CAP CER 220PF 50V	R17	A700019P45	RES DEPOS 4.7K 0.25W
C08	A700233P5	CAP CER 470PF 50V	R18	A700016P4	RES VAR 10K 0.25W
C09	A700235P13	CAP CER 10PF 50V	R19	A700019P45	RES DEPOS 4.7K 0.25W
C10	A700235P36	CAP CER 7,5PF 50V	R20	A700019P38	RES DEPOS 1.2K 0.25W
C12	A700235P10	CAP CER 5,6PF 50V	R21	A700019P49	RES DEPOS 10K 0.25W
C14	A700235P12	CAP CER 8,2PF 50V	R22	A700019P61	RES DEPOS 100K 0.25W
C15	A700235P13	CAP CER 10PF 50V	R23	A700019P37	RES DEPOS 1K 0,25W
C16	A700235P15	CAP CER 15PF 50V	R24	A700019P49	RES DEPOS 10K 0.25W
C17	A700233P3	CAP CER 220PF 50V	R25	A700019P48	RES DEPOS 8.2K 0.25W
C18	A700233P5	CAP CER 470PF 50V	R26	A700019P49	RES DEPOS 10K 0.25W
C18	A700235P18	CAP CER 27PF 50V	R27	A700019P15	RES DEPOS 15 OHM 0,25W
C19	A700233P5	CAP CER 470PF 50V	U01	0102721B46	M905254G1 ASM RA 911
C20	A700235P14	CAP CER 12PF 50V		8402003U48A	M905222P1R3 BD PW.
C21	A700235P12	CAP CER 8,2PF 50V			
C23	A700235P10	CAP CER 5,6PF 50V			
C24	A700235P17	CAP CER 22PF 50V			
C26	A700235P35	CAP CER 6,2PF 50V			
C27	A700013P4	CAP CER 0,18PF			
C28	A700235P35	CAP CER 6,2PF 50V			
C29	A700235P18	CAP CER 27PF 50V			
C31	A700233P5	CAP CER 470PF 50V			
C32	A700233P5	CAP CER 470PF 50V			
C33	A700235P14	CAP CER 12PF 50V			
C34	A700235P18	CAP CER 27PF 50V			
C35	A700235P13	CAP CER 10PF 50V			
C37	A700235P35	CAP CER 6,2PF 50V			
C41	A700233P5	CAP CER 470PF 50V			
C42	A700233P5	CAP CER 470PF 50V			
C43	2313749C48	CAP TA 22MF 20V			
C44	A700233P2	CAP CER 150PF 50V			
C46	A700233P5	CAP CER 470PF 50V			
D01	A700047P1	DIO SCT 5082-2835			
D02	A700047P1	DIO SCT 5082-2835			
D03	A700028P1	DIO 1N4148			
J01	A700171P2	CONN PW FEM RF-PHONO			
J02	A700171P2	CONN PW FEM RF-PHONO			
L01	A700024P10	COIL FIX 0,56MH			
L02	K805140G1	COIL			
L03	J706975G15	COIL			
L04	J706975G15	COIL			
L05	J706975G15	COIL			
L07	A700024P17	COIL FIX 2,0MH			
L08	J706975G15	COIL			
L09	J706975G15	COIL			
L10	J706975G15	COIL			
L11	J706975G15	COIL			
L12	J706975G15	COIL			
L13	J706975G15	COIL			
L14	J706975G15	COIL			
P01	A700041P7	CONN 8 PIN			
P02	A700041P4	CONN 5 PIN			
Q01	A700060P2	TSTR SI J-FET J310			
Q02	A700060P2	TSTR SI J-FET J310			
Q03	J706011P1	TSTR NPN SI BFR91			
Q04	A700026P1	TSTR SI PNP BC 369			
Q05	A700017P1	TSTR BC 548			
Q06	A700017P1	TSTR BC 548			
R01	A700019P21	RES DEPOS 47 OHM 0,25W			
R02	A700019P56	RES DEPOS 39K OHM 0,25W			
R03	A700019P12	RES DEPOS 8,2 OHM 0,25W			
R04	A700019P12	RES DEPOS 8,2 OHM 0,25W			
R05	A700019P27	RES DEPOS 150 OHM 0,25W			
R06	A700019P29	RES DEPOS 220OHM 0,25W			
R07	J706042P2	RES VAR 220 OHM 0.1W			
R08	A700019P29	RES DEPOS 220OHM 0,25W			
R09	A700019P36	RES DEPOS 820OHM 0.25W			
R10	A700019P39	RES DEPOS 1,5K 0,25W			

X403.815/4

DATE: 09/20/90



PIN - 2, 3, 4, 6, 7, 8, 10, 11, 12, 14, 16 ARE

RF AMPLIFIER RA911

D403.154/2

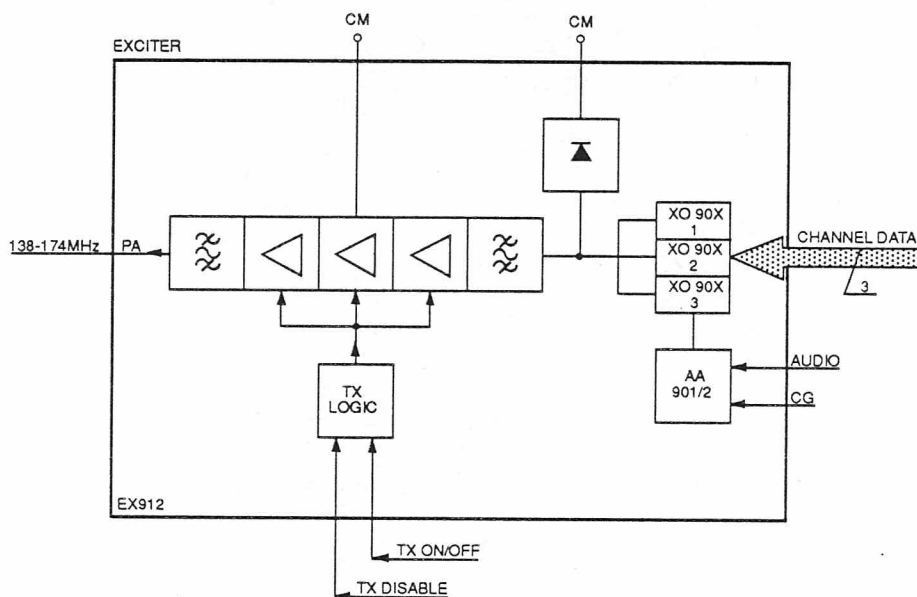
EX912

TRANSMITTER EXCITER

EX912 is used in the 900 duplex radios and in the FM9 base station, both in the frequency range 160 MHz.

EX912 supplies the PA with a modulated RF signal. The frequency range is 138 - 174 MHz and the maximum number of channel frequencies is 3.

Each channel frequency is generated in a plug-in crystal oscillator (XO). Maximum frequency spacing of the 2 channels is 6 MHz. If only one XO is used, it shall be placed as XO no. 1 and it will be on continuously. If two or three XO's are used, W1 is disconnected and the channel frequency is selected from P3.



TECHNICAL SPECIFICATIONS

Channel guard input level

for $\Delta f = 0.75$ kHz
300 mV ± 2 dB

AF input with preemphasis

for $\Delta f = 3$ kHz, $f_{mod} = 1$ kHz
100 mV ± 2 dB

AF input impedance

600 ohm

TX ON/OFF

<0.8 V/open coll.

RF output level

24.5 to 27.5 dBm

RF nominal impedance

50 ohm

RF load impedance

50 ohm

TX status

<5 V/0.8 - 1.5 mA

Supply voltage

9 V $\pm 5\%$

XO voltage

9 V $\pm 0.5\%$

Current consumption

(without XO's and AA)
<300 mA

Output frequency

138 - 174 MHz

Max. channel spacing

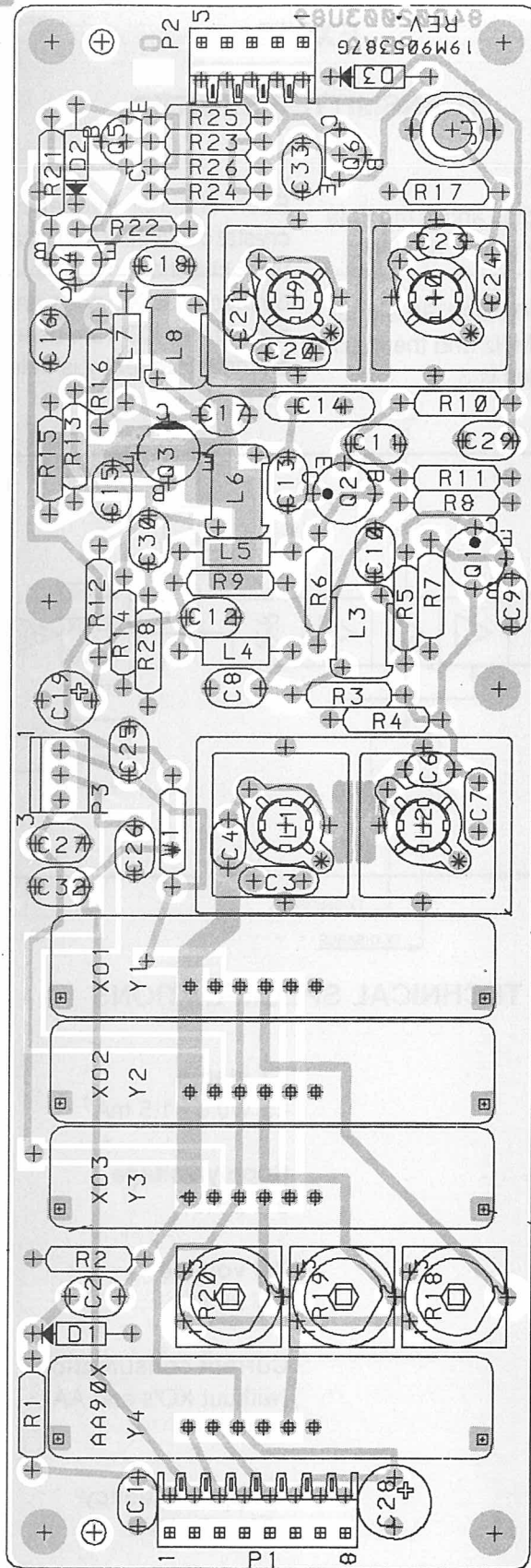
6 MHz

AF distortion (EIA)

<2%

Temperature range

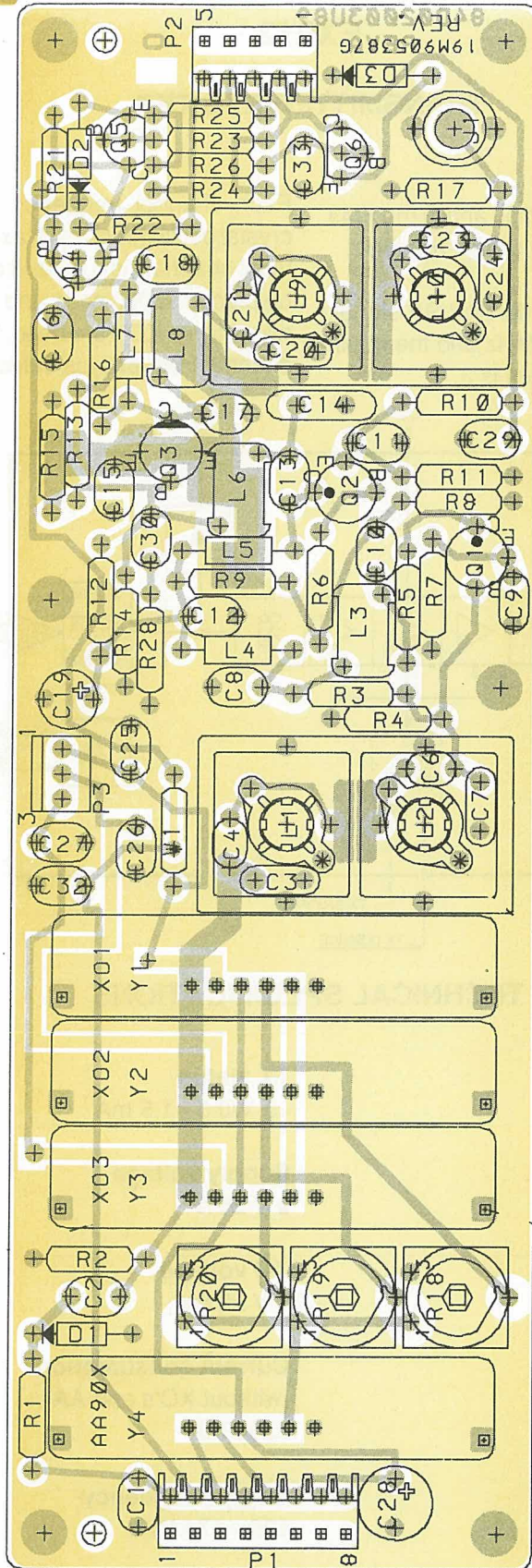
-40°C to +85°C



EXCITER EX912
COMPONENT LAYOUT

D403.302/2

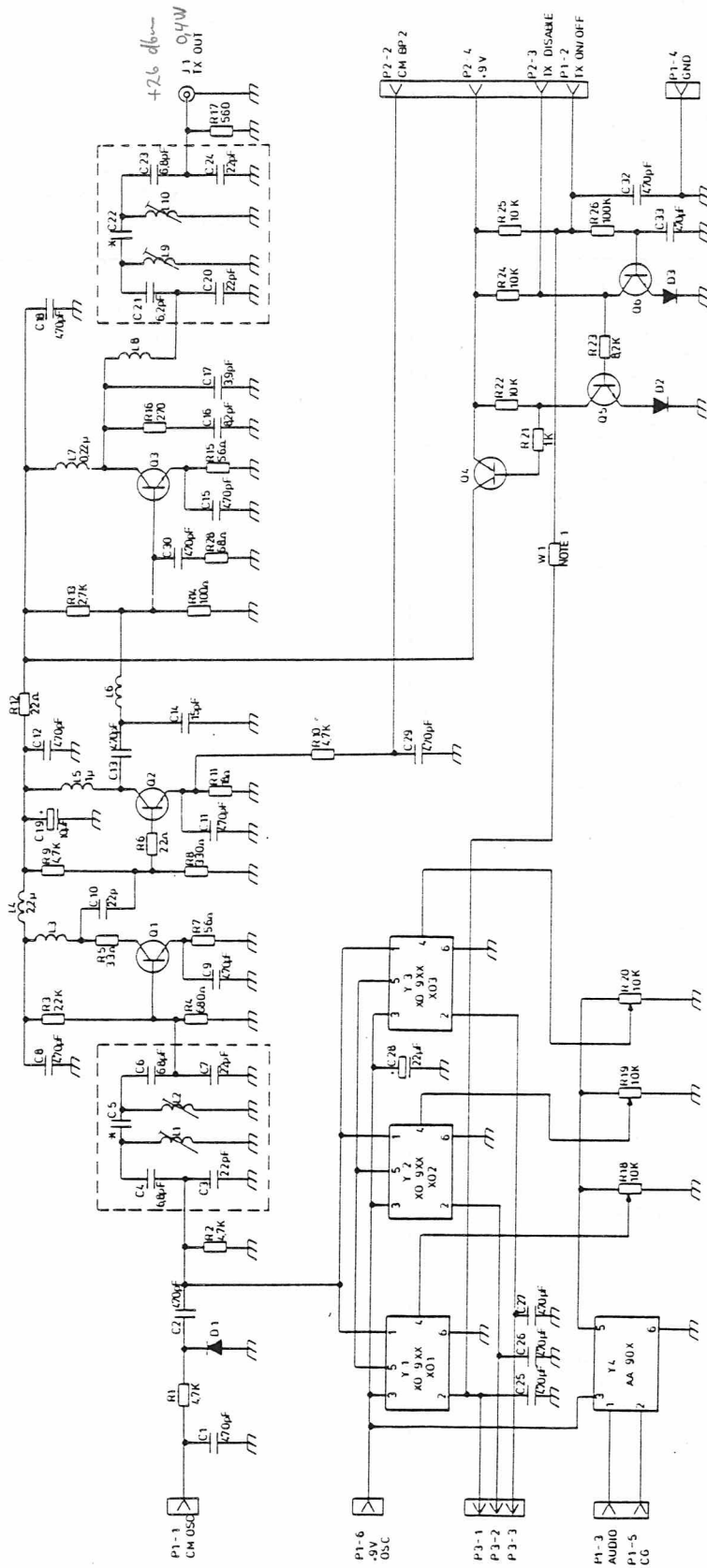
M905387 - GTD6140A



**EXCITER EX912
COMPONENT LAYOUT**

D403.302/2

M905387 - GTD6140A



* PRINTED BOARD CAPACITOR
 NOTE 1. W1 ARE REMOVED WHEN MORE
 THAN ONE XO ARE MOUNTED

EXCITER EX912

CODE NO. M905387G1 - GTD6140A

D403.437/3

PARTS LIST FOR EXCITER EX912

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GTD6140A	M905387G1 EX912			
C01	A700233P5	CAP CER 470P 10% 50V	R22	A700019P49	RES DEPC 10K 5% 1/4W
C02	A700233P5	CAP CER 470P 10% 50V	R23	A700019P49	RES DEPC 10K 5% 1/4W
C03	A700235P17	CAP CER N150 22P 5% 50V	R24	A700019P48	RES DEPC 8K2 5% 1/4W
C04	A700235P11	CAP CER N150 6P8.25P 50V	R25	A700019P49	RES DEPC 10K 5% 1/4W
C06	A700235P11	CAP CER N150 6P8.25P 50V	R26	A700019P61	RES DEPC 100K 5% 1/4W
C07	A700235P17	CAP CER N150 22P 5% 50V	R28	A700019P23	RES DEPC 68R 5% 1/4W
C08	A700233P5	CAP CER 470P 10% 50V	W01	A700184P1	WIRE JUMPER (ZEROHM)
C09	A700233P5	CAP CER 470P 10% 50V		8402003U89A	BD PW
C10	A700235P17	CAP CER N150 22P 5% 50V			NON REFERENCED ITEMS:
C11	A700233P5	CAP CER 470P 10% 50V		J706759P3	CSTG SHLD (2 used)
C12	A700233P5	CAP CER 470P 10% 50V		A701329P2	CONT EL PIN (24 used)
C13	A700233P5	CAP CER 470P 10% 50V		A700090P4	CONTACT (8 used)
C14	A700235P15	CAP CER N150 15P 5% 50V			
C15	A700233P5	CAP CER 470P 10% 50V			
C16	A700235P12	CAP CER N150 8P2.25P 50V			
C17	A700235P8	CAP CER N150 3P9.25P 50V			
C18	A700233P5	CAP CER 470P 10% 50V			
C19	2313749C40	CAP TA SOL 10U 20% 20V			
C20	A700235P17	CAP CER N150 22P 5% 50V			
C21	A700235P35	CAP CER N150 6P2.25P 50V			
C23	A700235P11	CAP CER N150 6P8.25P 50V			
C24	A700235P17	CAP CER N150 22P 5% 50V			
C25	A700233P5	CAP CER 470P 10% 50V			
C26	A700233P5	CAP CER 470P 10% 50V			
C27	A700233P5	CAP CER 470P 10% 50V			
C28	2313749C48	CAP TA SOL 22U 20% 20V			
C29	A700233P5	CAP CER 470P 10% 50V			
C30	A700233P5	CAP CER 470P 10% 50V			
C32	A700233P5	CAP CER 470P 10% 50V			
C33	A700233P5	CAP CER 470P 10% 50V			
D01	A700047P1	DIO SI SIG 2835			
D02	A700028P1	DIO SI SIG 1N4148			
J01	A700171P2	CONN PWB FEM PHONO			
L01	J706975G15	COIL SK 138-5			
L02	J706975G15	COIL SK 138-5			
L03	J706085P4	COIL RF FIX 5-1/2T			
L04	A700024P17	COIL FIX 2.0MH			
L05	A700024P13	COIL FIX 1.0MH			
L06	J706085P4	COIL RF FIX 5-1/2T			
L07	A700024P5	COIL 220NH			
L08	J706085P3	COIL RF FIX 3-1/2T			
L09	J706975G15	COIL SK 138-5			
L10	J706975G15	COIL SK 138-5			
P01	A700041P7	CONN PWB FEM 08 CKT			
P02	A700041P4	CONN PWB FEM 05 CKT			
P03	A700072P29	CONN PWB MALE 03 CKT			
Q01	J706011P1	TSTR NPN SI BFR 91			
Q02	J706012P1	TSTR NPN SI BFR 96			
Q03	A701940P1	TSTR NPN SI RF-PWR 0.4W			
Q04	J707435P1	TSTR PNP SI BC 369			
Q05	J707511P1	TSTR NPN SI BC 548A/B			
Q06	J707511P1	TSTR NPN SI BC 548A/B			
R01	A700019P45	RES DEPC 4K7 5% 1/4W			
R02	A700019P45	RES DEPC 4K7 5% 1/4W			
R03	A700019P41	RES DEPC 2K2 5% 1/4W			
R04	A700019P35	RES DEPC 680R 5% 1/4W			
R05	A700019P19	RES DEPC 33R 5% 1/4W			
R06	A700019P17	RES DEPC 22R 5% 1/4W			
R07	A700019P22	RES DEPC 56R 5% 1/4W			
R08	A700019P31	RES DEPC 330R 5% 1/4W			
R09	A700019P45	RES DEPC 4K7 5% 1/4W			
R10	A700019P45	RES DEPC 4K7 5% 1/4W			
R11	A700019P16	RES DEPC 18R 5% 1/4W			
R12	A700019P17	RES DEPC 22R 5% 1/4W			
R13	A700019P42	RES DEPC 2K7 5% 1/4W			
R14	A700019P25	RES DEPC 100R 5% 1/4W			
R15	A700019P10	RES DEPC 5R6 5% 1/4W			
R16	A700019P30	RES DEPC 270R 5% 1/4W			
R17	A700019P34	RES DEPC 560R 5% 1/4W			
R18	J708394P28	RES VAR 10K 20%			
R19	J708394P28	RES VAR 10K 20%			
R20	J708394P28	RES VAR 10K 20%			
R21	A700019P37	RES DEPC 1K0 5% 1/4W			

X403.889/3

DATE: 09/20/90

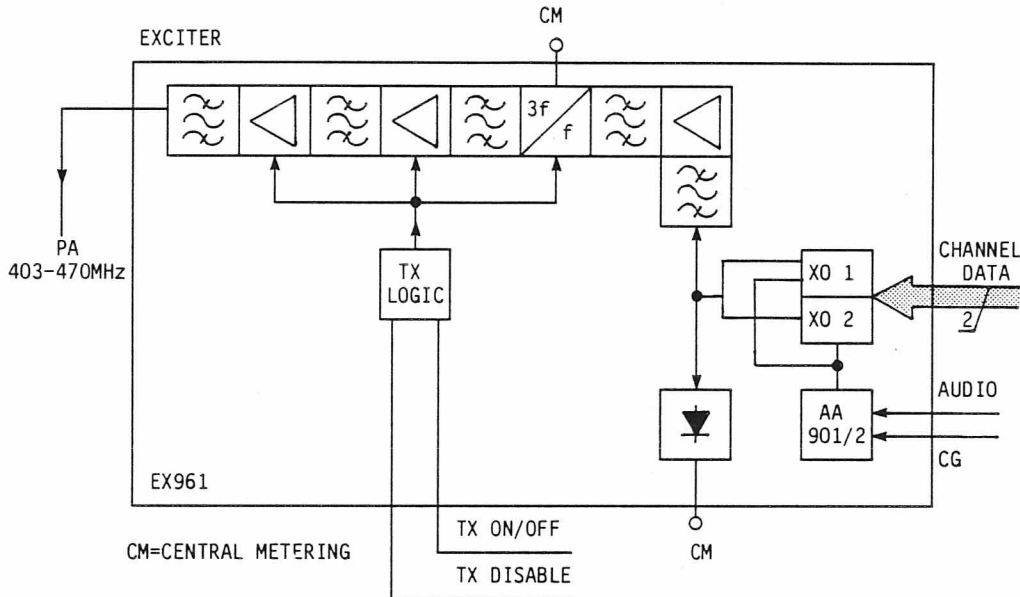
EX961

TRANSMITTER EXCITER

EX961 is used in the 900 multiplier radios and in the frequency range 403 - 470 MHz.

EX961 supplies the PA with a modulated RF signal. The frequency range is 403 - 470 MHz and the maximum number of channel frequencies is 2.

Each channel frequency is generated in a plug-in crystal oscillator (XO). Maximum frequency spacing of the 2 channels is 4.5 MHz. If only one XO is used, it shall be placed as XO no. 1 and it will be on continuously. If two or three XO's are used, W1 is disconnected and the channel frequency is selected from P3.



TECHNICAL SPECIFICATIONS

Channel guard input level

for $\Delta f = 0.75$ kHz
300 mV ± 2 dB

AF input with preemphasis

for $\Delta f = 3$ kHz, $f_{mod} = 1$ kHz
100 mV ± 2 dB

AF input impedance

600 ohm

TX ON/OFF

<0.8 V/open coll.

RF output level

24 to 27 dBm

RF nominal impedance

50 ohm

RF load impedance

50 ohm

Supply voltage

9 V $\pm 5\%$

XO voltage

9 V $\pm 0.5\%$

Current consumption

(without XO's and AA)
<300 mA

Output frequency

403 - 470 MHz

Max. channel spacing

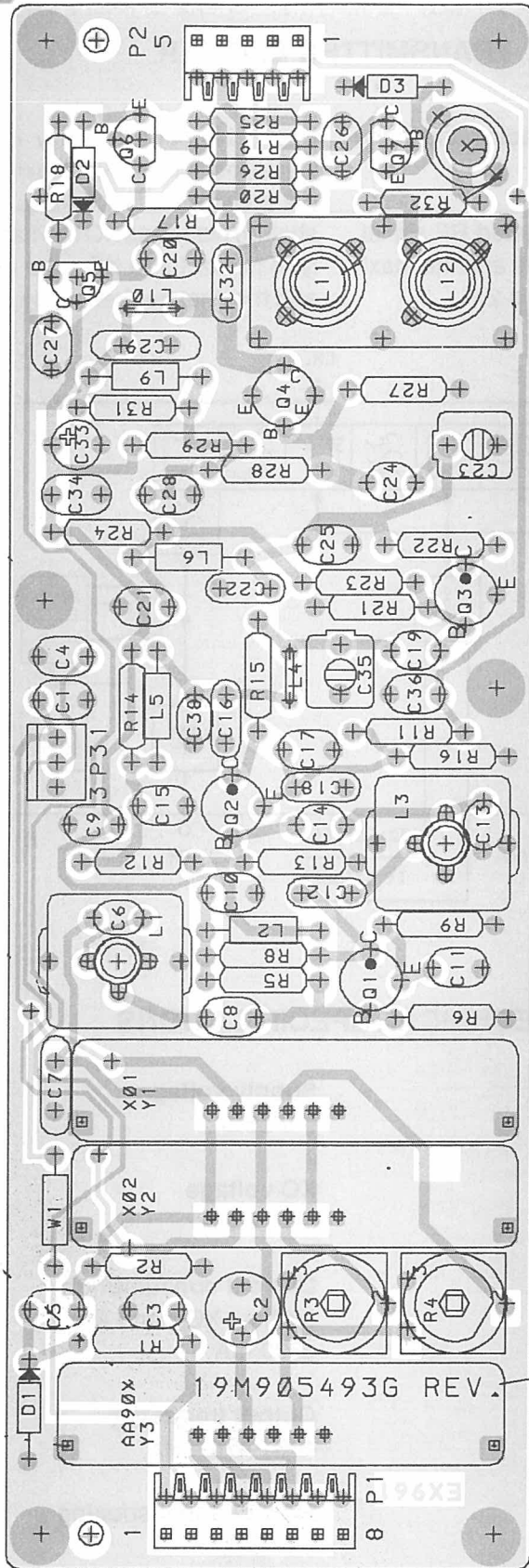
4.5 MHz

AF distortion (EIA)

<2%

Temperature range

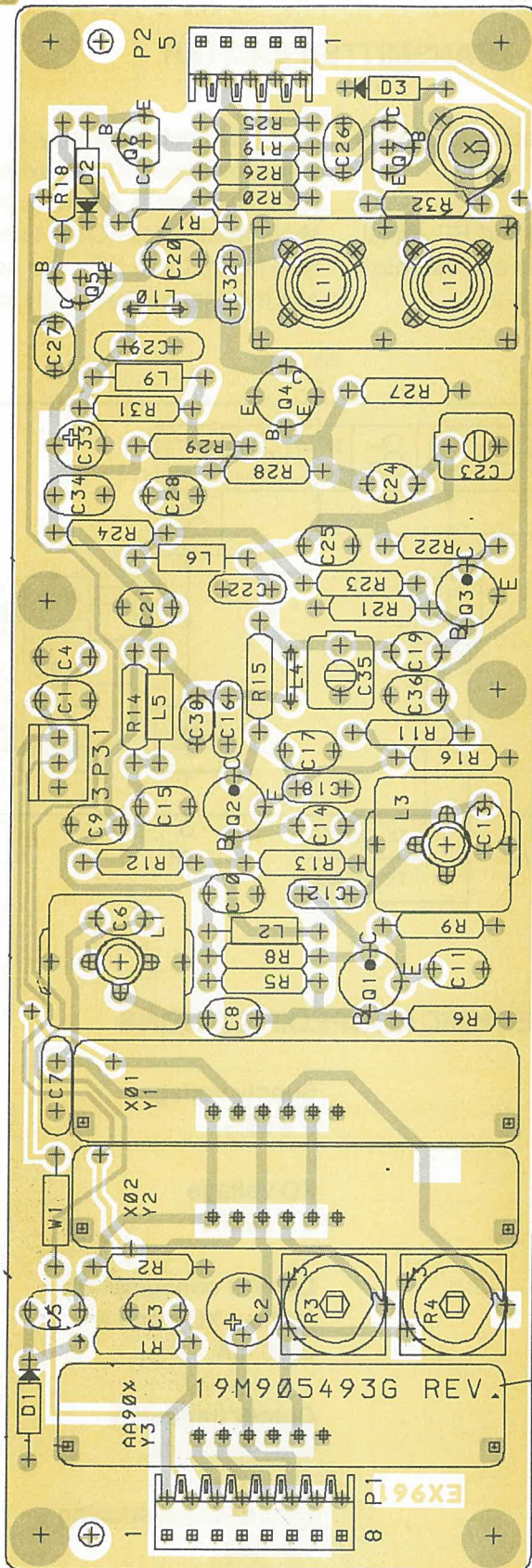
-40°C to +85°C



EXCITER EX961

D403.395/2

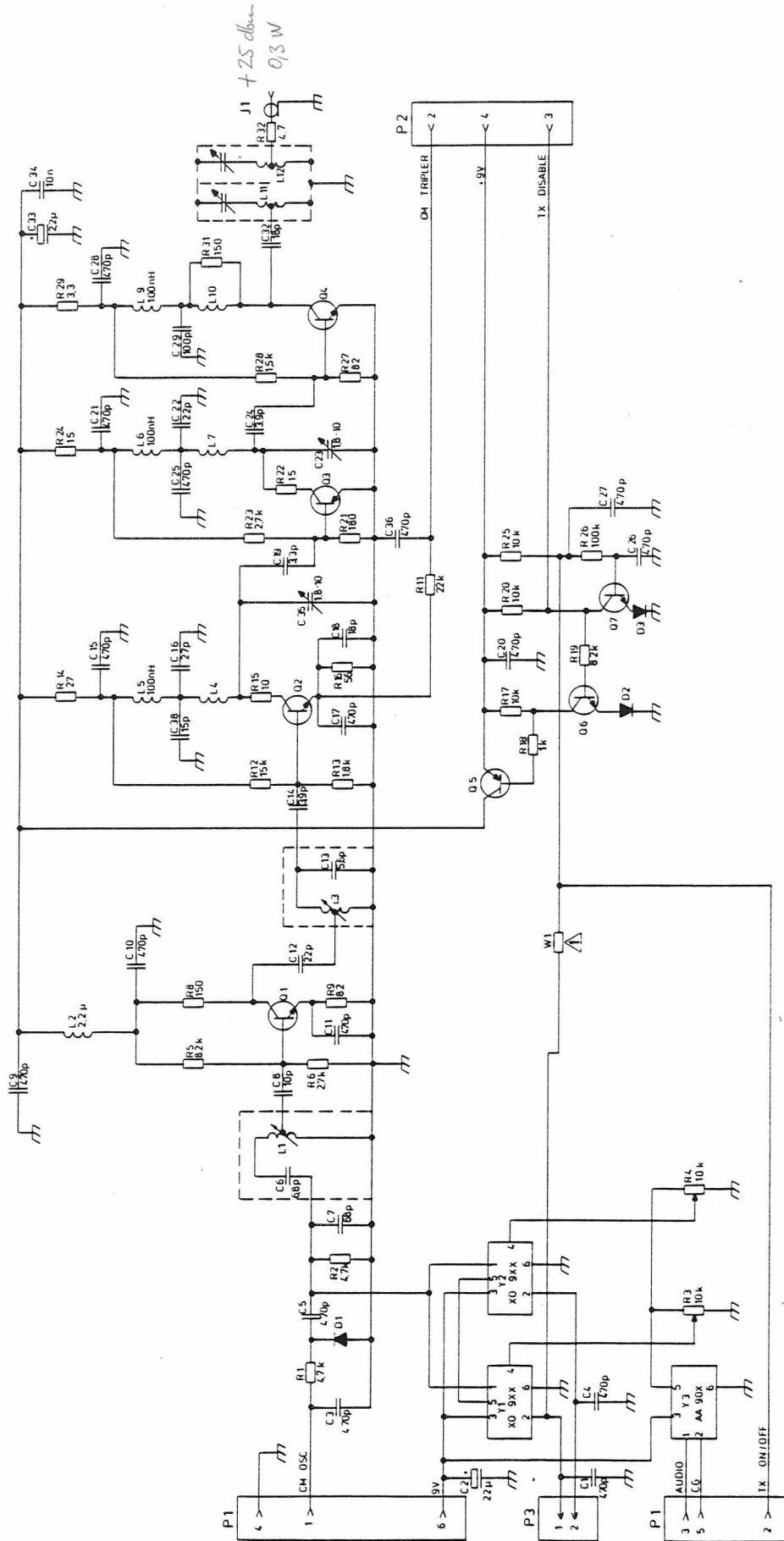
CODE NO. 19M905493G1 - GTE6007A



EXCITER EX961

D403.395/2

CODE NO. 19M905493G1 - GTE6007A



MODULE NO	REV LETTER
19M905493G1	A

NOTE
 W1 IS REMOVED WHEN MORE THAN
 ONE XO IS MOUNTED

EXCITER EX961

CODE NO. 19M905493G1 - GTE6007A

D403.385/3

PARTS LIST FOR EXCITER EX961

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GTE6007A	M905493G1 EX961			
C02	2313749C48	CAP TA SOL 22U 20% 16V	R19	A700019P48	RES DEPC 8K2 5% 1/4W
C03	A700233P5	CAP CER CL2 470P 20% 50V	R20	A700019P49	RES DEPC 10K 5% 1/4W
C04	A700233P5	CAP CER CL2 470P 20% 50V	R21	A700019P28	RES DEPC 180R 5% 1/4W
C05	A700233P5	CAP CER CL2 470P 20% 50V	R22	A700019P15	RES DEPC 15R 5% 1/4W
C06	A700235P11	CAP CER N150 6P8.25P 50V	R23	A700019P42	RES DEPC 2K7 5% 1/4W
C07	A700235P23	CAP CER N150 68P 5% 50V	R24	A700019P15	RES DEPC 15R 5% 1/4W
C08	A700235P13	CAP CER N150 10P 5% 50V	R25	A700019P49	RES DEPC 10K 5% 1/4W
C09	A700233P5	CAP CER CL2 470P 20% 50V	R26	A700019P61	RES DEPC 100K 5% 1/4W
C10	A700233P5	CAP CER CL2 470P 20% 50V	R27	A700019P24	RES DEPC 82R 5% 1/4W
C11	A700233P5	CAP CER CL2 470P 20% 50V	R28	A700019P39	RES DEPC 1K5 5% 1/4W
C12	A700235P17	CAP CER N150 22P 5% 50V	R29	A700019P7	RES DEPC 3R3 5% 1/4W
C13	A700235P10	CAP CER N150 5P6.25P 50V	R31	A700019P27	RES DEPC 150R 5% 1/4W
C14	A700235P8	CAP CER N150 3P9.25P 50V	R32	A700019P9	RES DEPC 4R7 5% 1/4W
C15	A700233P5	CAP CER CL2 470P 20% 50V	WO	A700184P1	WIRE JUMPER (ZEROHM)
C16	A700235P18	CAP CER N150 27P 5% 50V		8402003U83A	BD PW
C17	A700233P5	CAP CER CL2 470P 20% 50V			NON REFERENCED ITEMS:
C18	A700235P16	CAP CER N150 18P 5% 50V		J707745P1	SHIELD MODIF. CSTG HELICAL
C19	A700235P7	CAP CER N150 3P3.25P 50V		A700069P1	CAN (2 used)
C20	A700233P5	CAP CER CL2 470P 20% 50V		J706109P1	SCR TUN (2 used)
C21	A700233P5	CAP CER CL2 470P 20% 50V		J706110P1	SPG TUN (2 used)
C22	A700235P17	CAP CER N150 22P 5% 50V		A701329P2	CONT EL PIN (18 used)
C23	J706003P1	CAP VAR 1,8/10PF		A701785P2	CONTACT (6 used)
C24	A700235P8	CAP CER N150 3P9.25P 50V			
C25	A700233P1	CAP CER CL2 100P 20% 50V			
C26	A700233P5	CAP CER CL2 470P 20% 50V			
C27	A700233P5	CAP CER CL2 470P 20% 50V			
C28	A700233P5	CAP CER CL2 470P 20% 50V			
C29	A700235P25	CAP CER N150 100P 5% 50V			
C32	A700235P16	CAP CER N150 18P 5% 50V			
C33	2313749D64	CAP TA SOL 2U2 20% 35V			
C34	A700234P7	CAP PYES 10N 10% 50V			
C35	J706003P1	CAP VAR 1,8/10PF			
C36	A700233P5	CAP CER CL2 470P 20% 50V			
C38	A700235P15	CAP CER N150 15P 5% 50V			
D01	A700047P1	DIO SI SIG 2835			
D02	A700028P1	DIO SI SIG 1N4148			
J01	A700171P2	CONN PWB FEM PHONO			
L01	2402327Y02	J706537G2 COIL			
L02	A700024P17	COIL FIX 2,2UH 10%			
L03	2402327Y01	J706537G1(COIL			
L04	J707778P2	COIL AIR			
L05	A700024P1	COIL FIX 100NH 10%			
L06	A700024P1	COIL FIX 100NH 10%			
L09	A700024P1	COIL FIX 100NH 10%			
L10	J707778P2	COIL AIR			
L11	J706154P2	COIL RF FIX 7-1/2T TAP			
L12	J706154P2	COIL RF FIX 7-1/2T TAP			
P01	A700041P7	CONN PWB FEM 08 CKT			
P02	A700041P4	CONN PWB FEM 05 CKT			
P03	A700072P29	CONN PWB MALE 03 CKT			
Q01	J706011P1	TSTR NPN SI BFR 91			
Q02	J706011P1	TSTR NPN SI BFR 91			
Q03	J706012P1	TSTR NPN SI BFR 96			
Q04	A701940P1	TSTR NPN SI RF-PWR 0.4W			
Q05	J707435P1	TSTR PNP SI BC 369			
Q06	J707511P1	TSTR NPN SI BC 548A/B			
Q07	J707511P1	TSTR NPN SI BC 548A/B			
R01	A700019P45	RES DEPC 4K7 5% 1/4W			
R02	A700019P45	RES DEPC 4K7 5% 1/4W			
R03	A700185P4	RES VAR 10K0 20% 0,33W <i>18-2078Y28</i>			
R04	A700185P4	RES VAR 10K0 20% 0,33W			
R05	A700019P48	RES DEPC 8K2 5% 1/4W			
R06	A700019P42	RES DEPC 2K7 5% 1/4W			
R08	A700019P27	RES DEPC 150R 5% 1/4W			
R09	A700019P24	RES DEPC 82R 5% 1/4W			
R11	A700019P53	RES DEPC 22K 5% 1/4W			
R12	A700019P51	RES DEPC 15K 5% 1/4W			
R13	A700019P40	RES DEPC 1K8 5% 1/4W			
R14	A700019P18	RES DEPC 27R 5% 1/4W			
R15	A700019P13	RES DEPC 10R 5% 1/4W			
R16	A700019P22	RES DEPC 56R 5% 1/4W			
R17	A700019P49	RES DEPC 10K 5% 1/4W			
R18	A700019P37	RES DEPC 1K0 5% 1/4W			

DATE: 09/20/90

X403.885/3

FG932

RECEIVER INJECTION SOURCE

The FG932 gives the injection signal for the receiver converter in a duplex radio.

It covers the 66 - 88 MHz band which requires the injection frequency band to be 87.4 - 109.4 MHz.

The injection signal is produced by mixing a crystal oscillator signal (103.4 - 122.2 MHz) with the frequency

synthesizer signal (12.8 - 16.0 MHz) or the crystal oscillator frequency (XS901).

The crystal oscillator is XO932 which is a plug-in micromodule.

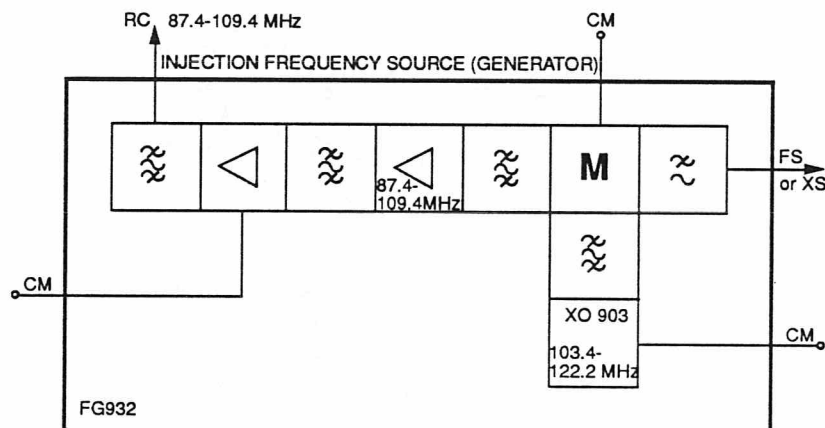
There are three central metering points for adjustments and test of the FG932 module.

CIRCUIT DESCRIPTION

The reference frequency from the FS90X or the XS901 is first attenuated to match the impedance and reduce the signal power, then it is applied to the dual gate J-FET mixer's source through a low pass filter in order to remove any harmonics. The crystal oscillator signal passes through a band pass filter to the mixer's gate

and the output frequency (f_o) passes through three band pass filters and two amplifiers. These filters attenuate both the oscillator signal and harmonics, if any. The last amplifier provides a constant signal output for the receiver converter.

All input and output impedances are 50 ohm and the output injection level is 10 - 13 dBm.



TECHNICAL SPECIFICATIONS

Input frequency

12.8 - 16.0 MHz

Input impedance

50 ohm

Reference oscillator frequency

103.4 - 122.2 MHz

Oscillator power

+5 dBm \pm 3 db

Oscillator impedance

50 ohm

Supply voltage

9 V \pm 5% and 9 V \pm 5%

Current consumption

<60 mA

Output frequency

87.4 - 109.4 MHz

Output power

+10 to +13 dBm

Output impedance

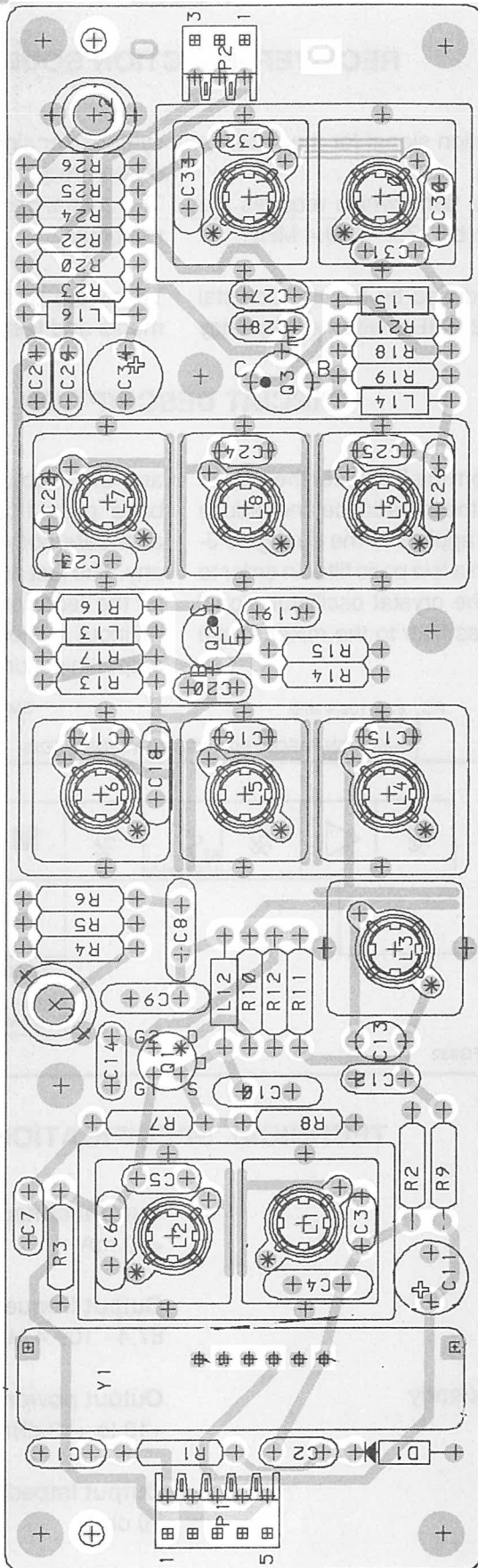
50 ohm

Channel bandwidth

3.5 MHz (3 dB)

Temperature range

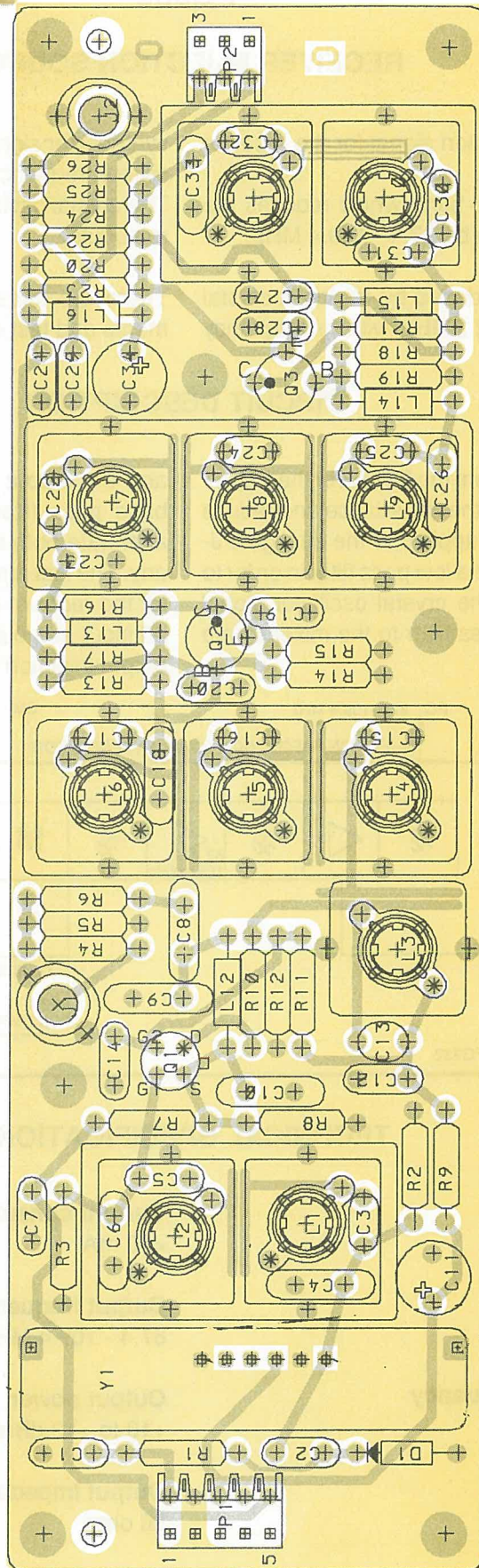
-40°C to 85°C



FREQUENCY GENERATOR FG932
 COMPONENT LAYOUT

D403.266/2

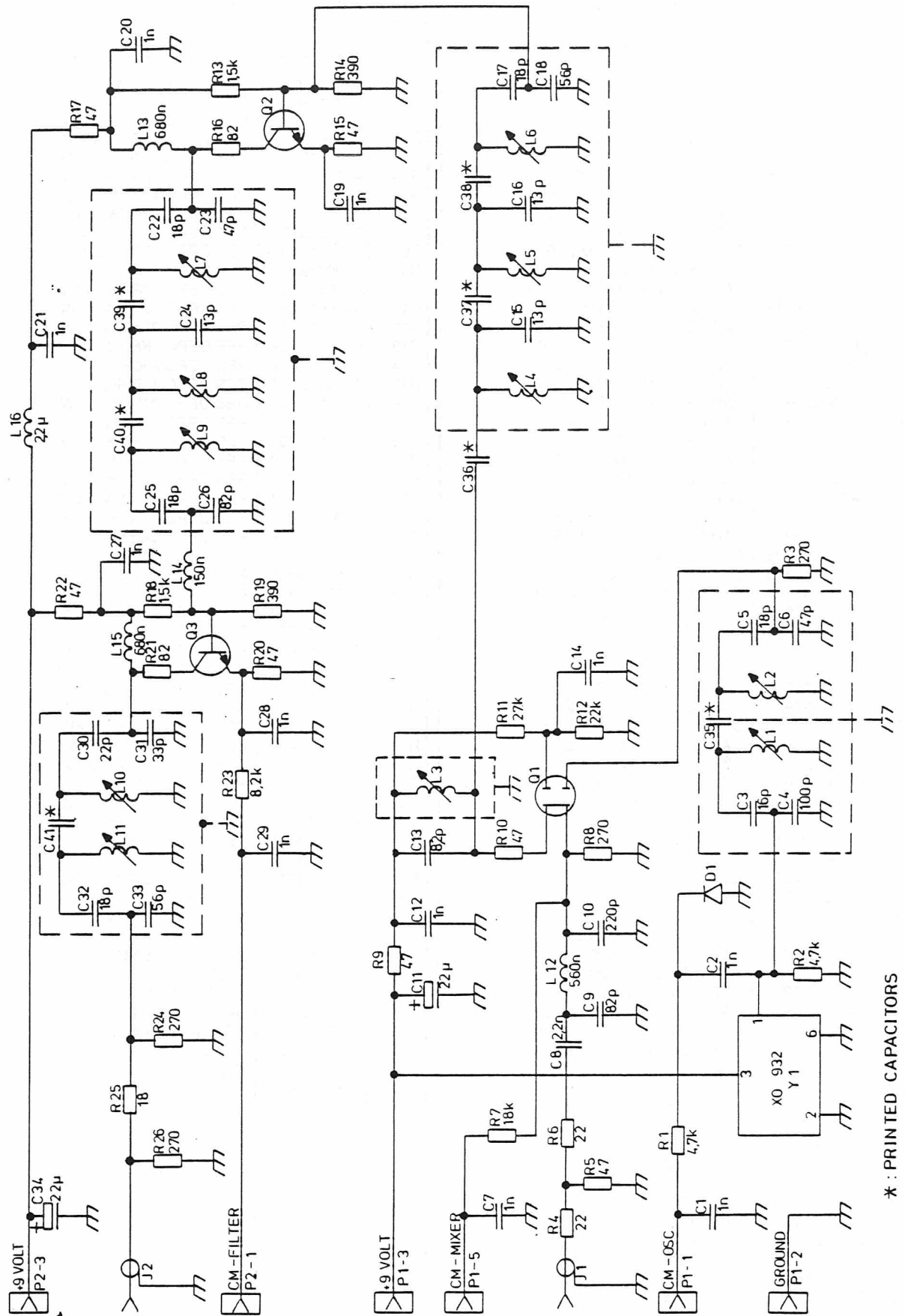
CODE NO. M905374G1 - GRC6028A



**FREQUENCY GENERATOR FG932
COMPONENT LAYOUT**

D403.266/2

CODE NO. M905374G1 - GRC6028A



* : PRINTED CAPACITORS

FREQUENCY GENERATOR FG932

CODE NO. M905374G1 - GRC6028A

D403.202/3

PARTS LIST FOR FREQUENCY GENERATOR FG932

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GRC6128A	M905374G1 FG 932	Q02	J706514P1	TSTR NPN SI BFW 92
C01	A700233P7	CAP CER CL2 1N 20% 50V	Q03	J706514P1	TSTR NPN SI BFW 92
C02	A700233P7	CAP CER CL2 1N 20% 50V	R01	A700019P45	RES DEPC 4K7 5% 1/4W
C03	A700235P38	CAP CER N150 16P 5% 50V	R02	A700019P45	RES DEPC 4K7 5% 1/4W
C04	A700235P25	CAP CER N150 100P 5% 50V	R03	A700019P30	RES DEPC 270R 5% 1/4W
C05	A700235P16	CAP CER N150 18P 5% 50V	R04	A700019P17	RES DEPC 22R 5% 1/4W
C06	A700235P21	CAP CER N150 47P 5% 50V	R05	A700019P21	RES DEPC 47R 5% 1/4W
C07	A700233P7	CAP CER CL2 1N 20% 50V	R06	A700019P17	RES DEPC 22R 5% 1/4W
C08	A700233P9	CAP CER CL2 2N2 20% 50V	R07	A700019P52	RES DEPC 18K 5% 1/4W
C09	A700235P24	CAP CER N150 82P 5% 50V	R08	A700019P30	RES DEPC 270R 5% 1/4W
C10	A700235P29	CAP CER N750 220P 5% 50V	R09	A700019P21	RES DEPC 47R 5% 1/4W
C11	2313749C48	CAP TA SOL 22U 20% 20V	R10	A700019P21	RES DEPC 47R 5% 1/4W
C12	A700233P7	CAP CER CL2 1N 20% 50V	R11	A700019P54	RES DEPC 27K 5% 1/4W
C13	A700235P12	CAP CER N150 8P2 .25P 50V	R12	A700019P53	RES DEPC 22K 5% 1/4W
C14	A700233P7	CAP CER CL2 1N 20% 50V	R13	A700019P39	RES DEPC 1K5 5% 1/4W
C15	A700235P33	CAP CER N150 13P 5% 50V	R14	A700019P32	RES DEPC 390R 5% 1/4W
C16	A700235P33	CAP CER N150 13P 5% 50V	R15	A700019P21	RES DEPC 47R 5% 1/4W
C17	A700235P16	CAP CER N150 18P 5% 50V	R16	A700019P24	RES DEPC 82R 5% 1/4W
C18	A700235P22	CAP CER N150 56P 5% 50V	R17	A700019P21	RES DEPC 47R 5% 1/4W
C19	A700233P7	CAP CER CL2 1N 20% 50V	R18	A700019P39	RES DEPC 1K5 5% 1/4W
C20	A700233P7	CAP CER CL2 1N 20% 50V	R19	A700019P32	RES DEPC 390R 5% 1/4W
C21	A700233P7	CAP CER CL2 1N 20% 50V	R20	A700019P21	RES DEPC 47R 5% 1/4W
C22	A700235P16	CAP CER N150 18P 5% 50V	R21	A700019P24	RES DEPC 82R 5% 1/4W
C23	A700235P21	CAP CER N150 47P 5% 50V	R22	A700019P21	RES DEPC 47R 5% 1/4W
C24	A700235P33	CAP CER N150 13P 5% 50V	R23	A700019P48	RES DEPC 8K2 5% 1/4W
C25	A700235P16	CAP CER N150 18P 5% 50V	R24	A700019P30	RES DEPC 270R 5% 1/4W
C26	A700235P24	CAP CER N150 82P 5% 50V	R25	A700019P16	RES DEPC 18R 5% 1/4W
C27	A700233P7	CAP CER CL2 1N 20% 50V	R26	A700019P30	RES DEPC 270R 5% 1/4W
C28	A700233P7	CAP CER CL2 1N 20% 50V	R11	A700019P54	RES DEPC 27K 5% 1/4W
C29	A700233P7	CAP CER CL2 1N 20% 50V	R12	A700019P53	RES DEPC 22K 5% 1/4W
C30	A700235P17	CAP CER N150 22P 5% 50V	R13	A700019P39	RES DEPC 1K5 5% 1/4W
C31	A700235P19	CAP CER N150 33P 5% 50V	R14	A700019P32	RES DEPC 390R 5% 1/4W
C32	A700235P16	CAP CER N150 18P 5% 50V	R15	A700019P21	RES DEPC 47R 5% 1/4W
C33	A700235P22	CAP CER N150 56P 5% 50V	R16	A700019P24	RES DEPC 82R 5% 1/4W
C34	2313749C48	CAP TA SOL 22U 20% 20V	R17	A700019P21	RES DEPC 47R 5% 1/4W
D01	A700047P1	DIO SI SIG 2835	R18	A700019P39	RES DEPC 1K5 5% 1/4W
J01	A700171P2	CONN PWB FEM PHONO	R19	A700019P32	RES DEPC 390R 5% 1/4W
J02	A700171P2	CONN PWB FEM PHONO	R20	A700019P21	RES DEPC 47R 5% 1/4W
L01	J706975G15	COIL ASM	R21	A700019P24	RES DEPC 82R 5% 1/4W
L02	J706975G15	COIL ASM	R22	A700019P21	RES DEPC 47R 5% 1/4W
L03	J706975G7	COIL ASM	R23	A700019P48	RES DEPC 8K2 5% 1/4W
L04	J706975G7	COIL ASM	R24	A700019P30	RES DEPC 270R 5% 1/4W
L05	J706975G7	COIL ASM	R25	A700019P16	RES DEPC 18R 5% 1/4W
L06	J706975G7	COIL ASM	R26	A700019P30	RES DEPC 270R 5% 1/4W
C27	A700233P7	CAP CER CL2 1N 20% 50V		8402003U90A	M9---P1R0 BD PW.
C28	A700233P7	CAP CER CL2 1N 20% 50V			
C29	A700233P7	CAP CER CL2 1N 20% 50V			
C30	A700235P17	CAP CER N150 22P 5% 50V		J706759P3	NON REFERENCED ITEMS::
C31	A700235P19	CAP CER N150 33P 5% 50V		J706758P4	SHIELD, MODIF.-
C32	A700235P16	CAP CER N150 18P 5% 50V		J706759P5	SHIELD, MODIF.- (2 used)
C33	A700235P22	CAP CER N150 56P 5% 50V		A700090P4	SHIELD, MODIF.-
C34	A701534P8	CAP TA SOL 22U 20% 16V		A701329P2	CONTACT 2 USED
D01	A700047P1	DIO SI SIG 2835		A701544P2	CONTACT PWB MALE, L=11.69MM
J01	A700171P2	CONN PWB FEM PHONO			(6 used)
J02	A700171P2	CONN PWB FEM PHONO			CAN
L01	J706975G15	COIL ASM			
L02	J706975G15	COIL ASM			
L03	J706975G7	COIL ASM			
L04	J706975G7	COIL ASM			
L05	J706975G7	COIL ASM			
L06	J706975G7	COIL ASM			
L07	J706975G7	COIL ASM			
L08	J706975G7	COIL ASM			
L09	J706975G7	COIL ASM			
L10	J706975G7	COIL ASM			
L11	J706975G7	COIL ASM			
L12	A700024P10	COIL FIX 560NH 10%			
L13	A700024P11	COIL FIX 680NH 10%			
L14	A700024P3	COIL FIX 150NH 10%			
L15	A700024P11	COIL FIX 680NH 10%			
L16	A700024P17	COIL FIX 2,2UH 10%			
P01	A700041P4	CONN PWB FEM 05 CKT			
P02	A700041P2	CONN PWB FEM 03 CKT			
Q01	A700074P1	TSTR MFET SI 3N205			

X404.082/2

DATE: 09/20/90

FG933

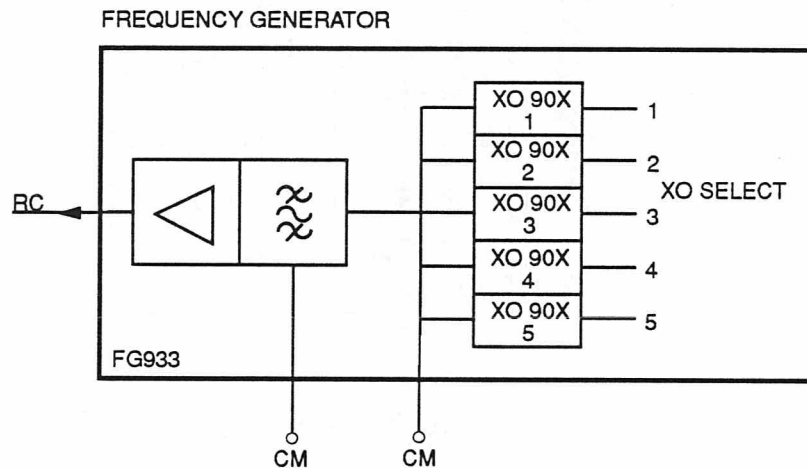
FREQUENCY GENERATOR

FG933 supplies the receiver with the injection signal. The output frequency range 87.4 - 109.4 MHz corresponds to the antenna frequency range 66 - 88 MHz.

Max. number of channels are 5 with max. spacing on 4 MHz. If only one XO is used, it shall be placed as XO no. 1 and it will be on continuously. If two or more are used, the shorting W1 is disconnected and the channel

frequencies are selected from the control unit.

The module can be supplied with max. 5 XO's which are plug-in modules. The output from the selected XO is filtered through 3 section bandpass filter, before amplification to the specified output level. There are two central metering points for use during test and alignment. Q1 provides limitation to minimize variation with temperature and frequency.



TECHNICAL SPECIFICATIONS

Output frequency
87.4 - 109.4 MHz

Output level
+10 - +13 dBm

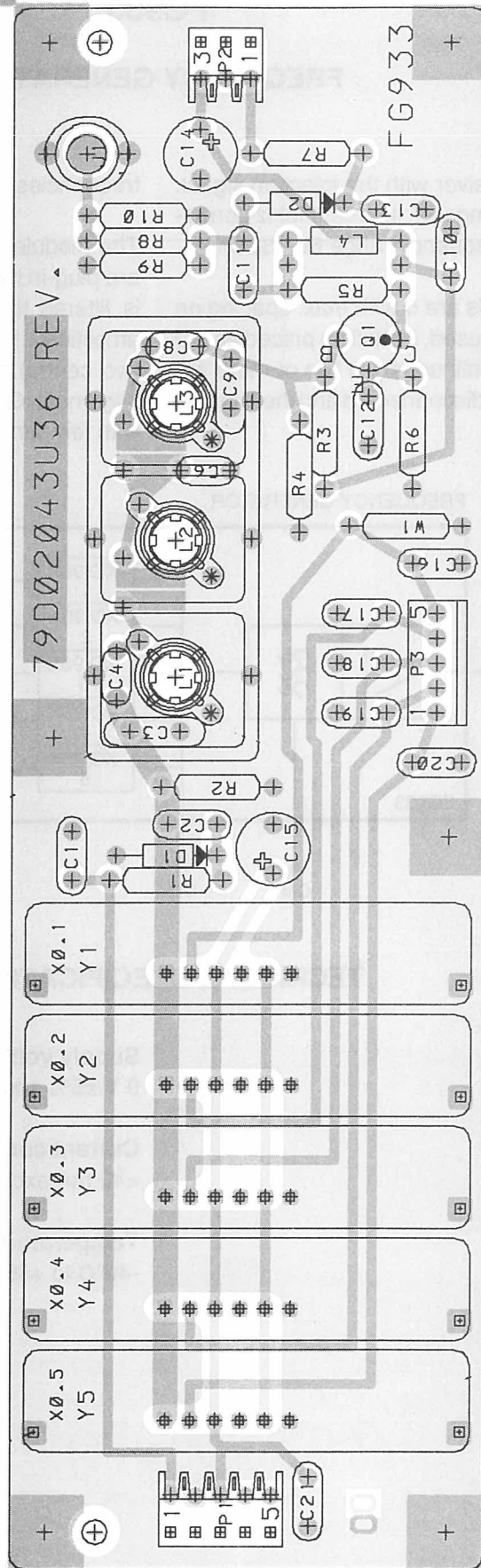
Impedance
50 ohm

Max. channel spacing
4 MHz

Supply voltage
9 V \pm 5% and 9 V \pm 5%

Current consumption
<40 mA excl. oscillators

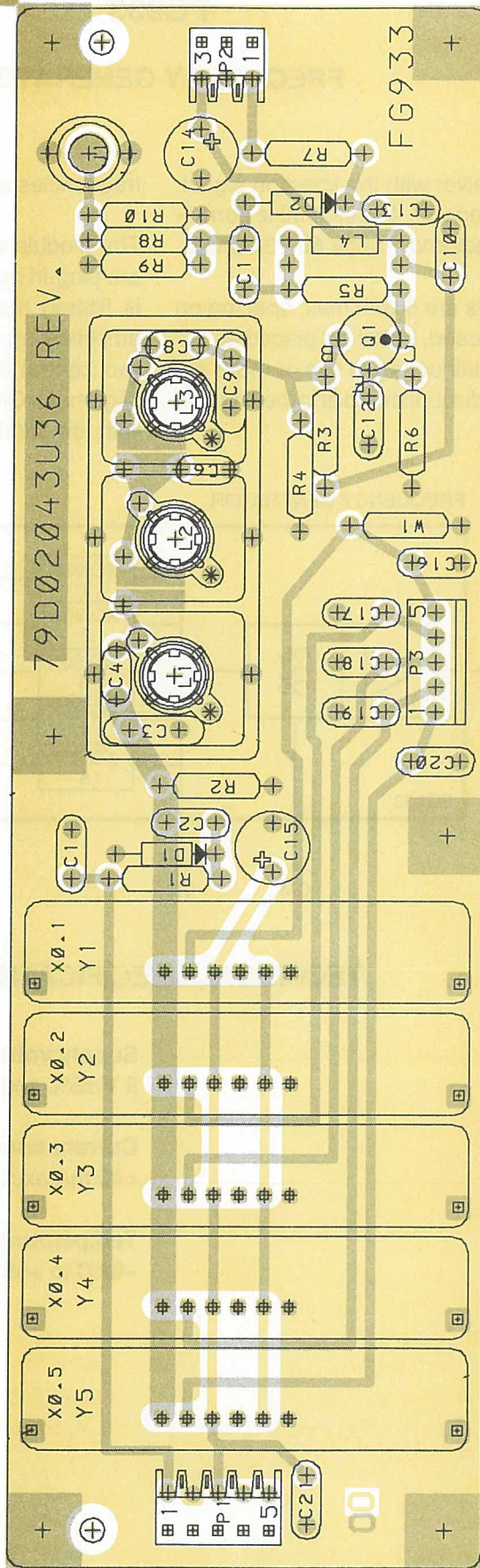
Temperature range
-40°C to +85°C



FREQUENCY GENERATOR FG933
 COMPONENT LAYOUT

D403.392/2

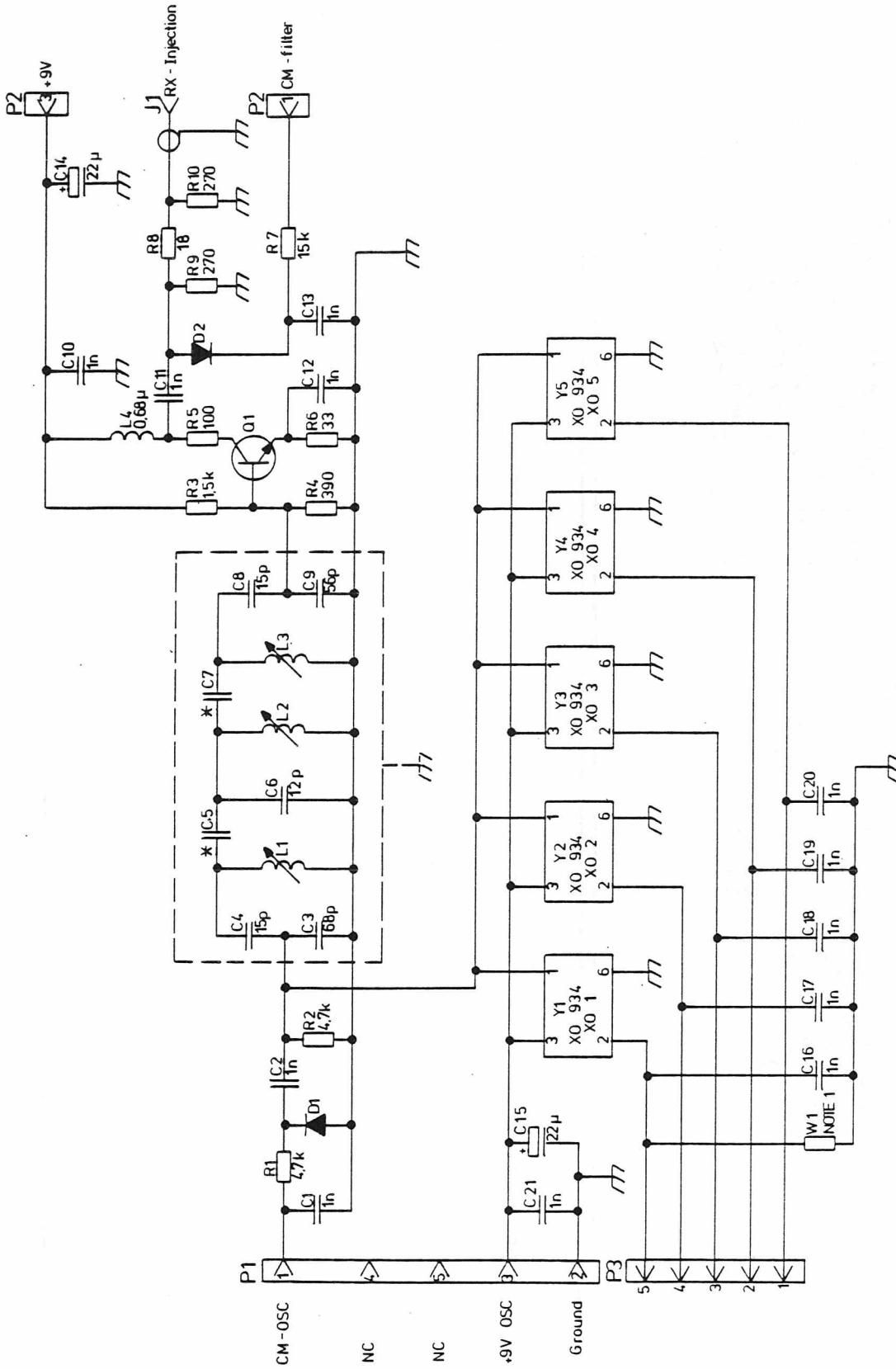
CODE NO. M905601G1 - GRC6027A



**FREQUENCY GENERATOR FG933
COMPONENT LAYOUT**

D403.392/2

CODE NO. M905601G1 - GRC6027A



NOTE 1: W1 shall be removed,
when more than one
XO are mounted.

* : Printed capacitors.

FREQUENCY GENERATOR FG933

CODE NO. M905601G1 - GRC6027A

D403.388/2

PARTS LIST FOR FREQUENCY GENERATOR FG933

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GRC6027A	M905601G1 FG 933			
C01	A700233P7	CAP CER CL2 1N 20% 50V			
C02	A700233P7	CAP CER CL2 1N 20% 50V			
C03	A700235P23	CAP CER N150 68P 5% 50V			
C04	A700235P15	CAP CER N150 15P 5% 50V			
C06	A700235P14	CAP CER N150 12P 5% 50V			
C08	A700235P15	CAP CER N150 15P 5% 50V			
C09	A700235P22	CAP CER N150 56P 5% 50V			
C10	A700233P7	CAP CER CL2 1N 20% 50V			
C11	A700233P7	CAP CER CL2 1N 20% 50V			
C12	A700233P7	CAP CER CL2 1N 20% 50V			
C13	A700233P7	CAP CER CL2 1N 20% 50V			
C14	2313749C48	CAP TA SOL 22U 20% 20V			
C15	2313749C48	CAP TA SOL 22U 20% 20V			
C16	A700233P7	CAP CER CL2 1N 20% 50V			
C17	A700233P7	CAP CER CL2 1N 20% 50V			
C18	A700233P7	CAP CER CL2 1N 20% 50V			
C19	A700233P7	CAP CER CL2 1N 20% 50V			
C20	A700233P7	CAP CER CL2 1N 20% 50V			
C21	A700233P7	CAP CER CL2 1N 20% 50V			
D01	A700047P1	DIO SI SIG 2835			
D02	A700047P1	DIO SI SIG 2835			
J01	A700171P2	CONN PWB FEM PHONO			
L01	J706975G7	COIL ASM			
L02	J706975G7	COIL ASM			
L03	J706975G7	COIL ASM			
L04	A700024P11	COIL FIX 680NH 10%			
P01	A700041P4	CONN PWB FEM 05 CKT			
P02	A700041P2	CONN PWB FEM 03 CKT			
P03	A700072P31	CONN PWB MALE 05 CKT			
Q01	J706011P1	TSTR NPN SI BFR 91			
R01	A700019P45	RES DEPC 4K7 5% 1/4W			
R02	A700019P45	RES DEPC 4K7 5% 1/4W			
R03	A700019P39	RES DEPC 1K5 5% 1/4W			
R04	A700019P32	RES DEPC 390R 5% 1/4W			
R05	A700019P25	RES DEPC 100R 5% 1/4W			
R06	A700019P19	RES DEPC 33R 5% 1/4W			
R07	A700019P51	RES DEPC 15K 5% 1/4W			
R08	A700019P16	RES DEPC 18R 5% 1/4W			
R09	A700019P30	RES DEPC 270R 5% 1/4W			
R10	A700019P30	RES DEPC 270R 5% 1/4W			
W01	A700184P1	RES WIRE JMPR			
	8402003U92A	M9---P1R0 BD PW.			
		NON REFERENCE ITEMS:			
	J706758P5	SHIELD, MODIF.-			
	A701329P2	CONTACT PWB MALE L=11.69MM (30 used)			
	A701785P2	CONTACT (10 used)			

FG912

RECEIVER INJECTION SOURCE

The FG912 gives the RX injection signal for the receiver converter in a duplex radio.

It covers the frequency band of 116.6 - 152.6 MHz which is the RX injection frequency for the receiver of 138 - 174 MHz ant. frequency. The module converts the 11.5 - 16 MHz signal from synthesizer to the right RX

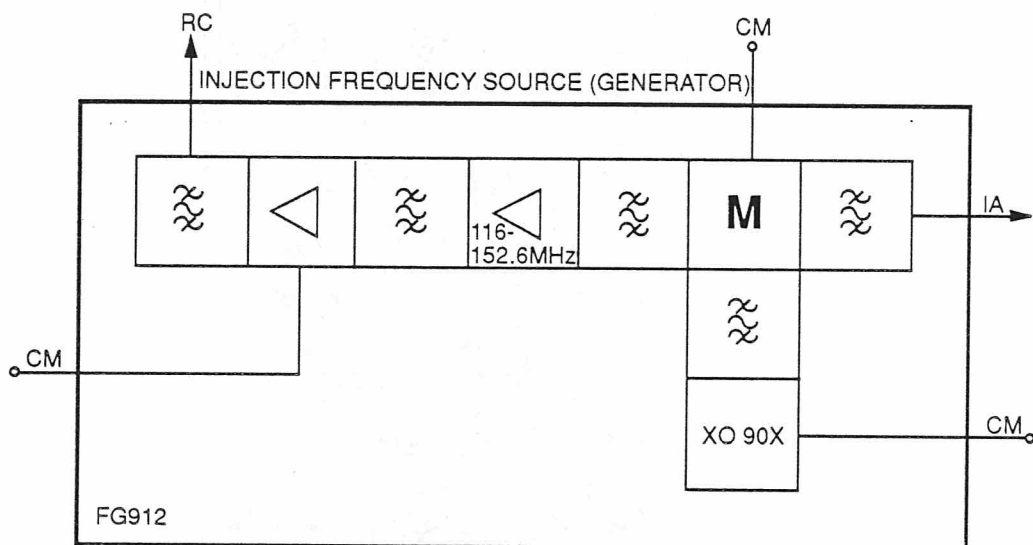
injection frequency. Central metering points are incorporated for adjustment and test of the module.

The components are placed on a printed circuit board. The crystal oscillator is a plug-in micromodule and the output is the third harmonic of the crystal frequency.

CIRCUIT DESCRIPTION

The output of oscillator is first filtered in a 3-section filter and fed to the gate of Q1. The source of the same mixer is also fed with the synthesizer signal through a low-pass-filter. The mixer output is filtered in two 3-section filter and one 2-section filter and amplified to the right output level in Q2 and Q3.

Q3 provides limitation to minimize variation with temperature and frequency. The filter arrangement attenuates the oscillator frequency in the output. Central metering points are provided for measuring and adjustment.



TECHNICAL SPECIFICATIONS

SPECIFICATIONS AT 25°C

FS Input frequency

11.5 - 16.0 MHz

FS Input Level

0 dBm (-1 dB/+3 dB)

Impedance

50 ohm

Oscillator power

+10 dBm +14 dBm

Supply voltage

9 V \pm 5%

XO voltage

9 V \pm 0.5%

Current consumption

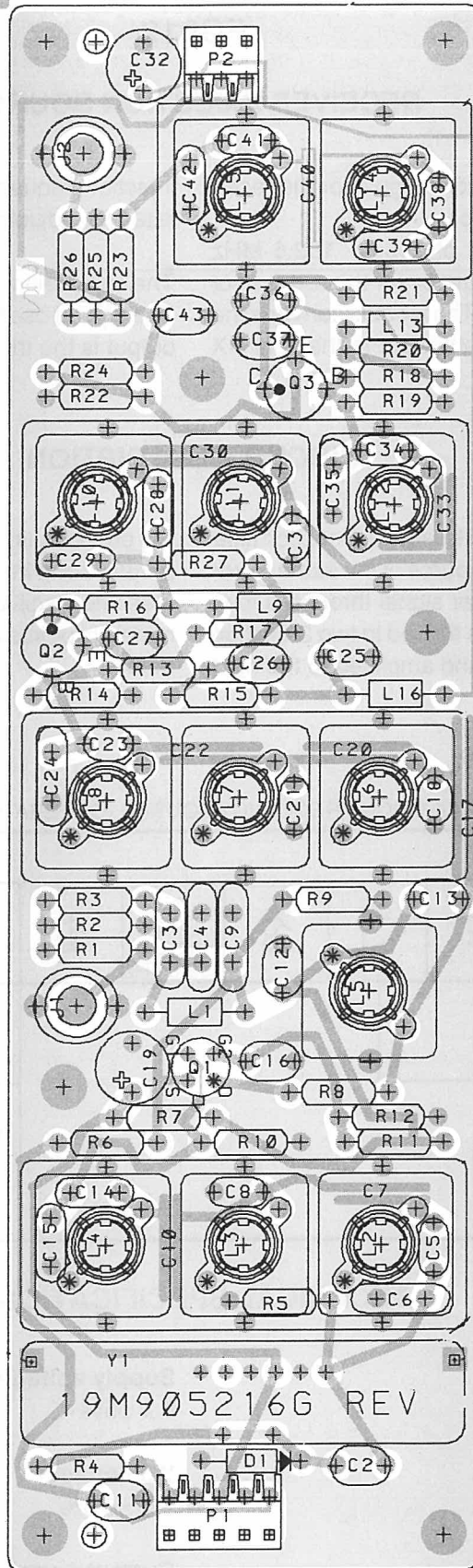
<60 mA

Output frequency

116.6 - 152.6 MHz

Channel bandwidth

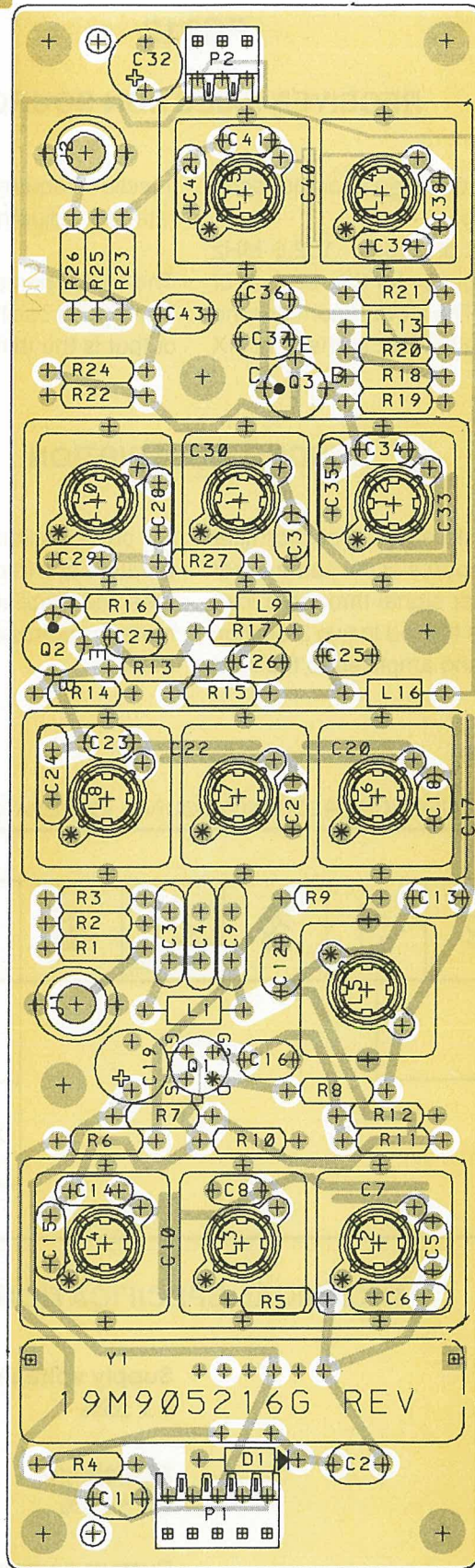
4.5 MHz



FREQUENCY GENERATOR FG912
COMPONENT LAYOUT

D403.301/3

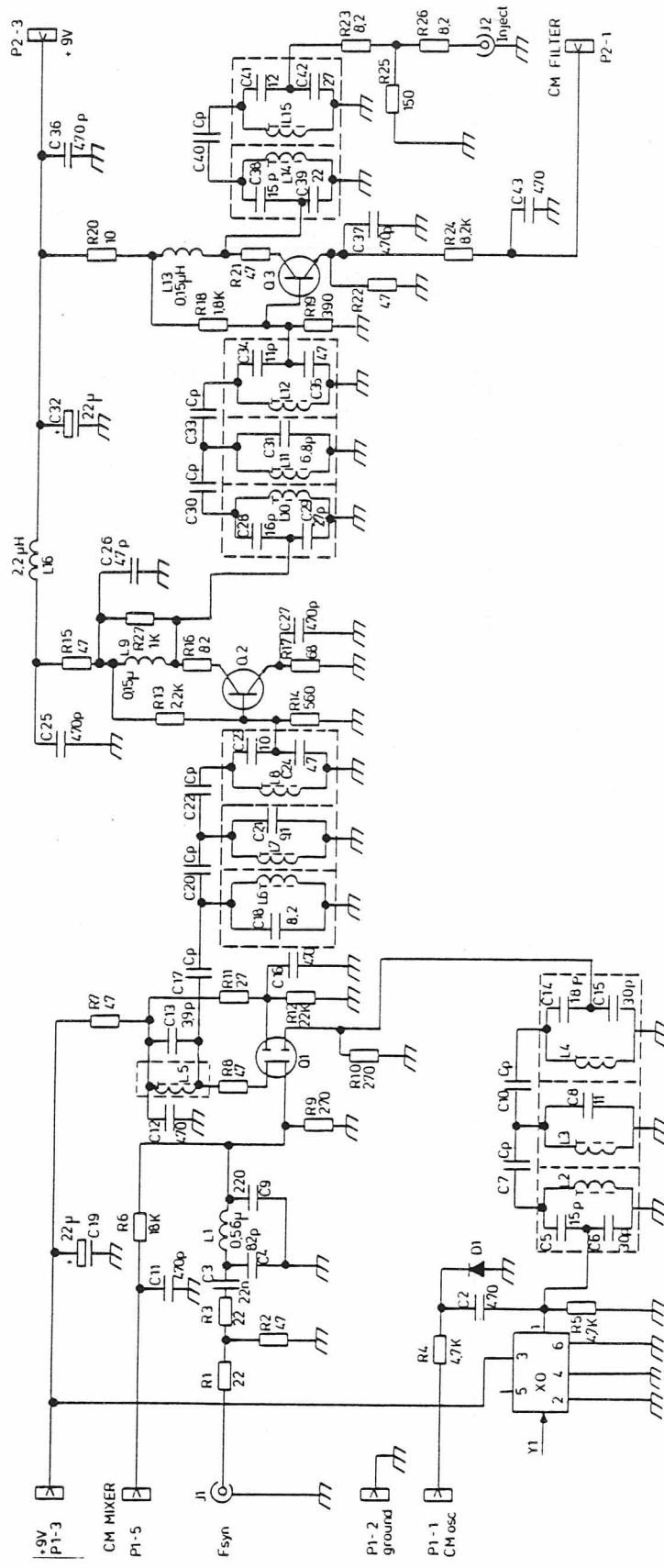
M905216G1 - GRD6110A



**FREQUENCY GENERATOR FG912
COMPONENT LAYOUT**

D403.301/3

M905216G1 - GRD6110A



MODEL NO	R/V LET
19M905216 G 1	A

FREQUENCY GENERATOR FG912

CODE NO. M905216G1 - GRD6110A

D403.146/3

PARTS LIST FOR FREQUENCY GENERATOR FG912

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GRD6110A	M905216G1 FG912			
C002	A700233P5	CAP CER 470P 10% 50V	R016	A700019P24	RES DEPC 82R 5% 1/4W
C003	A700233P9	CAP CER 2N2 10% 50V	R017	A700019P23	RES DEPC 68R 5% 1/4W
C004	A700235P24	CAP CER N150 82P 5% 50V	R018	A700019P40	RES DEPC 1K8 5% 1/4W
C005	A700235P15	CAP CER N150 15P 5% 50V	R019	A700019P32	RES DEPC 390R 5% 1/4W
C006	J706256P301	CAP CER N150 30P 5% 50V	R020	A700019P13	RES DEPC 10R 5% 1/4W
C008	A700235P32	CAP CER N150 11P 5% 50V	R021	A700019P21	RES DEPC 47R 5% 1/4W
C009	A700235P29	CAP CER N750 220P 5% 50V	R022	A700019P21	RES DEPC 47R 5% 1/4W
C011	A700233P5	CAP CER 470P 10% 50V	R023	A700019P12	RES DEPC 8R2 5% 1/4W
C012	A700233P5	CAP CER 470P 10% 50V	R024	A700019P48	RES DEPC 8K2 5% 1/4W
C013	A700235P8	CAP CER N150 3P9.25P 50V	R025	A700019P27	RES DEPC 150R 5% 1/4W
C014	A700235P16	CAP CER N150 18P 5% 50V	R026	A700019P12	RES DEPC 8R2 5% 1/4W
C015	J706256P301	CAP CER N150 30P 5% 50V	R027	A700019P37	RES DEPC 1K0 5% 1/4W
C016	A700233P5	CAP CER 470P 10% 50V		8402003U41A	M9—17P1R2 BD PW.
C018	A700235P12	CAP CER N150 8P2.25P 50V			NON REFERENCED ITEMS:
C019	2313749C48	CAP TA SOL 22U 20% 20V	J706758P4		SHIELD CASTING (3 used)
C021	A700235P34	CAP CER N150 9P1.25P 50V	J706759P3		SHIELD CASTING
C023	A700235P13	CAP CER N150 10P 5% 50V	A700090P4		CONTACT (2 used)
C024	A700235P21	CAP CER N150 47P 5% 50V	A701329P2		CONT EL PIN (6 used)
C025	A700233P5	CAP CER 470P 10% 50V	A701544P2		CAN
C026	A700233P5	CAP CER 470P 10% 50V			
C027	A700233P5	CAP CER 470P 10% 50V			
C028	A700235P38	CAP CER N150 16P 5% 50V			
C029	A700235P18	CAP CER N150 27P 5% 50V			
C031	A700235P11	CAP CER N150 6P8.25P 50V			
C032	2313749C48	CAP TA SOL 22U 20% 20V			
C034	A700235P32	CAP CER N150 11P 5% 50V			
C035	A700235P21	CAP CER N150 47P 5% 50V			
C036	A700233P5	CAP CER 470P 10% 50V			
C037	A700233P5	CAP CER 470P 10% 50V			
C038	A700235P15	CAP CER N150 15P 5% 50V			
C039	A700235P17	CAP CER N150 22P 5% 50V			
C041	A700235P14	CAP CER N150 12P 5% 50V			
C042	A700235P18	CAP CER N150 27P 5% 50V			
C043	A700233P5	CAP CER 470P 10% 50V			
D001	A700047P1	DIO SI SIG 2835			
J001	A700171P2	CONN PWB FEM PHONO-RF			
J002	A700171P2	CONN PWB FEM PHONO-RF			
L001	A700024P10	COIL FIX 0 56MH			
L002	J706975G15	COIL			
L003	J706975G15	COIL			
L004	J706975G15	COIL			
L005	J706975G15	COIL			
L006	J706975G15	COIL			
L007	J706975G15	COIL			
L008	J706975G15	COIL			
L009	A700024P3	COIL 0 15MH			
L010	J706975G15	COIL			
L011	J706975G15	COIL			
L012	J706975G15	COIL			
L013	A700024P3	COIL 0 15MH			
L014	J706975G15	COIL			
L015	J706975G15	COIL			
L016	A700024P17	COIL FIX 2 0MH			
P001	A700041P4	CONN PWB FEM 05 CKT			
P002	A700041P2	CONN PWB FEM 03 CKT			
Q001	A700074P1	TSTR MFET SI 3N205			
Q002	J706514P1	TSTR NPN SI BFW 92			
Q003	J706514P1	TSTR NPN SI BFW 92			
R001	A700019P17	RES DEPC 22R 5% 1/4W			
R002	A700019P21	RES DEPC 47R 5% 1/4W			
R003	A700019P17	RES DEPC 22R 5% 1/4W			
R004	A700019P45	RES DEPC 4K7 5% 1/4W			
R005	A700019P45	RES DEPC 4K7 5% 1/4W			
R006	A700019P52	RES DEPC 18K 5% 1/4W			
R007	A700019P21	RES DEPC 47R 5% 1/4W			
R008	A700019P21	RES DEPC 47R 5% 1/4W			
R009	A700019P30	RES DEPC 270R 5% 1/4W			
R010	A700019P30	RES DEPC 270R 5% 1/4W			
R011	A700019P54	RES DEPC 27K 5% 1/4W			
R012	A700019P53	RES DEPC 22K 5% 1/4W			
R013	A700019P41	RES DEPC 2K2 5% 1/4W			
R014	A700019P34	RES DEPC 560R 5% 1/4W			
R015	A700019P21	RES DEPC 47R 5% 1/4W			

X403.816/4

DATE: 09/20/90

FG913

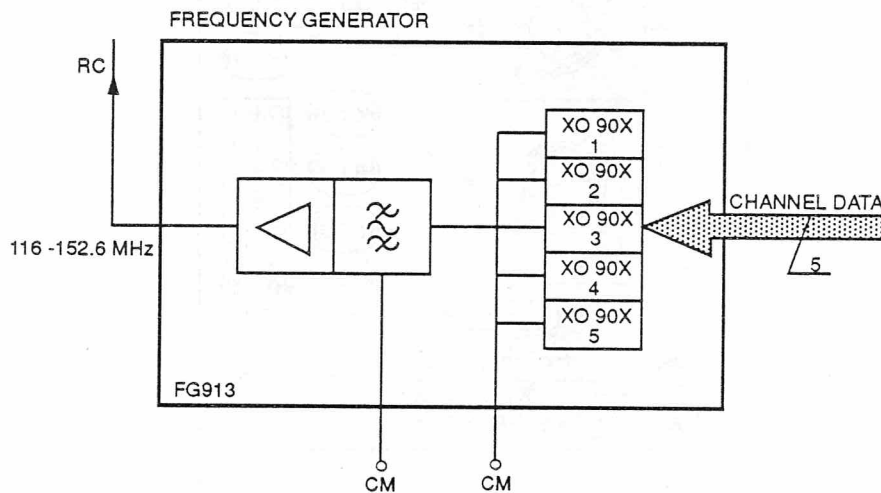
FREQUENCY GENERATOR

FG913 supplies the receiver with the injection signal in simplex or duplex radio, multiplier version. The output frequency range 116.6 - 152.6 MHz corresponds to the antenna frequency range 138 - 174 MHz.

Max. number of channels are 5 with max. spacing on 8 MHz. If only one XO is used, it shall be placed as XO no. 1 and it will be on continuously. If two or more are used, the shorting W1 is disconnected and the channel

frequencies are selected from the control unit.

The module can be supplied with max. 5 XO's which are plug-in modules. The output from the selected XO is filtered through a 3 section bandpass filter, before amplification to the specified output level. There are two central metering points for use during test and alignment. Q1 provides limitation to minimize variation with temperature and frequency.



TECHNICAL SPECIFICATIONS

Output frequency
116.6 - 152.6 MHz

Output level
+9 - +13 dBm

Impedance
50 ohm

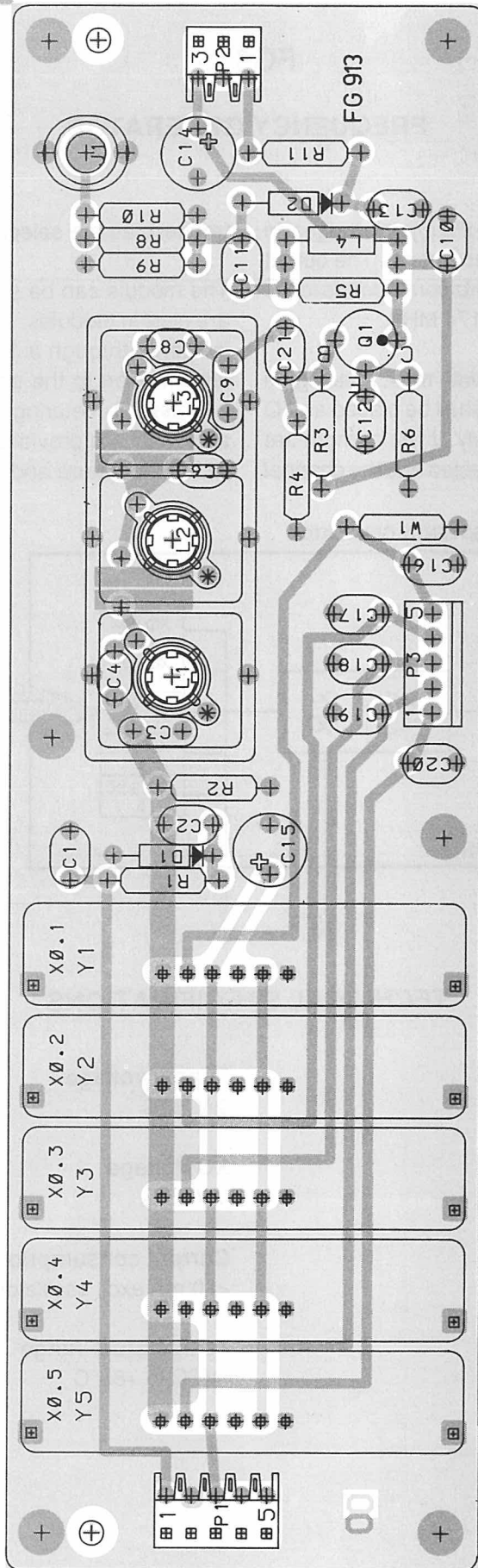
Max. channel spacing
8 MHz

Supply voltage
9 V \pm 5%

XO Voltage
9 V \pm 5%

Current consumption
<30 mA excl. oscillators

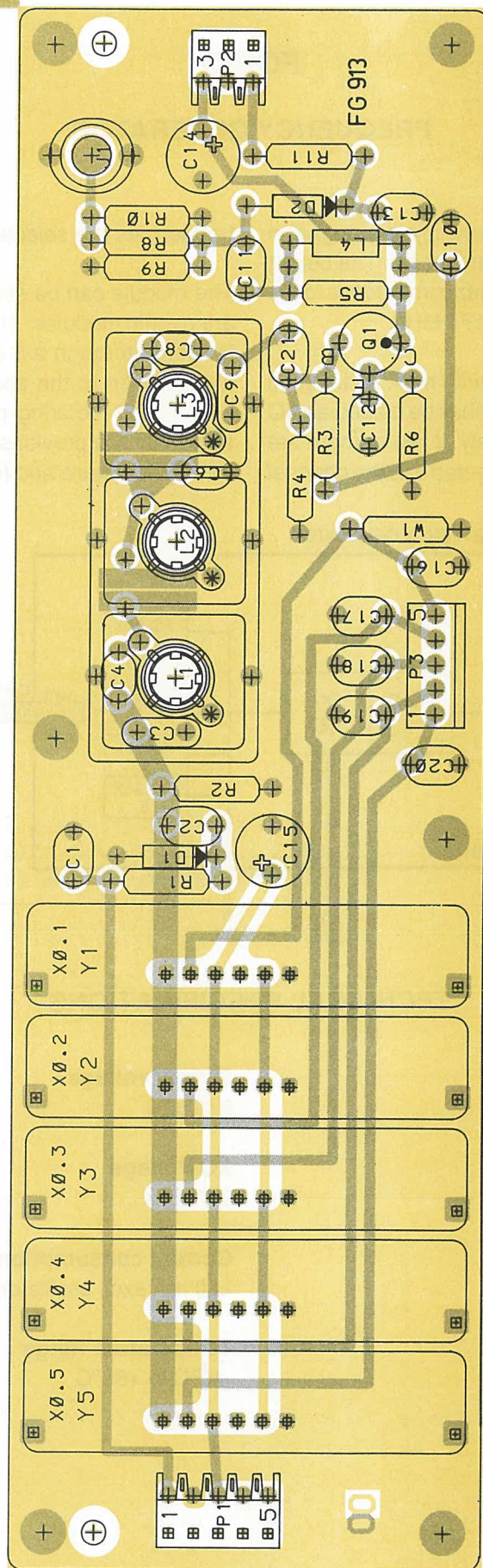
Temperature range
-40°C to +85°C



**FREQUENCY GENERATOR FG913
COMPONENT LAYOUT**

D403.436/2

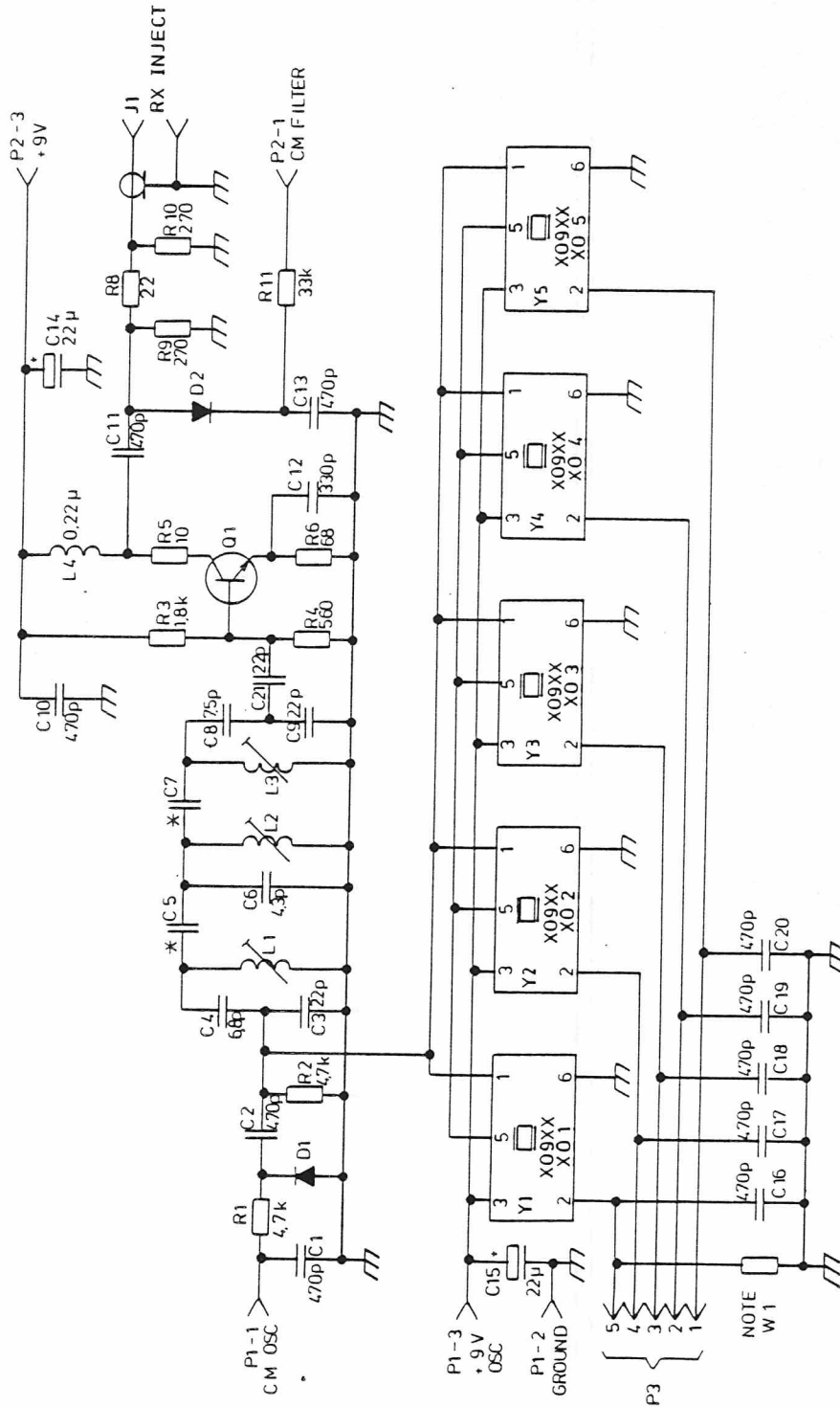
CODE NO. M905398 G1 - GRD6109A



**FREQUENCY GENERATOR FG913
COMPONENT LAYOUT**

D403.436/2

CODE NO. M905398 G1 - GRD6109A



* PRINTED BOARD CAPACITORS.
 NOTE: W1 ARE REMOVED WHEN
 MORE THAN ONE XO ARE MOUNTED.

FREQUENCY GENERATOR FG913

CODE NO. M905398G1 - GRD6109A

D403.435/3

PARTS LIST FOR FREQUENCY GENERATOR FG913

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GRD6109A	M905398G1 FG913			
C001	A700233P5	CAP CER 470P 10% 50V			
C002	A700233P5	CAP CER 470P 10% 50V			
C003	A700235P17	CAP CER N150 22P 5% 50V			
C004	A700235P11	CAP CER N150 6P8.25P 50V			
C006	A700235P37	CAP CER N150 4P3.25P 50V			
C008	A700235P36	CAP CER N150 7P5.25P 50V			
C009	A700235P17	CAP CER N150 22P 5% 50V			
C010	A700233P5	CAP CER 470P 10% 50V			
C011	A700233P5	CAP CER 470P 10% 50V			
C012	A700233P4	CAP CER 330P 10% 50V			
C013	A700233P5	CAP CER 470P 10% 50V			
C014	2313749C48	CAP TA SOL 22U 20% 20V			
C015	2313749C48	CAP TA SOL 22U 20% 20V			
C016	A700233P5	CAP CER 470P 10% 50V			
C017	A700233P5	CAP CER 470P 10% 50V			
C018	A700233P5	CAP CER 470P 10% 50V			
C019	A700233P5	CAP CER 470P 10% 50V			
C020	A700233P5	CAP CER 470P 10% 50V			
C021	A700235P17	CAP CER N150 22P 5% 50V			
D001	A700047P1	DIO SI SIG 2835			
D002	A700047P1	DIO SI SIG 2835			
J001	A700171P2	CONN PWB FEM PHONO			
L001	J706975G7	COIL			
L002	J706975G7	COIL			
L003	J706975G7	COIL			
L004	A700024P5	COIL 220NH			
P001	A700041P4	CONN PWB FEM 05 CKT			
P002	A700041P2	CONN PWB FEM 03 CKT			
P003	A700072P31	CONN PWB MALE 05 CKT			
Q001	J706011P1	TSTR NPN SI BFR 91			
R001	A700019P45	RES DEPC 4K7 5% 1/4W			
R002	A700019P45	RES DEPC 4K7 5% 1/4W			
R003	A700019P40	RES DEPC 1K8 5% 1/4W			
R004	A700019P34	RES DEPC 560R 5% 1/4W			
R005	A700019P13	RES DEPC 10R 5% 1/4W			
R006	A700019P23	RES DEPC 68R 5% 1/4W			
R008	A700019P17	RES DEPC 22R 5% 1/4W			
R009	A700019P30	RES DEPC 270R 5% 1/4W			
R010	A700019P30	RES DEPC 270R 5% 1/4W			
R011	A700019P55	RES DEPC 33K 5% 1/4W			
W001	A700184P1	WIRE JUMPER (ZEROHM)			
	8402003U91A	BD PW			
		NON REFERENCED ITEMS:			
	L855145P1	CASTING SHIELD			
	A701329P2	CONT EL PIN (30 used)			
	A700090P4	CONTACT (10 used)			

FG961

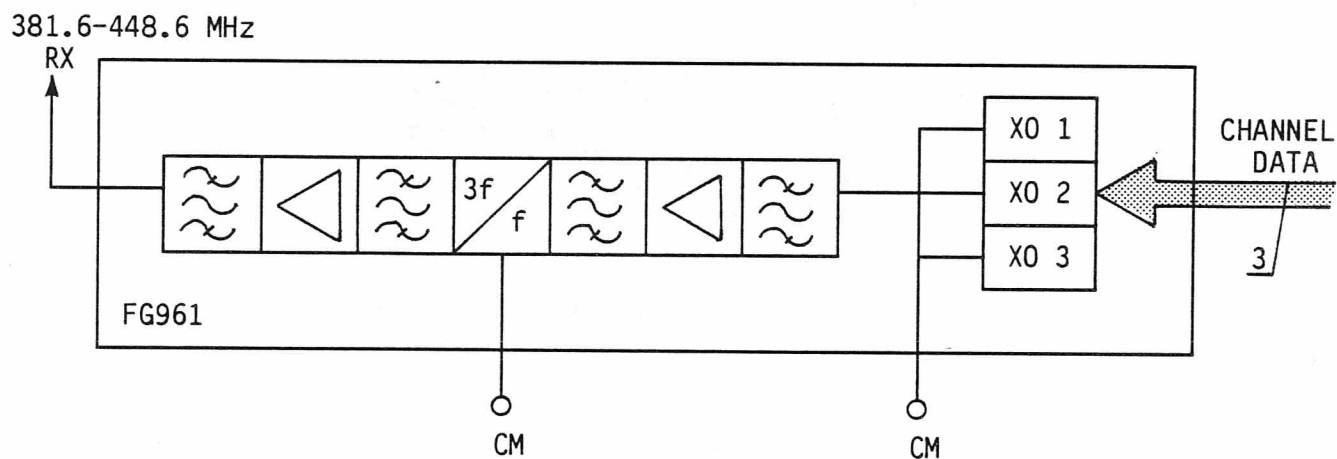
FREQUENCY GENERATOR

FG961 supplies the receiver with the injection signaling simplex radio, multiplier version. The output frequency range 381.6 - 448.6 MHz corresponds to the antenna frequency range 403 - 470 MHz.

Max. number of channels are 3 with max. spacing on 4.5 MHz. If only one XO is used, it shall be placed as XO no. 1 and it will be on continuously. If two or more

are used, the shorting W1 is disconnected and the channel frequencies are selected from the control unit.

The module can be supplied with max. 3 XO's which are plug-in modules. The output from the selected XO is filtered through a four bandpass filter, tripled and amplified to the specified output level. There are two central metering points for use during test and alignment.



TECHNICAL SPECIFICATIONS

Output frequency

386 - 448.6 MHz

Output level

+9 - +13 dBm

Impedance

50 ohm

Max. channel spacing

4.5 MHz

Supply voltage

9 V \pm 5%

XO voltage

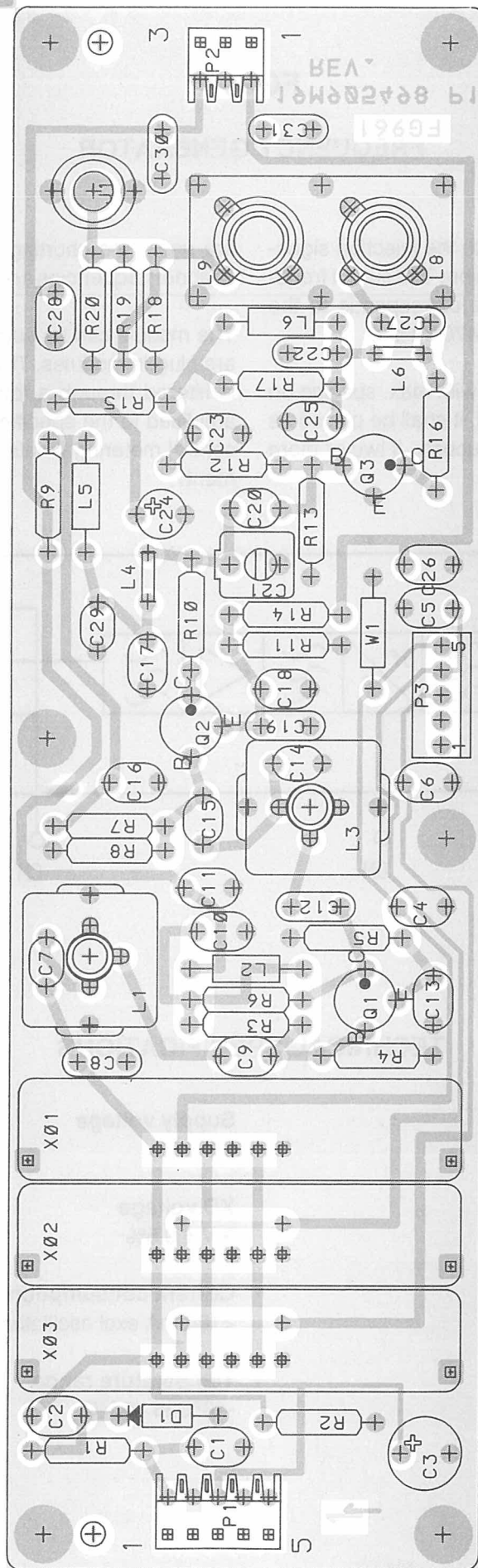
9 V \pm 0.5%

Current consumption

<100 mA excl oscillators

Temperature range

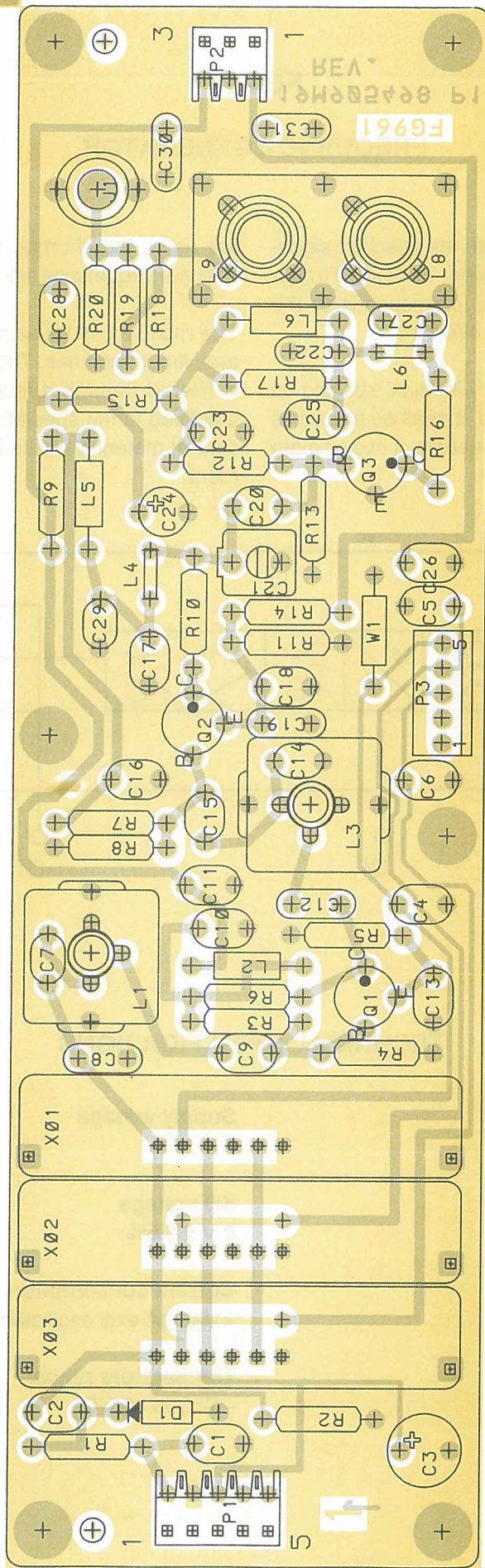
-40°C to +85°C



FREQUENCY GENERATOR FG961

D403.394/2

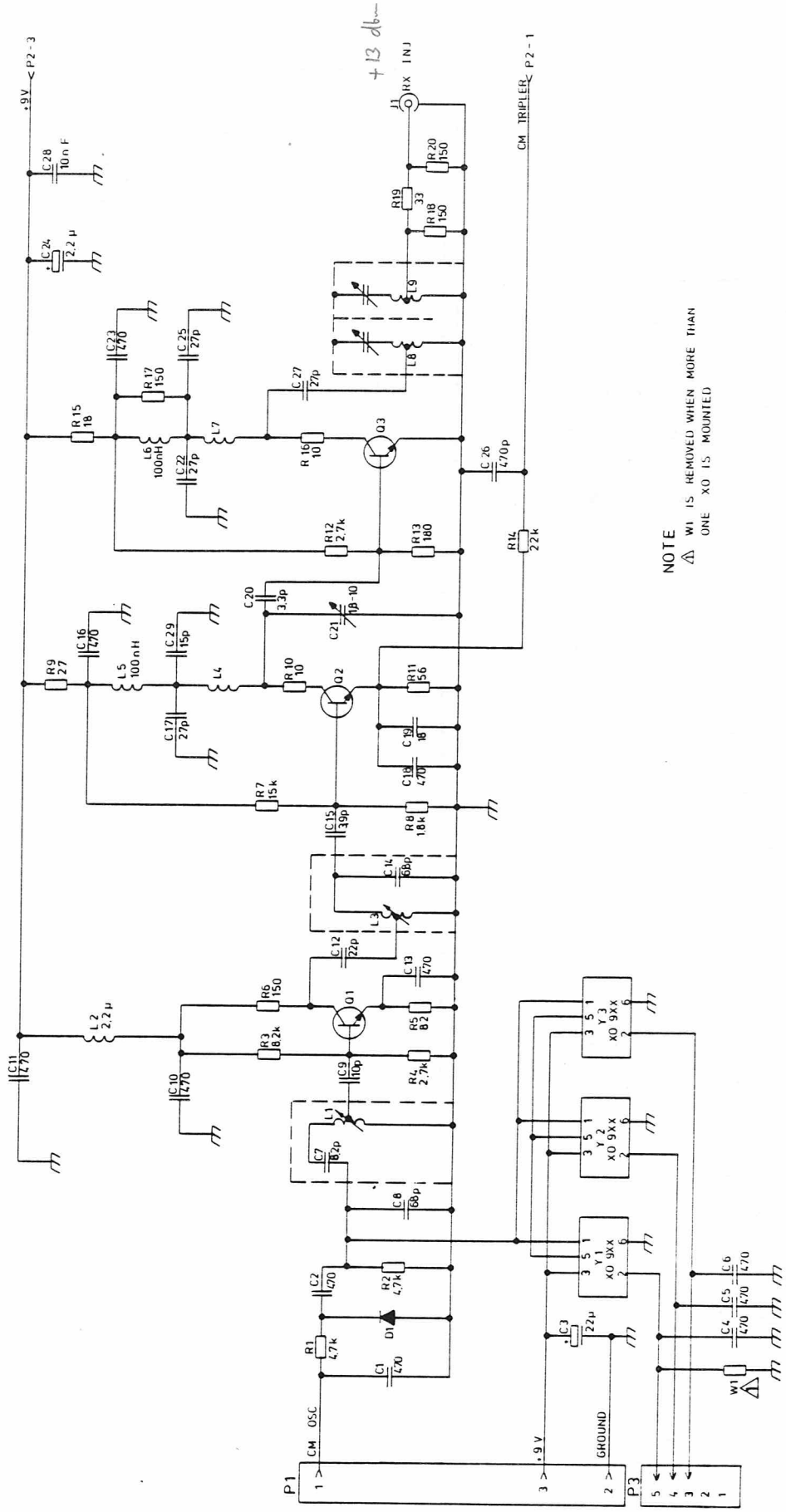
CODE NO. 19M905497G1 - GRE6020A



FREQUENCY GENERATOR FG961

D403.394/2

CODE NO. 19M905497G1 - GRE6020A



NOTE
 △ W1 IS REMOVED WHEN MORE THAN ONE XO IS MOUNTED

FREQUENCY GENERATOR FG961

D403.387/2

PARTS LIST FOR FREQUENCY GENERATOR FG961

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GRE6020A	M905497G1 FG961			NON REFERENCED ITEMS:
C01	A700233P5	CAP CER CL2 470P 20% 50V		K805050P1	CSTG HEL
C02	A700233P5	CAP CER CL2 470P 20% 50V		A700069P1	CAN (2 used)
C03	A701534P8	CAP TA SOL 22U 20% 16V		J706109P1	SCR TUN (2 used)
C04	A700233P5	CAP CER CL2 470P 20% 50V		J706110P1	SPG TUN (2 used)
C05	A700233P5	CAP CER CL2 470P 20% 50V		A701329P2	CONT EL PIN (18 used)
C06	A700233P5	CAP CER CL2 470P 20% 50V		A701785P2	CONTACT (6 used)
C07	A700235P12	CAP CER N150 8P2.25P 50V			
C08	A700235P23	CAP CER N150 68P 5% 50V			
C09	A700235P13	CAP CER N150 10P 5% 50V			
C10	A700233P5	CAP CER CL2 470P 20% 50V			
C11	A700233P5	CAP CER CL2 470P 20% 50V			
C12	A700235P17	CAP CER N150 22P 5% 50V			
C13	A700233P5	CAP CER CL2 470P 20% 50V			
C14	A700235P11	CAP CER N150 6P8.25P 50V			
C15	A700235P8	CAP CER N150 3P9.25P 50V			
C16	A700233P5	CAP CER CL2 470P 20% 50V			
C17	A700235P18	CAP CER N150 27P 5% 50V			
C18	A700233P5	CAP CER CL2 470P 20% 50V			
C19	A700235P16	CAP CER N150 18P 5% 50V			
C20	A700235P7	CAP CER N150 3P3.25P 50V			
C21	J706003P1	CAP VAR 1,8/10PF			
C22	A700235P18	CAP CER N150 27P 5% 50V			
C23	A700233P5	CAP CER CL2 470P 20% 50V			
C24	A701534P5	CAP TA SOL 2U2 20% 35V			
C25	A700235P18	CAP CER N150 27P 5% 50V			
C26	A700233P5	CAP CER CL2 470P 20% 50V			
C27	A700235P18	CAP CER N150 27P 5% 50V			
C28	A700234P7	CAP PYES 10N 10% 50V			
C29	A700235P15	CAP CER N150 15P 5% 50V			
C30	A700235P18	CAP CER N150 27P 5% 50V			
C31	A700235P18	CAP CER N150 27P 5% 50V			
D01	A700047P1	DIO SI SIG 2835			
L01	2402327Y02	J706537G2 COIL			
L02	A700024P17	COIL FIX 2,2UH 10%			
L03	((02327Y02	J706537G2 COIL			
L04	J707778P1	COIL AIR			
L05	A700024P1	COIL FIX 100NH 10%			
L06	A700024P1	COIL FIX 100NH 10%			
L07	J707778P1	COIL AIR			
L08	J706154P2	COIL RF FIX 7-1/2T TAP			
L09	J706154P2	COIL RF FIX 7-1/2T TAP			
P01	A700041P4	CONN PWB FEM 05 CKT			
P02	A700041P2	CONN PWB FEM 03 CKT			
P03	A700072P31	CONN PWB MALE 05 CKT			
Q01	J706011P1	TSTR NPN SI BFR 91			
Q02	J706011P1	TSTR NPN SI BFR 91			
Q03	J706012P1	TSTR NPN SI BFR 96			
R01	A700019P45	RES DEPC 4K7 5% 1/4W			
R02	A700019P45	RES DEPC 4K7 5% 1/4W			
R03	A700019P48	RES DEPC 8K2 5% 1/4W			
R04	A700019P42	RES DEPC 2K7 5% 1/4W			
R05	A700019P24	RES DEPC 82R 5% 1/4W			
R06	A700019P27	RES DEPC 150R 5% 1/4W			
R07	A700019P51	RES DEPC 15K 5% 1/4W			
R08	A700019P40	RES DEPC 1K8 5% 1/4W			
R09	A700019P18	RES DEPC 27R 5% 1/4W			
R10	A700019P13	RES DEPC 10R 5% 1/4W			
R11	A700019P22	RES DEPC 56R 5% 1/4W			
R12	A700019P42	RES DEPC 2K7 5% 1/4W			
R13	A700019P28	RES DEPC 180R 5% 1/4W			
R14	A700019P53	RES DEPC 22K 5% 1/4W			
R15	A700019P16	RES DEPC 18R 5% 1/4W			
R16	A700019P13	RES DEPC 10R 5% 1/4W			
R17	A700019P27	RES DEPC 150R 5% 1/4W			
R18	A700019P27	RES DEPC 150R 5% 1/4W			
R19	A700019P19	RES DEPC 33R 5% 1/4W			
R20	A700019P27	RES DEPC 150R 5% 1/4W			
R21	A700019P30	RES DEPC 270R 5% 1/4W			
R22	A700019P30	RES DEPC 270R 5% 1/4W			
W01	A700184P1	WIRE JUMPER (ZEROHM)			

X403.886/3

DATE: 09/20/90

FN909

FEED THROUGH FILTER

FN909 is a filter built on a printed wiring board. 21 chip capacitors mounted on the module decouple the input and output lines from the receiver screen box. Mecha-

nical the filter is used to close the slot where the lines are brought out of the screen box in order to attenuate unwanted radiation.

SPECIFICATIONS

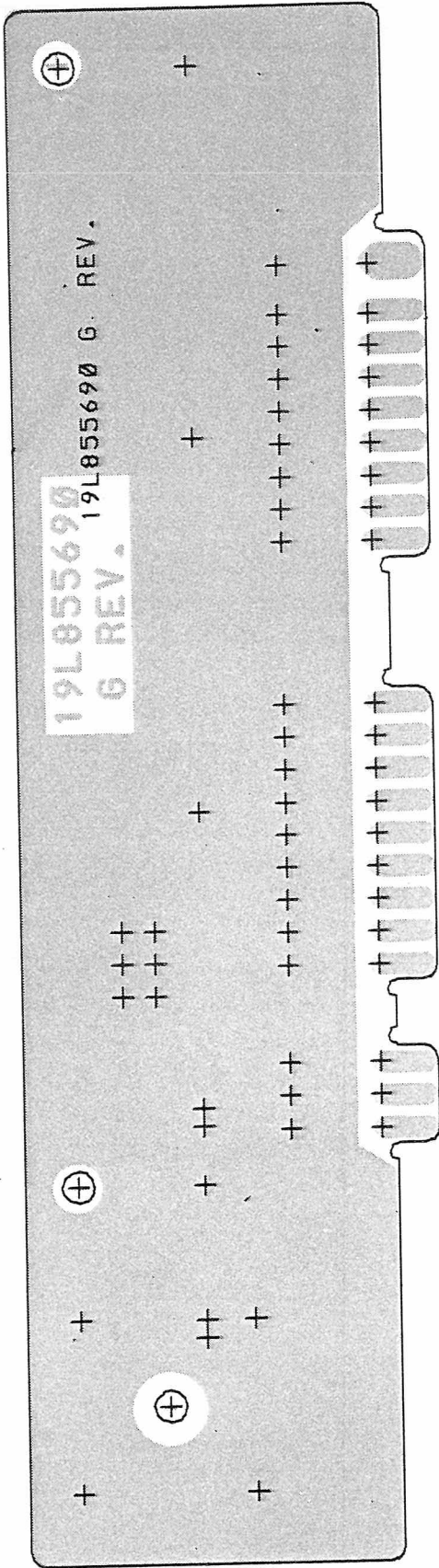
Dimensions

Width 29 mm
Length 96 mm

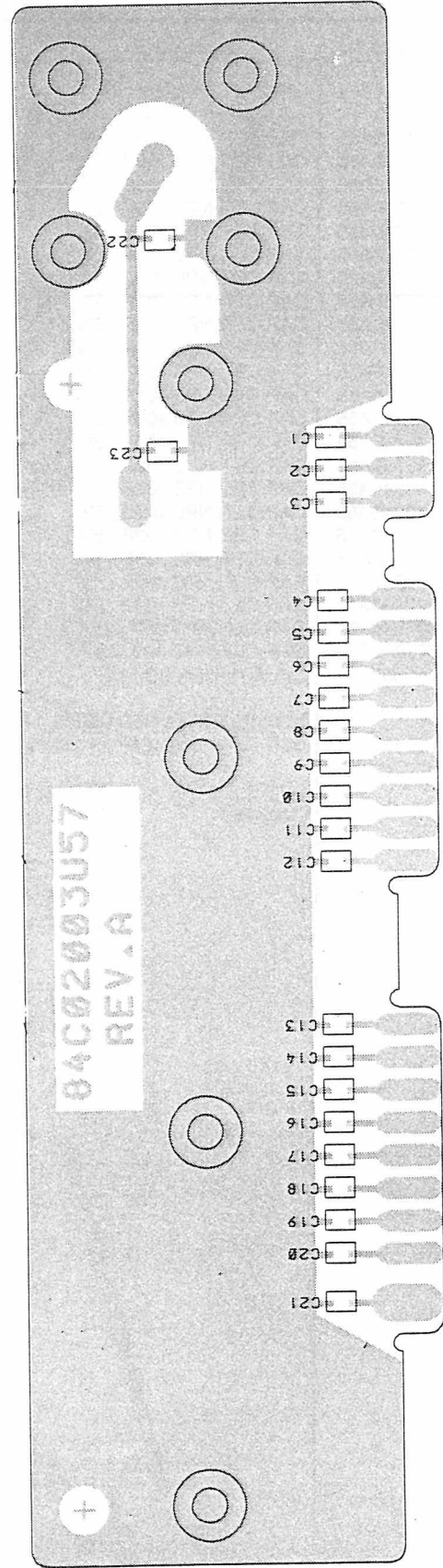
Temperature range

-40°C to +85°C

COMPONENT SIDE



CHIP SIDE



FILTER NETWORK FN909
COMPONENT LAYOUT

CODE NO. 0102721B64

D404.257/5

PARTS LIST FOR FILTER NETWORK FN909 DB REV.3

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	0102721B64	L855690G1 FN909			
C001	2113740A55	CAP,CER,NP0 100P , 5%			
C002	2113740A55	CAP,CER,NP0 100P , 5%			
C003	2113740A55	CAP,CER,NP0 100P , 5%			
C004	2113740A55	CAP,CER,NP0 100P , 5%			
C005	2113740A55	CAP,CER,NP0 100P , 5%			
C006	2113740A55	CAP,CER,NP0 100P , 5%			
C007	2113740A55	CAP,CER,NP0 100P , 5%			
C008	2113740A55	CAP,CER,NP0 100P , 5%			
C009	2113740A55	CAP,CER,NP0 100P , 5%			
C010	2113740A55	CAP,CER,NP0 100P , 5%			
C011	2113740A55	CAP,CER,NP0 100P , 5%			
C012	2113740A55	CAP,CER,NP0 100P , 5%			
C013	2113740A55	CAP,CER,NP0 100P , 5%			
C014	2113740A55	CAP,CER,NP0 100P , 5%			
C015	2113740A55	CAP,CER,NP0 100P , 5%			
C016	2113740A55	CAP,CER,NP0 100P , 5%			
C017	2113740A55	CAP,CER,NP0 100P , 5%			
C018	2113740A55	CAP,CER,NP0 100P , 5%			
C019	2113740A55	CAP,CER,NP0 100P , 5%			
C020	2113740A55	CAP,CER,NP0 100P , 5%			
C021	2113740A55	CAP,CER,NP0 100P , 5%			
C022	J707809P8	CAP,CER,NP0 3P9 ,.25P			
C023	J707809P8	CAP,CER,NP0 3P9 ,.25P			
	8402003U57A	L855691P1R3 BD PW			
		NON REFERENCED ITEMS:			
	J708450P2	SPC,SELF-CNCH 5.6X1.5XM3 (8 used)			
		SEE ELECTRICAL DIAGRAM			
		D403.861			

FN9010/FN9012

FEED THROUGH FILTER

FN9010/FN9012 are filters built on a printed wiring board. 18 chip capacitors mounted on the module decouple the input and output lines from the transmitter screen box. Mechanically, the filter is used to close the slot where the lines are brought out of the screen box in order to attenuate unwanted radiation.

The printed wiring board also contains a micro stripline and some capacitors, resistors and two transistors which form a standing wave detector.

The output voltage between 0,8 volt and 6,0 volt depends on the output power from the PA stage and the frequency band.

FN9010 is used in connection with JP9011 in CQF911x, CQF933x and CQF977x.

FN9012 is used in connection with JP9015 in CQF955x, CQF966x and CQF999x.

SPECIFICATIONS

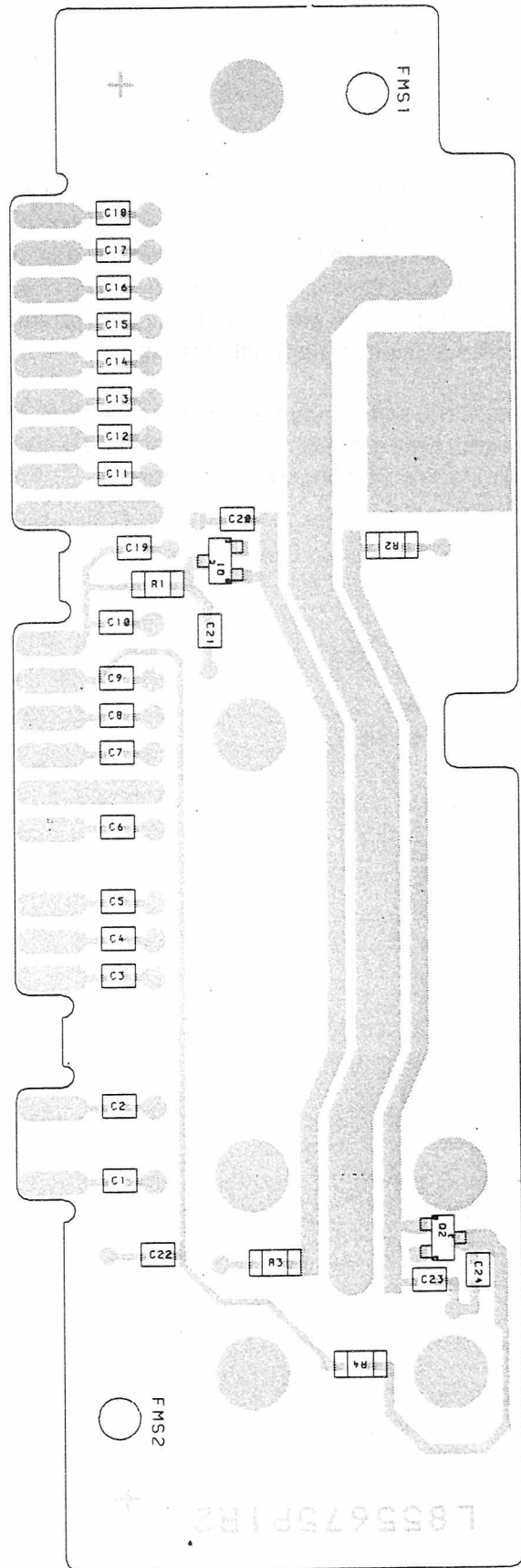
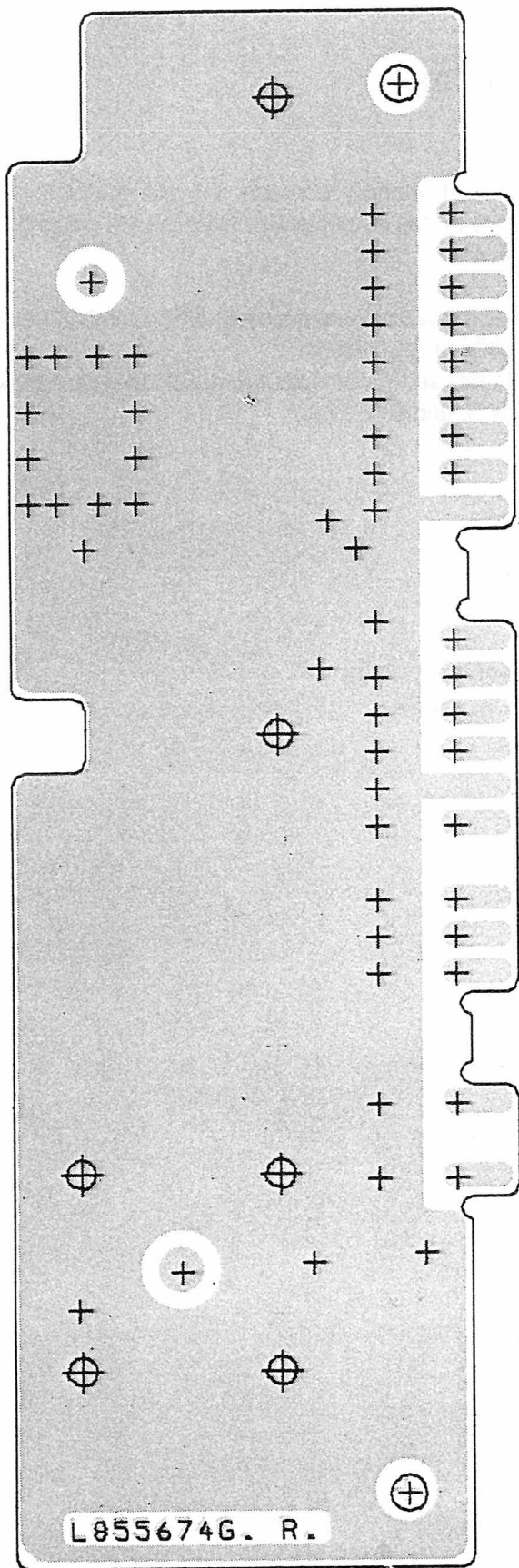
Dimensions

Width: 34 mm

Length: 106 mm

Temperature range

-40°C to +85°C

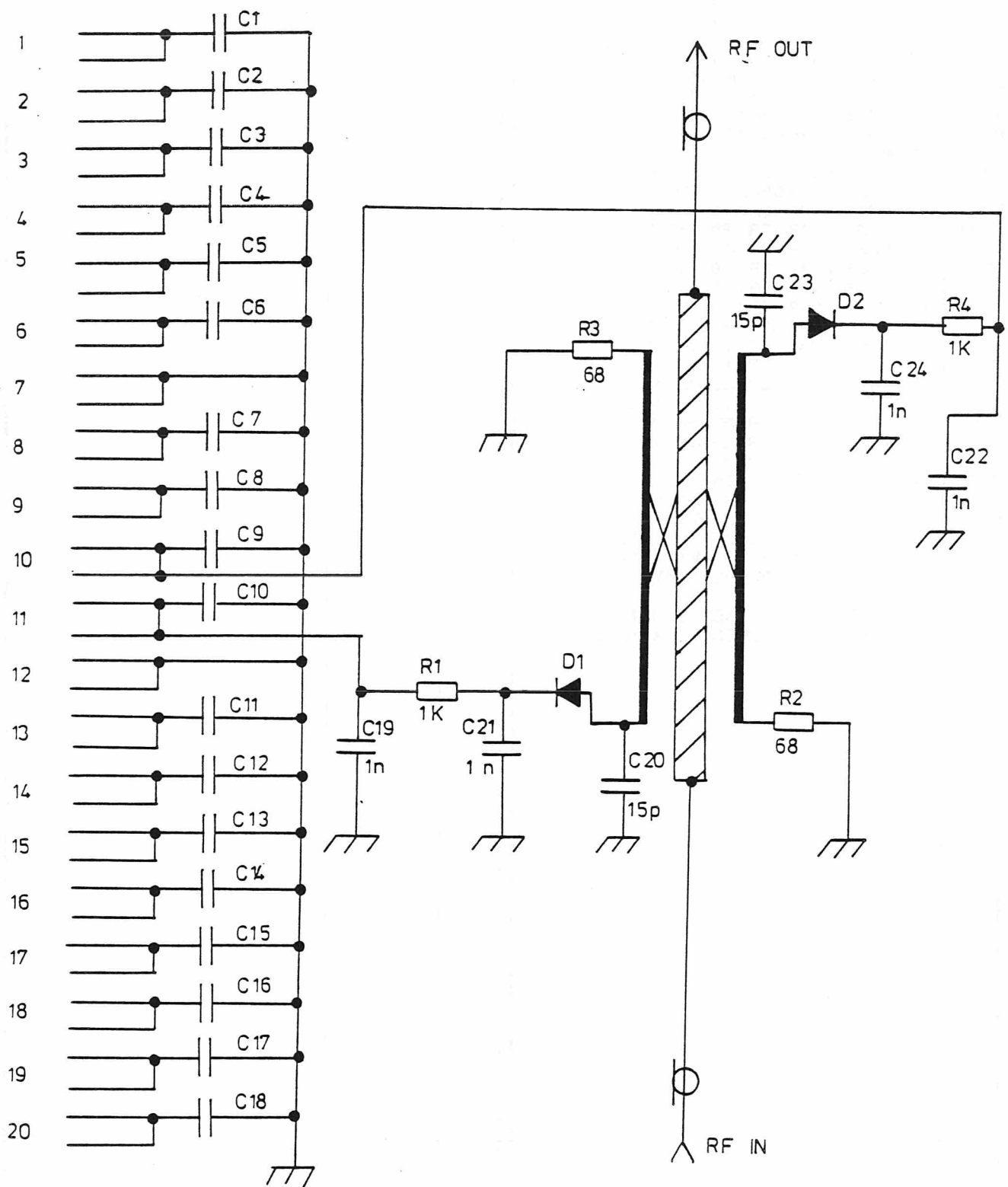


**FILTER NETWORK FN9010
COMPONENT LAYOUT**

D404.263/3

REV.2

CODE NO. 01027221B62



FILTER NETWORK FN9010

CODE NO. 0102721B62

D404.330/3

PARTS LIST FOR FILTER NETWORK FN9010

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	0102721B62	L855674G1 FN9010			
C001	2113740A55	CAP,CER,NP0 100P , 5%			
C002	2113740A55	CAP,CER,NP0 100P , 5%			
C003	2113740A55	CAP,CER,NP0 100P , 5%			
C004	2113740A55	CAP,CER,NP0 100P , 5%			
C005	2113740A55	CAP,CER,NP0 100P , 5%			
C006	2113740A55	CAP,CER,NP0 100P , 5%			
C007	2113740A55	CAP,CER,NP0 100P , 5%			
C008	2113740A55	CAP,CER,NP0 100P , 5%			
C009	2113740A55	CAP,CER,NP0 100P , 5%			
C010	2113740A55	CAP,CER,NP0 100P , 5%			
C011	2113740A55	CAP,CER,NP0 100P , 5%			
C012	2113740A55	CAP,CER,NP0 100P , 5%			
C013	2113740A55	CAP,CER,NP0 100P , 5%			
C014	2113740A55	CAP,CER,NP0 100P , 5%			
C015	2113740A55	CAP,CER,NP0 100P , 5%			
C016	2113740A55	CAP,CER,NP0 100P , 5%			
C017	2113740A55	CAP,CER,NP0 100P , 5%			
C018	2113740A55	CAP,CER,NP0 100P , 5%			
C019	2113741M21	CAP,CER,CL2 1N0 , 10%			
C020	2113740A33	CAP,CER,NP0 15P , 5%			
C021	2113741M21	CAP,CER,CL2 1N0 , 10%			
C022	2113741M21	CAP,CER,CL2 1N0 , 10%			
C023	2113740A33	CAP,CER,NP0 15P , 5%			
C024	2113741M21	CAP,CER,CL2 1N0 , 10%			
D001	J710643P1	DIO,SI,SIG 2802			
D002	J710643P1	DIO,SI,SIG 2802			
R001	J707385P102	RES,MFLM,1/8W 1K0 , 5%			
R002	J707385P680	RES,MFLM,1/8W 68R , 5%			
R003	J707385P680	RES,MFLM,1/8W 68R , 5%			
R004	J707385P102	RES,MFLM,1/8W 1K0 , 5%			
	8402003U59A	L855675P1R2, BD PW			
	J708450P2	NON REFERENCED ITEMS: SPC,SELF-CNCH5.6X1.5XM3			

FN9010/FN9012

FEED THROUGH FILTER

FN9010/FN9012 are filters built on a printed wiring board. 18 chip capacitors mounted on the module decouple the input and output lines from the transmitter screen box. Mechanically, the filter is used to close the slot where the lines are brought out of the screen box in order to attenuate unwanted radiation.

The printed wiring board also contains a micro stripline and some capacitors, resistors and two transistors which form a standing wave detector.

The output voltage between 0,8 volt and 6,0 volt depends on the output power from the PA stage and the frequency band.

FN9010 is used in connection with JP9011 in CQF911x, CQF933x and CQF977x.

FN9012 is used in connection with JP9015 in CQF955x, CQF966x and CQF999x.

SPECIFICATIONS

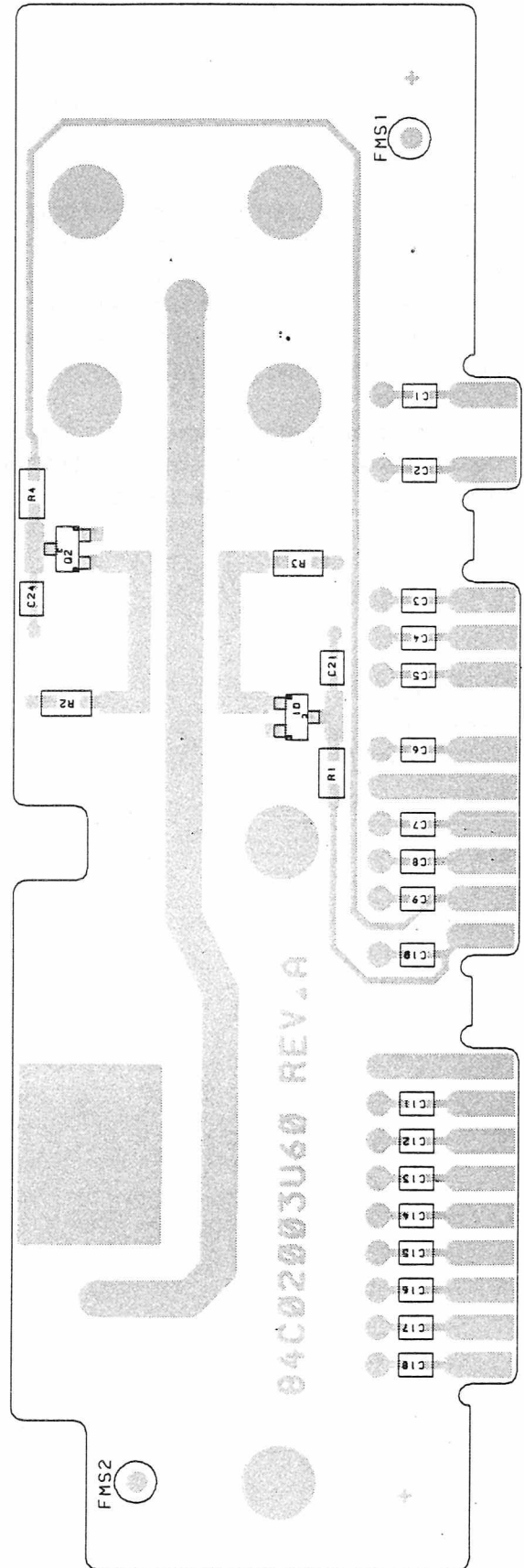
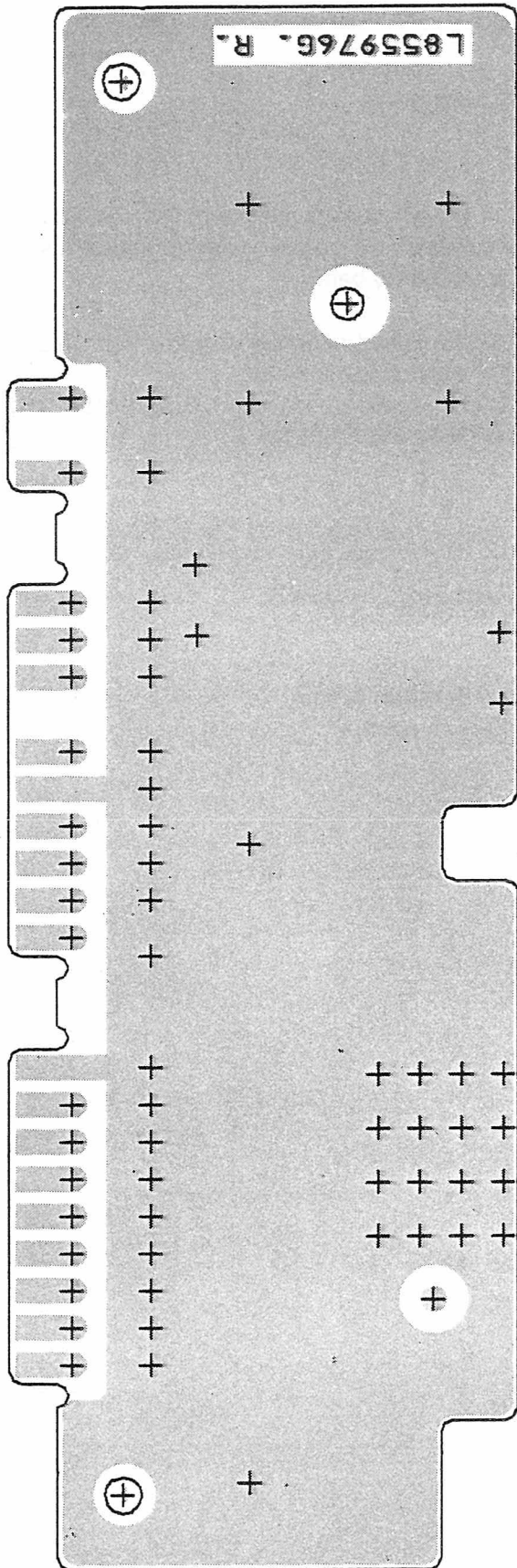
Dimensions

Width: 34 mm

Length: 106 mm

Temperature range

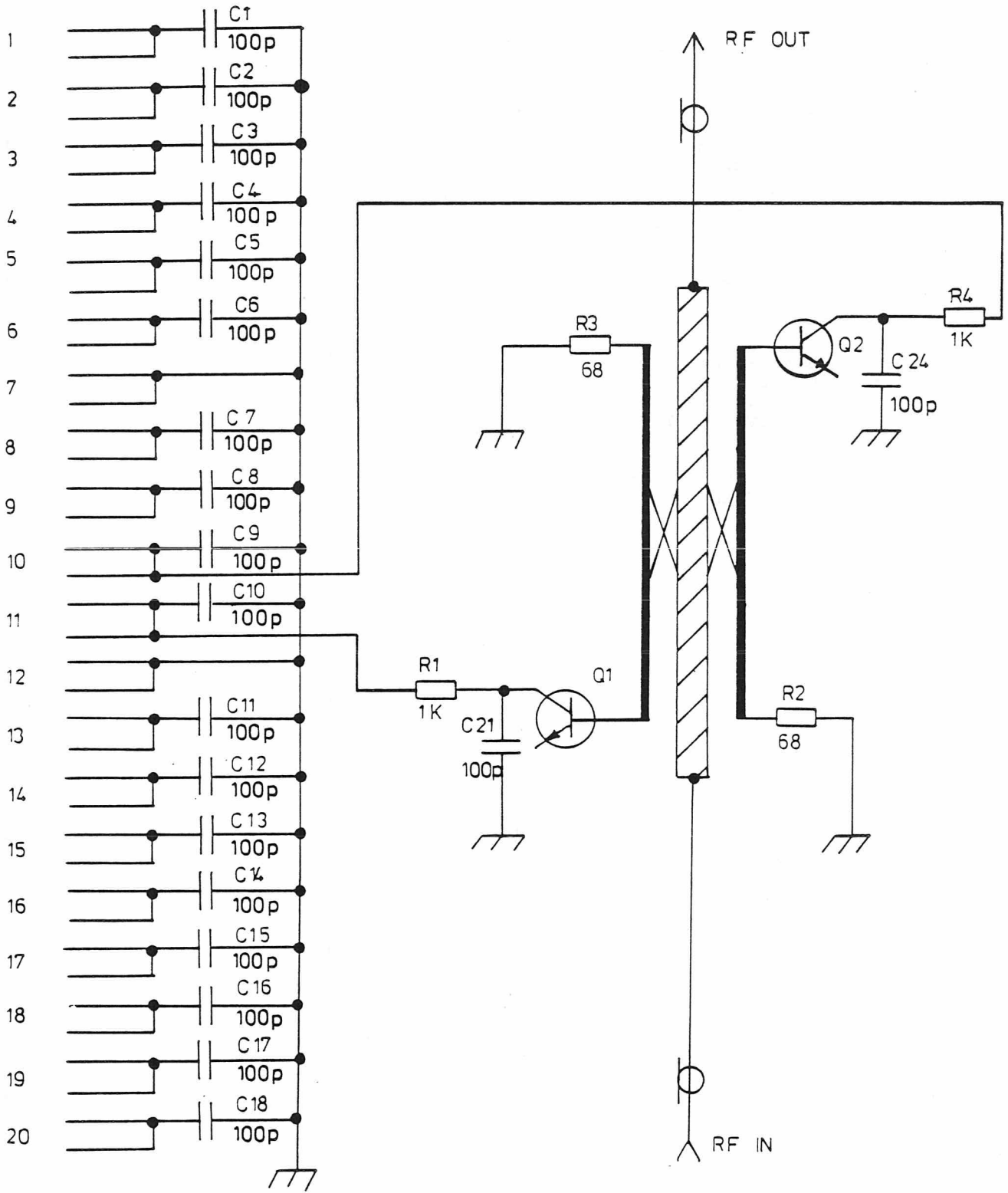
-40°C to +85°C



**FILTER NETWORK FN9012
COMPONENT LAYOUT**

D405.757/2

CODE NO. L855976G1 - 0102721B61



FILTER NETWORK FN9012

D404.756/3

PARTS LIST FOR FILTER NETWORK FN9012 DB REV.0

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	0102721B61	L855976G1 FN9012			
C001	2113740A55	CAP,CER,NP0 100P , 5%			
C002	2113740A55	CAP,CER,NP0 100P , 5%			
C003	2113740A55	CAP,CER,NP0 100P , 5%			
C004	2113740A55	CAP,CER,NP0 100P , 5%			
C005	2113740A55	CAP,CER,NP0 100P , 5%			
C006	2113740A55	CAP,CER,NP0 100P , 5%			
C007	2113740A55	CAP,CER,NP0 100P , 5%			
C008	2113740A55	CAP,CER,NP0 100P , 5%			
C009	2113740A55	CAP,CER,NP0 100P , 5%			
C010	2113740A55	CAP,CER,NP0 100P , 5%			
C011	2113740A55	CAP,CER,NP0 100P , 5%			
C012	2113740A55	CAP,CER,NP0 100P , 5%			
C013	2113740A55	CAP,CER,NP0 100P , 5%			
C014	2113740A55	CAP,CER,NP0 100P , 5%			
C015	2113740A55	CAP,CER,NP0 100P , 5%			
C016	2113740A55	CAP,CER,NP0 100P , 5%			
C017	2113740A55	CAP,CER,NP0 100P , 5%			
C018	2113740A55	CAP,CER,NP0 100P , 5%			
C021	2113740A55	CAP,CER,NP0 100P , 5%			
C024	2113740A55	CAP,CER,NP0 100P , 5%			
D001	J710643P1	DIO,SI,SIG 2802			
D002	J710643P1	DIO,SI,SIG 2802			
R001	J707385P102	RES,MFLM,1/8W 1K0 , 5%			
R002	0611077A46	RES,MFLM,1/8W 68R , 5%			
R003	0611077A46	RES,MFLM,1/8W 68R , 5%			
R004	0611077A74	RES,MFLM,1/8W 1K0 , 5%			
	8402003U60A	L855977P1R0 BD PW			
	J708450P2	NON REFERENCED ITEM: SPC,SELF-CNCH 5.6X1.5XM3 (6 used)			

FS90x

FREQUENCY SYNTHESIZER

The frequency synthesizer module is used to generate frequencies for up to 256 channels and is built on a printed wiring board which comprises an integrated synthesizer circuit, a voltage controlled oscillator

(VCO), a loop switch circuit and two loop filters. The integrated synthesizer circuit contains a reference oscillator, a programmable reference divider, two phase detectors, a lock detector circuit and the programmable divider which determines the channel frequency.

	FS906	FS907	FS908	FS909	FS9010	FS9011
Channel spacing kHz	5.0	6.25	10.0	12.5	20.0	25.0
Reference Oscillator MHz	10.24	12.80	10.24	12.80	10.24	12.80
Minimum Frequency MHz	12.89	12.80	12.80	12.80	12.80	12.80
Maximum Frequency MHz	14.075	14.39375	15.350	15.9875	15.340	19.175
Number of Channels	256	256	256	256	128	56

CIRCUIT DESCRIPTION

REFERENCE DIVIDER

The reference oscillator frequency is divided down to a frequency corresponding to the channel spacing. The programming of the reference divider is made with one or two straps and the output of the reference is fed to the two phase detectors.

PROGRAMMABLE DIVIDER

The programmable divider is programmed by 14 bits of which the 8 least significant bits are programmed either by the software or by the channel control. Of the 6 most significant bits two are fixed and 4 programmed by straps on the printed wiring board (straps A, B, C, D).

The VCO signal is fed through the programmable divider down to a frequency equal to the reference when the synthesizer's phase loop is locked.

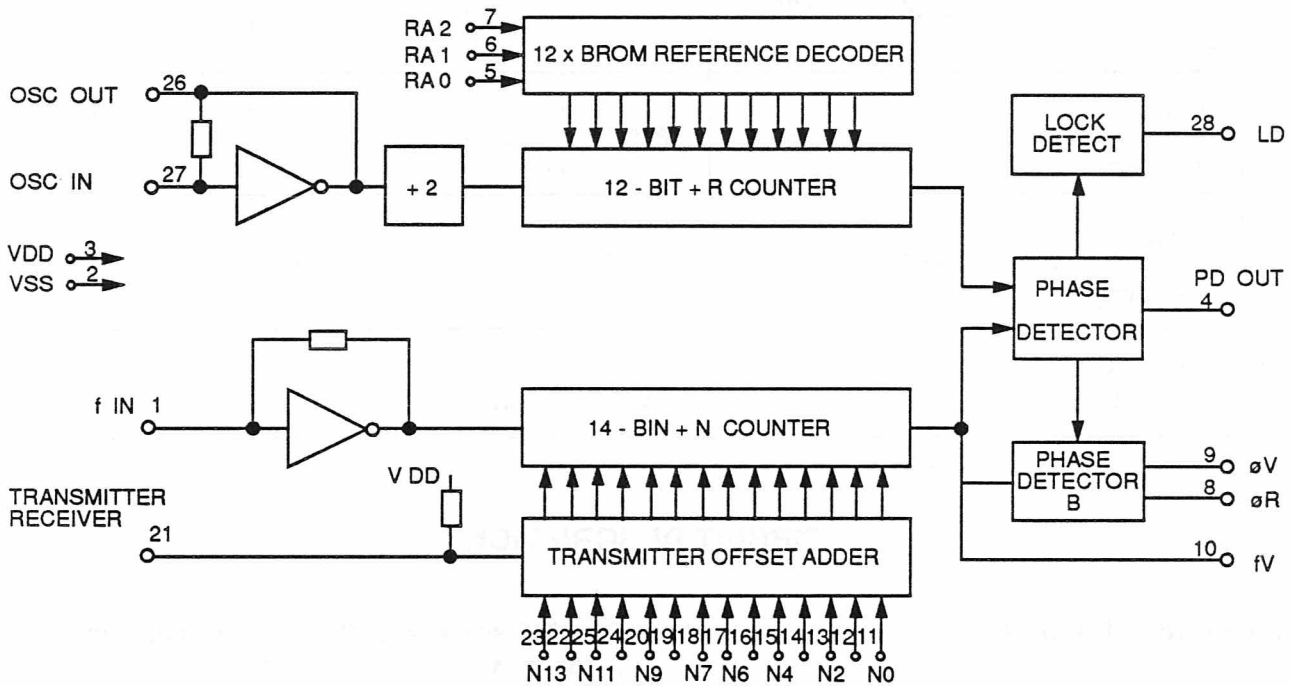
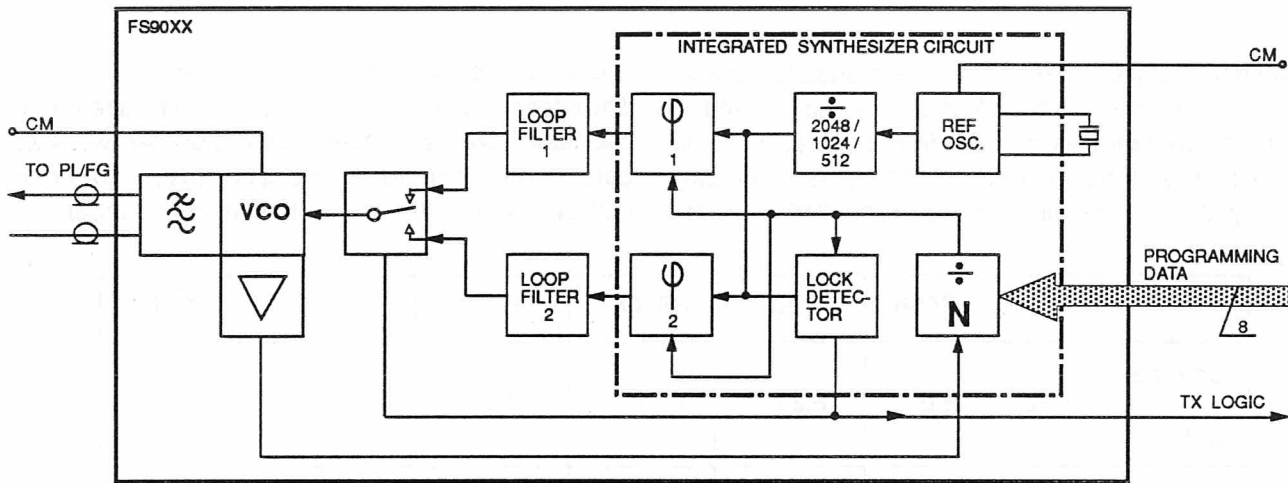
PHASE DETECTORS

The frequencies of the reference divider signal and the programmable divider signal are compared in the phase detectors where they produce a DC voltage proportional to their difference. The DC voltage is used to control the VCO through the loop filters.

LOOP FILTERS

The DC voltage from phase detector 1 is fed to loop filter 1 which is a lead/lag filter, relatively slow and with good noise performance but narrow pull-in range.

REFERENCE FREQUENCY SYNTHESIZER



- | | |
|--------------------|--------------------------------------|
| PIN | |
| 1 | Input to -N portion of synthesizer |
| 2 | Ground |
| 3 | Power supply |
| 4 | Three-state output of phase detector |
| 5, 6, 7 | Set divide value |
| 8, 9 | Phase detector outputs |
| 10 | Output of the -N counter |
| 11 TO 20, 22 TO 25 | Data preset into the -N counter |
| 21 | Offsetting the VCO frequency |
| 26, 27 | Reference oscillator |
| 28 | Lock detector signal |

The DC voltage from phase detector 2 is fed to loop filter 2 which is an active filter whose bandwidth is 20 times that of loop filter 1. This filter has poor noise performance but very large pull-in range.

Both filter outputs are fed to the loop switch circuit.

LOOP SWITCH

The loop switch is controlled by the lock detector. When the synthesizer is out of lock the control voltage from loop filter 2 is switched to the VCO and quickly tunes the VCO to the right frequency. The lock detector then indicates locked condition and the loop switch

then switches loop filter 2 off and loop filter 1 is then applied to the VCO. This configuration ensures a very short lock-in time and good noise performance in locked condition.

VOLTAGE CONTROLLED OSCILLATOR (VCO)

The active component of the VCO is a J-FET transistor in a Hartley oscillator configuration. The oscillator is tuned by varicaps across the frequency determining coil and a constant feedback throughout the tuning frequency band gives a nearly constant output power independently of the output frequency.

SPECIFICATIONS

Reference Divider Ratio

FS906:	2048
FS907:	2048
FS908:	1024
FS909:	1024
FS9010:	512
FS9011:	512

Reference Crystal Frequency

FS906:	10.24 MHz
FS907:	12.80 MHz
FS908:	10.24 MHz
FS909:	12.80 MHz
FS9010:	10.24 MHz
FS9011:	12.80 MHz

RF Output (J1 - J2)

Level:	0 dBm + 3 dB/-1 dB
Source impedance:	50 ohm
Load impedance:	50 ohm

Frequency Stability

± 5 ppm

Channel Switching Time

FS906/FS907:	
1 channel:	≤ 10 ms
random:	≤ 10 ms

FS908/FS909:

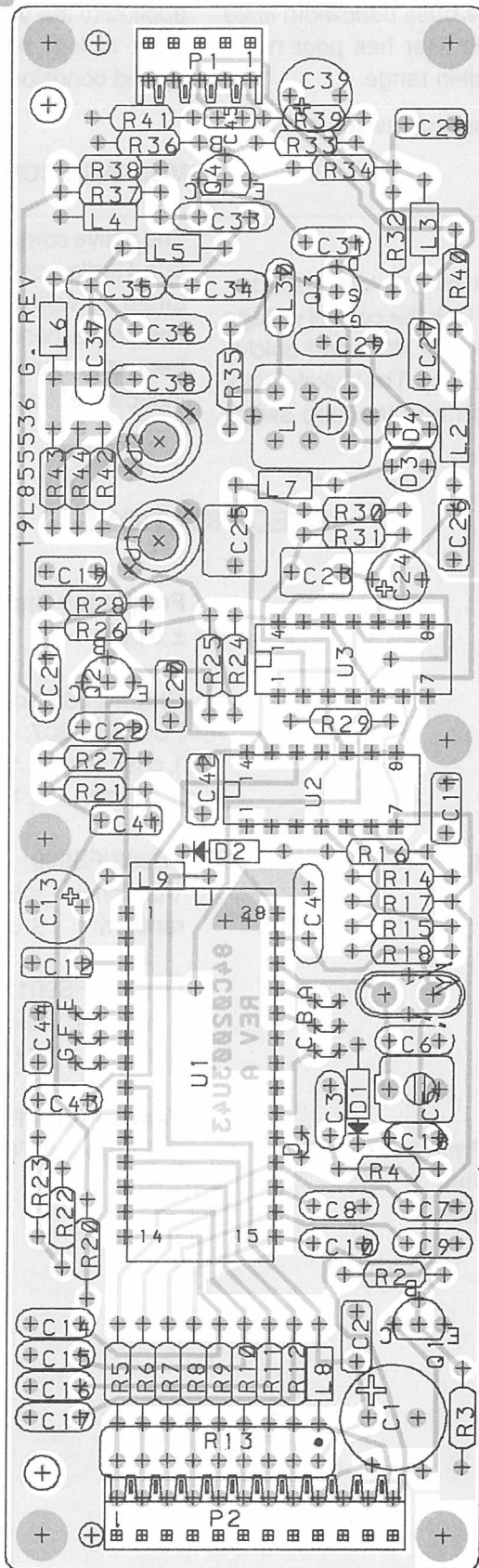
1 channel:	≤ 5 ms
random:	≤ 8 ms

FS9010/FS9011:

1 channel:	≤ 4 ms
random:	≤ 6 ms

Temperature Range

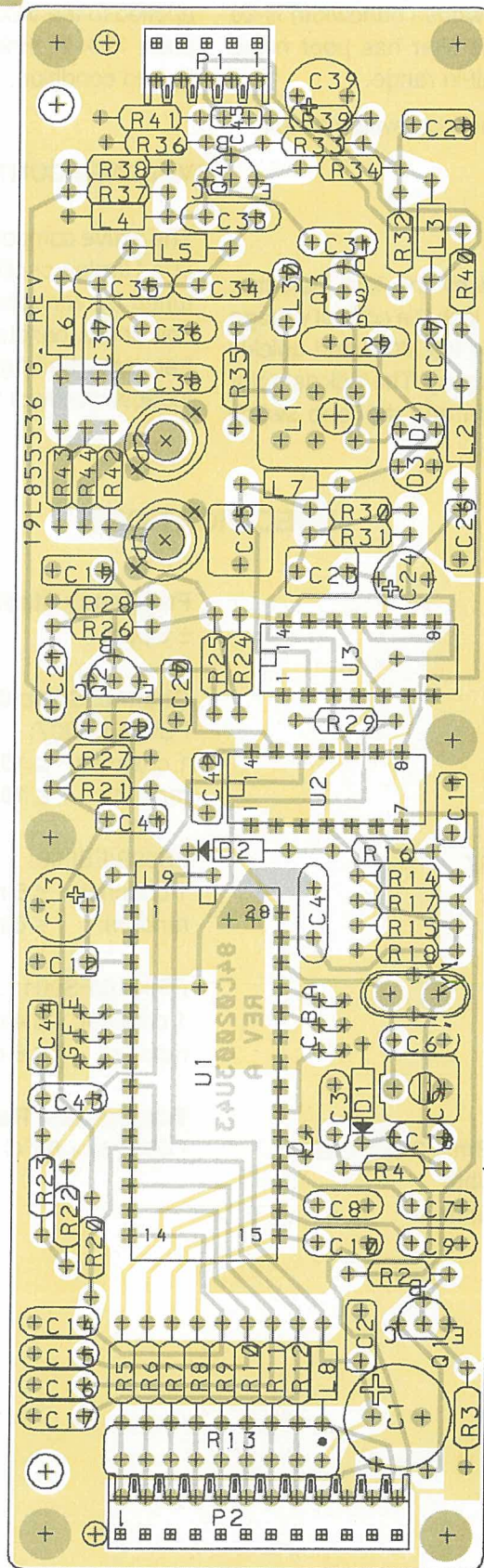
- 40°C to + 85°C



FREQUENCY SYNTHESIZER FS90XX
COMPONENT LAYOUT

D403.671/5

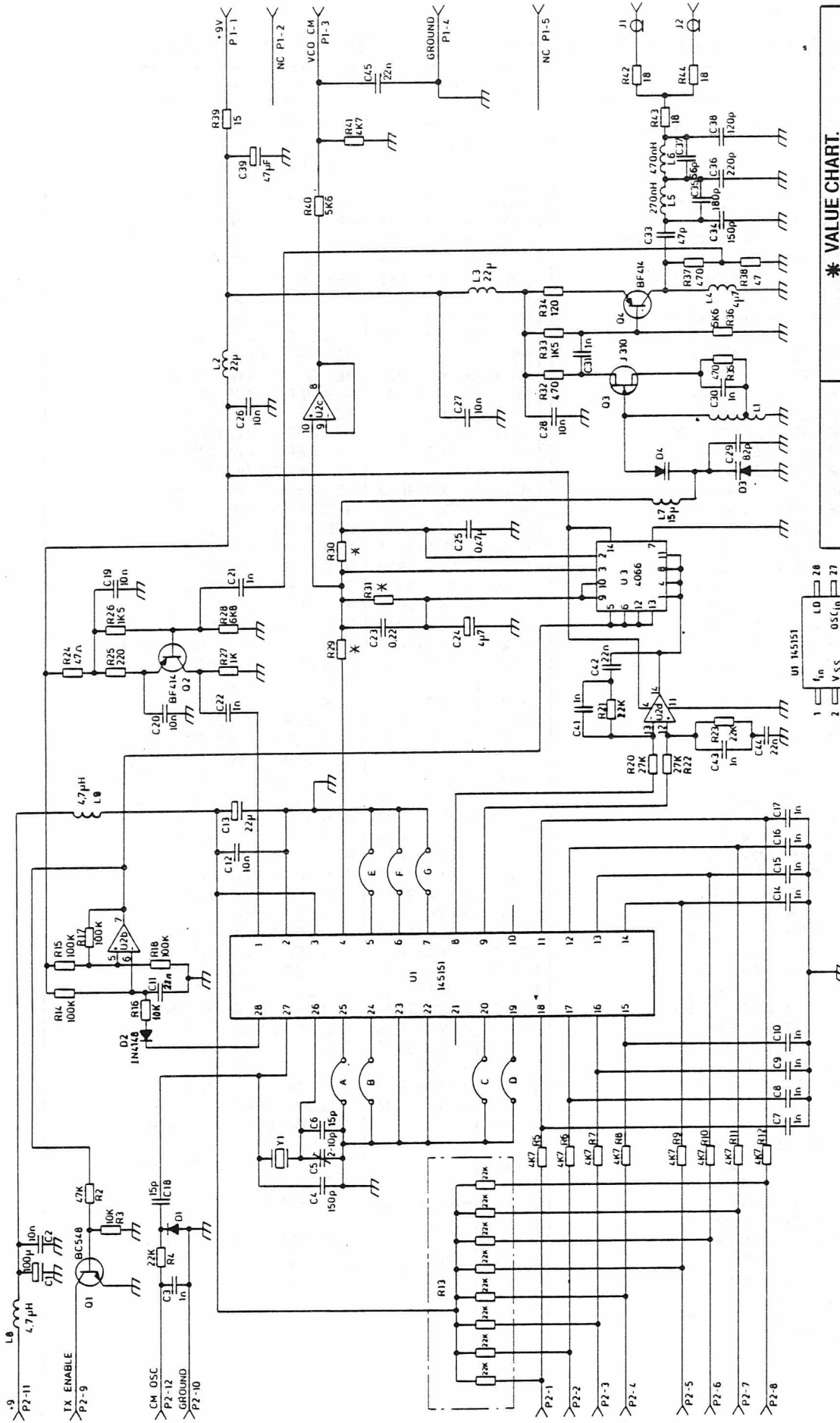
REV.1



FREQUENCY SYNTHESIZER FS90XX
COMPONENT LAYOUT

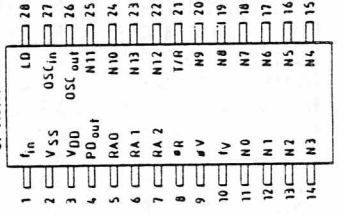
D403.671/5

REV.1



*** VALUE CHART.**

CODE NO.	UNIT	CHANNEL SPACING	PROGRAM STRAPPING	Y1	R29	R30	R31
L855536G1	FS906	5KHz	BDF	10.24	10K	390	1K2
L855536G2 - GLN7077A	FS907	6.25KHz	BCDF	12.800	10K	390	1K2
L855536G3 - GLN7070A	FS908	10KHz	ACEF	10.24	8K2	270	820
L855536G4 - GLN7044A	FS909	12.5KHz	ACDEF	12.800	8K2	270	820
L855536G5 - GLN7045A	FS910	20KHz	ABDG	10.24	5K6	180	180
L855536G6 - GLN7046A	FS911	25KHz	ABDG	12.800	5K6	180	180



FREQUENCY SYNTHESIZER FS90XX

REV.A

D403.868/4

PARTS LIST FOR FFREQUENCY SYNTHESIZER FS90XX DB REV.2/A

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	L855536G1	FS906 : CH. SPACING 5 kHz (A)	Q004	J706264P1	TSTR PNP SI BF 414
	GLN7077A	L855536G2 (B)	R002	A700019P57	RES DEPC 1/4W 47K 5%
		FS907 : CH. SPAC. 6.25 kHz	R003	A700019P49	RES DEPC 1/4W 10K 5%
	GLN7070A	L855536G3 (C)	R004	A700019P53	RES DEPC 1/4W 22K 5%
		FS908 : CH. SPACING 10 kHz	R005	A700019P45	RES DEPC 1/4W 4K7 5%
	GLN7044A	L855536G4 (D)	R006	A700019P45	RES DEPC 1/4W 4K7 5%
		FS909 : CH. SPACING 12.5 kHz	R007	A700019P45	RES DEPC 1/4W 4K7 5%
	GLN7045A	L855536G5 (E)	R008	A700019P45	RES DEPC 1/4W 4K7 5%
		FS9010: CH. SPACING 20 kHz	R009	A700019P45	RES DEPC 1/4W 4K7 5%
	GLN7046A	L855536G6 (F)	R010	A700019P45	RES DEPC 1/4W 4K7 5%
		FS9011: CH. SPACING 25 kHz	R011	A700019P45	RES DEPC 1/4W 4K7 5%
			R012	A700019P45	RES DEPC 1/4W 4K7 5%
C001	J706005P4	CAP ELECT 100U 16V	R013	J706216P6	RES NETW 8X 22K 5%
C002	J707412P3	CAP PYES 10N 10%	R014	A700019P61	RES DEPC 1/4W 100K 5%
C003	A700233P7	CAP CER CL2 1N 20%	R015	A700019P61	RES DEPC 1/4W 100K 5%
C004	A700235P27	CAP CER N750 150P 5%	R016	A700019P49	RES DEPC 1/4W 10K 5%
C005	J706003P1	CAP VAR FILM 1.8/10 PF	R017	A700019P61	RES DEPC 1/4W 100K 5%
C006	A700235P15	CAP CER N150 15P 5%	R018	A700019P61	RES DEPC 1/4W 100K 5%
C007	A700233P7	CAP CER CL2 1N 20%	R020	A700019P54	RES DEPC 1/4W 27K 5%
C008	A700233P7	CAP CER CL2 1N 20%	R021	A700019P53	RES DEPC 1/4W 22K 5%
C009	A700233P7	CAP CER CL2 1N 20%	R022	A700019P54	RES DEPC 1/4W 27K 5%
C010	A700233P7	CAP CER CL2 1N 20%	R023	A700019P53	RES DEPC 1/4W 22K 5%
C011	J707412P5	CAP PYES 22N 10%	R024	A700019P21	RES DEPC 1/4W 47R 5%
C012	J707412P3	CAP PYES 10N 10%	R025	A700019P29	RES DEPC 1/4W 220R 5%
C013	2313749C48	CAP TA SOL 22U 16V	R026	A700019P39	RES DEPC 1/4W 1K5 5%
C014	A700233P7	CAP CER CL2 1N 20%	R027	A700019P37	RES DEPC 1/4W 1K0 5%
C015	A700233P7	CAP CER CL2 1N 20%	R028	A700019P47	RES DEPC 1/4W 6K8 5%
C016	A700233P7	CAP CER CL2 1N 20%	R029	A700019P49	RES DEPC 1/4W 10K 5% (A,B)
C017	A700233P7	CAP CER CL2 1N 20%	R029	A700019P48	RES DEPC 1/4W 8K2 5% (C,D)
C018	A700235P15	CAP CER N150 15P 5%	R029	A700019P46	RES DEPC 1/4W 5K6 5% (E,F)
C019	J707412P3	CAP PYES 10N 10%	R030	A700019P32	RES DEPC 1/4W 390R 5% (A,B)
C020	J707412P3	CAP PYES 10N 10%	R030	A700019P30	RES DEPC 1/4W 270R 5% (C,D)
C021	A700233P7	CAP CER CL2 1N 20%	R030	A700019P28	RES DEPC 1/4W 180R 5% (E,F)
C022	A700233P7	CAP CER CL2 1N 20%	R031	A700019P38	RES DEPC 1/4W 1K2 5% (A,B)
C023	J707412P11	CAP PYES 220N 10%	R031	A700019P36	RES DEPC 1/4W 820R 5% (C,D)
C024	2313749D72	CAP TA SOL 4U7 35V	R031	A700019P34	RES DEPC 1/4W 560R 5% (E,F)
C025	J707412P13	CAP PYES 470N 10%	R032	A700019P33	RES DEPC 1/4W 470R 5%
C026	J707412P3	CAP PYES 10N 10%	R033	A700019P39	RES DEPC 1/4W 1K5 5%
C027	J707412P3	CAP PYES 10N 10%	R034	A700019P26	RES DEPC 1/4W 120R 5%
C028	J707412P3	CAP PYES 10N 10%	R035	A700019P33	RES DEPC 1/4W 470R 5%
C029	A700235P24	CAP CER N150 82P 5%	R036	A700019P46	RES DEPC 1/4W 5K6 5%
C030	A700233P7	CAP CER CL2 1N 20%	R037	A700019P33	RES DEPC 1/4W 470R 5%
C031	A700233P7	CAP CER CL2 1N 20%	R038	A700019P21	RES DEPC 1/4W 47R 5%
C033	A700235P21	CAP CER N150 47P 5%	R039	A700019P15	RES DEPC 1/4W 15R 5%
C034	A700235P27	CAP CER N750 150P 5%	R040	A700019P46	RES DEPC 1/4W 5K6 5%
C035	A700235P28	CAP CER N750 180P 5%	R041	A700019P45	RES DEPC 1/4W 4K7 5%
C036	A700235P29	CAP CER N750 220P 5%	R042	A700019P16	RES DEPC 1/4W 18R 5%
C037	A700235P22	CAP CER N150 56P 5%	R043	A700019P16	RES DEPC 1/4W 18R 5%
C038	A700235P26	CAP CER N750 120P 5%	R044	A700019P16	RES DEPC 1/4W 18R 5%
C039	J707444P17	CAP TA SOL 47U 10V	U001	J708256P1	IC PLL SYN 145151
C041	A700233P7	CAP CER CL2 1N 20%	U002	J708164P1	IC LIN OP-AMP TL074
C042	J707412P5	CAP PYES 22N 10%	U003	A700029P44	IC DIG SW 4066
C043	A700233P7	CAP CER CL2 1N 20%	Y001	J707567P8	CRYSTAL UNIT 10.2400MHZ
C044	J707412P5	CAP PYES 22N 10%			(A,C,E)
C045	A700121P3	CAP CER 50V 22N 20%	Y001	J707567P6	CRYSTAL UNIT 12.8000MHZ
D001	A700028P1	DIO SI SIG 1N4148		8402003U43A	L855537P1R2 BD PW
D002	A700028P1	DIO SI SIG 1N4148			
D003	A701276P2	DIO SI CAP MVAM 108			
D004	A701276P2	DIO SI CAP MVAM 108			
J001	A700171P2	CONN PWB FEM		J706232P1	NON REFERENCED ITEMS:
J002	A700171P2	CONN PWB FEM		J706275P1	CONN JACK
L001	J708224G1	COIL ASM			SPG XTAL
L002	A700024P29	COIL RF FIX 22UH 10%			
L003	A700024P29	COIL RF FIX 22UH 10%			
L004	A700024P21	COIL RF FIX 4.7UH 10%			
L005	A700024P6	COIL RF FIX 0.27UH 10%			
L006	A700024P9	COIL RF FIX 0.47UH 10%			
L007	A700024P27	COIL RF FIX 15UH 10%			
L008	A700024P21	COIL RF FIX 4.7UH 10%			
L009	A700024P21	COIL RF FIX 4.7UH 10%			
P001	A700041P4	CONN PWB FEM 05-CKT			
P002	A700041P11	CONN PWB FEM 12-CKT			
Q001	J707511P1	TSTR NPN SI BC 548A/B			
Q002	J706264P1	TSTR PNP SI BF 414			
Q003	A700060P2	TSTR JFET SI J 310			

IA907/IA908/IA909

IF AMPLIFIER AND DETECTOR

The Intermediate Frequency module amplifies the 21.4 MHz signal convert it to 455 kHz, amplifies this signal and detect the modulation. The module accepts a narrowband FM signal and delivers an audio output from DC to 3000 Hz into a load of 2000 ohms or greater.

- IA907 is used for 25 kHz channel spacing.
- IA908 is used for 20 kHz channel spacing.
- IA909 is used for 12.5 kHz channel spacing.

The required selectivity is obtained by two crystal filter blocks, one on 21.4 MHz and one on 455 kHz.

The two filters and the amplifying stages provide the necessary gain and selectivity distribution and set the noise figure. They also protect against desensitization and intermodulation.

The input amplifier after the crystal filter is a dual-gate FET with 15 - 20 dB gain and it overcomes the noise

figure of the following stage and stabilize the load on the crystal filter.

The input amplifier is followed by an intergrated circuit which includes oscillator, mixer, 455 kHz amplifier, discriminator and AF amplifier.

The mixer crystal frequency is either:

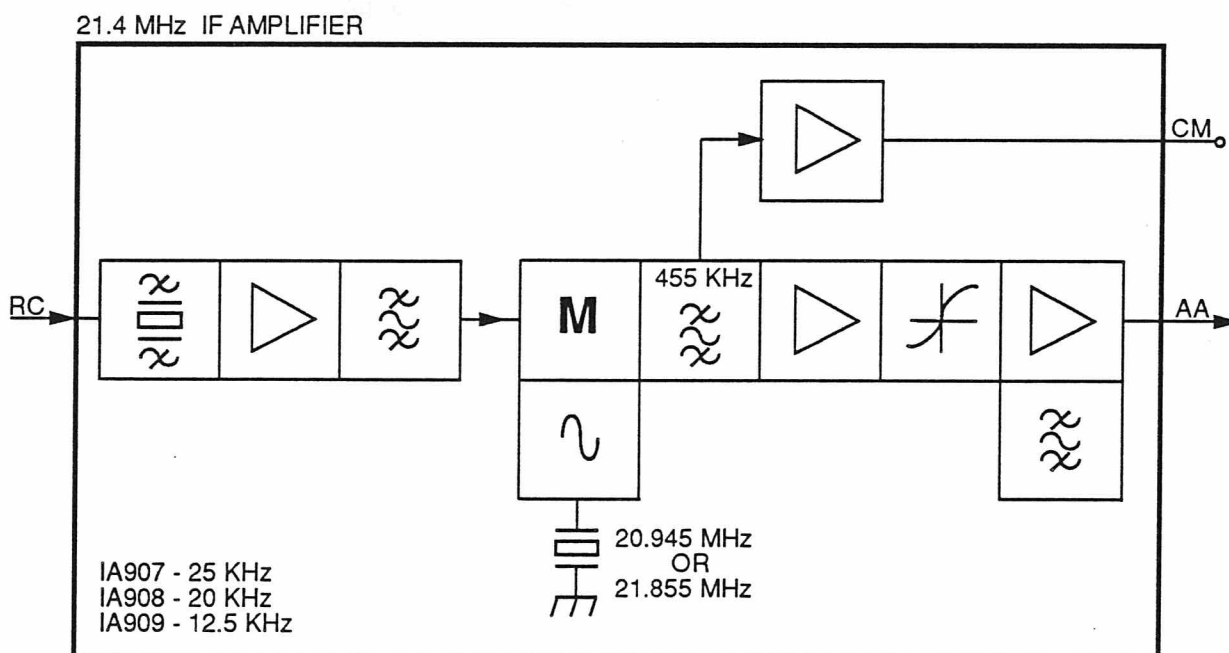
$$21.4 \text{ MHz} + 0.455 \text{ MHz} = 21.855 \text{ MHz}$$

$$\text{or } 21.4 \text{ MHz} - 0.455 \text{ MHz} = 20.945 \text{ MHz}$$

The discriminator is a quadrature type with a tuned LC-circuit as the phasing element.

The audio output is DC coupled through an emitter follower to provide the AF response which is required in some signalling applications.

A circuit for detecting the signal strenght is included in the module and is used for adjustment and measurements.



TECHNICAL SPECIFICATIONS

Input frequency

21.4 MHz

Nominal input impedance

1600 ohm

Source impedance

1600 ohm $\pm 5\%$

AF output impedance

<100 ohm

Minimum external load

1000 ohm

Power supply voltage

9 V $\pm 5\%$

Current consumption

<15 mA

Sensitivity, 12 dB SINAD

0.50 uV max., emf, 50 ohm input

Static selectivity

	IA907	IA908	IA909
6 dB	$>\pm 7.5$ kHz	$>\pm 6$ kHz	$>\pm 3.75$ kHz
80 dB			$\leq \pm 11$ kHz
100 dB	$\leq \pm 22$ kHz	$\leq \pm 17.5$ kHz	

Discriminator bandwidth

IA907/IA908 $\geq \pm 10$ kHz

IA909 $\geq \pm 7$ kHz

AF output

for $f_{mod} = 1$ kHz

IA907:

300 mV ± 2 dB ($f = \pm 3$ kHz)

IA908:

300 mV ± 2 dB ($f = \pm 2.5$ kHz)

IA909:

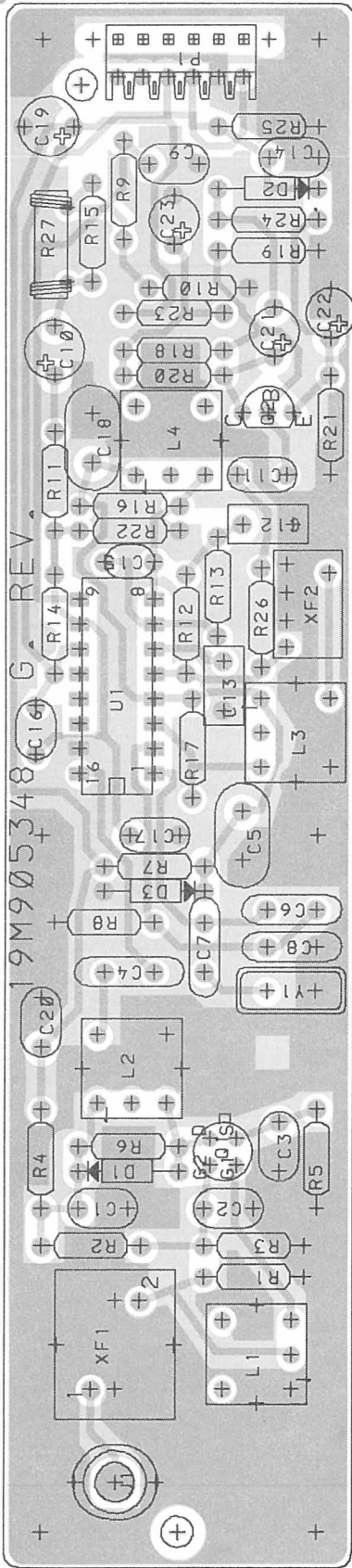
300 mV ± 2 dB ($f = \pm 1.5$ kHz)

AF response

Flat from 300 to 3000 Hz

Temperature range

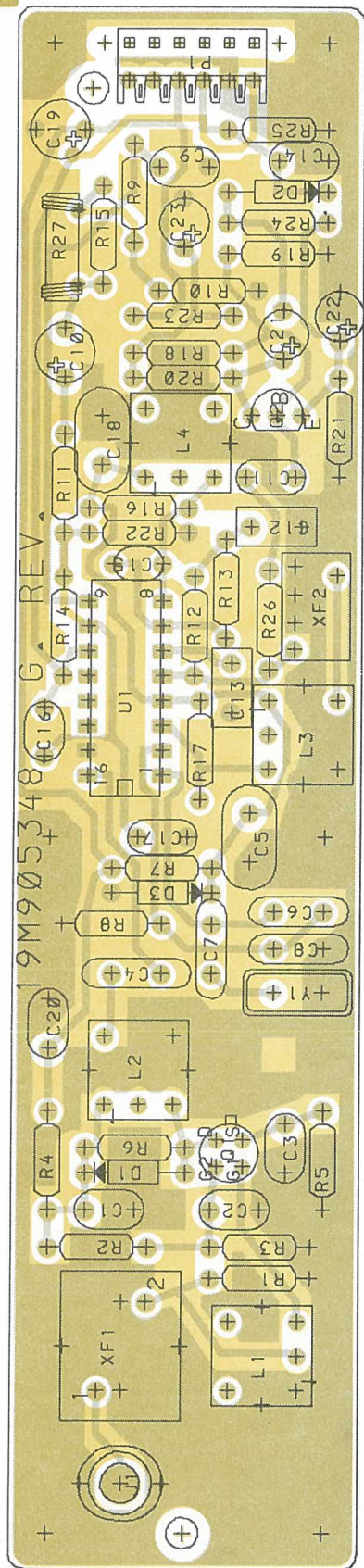
-40°C to +85°C



IF AMPLIFIER IA907/908/909
COMPONENT LAYOUT

D403.373/2

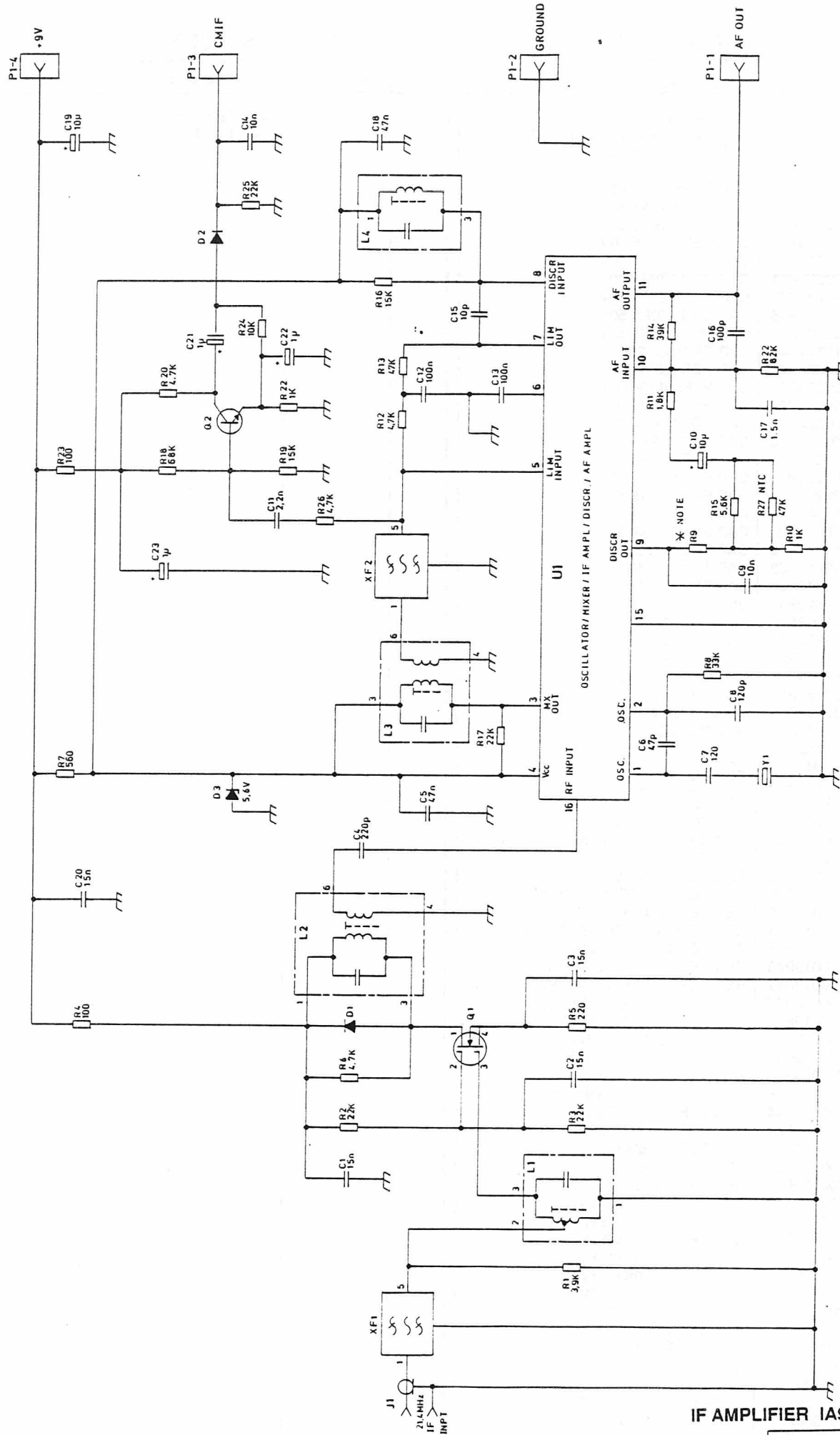
CODE NO. 19M905348	CHANNEL SPACING
G1:IA907 - GRN6126A	25KHZ
G2:IA908 - GRN6127A	20KHZ
G3:IA909 - GRN6127A	12.5KHZ



IF AMPLIFIER IA907/908/909
COMPONENT LAYOUT

D403.373/2

CODE NO. 19M905348	CHANNEL SPACING
G1:IA907 - GRN6126A	25KHZ
G2:IA908 - GRN6127A	20KHZ
G3:IA909 - GRN6127A	12.5KHZ



CODE NO.	*R9	CHANNEL SPACING
IA907	M90534BG1 - GRN6126A	25KHz
IA908	M90534BG2 - GRN6127A	20KHz
IA909	M90534BG3 - GRN6128A	12.5KHz

IF AMPLIFIER IA907/8/9

D403.367/4

PARTS LIST FOR IF AMPLIFIER IA907/IA908/IA909

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GRN6126A	M905348G1 IA907 25.0 kHz (A)			
	GRN6127A	M905348G2 IA908 20.0 kHz (B)			
	GRN6128A	M905348G3 IA909 12.5 kHz (C)			
C01	A700234P8	CAP PYES 15NF 63V			
C02	A700234P8	CAP PYES 15NF 63V			
C03	A700234P8	CAP PYES 15NF 63V			
C04	A700235P29	CAP CER 220PF 50V			
C05	A700234P11	CAP POLY 47NF 50V			
C06	A700235P21	CAP CER 47PF 50V			
C07	A700235P26	CAP CER 120PF 50V			
C08	A700235P26	CAP CER 120PF 50V			
C09	A700234P7	CAP POLY 10NF 50V			
C10	2313749C40	CAP TA 10MF 20V			
C11	A700233P9	CAP CER 2,2NF 50V			
C12	A700004P2	CAP PYES 0.1MF 63V			
C13	A700004P2	CAP PYES 0.1MF 63V			
C14	A700234P7	CAP POLY 10NF 50V			
C15	A700235P13	CAP CER 10PF 50V			
C16	A700233P1	CAP CER 100PF 50V			
C17	A700234P2	CAP POLY 1,5NF 50V			
C18	A700234P11	CAP POLY 47NF 50V			
C19	2313749C40	CAP TA 10MF 16V			
C20	A700234P8	CAP PYES 15NF 63V			
C21	2313749D52	CAP TA 1MF 35V			
C22	2313749D52	CAP TA 1MF 35V			
C23	2313749D52	CAP TA 1MF 35V			
D1	A700028P1	DIO 1N4148			
D2	A700028P1	DIO 1N4148			
D3	J706270P1	DIO ZENR 5,6V 2% , 0,4W			
E1	J707961P4	FERR. CORE TOR.			
J1	A700171P2	CONN RF PHONO			
L1	J707342P1	RF COIL 21.4MHZ <i>14.25/2.20</i>			
L2	J707342P1	RF COIL 21.4MHZ			
L3	J707343P1	RF COIL 455KHZ <i>9.50/1.87</i>			
L4	J707343P1	RF COIL 455KHZ			
P1	A700041P5	CONN 6 PIN			
Q1	A700074P1	MOS FET 3N205 <i>24.50/4.59</i>			
Q2	J707511P1	TSTR SI BC548			
R01	A700019P44	RES DEPOS 3,9KOHM			
R02	A700019P53	RES DEPOS 22K 0,25W			
R03	A700019P53	RES DEPOS 22K 0,25W			
R04	A700019P25	RES DEPOS 100 OHM 0,25W			
R05	A700019P29	RES DEPOS 220OHM 0,25W			
R06	A700019P45	RES DEPOS 4.7K 0.25W			
R07	A700019P34	RES DEPOS 560OHM 0,25W			
R08	A700019P55	RES DEPOS 33K 0.25W			
R09	A700019P43	RES DEPOS 3.3K 0.25W (A)			
R09	A700019P41	RES DEPOS 2.2K 0.25W (B)			
R09	A700019P37	RES DEPOS 1.0K 0.25W (C)			
R10	A700019P37	RES DEPOS 1K 0,25W			
R11	A700019P40	RES DEPOS 1,8K 0,25W			
R12	A700019P45	RES DEPOS 4.7K 0.25W			
R13	A700019P57	RES DEPOS 47K 0.25W			
R14	A700019P56	RES DEPOS 39K OHM 0,25W			
R15	A700019P46	RES DEPOS 5.6K 0.25W			
R16	A700019P51	RES DEPOS 15K 0.25W			
R17	A700019P53	RES DEPOS 22K 0,25W			
R18	A700019P59	RES DEPOS 68K 0.25W			
R19	A700019P51	RES DEPOS 15K 0.25W			
R20	A700019P45	RES DEPOS 4.7K 0.25W			
R21	A700019P37	RES DEPOS 1K 0,25W			
R22	A700019P61	RES DEPOS 100K 0.25W			
R23	A700019P25	RES DEPOS 100 OHM 0,25W			
R24	A700019P49	RES DEPOS 10K 0.25W			
R25	A700019P53	RES DEPOS 22K 0,25W			
R26	A700019P45	RES DEPOS 4.7K 0.25W			
R27	J707282P2	RES NTC 47K OHM 0,6W			
U1	A701780P1	IC, LO-POW. FM/IF, MC3357P <i>72.00/10.00</i>			
XF1	9102383Y12	A701196G12 XTAL-FLT. 21.4MHZ <i>373.00/50.90</i>			
XF2	J707308P1	CER FLT CFW 455D (A) <i>123.00/7.81</i>			
XF2	J707308P2	CER FLT CFW 455E (B)			
XF2	J707308P3	CER FLT CFW 455F (C)			
Y1	J707309P1	X-TAL 20,945MHZ <i>71.00/10.16</i>			
	8402003U42A	BD PW			
				J706804P1	NON REFERENCED ITEM: WASH. INSUL.

X405.356/2

DATE: 09/20/90

IA9012 / IA9013 / IA9014

IF-AMPLIFIER

FUNCTIONAL DESCRIPTION

The module operates at 21.4 MHz input, which is converted to 100 kHz. It provides the receiver IF gain, selectivity, limiting, FM detection, and RSSI detection.

module IA9013 20 kHz, and module IA9014 12.5 kHz.

The only difference between the 3 bands is the x-tal filter and R23 and R24.

The channel spacing for the module IA9012 is 25 kHz,

CIRCUIT DESCRIPTION

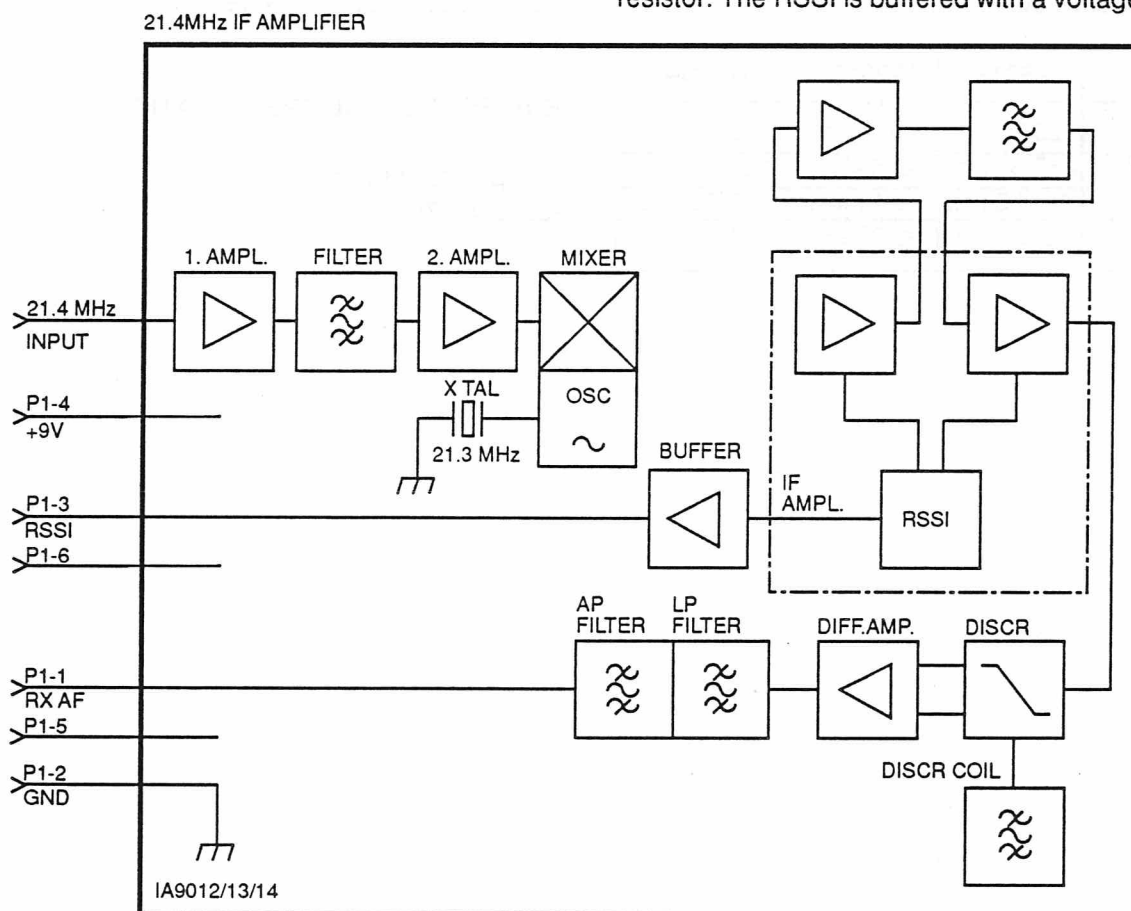
The input signal is amplified and fed to the crystal filter, which is an 8 pole monolithic filter providing the required selectivity. The second amplifier provides gain to overcome the noise figure of the following mixer. The two amplifiers before and after the crystal filter provide a stable matching to the filter.

The 2. amplifier is followed by an integrated mixer with an on-chip oscillator. The mixer converts the 21.4 MHz input to 100 kHz. The mixer output is fed to the IF amplifier. The IF amplifier contains two amplifiers which are connected via an amplifier and a low Q bandpass filter.

The discriminator is a quadrature type built around a transistor array with two differentially coupled amplifiers. The balanced outputs from the discriminator are converted to unbalanced signal with reference to +4.5_V in a differential amplifier. The audio signal passes a low pass and an all pass filter which together give a constant group delay at frequencies up to 3 kHz.

The output voltage is about 0.3 Volt RMS, and R23 and R24 is changed for different bandwidth.

The IF amplifier contains an RSSI (Receiver Signal Strength Indicator) which delivers a current of approximately 10 uV per 20 dB input signal level. The RSSI is temperature compensated with a diode and a PTC resistor. The RSSI is buffered with a voltage follower.



SPECIFICATIONS

INTERFACE

Input

Frequency: 21.4 MHz

Source impedance: ≤ 1600 Ohm

RF AF

AF output impedance: < 100 Ohm

Minimum external load: 2 kOhm

DC level: 4.5 V

RSSI output

DC output impedance: ≤ 560 Ohm

Power supply voltage

9 V ($\pm 5\%$)

Consumption

≤ 40 mA

PERFORMANCE

Sensitivity

20 dB psophometric, (50 Ohm input) 0.6 μ V EMF max.

Static selectivity

	IA9012	IA9013	IA9014
Bandwidth	25 kHz	20 kHz	12.5 kHz
3 dB	$\geq \pm 7.5$ kHz	$\geq \pm 6$ kHz	$\geq \pm 3.75$ kHz
65 dB	$\leq \pm 17.5$ kHz	$\leq \pm 14$ kHz	$\leq \pm 8.75$ kHz
80 dB	$\leq \pm 25.0$ kHz	$\leq \pm 20$ kHz	$\leq \pm 12.5$ kHz

Group delay distortion

300 - 3000 < 10 μ S

Stability

2600 Hz (level dependence): $< \pm 0.75$ μ s

2600 Hz (temperature dependence): $< \pm 5$ μ s

Discriminator bandwidth

$> \pm 6$ kHz

AF output (f mod. 1 kHz)

300 mV ± 2 dB at 60% of max. Δf

AF Response

100 - 2000 Hz ± 0.5 dB

2000 - 3000 Hz $+0.5$ to -1.0 dB

Harmonic distortion

f mod. 1 kHz at 60% of max Δf : $< 5\%$

Hum and noise

Rel. to f mod. 1 kHz, and 60% of max. Δf weighted by psophometric filter ≤ -60 dB

RSSI

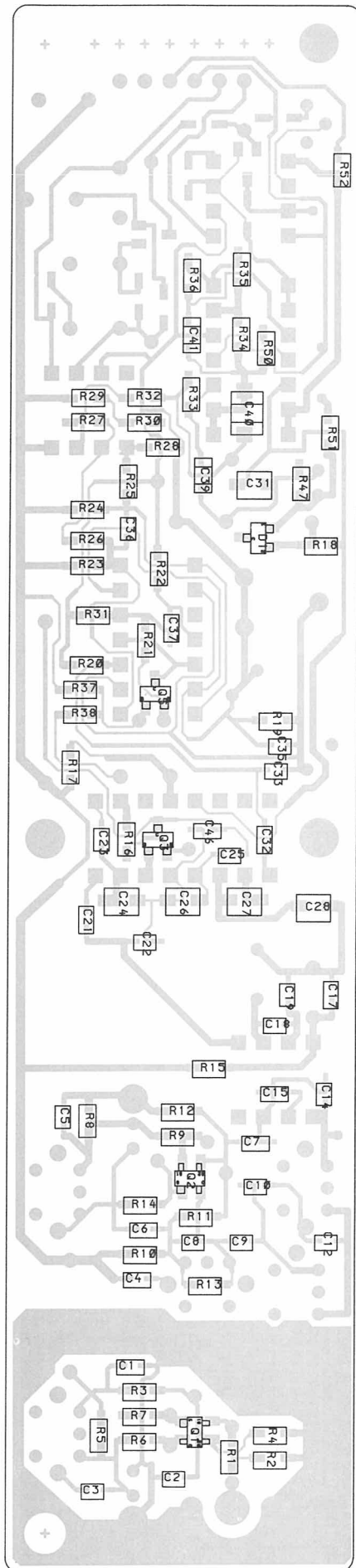
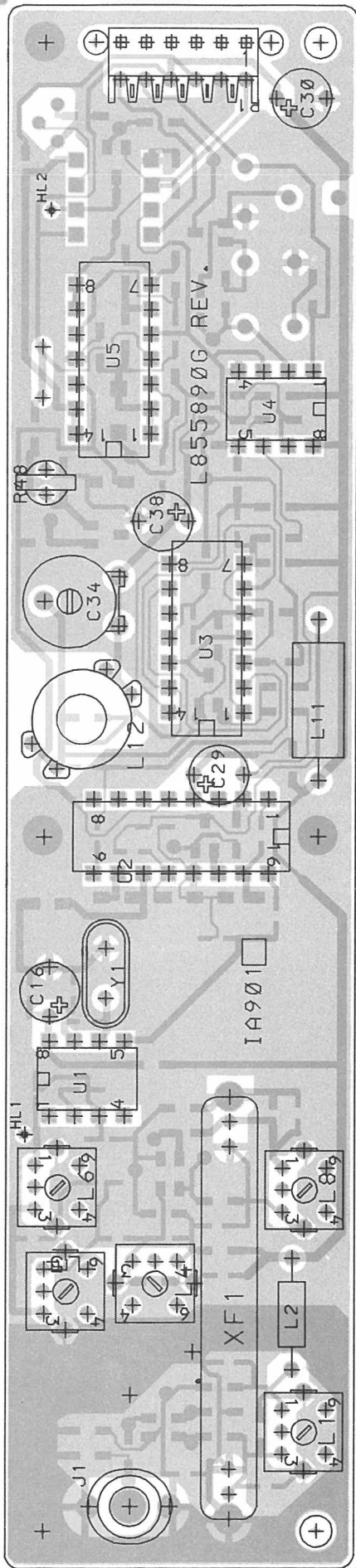
Range (with RC961) 20 dB SINAD: -2 ± 45 dB

Temperature stability: ± 3 dB

ENVIRONMENTAL SPECIFICATIONS

Temperature range

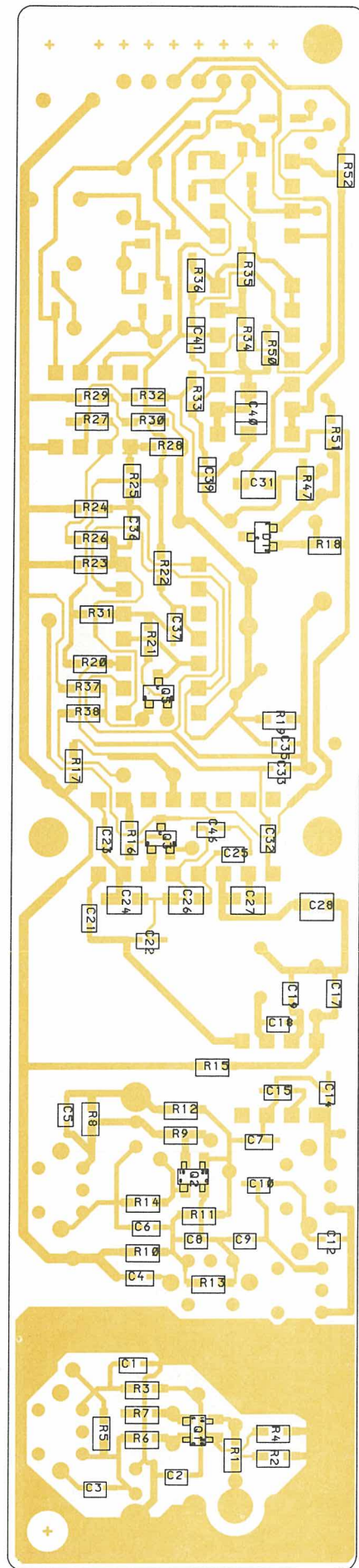
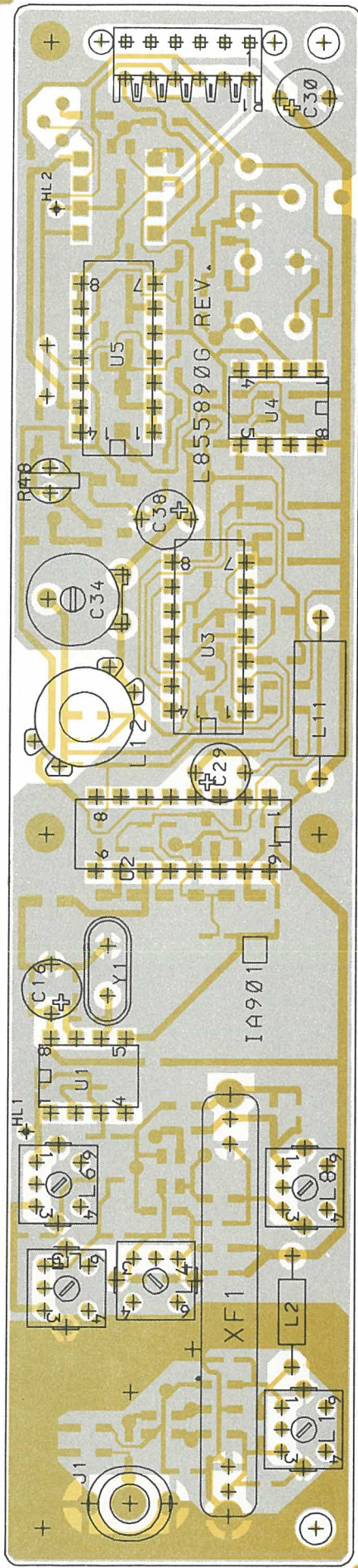
-25°C to $+75^\circ\text{C}$



IF AMPLIFIER IA9012/13/14
COMPONENT LAYOUT

D404.602/3

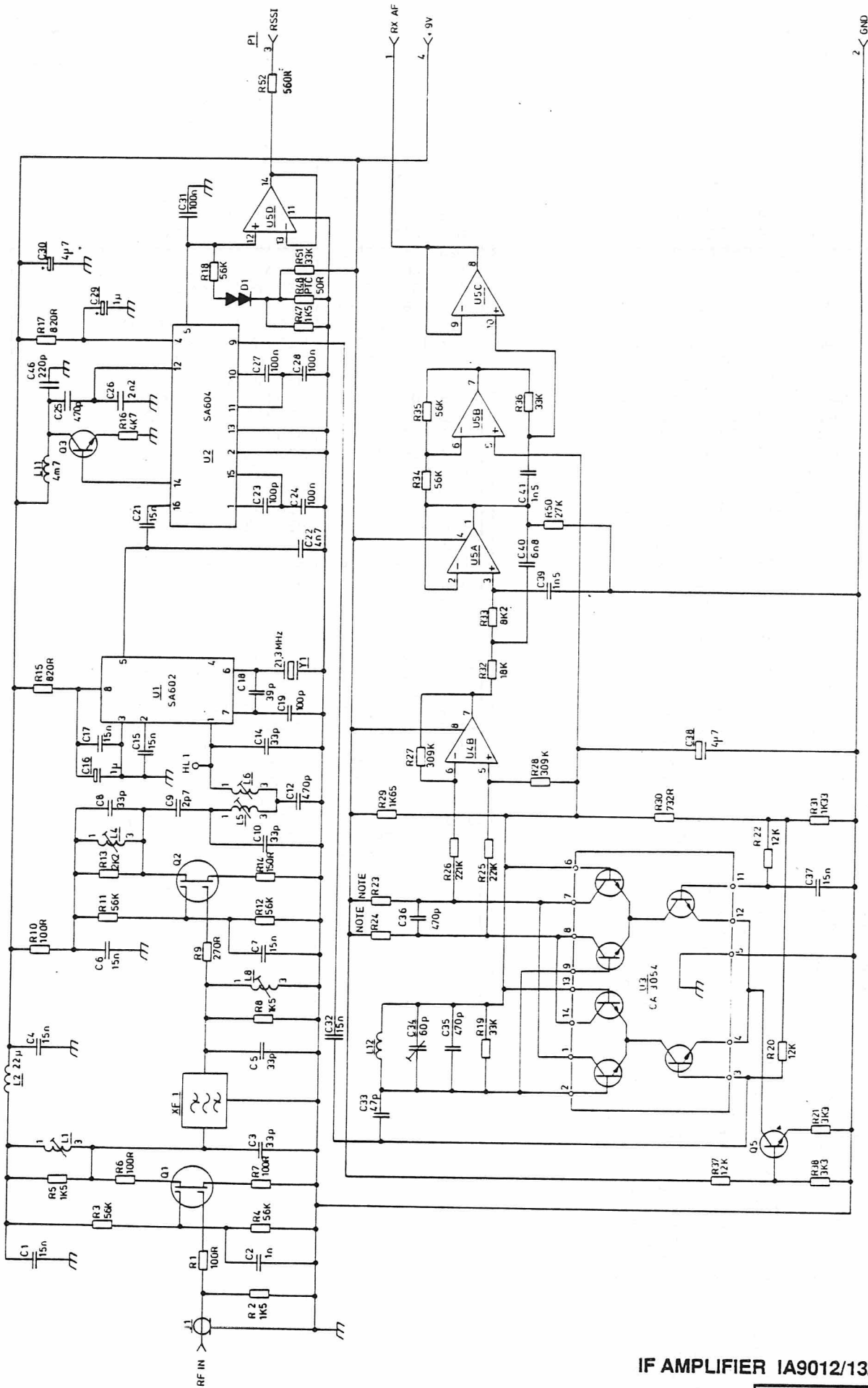
CODE NO. L855890G2,G3,G4 - GLN7073A/7072A/7071A



IF AMPLIFIER IA9012/13/14
COMPONENT LAYOUT

D404.602/3

CODE NO. L855890G2,G3,G4 - GLN7073A/7072A/7071A



IF AMPLIFIER IA9012/13/14

D404.601/4

NOTE:
 R23 & R24 = 3K3 FOR IA9012 (25KHz) CODE NO. L855890G2 - GLN7073A
 R23 & R24 = 4K7 FOR IA9013 (20KHz) CODE NO. L855890G3 - GLN7072A
 R23 & R24 = 6K8 FOR IA9014 (12.5KHz) CODE NO. L855890G4 - GLN7071A

NOTE:
 COMPONENTS MARKED CXXX ARE
 PLACED ON NO SOLDER SIDE

PARTS LIST FOR IF AMPLIFIER IA9012/IA9013/IA9014

Pos	Code/Kit No.	Description
	GLN7073A	L855890G2 IA9012 Chann.spac.25.0kHz (A)
	GLN7072A	L855890G3 IA9013 Chann.spac.20.0kHz (B)
	GLN7071A	L855890G4 IA9014 Chann.spac.12.5kHz (C)
C001	2113741M49	CAP,CER,CL2 15N , 10%
C002	2113741M21	CAP,CER,CL2 1N0 , 10%
C003	2113740A41	CAP,CER,NP0 33P , 5%
C004	2113741M49	CAP,CER,CL2 15N , 10%
C005	2113740A41	CAP,CER,NP0 33P , 5%
C006	2113741M49	CAP,CER,CL2 15N , 10%
C007	2113741M49	CAP,CER,CL2 15N , 10%
C008	2113740A41	CAP,CER,NP0 33P , 5%
C009	2113740A13	CAP,CER,NP0 2P7 , 25P
C010	2113740A41	CAP,CER,NP0 33P , 5%
C012	2113740A71	CAP,CER,NP0 470P , 5%
C014	2113740A41	CAP,CER,NP0 33P , 5%
C015	2113741M49	CAP,CER,CL2 15N , 10%
C016	2313749D52	CAP,TA,SOL 1U , 35V
C017	2113741M49	CAP,CER,CL2 15N , 10%
C018	2113740A43	CAP,CER,NP0 39P , 5%
C019	2113740A55	CAP,CER,NP0 100P , 5%
C021	2113741M49	CAP,CER,CL2 15N , 10%
C022	2113741M37	CAP,CER,CL2 4N7 , 10%
C023	2113740A55	CAP,CER,NP0 100P , 5%
C024	2113741C17	CAP,CER,CL2 100N , 5%
C025	2113740A71	CAP,CER,NP0 470P , 5%
C026	2113740C25	CAP,CER,NP0 2N2 , 5%
C027	2113741C17	CAP,CER,CL2 100N , 5%
C028	2113741C17	CAP,CER,CL2 100N , 5%
C029	2313749D52	CAP,TA,SOL 1U , 35V
C030	2313749D72	CAP,TA,SOL 4U7 , 35V
C031	2113741C17	CAP,CER,CL2 100N , 5%
C032	2113741M49	CAP,CER,CL2 15N , 10%
C033	2113740A46	CAP,CER,NP0 47P , 5%
C034	J706080P1	CAP,VAR,FILM 5.0/57 PF
C035	J707363P7	CAP,CER,NP0 470P , 2%
C036	2113740A71	CAP,CER,NP0 470P , 5%
C037	2113741M49	CAP,CER,CL2 15N , 10%
C038	2313749D72	CAP,TA,SOL 4U7 , 35V
C039	2113740C21	CAP,CER,NP0 1N5 , 5%
C040	J707349P9	CAP,CER,NP0 6N8 , 2%
C041	2113740C21	CAP,CER,NP0 1N5 , 5%
C046	2113740A63	CAP,CER,NP0 220P , 5%
D001	J707389P1	DIO,SI,SIG BAV 99
J001	A700171P2	CONN,PWB,FEM
L001	K805800G1	COIL ASM
L002	A700024P29	COIL,RF,FIX 22UH , 10%
L004	J708428P1	COIL,RF,VAR 45 MHZ
L005	J708428P1	COIL,RF,VAR 45 MHZ
L006	J708428P1	COIL,RF,VAR 45 MHZ
L008	J708428P1	COIL,RF,VAR 45 MHZ
L011	J707174P1	COIL,RF,FIX 4700UH, 10%
L012	K805798G1	COIL ASM
P001	A700041P5	CONN,PWB,FEM 06-CKT
Q001	J707433P1	TSTR,MFET,SI BF 989
Q002	J707433P1	TSTR,MFET,SI BF 989
Q003	J707386P1	TSTR,NPN,SI BCW 32
Q005	J707386P1	TSTR,NPN,SI BCW 32
R001	0611077A50	RES,MFLM,1/8W 100R , 5%
R002	0611077A78	RES,MFLM,1/8W 1K5 , 5%
R003	0611077B17	RES,MFLM,1/8W 56K , 5%
R004	0611077B17	RES,MFLM,1/8W 56K , 5%
R005	0611077A78	RES,MFLM,1/8W 1K5 , 5%
R006	0611077A50	RES,MFLM,1/8W 100R , 5%
R007	0611077A50	RES,MFLM,1/8W 100R , 5%
R008	0611077A78	RES,MFLM,1/8W 1K5 , 5%
R009	0611077A60	RES,MFLM,1/8W 270R , 5%
R010	0611077A50	RES,MFLM,1/8W 100R , 5%
R011	0611077B17	RES,MFLM,1/8W 56K , 5%
R012	0611077B17	RES,MFLM,1/8W 56K , 5%
R013	0611077A82	RES,MFLM,1/8W 2K2 , 5%
R014	0611077A54	RES,MFLM,1/8W 150R , 5%

Pos	Code/Kit No.	Description
R015	0611077A72	RES,MFLM,1/8W 820R , 5%
R016	0611077A90	RES,MFLM,1/8W 4K7 , 5%
R017	0611077A72	RES,MFLM,1/8W 820R , 5%
R018	0611077B17	RES,MFLM,1/8W 56K , 5%
R019	0611077B11	RES,MFLM,1/8W 33K , 5%
R020	0611077B01	RES,MFLM,1/8W 12K , 5%
R021	0611077A86	RES,MFLM,1/8W 3K3 , 5%
R022	0611077B01	RES,MFLM,1/8W 12K , 5%
R023	0611077F45	RES,MFLM,1/8W 3K32, 1% (A)
R023	0611077F60	RES,MFLM,1/8W 4K75, 1% (B)
R023	0611077F75	RES,MFLM,1/8W 6K81, 1% (C)
R024	0611077F45	RES,MFLM,1/8W 3K32, 1% (A)
R024	0611077F60	RES,MFLM,1/8W 4K75, 1% (B)
R024	0611077F75	RES,MFLM,1/8W 6K81, 1% (C)
R025	0611077H22	RES,MFLM,1/8W 221K
R026	0611077H22	RES,MFLM,1/8W 221K , 1%
R027	0611077H36	RES,MFLM,1/8W 309K , 1%
R028	0611077H36	RES,MFLM,1/8W 309K , 1%
R029	0611077F16	RES,MFLM,1/8W 1K65, 1%
R030	0611077E81	RES,MFLM,1/8W 732R , 1%
R031	0611077F07	RES,MFLM,1/8W 1K33, 1%
R032	0611077B05	RES,MFLM,1/8W 18K , 5%
R033	0611077A96	RES,MFLM,1/8W 8K2 , 5%
R034	0611077B17	RES,MFLM,1/8W 56K , 5%
R035	0611077B17	RES,MFLM,1/8W 56K , 5%
R036	0611077B11	RES,MFLM,1/8W 33K , 5%
R037	0611077B01	RES,MFLM,1/8W 12K , 5%
R038	0611077A86	RES,MFLM,1/8W 3K3 , 5%
R047	0611077A78	RES,MFLM,1/8W 1K5 , 5%
R048	J706147P1	RES,THERM,PTC 50R , 30%
R050	0611077B09	RES,MFLM,1/8W 27K , 5%
R051	0611077B11	RES,MFLM,1/8W 33K , 5%
R052	0611077A68	RES,MFLM,1/8W 560R , 5%
U001	J709575P1	IC,LIN,MIX 602
U002	J709576P1	IC,LIN,IF-AMP 604
U003	J709577P1	IC,ARRAY,TSTR CA 3054
U004	J709530P1	IC,LIN,OP-AMP 082
U005	A701789P3	IC,LIN,OP-AMP 224
XF01	J709578P1	FLTR,CRY,21.4 +/-7.50KHZ (A)
XF01	J709578P2	FLTR,CRY,21.4 +/-6.00KHZ (B)
XF01	J709578P3	FLTR,CRY,21.4 +/-3.75KHZ (C)
Y001	J707567P13	CRYSTAL UNIT 21.3000MHZ
	L855891P1R1	BD PW
	J706804P1	NON REFERENCED ITEM: WASH,INS,CRYS FOR HC-25/U

JP9011/JP9015

INTERCONNECTION BOARD

The interconnection board JP9011/JP9015 is a mother board for the transmitter modules in CQF9000 base stations and provides all modules interconnections.

The board is furnished with connectors for the modules and connectors for the power supply and the interface.

The interconnection board is in both multiplier and synthesizer transmitters.

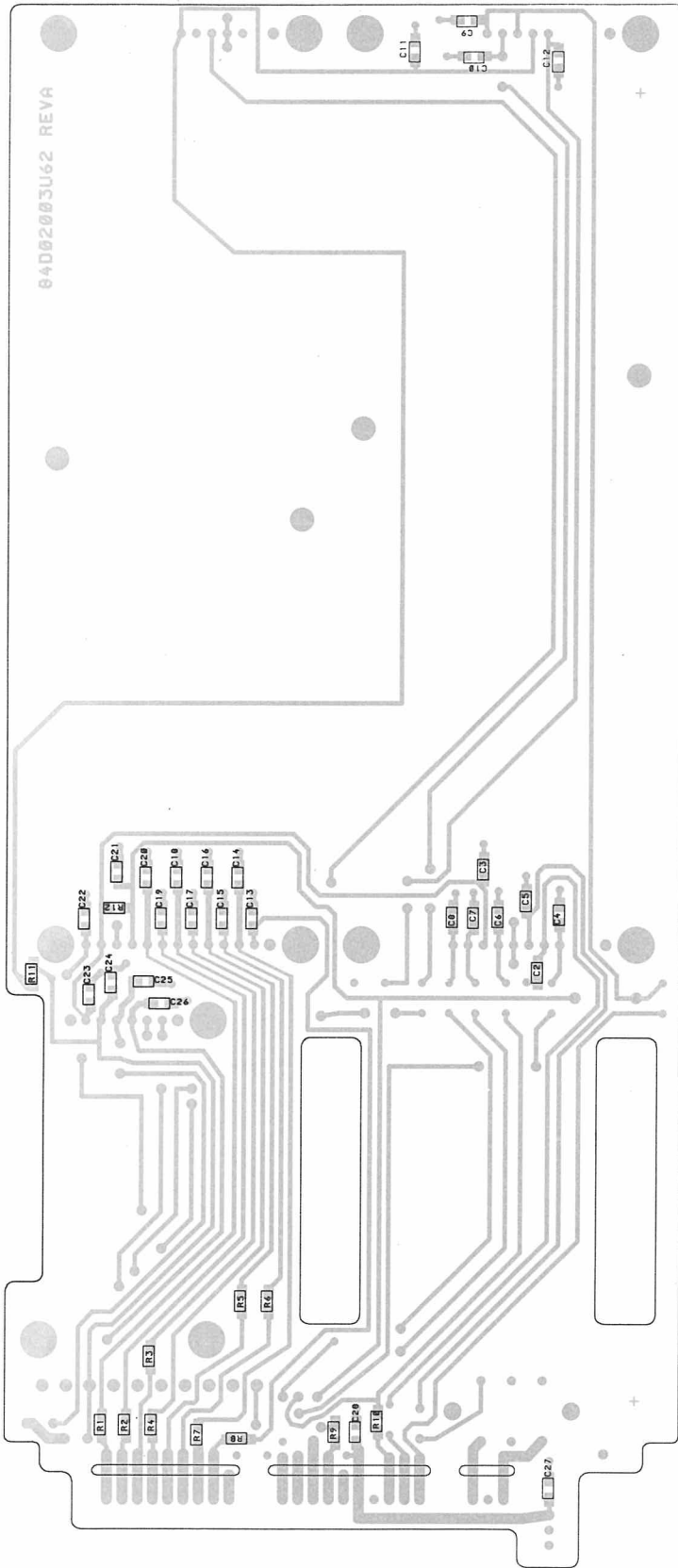
JP9011 is used in CQF911X, CQF933X and CQP977X.

JP9015 is used in CQF955X, CQF966X and CQF999X.

SPECIFICATIONS

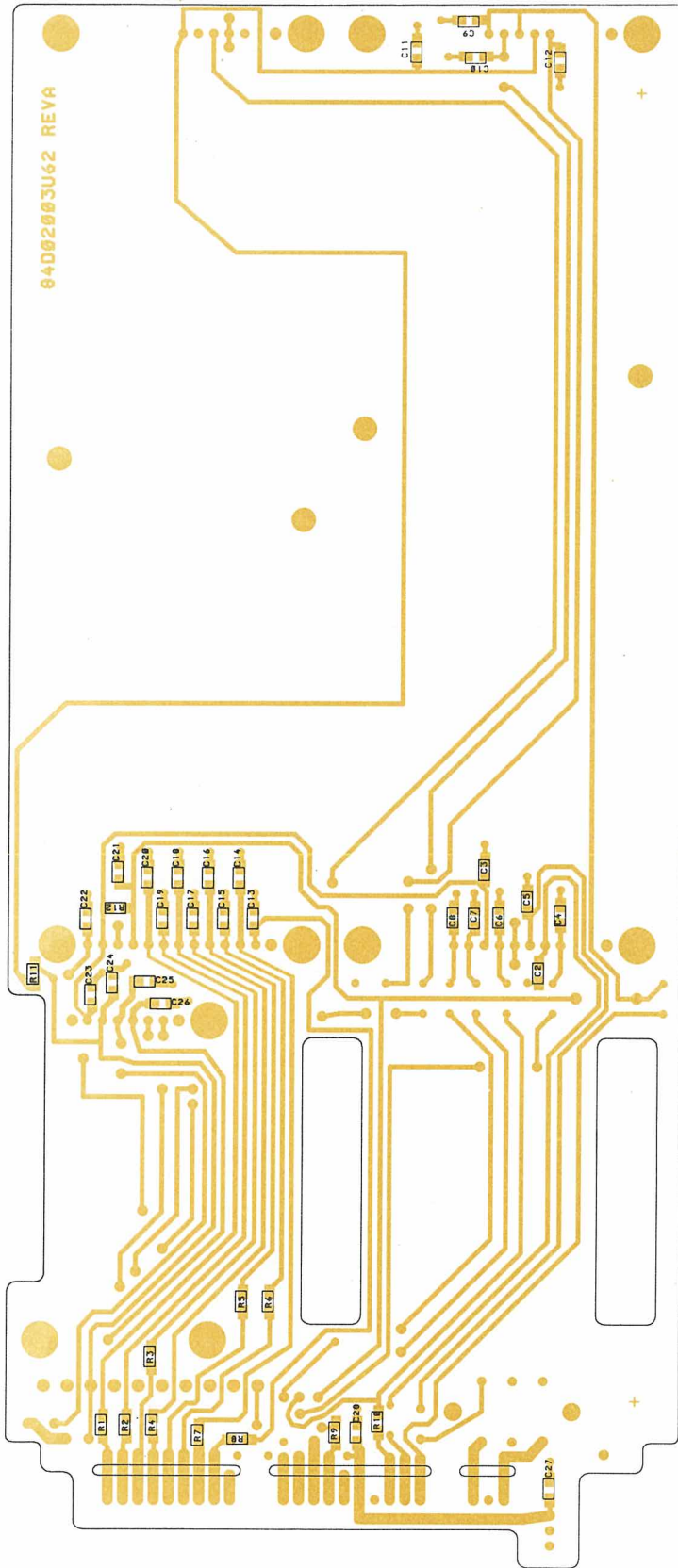
Dimensions
112 x 262 mm

Temperature Range
+40°C to +85°C



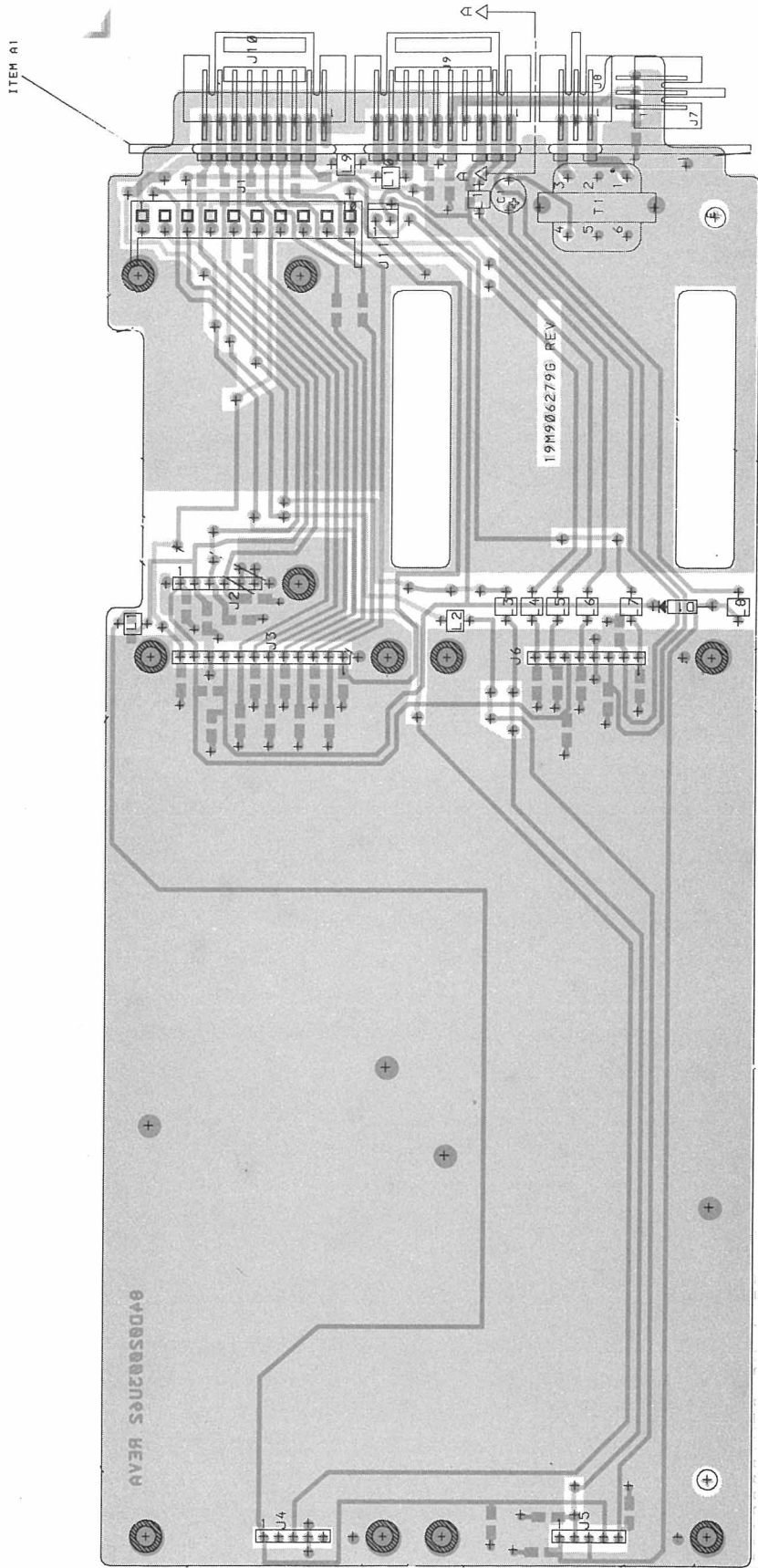
**JUNCTION PANEL JP9011/JP9015
COMPONENT LAYOUT CHIP SIDE**

D404.755/2



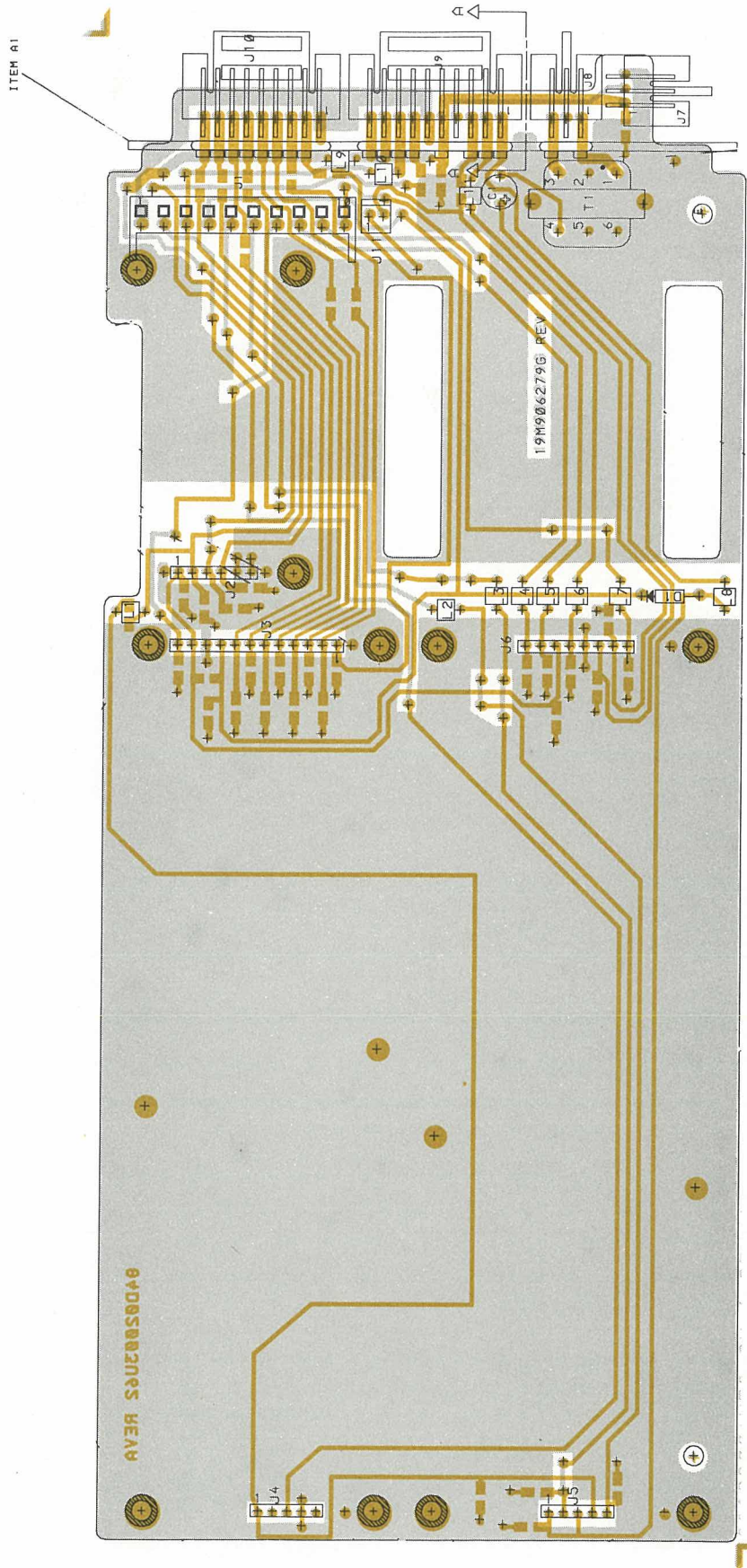
**JUNCTION PANEL JP9011/JP9015
COMPONENT LAYOUT CHIP SIDE**

D404.755/2



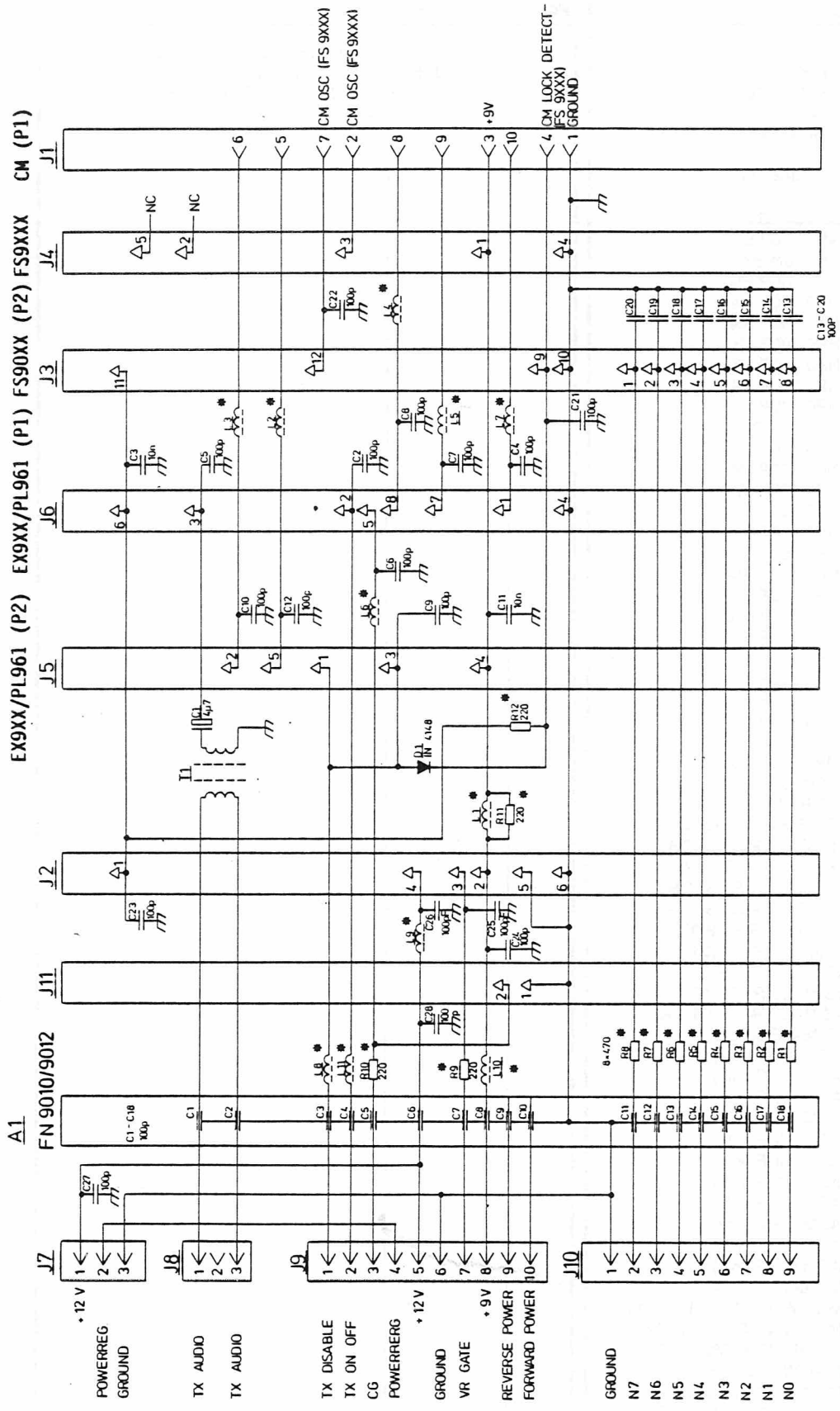
**JUNCTION PANEL JP9011/JP9015
COMPONENT LAYOUT COMPONENT SIDE**

D404.754/2



**JUNCTION PANEL JP9011/JP9015
COMPONENT LAYOUT COMPONENT SIDE**

D404.754/2



PIN	5	6	8	9	10
EX931	BP1	BP 2	NC	MIXER	OSC
EX932	NC	BP 2	NC	NC	OSC
EX911	BP1	BP 2	NC	MIXER	OSC
EX912	NC	BP 2	NC	NC	OSC
EX961	NC	TRIPLER	NC	NC	OSC
PL 952	TX STATUS	TUNE	FILTER	TRIPLER	OSC
PL 961	TX STATUS	TUNE	FILTER	TRIPLER	OSC

COMPONENTS MARKED CXX ARE PLACED ON NON SOLDER SIDE
COMPONENTS MARKED * SEE PARTS LIST

JUNCTION PANEL JP9011/JP9015

D404.753/3

PARTS LIST FOR JUNCTION PANEL JP9011/JP9015

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
A001	GLN7051A 0102721B62	M905804G1 JP9011 L855674G1 FN9010 (See parts list X404.606)		A700090P5 J709903P1	NON REFERENCED ITEMS: CONTACT (6 used) SPACER MODIF (11 used)
A001	GLE6201A 0102721B61	M906279G1 JP9015 L855976G1 FN9012 (See parts list X404.760)			
C001	2313749D72	CAP,TA,SOL 4U7 35V			
C002	2113740B49	CAP,CER,NP0 100P 5%			
C003	2113741B45	CAP,CER,CL2 10N 5%			
C004	2113740B49	CAP,CER,NP0 100P 5%			
C005	2113740B49	CAP,CER,NP0 100P 5%			
C006	2113740B49	CAP,CER,NP0 100P 5%			
C007	2113740B49	CAP,CER,NP0 100P 5%			
C008	2113740B49	CAP,CER,NP0 100P 5%			
C009	2113740B49	CAP,CER,NP0 100P 5%			
C010	2113740B49	CAP,CER,NP0 100P 5%			
C011	2113741B45	CAP,CER,CL2 10N 5%			
C012	2113740B49	CAP,CER,NP0 100P 5%			
C013	2113740B49	CAP,CER,NP0 100P 5%			
C014	2113740B49	CAP,CER,NP0 100P 5%			
C015	2113740B49	CAP,CER,NP0 100P 5%			
C016	2113740B49	CAP,CER,NP0 100P 5%			
C017	2113740B49	CAP,CER,NP0 100P 5%			
C018	2113740B49	CAP,CER,NP0 100P 5%			
C019	2113740B49	CAP,CER,NP0 100P 5%			
C020	2113740B49	CAP,CER,NP0 100P 5%			
C021	2113740B49	CAP,CER,NP0 100P 5%			
C022	2113740B49	CAP,CER,NP0 100P 5%			
C023	2113740B49	CAP,CER,NP0 100P 5%			
C024	2113740B49	CAP,CER,NP0 100P 5%			
C025	2113740B49	CAP,CER,NP0 100P 5%			
C026	2113740B49	CAP,CER,NP0 100P 5%			
C027	2113740B49	CAP,CER,NP0 100P 5%			
C028	2113740B49	CAP,CER,NP0 100P 5%			
D001	A700028P1	DIO,SI,SIG 1N4148			
J001	J708085P10	CONN,PWB,FEM RECP,10-CKT			
J002	2802044U06	CON PCB HDR .1 SR ST 6POS			
J003	2802044U12	CON PCB HDR .1 SR ST 12P			
J004	2802044U05	CON PCB HDR .1 SR ST 5POS			
J005	2802044U05	CON PCB HDR .1 SR ST 5POS			
J006	2802044U08	CON PCB HDR .1 SR ST 8POS			
J007	J708068P103	CONN,PWB,MALE RECP,03-CKT			
J008	J708068P103	CONN,PWB,MALE RECP,03-CKT			
J009	J708068P110	CONN,PWB,MALE RECP,10-CKT			
J010	J708068P109	CONN,PWB,MALE RECP,09-CKT			
J011	A700072P28	CONN,PWB,MALE 02-CKT			
L001	J707339G1	COIL FIX ASM (UHF only)			
L002	J707339G1	COIL FIX ASM (UHF only)			
L003	J707339G1	COIL FIX ASM (UHF only)			
L004	J707339G1	COIL FIX ASM (UHF only)			
L005	J707339G1	COIL FIX ASM (UHF only)			
L006	J707339G1	COIL FIX ASM (UHF only)			
L007	J707339G1	COIL FIX ASM (UHF only)			
L008	J707339G1	COIL FIX ASM (UHF only)			
L009	J707339G1	COIL FIX ASM (UHF only)			
L010	J707339G1	COIL FIX ASM (UHF only)			
L011	J707339G1	COIL FIX ASM (UHF only)			
R001	0611077A98	RES,MFLM,1/8W 10K 5%			
R001	0611077A66	RES,MFLM,1/8W 470R 5% (UHF only)			
R002	0611077A66	RES,MFLM,1/8W 470R 5% (UHF only)			
R003	0611077A66	RES,MFLM,1/8W 470R 5% (UHF only)			
R004	0611077A66	RES,MFLM,1/8W 470R 5% (UHF only)			
R005	0611077A66	RES,MFLM,1/8W 470R 5% (UHF only)			
R006	0611077A66	RES,MFLM,1/8W 470R 5% (UHF only)			
R007	0611077A66	RES,MFLM,1/8W 470R 5% (UHF only)			
R008	0611077A66	RES,MFLM,1/8W 470R 5% (UHF only)			
R009	0611077A58	RES,MFLM,1/8W 220R 5% (UHF only)			
R010	0611077A58	RES,MFLM,1/8W 220R 5% (UHF only)			
R011	0611077A58	RES,MFLM,1/8W 220R 5% (UHF only)			
R012	0611077A98	RES,MFLM,1/8W 10K 5% (UHF only)			
T001	J708385P1 8402003U62A	TRANSFORMER AUDIO BOARD PW			

X404.759/5

DATE: 09/20/90

JP9012

INTERCONNECTION BOARD

The interconnection board JP9012 is a mother board for the receiver modules in CQF9000 base stations and provides all modules interconnections.

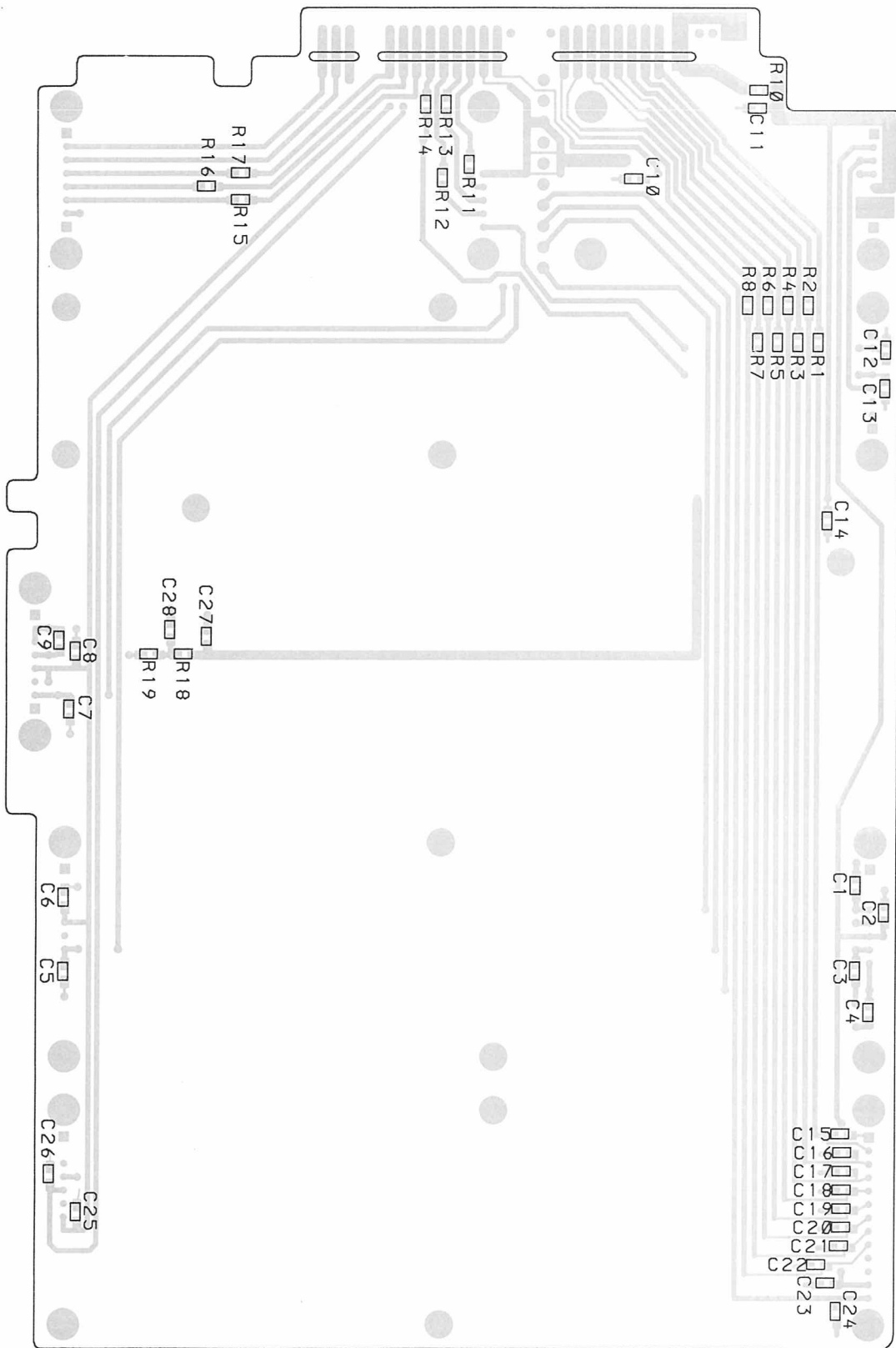
The board is furnished with connectors for the modules and connectors for the power supply and the interface.

The interconnection board is in both multiplier and synthesizer receivers.

SPECIFICATIONS

Dimensions
168 x 255 mm

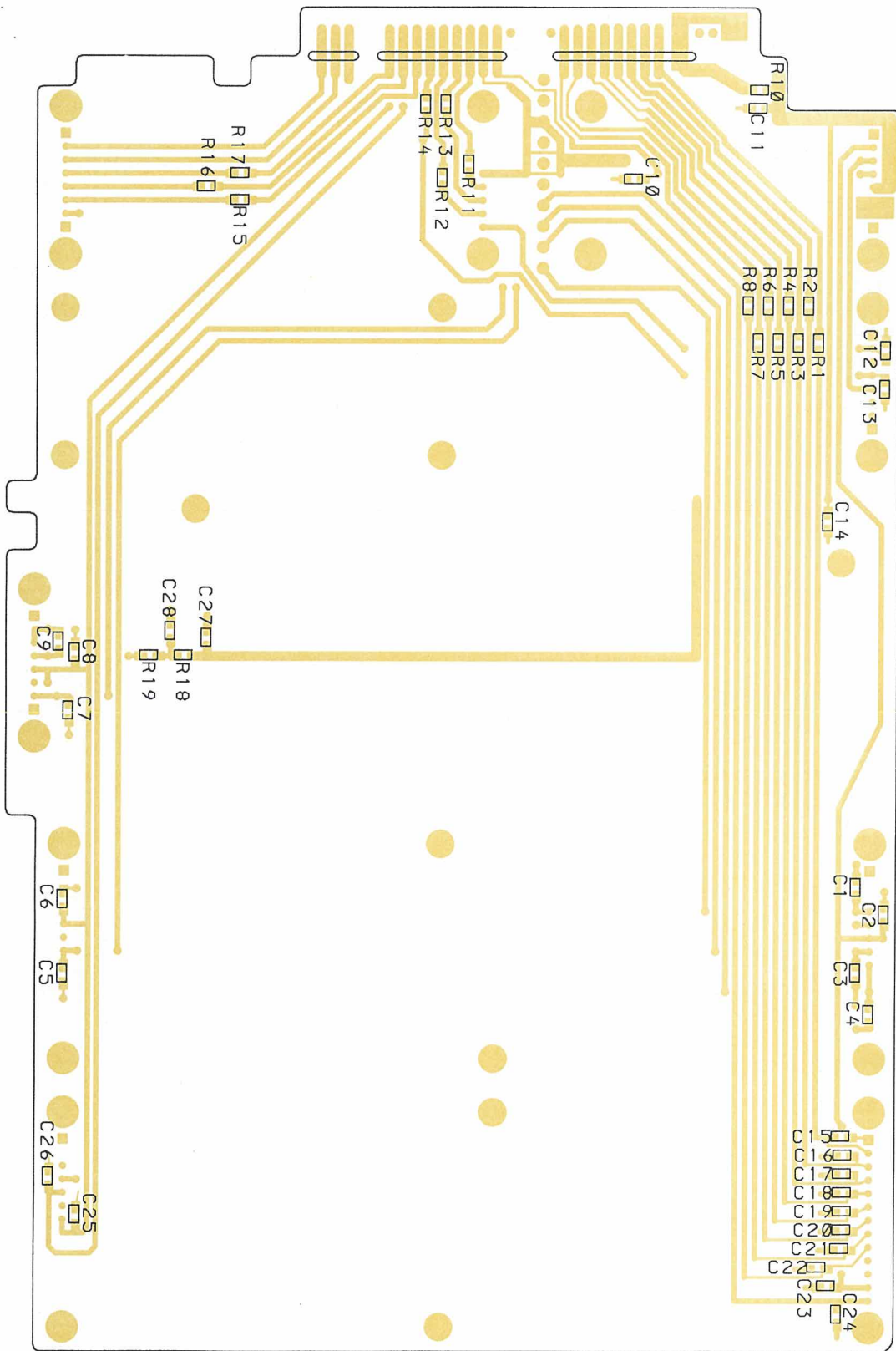
Temperature Range
-40°C to +85°C



**JUNCTION PANEL JP9012
COMPONENT LAYOUT CHIP SIDE**

CODE NO. M905807G1 - GLN7052A

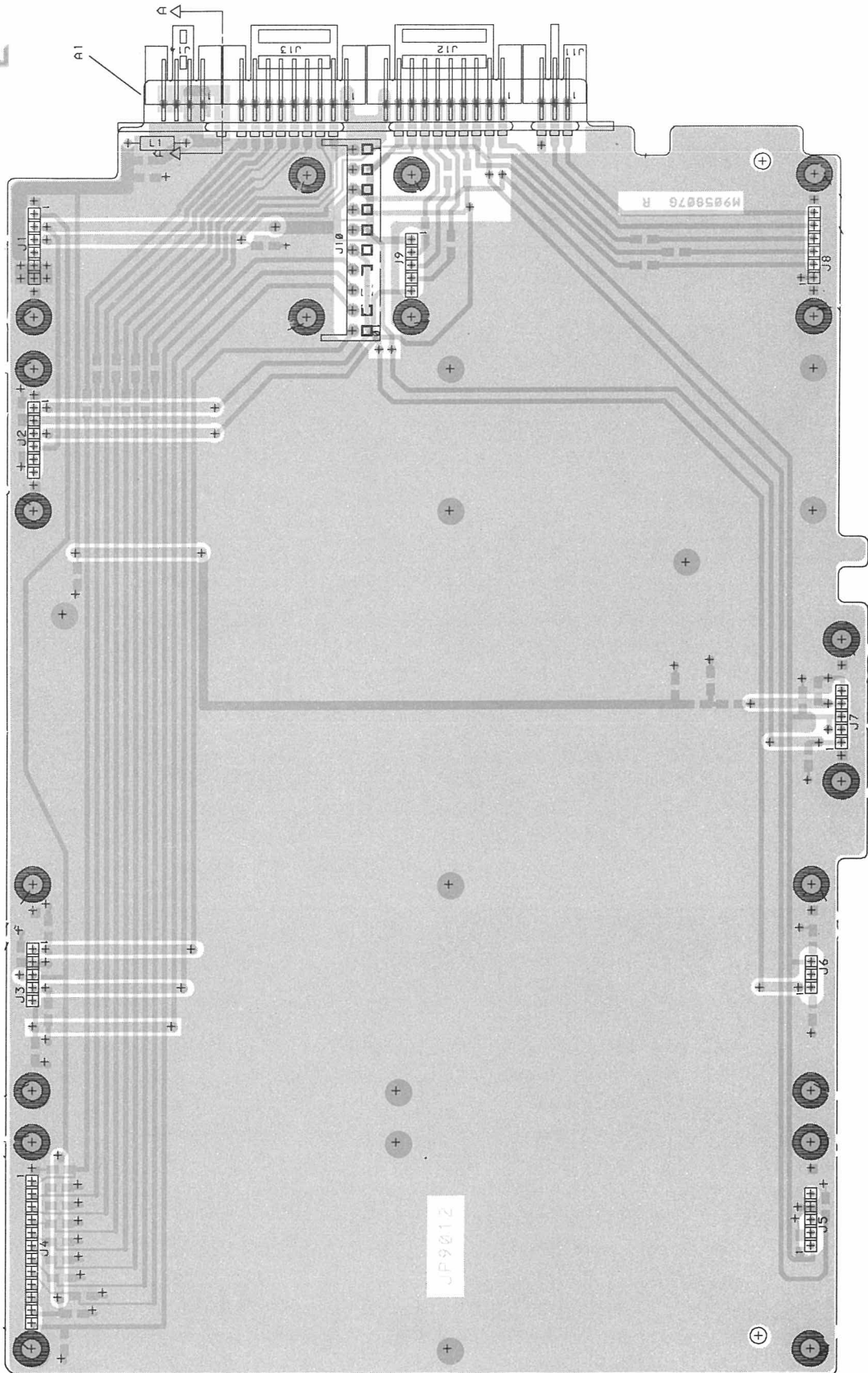
D405.631



**JUNCTION PANEL JP9012
COMPONENT LAYOUT CHIP SIDE**

CODE NO. M905807G1 - GLN7052A

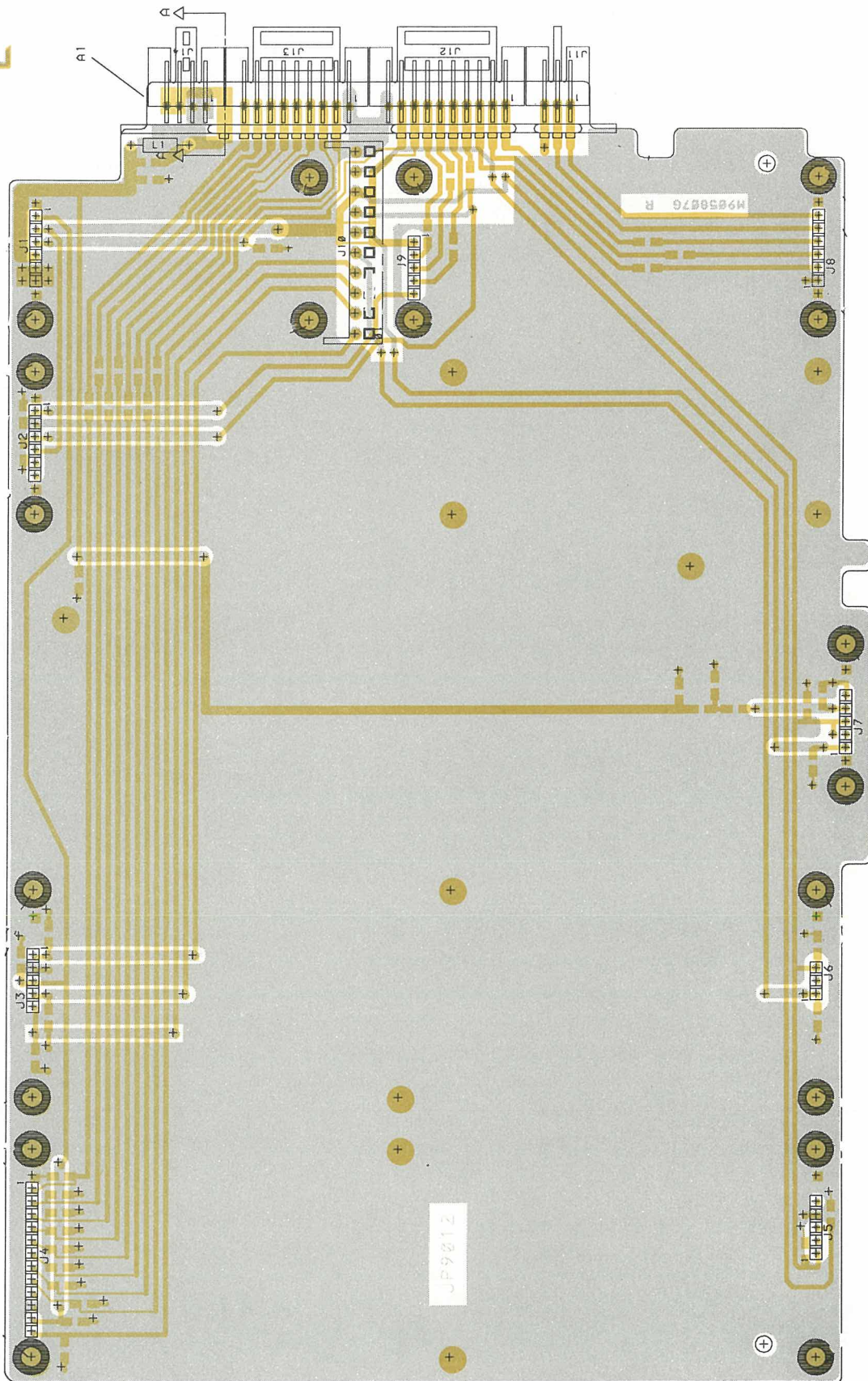
D405.631



**JUNCTION PANEL JP9012
COMPONENT LAYOUT - COMPONENT SIDE**

D403.862/5

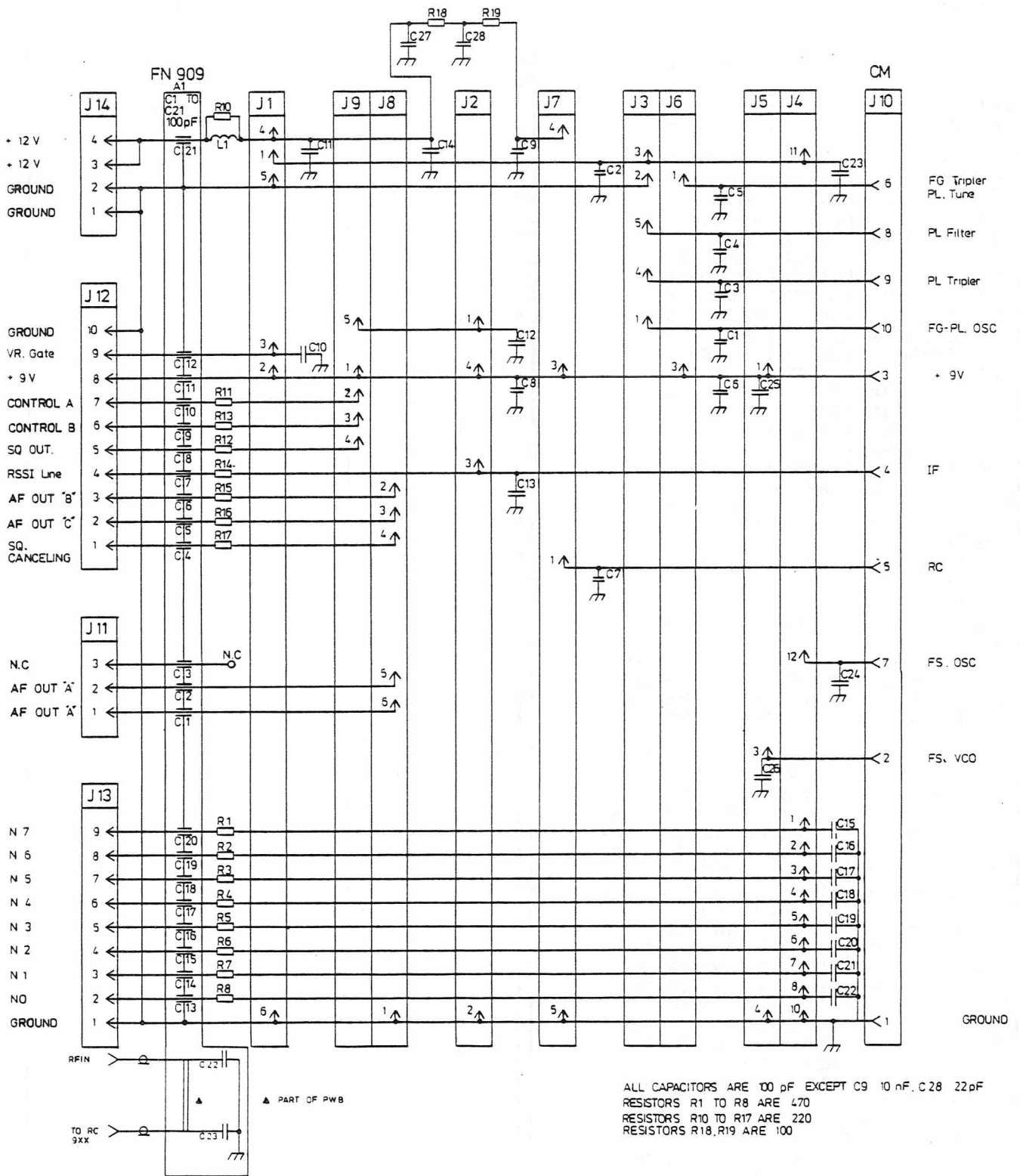
CODE NO. M905807G1 - GLN7052A



**JUNCTION PANEL JP9012
COMPONENT LAYOUT - COMPONENT SIDE**

D403.862/5

CODE NO. M905807G1 - GLN7052A



RX JUNCTION PANEL JP9012

CODE NO. M905807G1 - GLN7052A

D403.861/4

PARTS LIST FOR JUNCTION PANEL JP9012

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GLN7052A	M905807G1 JP9012			
A001	0102721B64	L855690G1 CPNT BD PW FN909			
C001	2113740B49	CAP,CER,NPO 100P , 5%			
C002	2113740B49	CAP,CER,NPO 100P , 5%			
C003	2113740B49	CAP,CER,NPO 100P , 5%			
C004	2113740B49	CAP,CER,NPO 100P , 5%			
C005	2113740B49	CAP,CER,NPO 100P , 5%			
C006	2113740B49	CAP,CER,NPO 100P , 5%			
C007	2113740B49	CAP,CER,NPO 100P , 5%			
C008	2113740B49	CAP,CER,NPO 100P , 5%			
C009	2113741B45	CAP,CER,CL2 10N , 5%			
C010	2113740B49	CAP,CER,NPO 100P , 5%			
C011	2113740B49	CAP,CER,NPO 100P , 5%			
C012	2113740B49	CAP,CER,NPO 100P , 5%			
C013	2113740B49	CAP,CER,NPO 100P , 5%			
C014	2113740B49	CAP,CER,NPO 100P , 5%			
C015	2113740B49	CAP,CER,NPO 100P , 5%			
C016	2113740B49	CAP,CER,NPO 100P , 5%			
C017	2113740B49	CAP,CER,NPO 100P , 5%			
C018	2113740B49	CAP,CER,NPO 100P , 5%			
C019	2113740B49	CAP,CER,NPO 100P , 5%			
C020	2113740B49	CAP,CER,NPO 100P , 5%			
C021	2113740B49	CAP,CER,NPO 100P , 5%			
C022	2113740B49	CAP,CER,NPO 100P , 5%			
C023	2113740B49	CAP,CER,NPO 100P , 5%			
C024	2113740B49	CAP,CER,NPO 100P , 5%			
C025	2113740B49	CAP,CER,NPO 100P , 5%			
C026	2113740B49	CAP,CER,NPO 100P , 5%			
C027	2113740B49	CAP,CER,NPO 100P , 5%			
C028	2113740B33	CAP,CER,NPO 22P , 5%			
J001	J706788P106	CONN,PWB,MALE 06-CKT			
J002	2802044U06	CON PCB HDR .1 SR ST 6POS			
J003	2802044U05	CON PCB HDR .1 SR ST 5POS			
J004	2802044U12	CON PCB HDR .1 SR ST 12P			
J005	2802044U05	CON PCB HDR .1 SR ST 5POS			
J006	2802044U03	CON PCB HDR .1 SR ST 3POS			
J007	2802044U05	CON PCB HDR .1 SR ST 5POS			
J008	2802044U06	CON PCB HDR .1 SR ST 6POS			
J009	2802044U05	CON PCB HDR .1 SR ST 5POS			
J010	J708085P10	CONN,PWB,FEM RECP,10-CKT			
J011	J708068P103	CONN,PWB,MALE RECP,03-CKT			
J012	J708068P110	CONN,PWB,MALE RECP,10-CKT			
J013	J708068P109	CONN,PWB,MALE RECP,09-CKT			
J014	J708068P104	CONN,PWB,MALE RECP,04-CKT			
L001	A700024P1	COIL,RF,FIX 0.1UH , 10%			
R001	0611077A66	RES,MFLM,1/8W 470R , 5%			
R002	0611077A66	RES,MFLM,1/8W 470R , 5%			
R003	0611077A66	RES,MFLM,1/8W 470R , 5%			
R004	0611077A66	RES,MFLM,1/8W 470R , 5%			
R005	0611077A66	RES,MFLM,1/8W 470R , 5%			
R006	0611077A66	RES,MFLM,1/8W 470R , 5%			
R007	0611077A66	RES,MFLM,1/8W 470R , 5%			
R008	0611077A66	RES,MFLM,1/8W 470R , 5%			
R010	0611077A58	RES,MFLM,1/8W 220R , 5%			
R011	0611077A58	RES,MFLM,1/8W 220R , 5%			
R012	0611077A58	RES,MFLM,1/8W 220R , 5%			
R013	0611077A58	RES,MFLM,1/8W 220R , 5%			
R014	0611077A58	RES,MFLM,1/8W 220R , 5%			
R015	0611077A58	RES,MFLM,1/8W 220R , 5%			
R016	0611077A58	RES,MFLM,1/8W 220R , 5%			
R017	0611077A58	RES,MFLM,1/8W 220R , 5%			
R018	0611077A50	RES,MFLM,1/8W 100R , 5%			
R019	0611077A50	RES,MFLM,1/8W 100R , 5%			
	8402003U58A	BOARD PW			
	J709903P1	NON REFERENCED ITEMS:			
	A700090P5	SPACER MODIF (19 used)			
		CONTACT (12 used)			

JP9013

INTERCONNECTION BOARD

The interconnection board JP9013 is used for connecting +12 V to the power to the power amplifier module in CQF9000 base transmitters.

The interconnection board has two pi-filters for decoupling the battery voltage and the power control voltage from the power amplifier.

The JP9013 is furnished with three connectors and two battery voltage terminals.

J1 - Chassis (-A).

J2 - +12 V (+A).

J3 - +12 V and power control voltage to the exciter.

J4 - +12 V to the receiver.

J5 - Power amplifier connector.

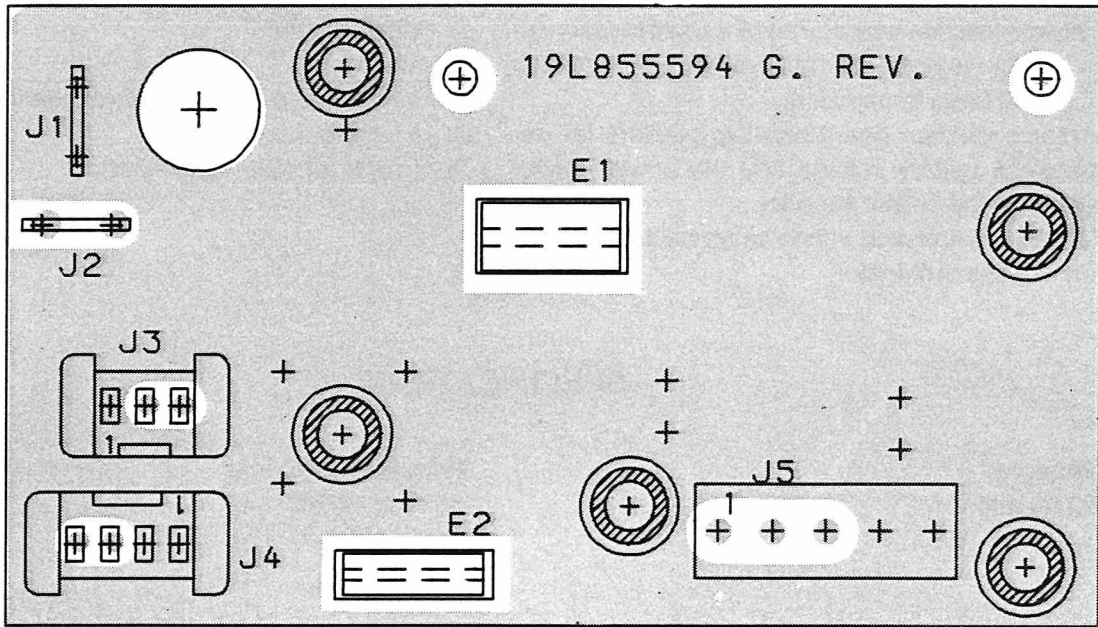
SPECIFICATIONS

Dimensions

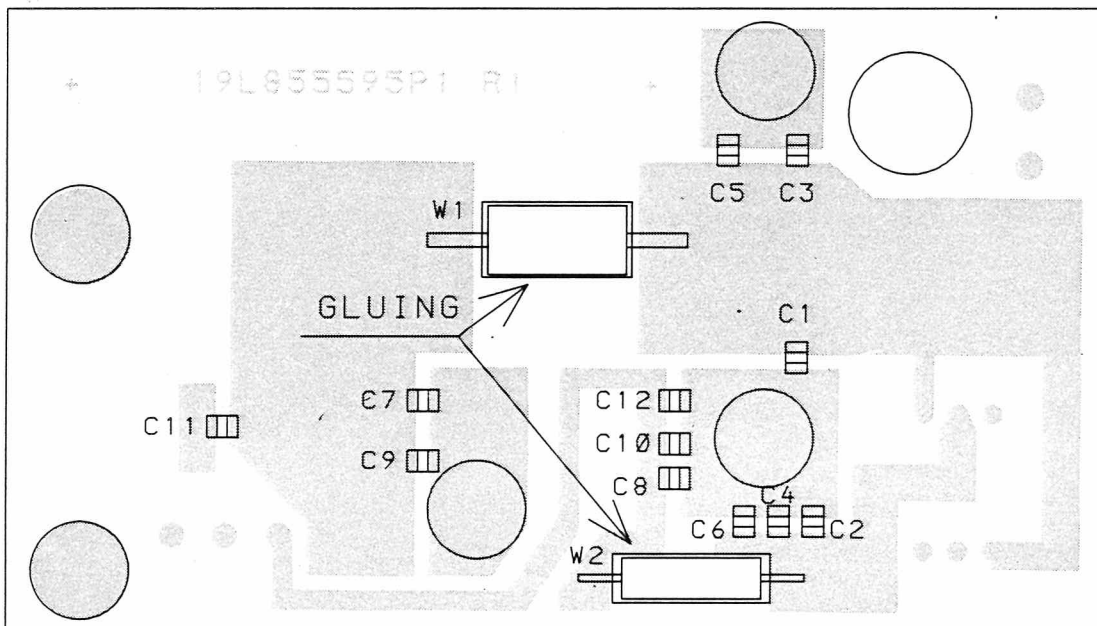
45.8 x 80 mm

Temperature range

-40°C to +85°C



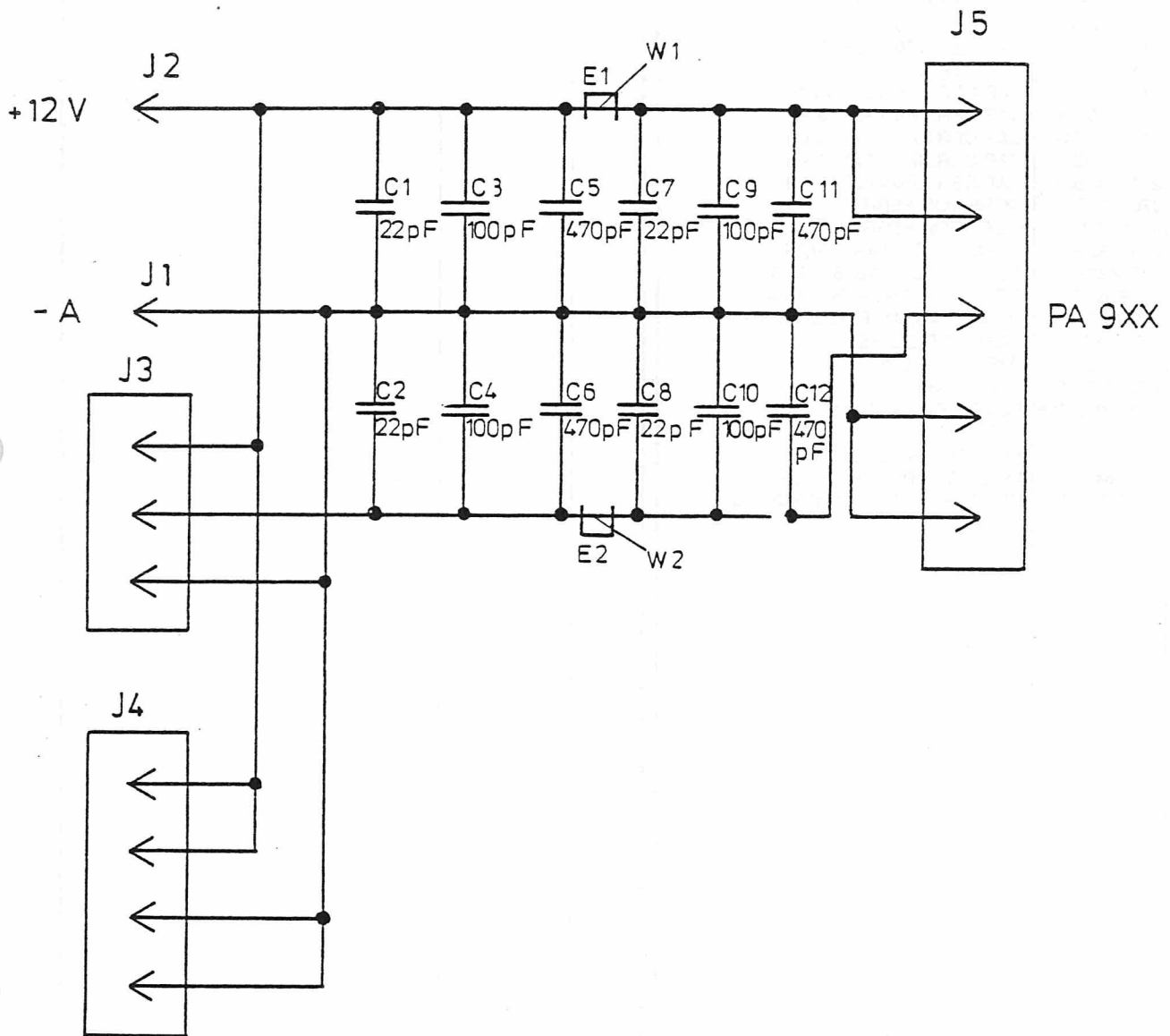
CHIP SIDE



COMPONENT BOARD FOR JP9013

D403.865/3

REV.1 CODE NO. L855594G1 - GLN7050A



JUNCTION PANEL JP9013

CODE NO. L855594G1 - GLN7050A

D403.864/3

PARTS LIST FOR JUNCTION PANEL JP9013

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GLN7050A	L855594G1 JP9013			
C001	2113740B33	CAP,CER,NP0 22P , 5% 1			
C002	2113740B33	CAP,CER,NP0 22P , 5% 1			
C003	2113740B49	CAP,CER,NP0 100P , 5% 1			
C004	2113740B49	CAP,CER,NP0 100P , 5% 1			
C005	2113740B65	CAP,CER,NP0 470P , 5% 1			
C006	2113740B65	CAP,CER,NP0 470P , 5% 1			
C007	2113740B33	CAP,CER,NP0 22P , 5% 1			
C008	2113740B33	CAP,CER,NP0 22P , 5% 1			
C009	2113740B49	CAP,CER,NP0 100P , 5% 1			
C010	2113740B49	CAP,CER,NP0 100P , 5% 1			
C011	2113740B65	CAP,CER,NP0 470P , 5% 1			
C012	2113740B65	CAP,CER,NP0 470P , 5% 1			
E001	J708771P2	CORE,TOR FERR 1			
E002	J708771P1	CORE,TOR FERR 1			
J001	J706683P1	TERM,SPADE TAB, 6.3MM 1			
J002	J706683P1	TERM,SPADE TAB, 6.3MM 1			
J003	J708068P3	CONN,PWB,MALE RECP,03-CKT 1			
J004	J708068P4	CONN,PWB,MALE RECP,04-CKT 1			
J005	A701785P4	CONTACT (5 used)			
W001	A700133P26	WIRE 1.000 DIA			
W002	A700133P19	WIRE 0.630 DIA			
	8402003U71A	BOARD PW JP9013 1			
	A701648P4	NON REFERENCED ITEMS:			
	J708450P3	MOLD COMP SIL RUB,CLR			
		SPC,SELF-CNCH 7.1X2.5X3.6 (5 used)			

PA931

POWER AMPLIFIER

PA931 is a broadband power amplifier for use in the 80 MHz band-end contains two RF amplifier stages, a directional coupler, a low-pass filter and a hybrid IC

power control circuit.

This module is intended for use in both simplex and duplex radios. The PA covers 66 - 88 MHz.

CIRCUIT DESCRIPTION

A signal of at least 320 mW and on the desired carrier frequency is applied to the input connector of the PA. Wideband matching networks (no tuning) are used to convert the 50-ohm input impedance down to the input impedance of the first transistor and deliver the input signal to the base of the first amplifier where it is increased in level. The first amplifier uses a TO39 cased transistor with the silicon chip electrically isolated from the case. The emitter is connected to this case which is grounded by soldering to the printed board pattern.

The output signal from the first amplifier is impedance-matched to the input of the second stage with wideband networks. The second amplifier again increases the level of the RF signal to the desired amplitude and wideband networks match the output impedance of the second transistor to 50 ohms. The second transistor is a 4-lead flange device.

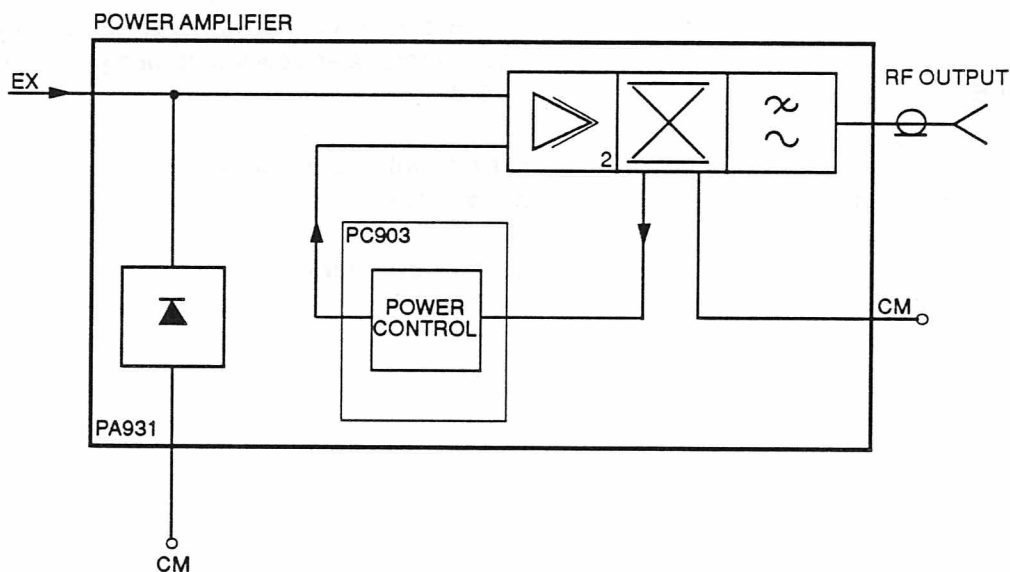
A 50 ohm microstrip line conducts the RF signal through a directional coupler to the low-pass filter where the harmonic energy is removed from the RF signal. The desired RF level is then passed to the output connector along a 50 ohm microstrip line.

The directional coupler samples the forward power level and rectifies the RF producing a DC voltage proportional to the forward signal. This DC voltage is applied to the power control hybrid IC. A power set control sends a desired output power level command to the power control IC which in turn regulates the DC voltage to the first RF-amplifier to maintain the desired output power level.

Because the power control IC consumes some current in the "TX Unkeyed" condition, a switch circuit is included to reduce the current drain during idle periods. Drive power to the first stage of the PA is sampled and detected by a diode circuit. When drive is present, a DC voltage then turns on the voltage regulator included in the monolithic IC chip. The turn-on is sequenced such that the feedback loop is brought up to power rather than coming on "full blast" and then regulating back.

A remote power reduction terminal is provided so the power can be reduced in a step function by the command system of the radio.

For ease of troubleshooting, a central metering jack provided in the PA to meter input drive from the exciter,



PA driver current, PA final amplifier current, control voltage, and voltage proportional to the forward power from the directional coupler.

DC power is brought into the PA through feedthrough bypass capacitors mounted in the PA shelf. These voltage leads are isolated from chassis ground causing the PA to float with respect to the DC levels of the vehicle. Some filtering is provided by a large electrolytic capacitor placed across the two connections.

The module is protected against accidental reverse voltage application by a large diode connected across the DC terminal. If the battery leads are connected to the wrong terminals, the diode conducts a large amount of current which then blows the fuse.

The PA is designed to operate over a DC battery voltage range of 10.8 to 16.6 volts. The output power is set to rated level at the EIA nominal voltage of approximately 13.8 voltage and will remain almost constant for all higher voltages. However, as the voltage is reduced below 13.8 the power will remain at rated level only as long as the control loop has excessivt gain. At some voltage, the power output will start to decrease with decreasing voltage.

To prevent excessive spurious signal from being radiated the PA module is shielded by a metal cover. The printed board is held down to the heat sink by several screws. The shielding required between the activ PA circuit and the lowpass filter is done by a separate filter cover.

TECHNICAL SPECIFICATIONS

FOR LOW PASS FILTER IN PA MODULE

Frequency range

66 - 88 MHz

Pass-band insertion loss

0.5 dB: 66 - 88 MHz

Stop band attenuation

≥45 dB from 132 MHz up to 792 MHz

Operating temperature range

-40°C to 85°C

Output load

The nominal load shall be 50 ohms non-reactive. The circuit shall not be damaged when operated at the EIA standard duty cycle into an infinite VSWR at 40 watts.

FOR PA MODULE

Power input

320 mW min. to 630 mW max.

Input VSWR

≤2.5: 1 at rated power output

Frequency range

66 - 88 MHz

Supply voltage at PA terminals

13.6 V nominal at pa power output.

Operating voltage range 12.5 to 15.5 V

Power output

10 W

Current consumption

3.0 A max.

Nominal load impedance

50 ohms non-reactive

Stability

Stable into any load with up to 3:1 VSWR.

VSWR greater than 3:1 will not damage modules if operated at ≤ rated power with supply voltage less than 15.5 V.

Current with no RF drive

5.0 mA max.

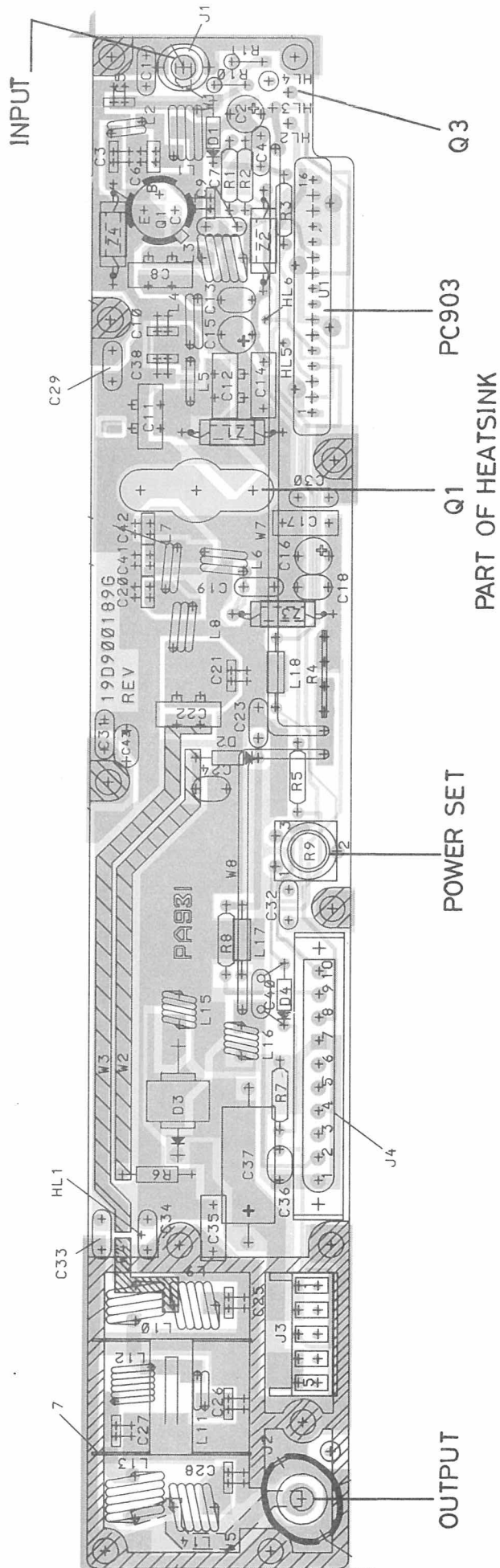
Temperature range

-40°C to 85°C

MODULE	POWER	CODE NO.
PA931	6/10W	D900461G1
PA931	6/10W	D900461G4 - GTC6114A (CQF933X ONLY)
PA931		D900476G1

**POWER AMPLIFIER PA931
COMPONENT LAYOUT**

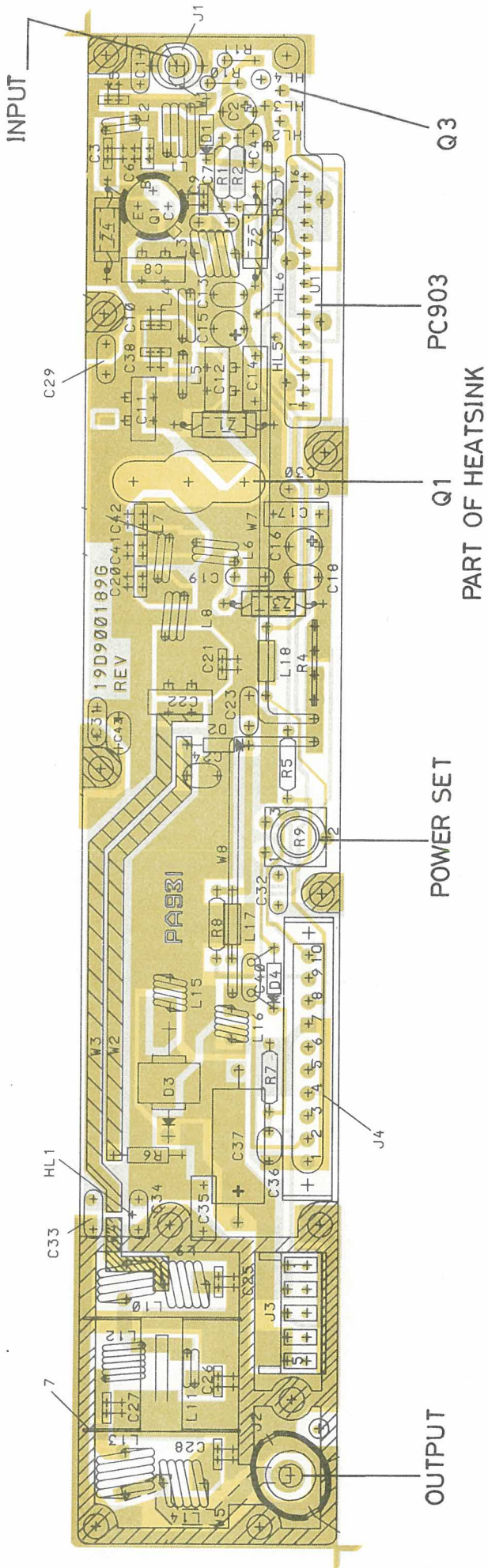
D403.402/4

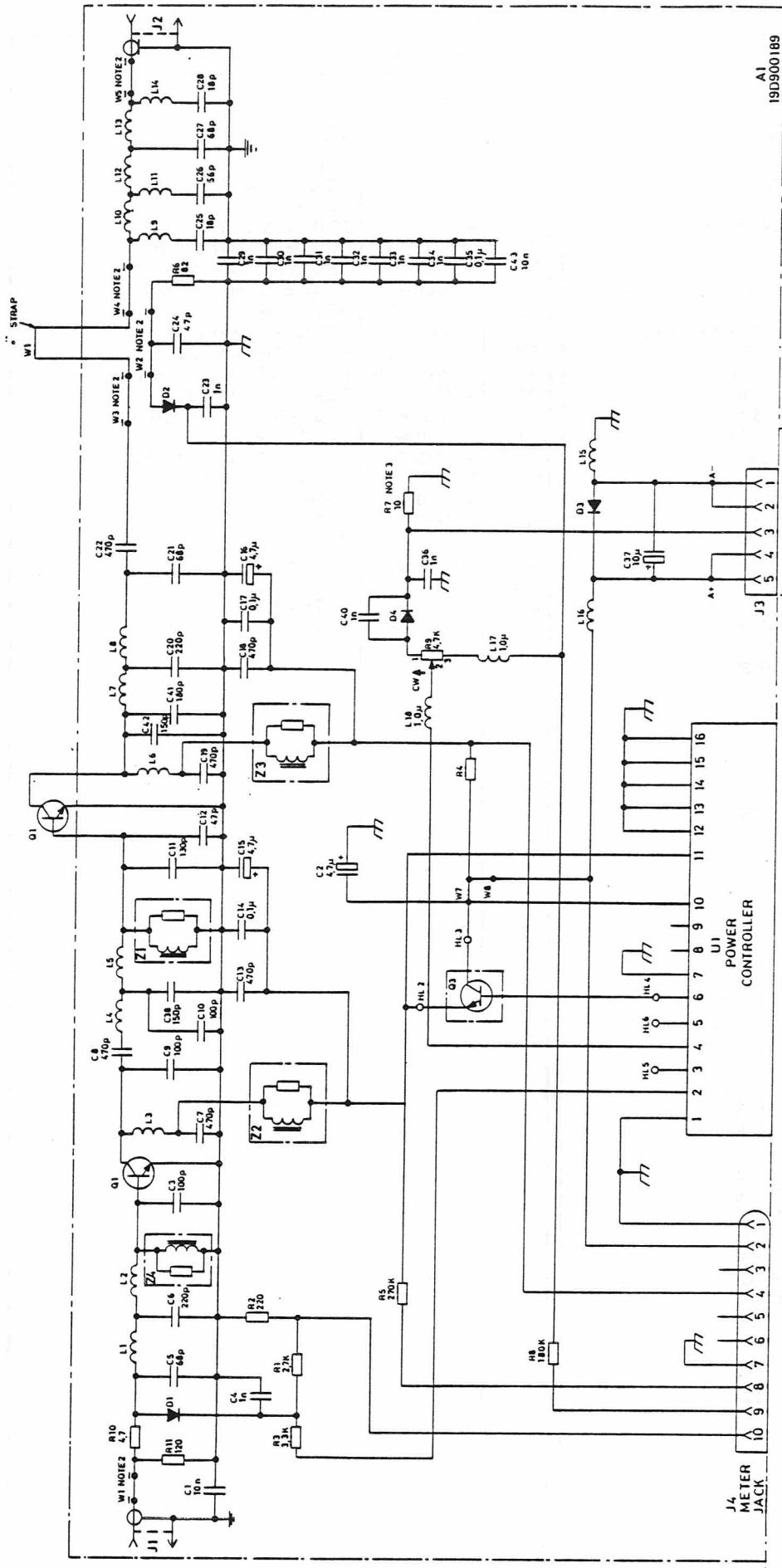


MODULE	POWER	CODE NO.
PA931	6/10W	D900461G1
PA931	6/10W	D900461G4 - GTC6114A (CQF933X ONLY)
PA931		D900476G1

**POWER AMPLIFIER PA931
COMPONENT LAYOUT**

D403.402/4





- NOTES:
- 1: ⊕ INDICATES CHASSIS GND
 - 2: PART OF PWB
 - 3: REMOVE R7 WHEN REMOTE POWER CONTROL OPTION IS INSTALLED

POWER AMPLIFIER PA931

REV. A

D403.197/4

MODULE	POWER	CODE NO.
PA931	6/10W	D900461G1
PA931	6/10W	D900461G4 - GTC6114A (COF933X ONLY)
PA931		D900476G1

PARTS LIST FOR POWER AMPLIFIER PA931

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GTC6114A	D900461G4 PA931			
A001	0102720B87	D900189G1 PA931 PWR AMPL	L013	B800749P3	COIL
Q001	J708943P6	TSTR NPN SI RF-BRD 12W	L014	B800749P4	COIL
Q003	A700054P1	TSTR NPN SI BD 201	L015	A701419P1	COIL
W001	A701093P1	STRAP	L016	A701419P1	COIL
	2602034U02	K805619G1, HEAT SINK	L017	A700024P13	COIL RF FIX 1.0UH 10%
	A701887P1	HT SK	L018	A700024P13	COIL RF FIX 1.0UH 10%
	A701900P2	CLIP COMPR.	Q001	A701941P1	TSTR NPN SI RF-PWR 2.0W
	A700031P306	SCR PAN HD. M-2.5X 6.0 2 USED	R001	A700019P42	RES DEPC 1/4W 2K7 5%
A001	0102720B18	D900189G1 PA 931 PWR AMPL	R002	A700019P29	RES DEPC 1/4W 220R 5%
C001	A700234P7	CAP PYES 10N 10%	R003	A700019P43	RES DEPC 1/4W 3K3 5%
C002	2313749D72	CAP TA SOL 4U7 35V	R004	J708143P2	RESISTOR
C003	A701413P34	CAP MICA 100P 5%	R005	A700019P66	RES DEPC 1/4W 270K 5%
C004	A700233P7	CAP CER CL2 1N 20%	R006	A700106P37	RES COMP 1/4W 82R 5%
C005	A701413P30	CAP MICA 68P 5%	R007	A700106P15	RES COMP 1/4W 10R 5%
C006	A701413P44	CAP MICA 220P 5%	R008	A700019P64	RES DEPC 1/4W 180K 5%
C007	A700227P89	CAP CER N1500 470P 5%	R009	J708394P27	RES VAR CERM 4K7 20%
C008	A700015P45	CAP PTFE 470P 5%	R010	A700106P7	RES COMP 1/4W 4R7 5%
C009	A701413P34	CAP MICA 100P 5%	R011	A700106P41	RES COMP 1/4W 120R 5%
C010	A701413P34	CAP MICA 100P 5%	U001	0102720B18	D900111G1 PC 903
C011	A700015P32	CAP PTFE 130P 5%	W007	A702102P2	JMPR
C012	A700015P21	CAP PTFE 47P 5%	W008	A702102P1	JMPR
C013	A700233P5	CAP CER CL2 470P 20%	Z001	J709081G3	FILTER ASM
C014	A700004P2	CAP PYES 100N 10%	Z002	J709081G3	FILTER ASM
C015	2313749D72	CAP TA SOL 4U7 35V	Z003	J709081G3	FILTER ASM
C016	2313749D72	CAP TA SOL 4U7 35V	Z004	J709081G3	FILTER ASM
C017	A700004P2	CAP PYES 100N 10%		8402003U63A	D900190P1R1 BD PW
C018	A700233P5	CAP CER CL2 470P 20%			
C019	A700227P89	CAP CER N1500 470P 5%			
C020	A701413P44	CAP MICA 220P 5%			
C021	A701413P30	CAP MICA 68P 5%			
C022	A700015P45	CAP PTFE 470P 5%			
C023	A700233P7	CAP CER CL2 1N 20%			
C024	A700235P22	CAP CER N150 56P 5%			
C025	A701413P14	CAP MICA 18P 5%			
C026	A701413P28	CAP MICA 56P 5%			
C027	A701413P30	CAP MICA 68P 5%			
C028	A701413P14	CAP MICA 18P 5%			
C029	A700233P7	CAP CER CL2 1N 20%			
C030	A700233P7	CAP CER CL2 1N 20%			
C031	A700233P7	CAP CER CL2 1N 20%			
C032	A700233P7	CAP CER CL2 1N 20%			
C033	A700233P7	CAP CER CL2 1N 20%			
C034	A700233P7	CAP CER CL2 1N 20%			
C035	A700004P2	CAP PYES 100N 10%			
C036	A700233P7	CAP CER CL2 1N 20%			
C037	A700064P1	CAP ELECT 10U 25V			
C038	A701413P38	CAP MICA 150P 5%			
C040	A700233P7	CAP CER CL2 1N 20%			
C041	A701413P41	CAP MICA 180P 5%			
C042	A701413P38	CAP MICA 150P 5%			
C043	A700234P7	CAP PYES 10N 10%			
D001	A700047P3	DIO SI SIG 1N6263			
D002	A700047P3	DIO SI SIG 1N6263			
D003	A700082P1	DIO SI PWR MR 751			
D004	A700028P1	DIO SI SIG 1N4148			
J001	A700171P2	CONN PWB FEM			
J002	A700049P2	CONNECTOR RECET COAXIAL			
J003	A700102P13	CONN PWB FEM 05-CKT			
J004	J708085P10	CONN PWB FEM RECP 10-CKT			
L001	B800748P1	COIL			
L002	B800742P3	COIL			
L003	B800749P1	COIL			
L004	B800742P2	COIL			
L005	A701422P2	COIL			
L006	B800742P2	COIL			
L007	B800748P6	COIL			
L008	B800742P2	COIL			
L009	B800749P1	COIL			
L010	B800749P2	COIL			
L011	B800748P3	COIL			
L012	B800748P5	COIL			

PA932

POWER AMPLIFIER

PA932 is a broadband power amplifier for use in the 80 MHz band-end contains two RF amplifier stages, a directional coupler, a low-pass filter and a hybrid IC

power control circuit.

This module is intended for use in both simplex and duplex radios. The PA covers 66 - 88 MHz.

CIRCUIT DESCRIPTION

A signal of at least 320 mW and on the desired carrier frequency is applied to the input connector of the PA. Wideband matching networks (no tuning) are used to convert the 50-ohm input impedance down to the input impedance of the first transistor and deliver the input signal to the base of the first amplifier where it is increased in level. The first amplifier uses a TO39 cased transistor with the silicon chip electrically isolated from the case. The emitter is connected to this case which is grounded by soldering to the printed board pattern.

The output signal from the first amplifier is impedance-matched to the input of the second stage with wideband networks. The second amplifier again increases the level of the RF signal to the desired amplitude and wideband networks match the output impedance of the second transistor to 50 ohms. The second transistor is a 4-lead flange device.

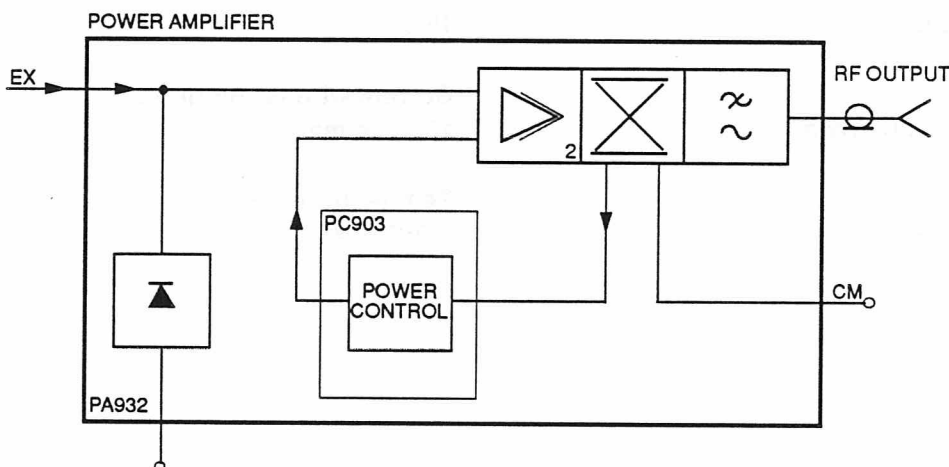
A 50 ohm microstrip line conducts the RF signal through a directional coupler to the low-pass filter where the harmonic energy is removed from the RF signal. The desired RF level is then passed to the output connector along a 50 ohm microstrip line.

The directional coupler samples the forward power level and rectifies the RF producing a DC voltage proportional to the forward signal. This DC voltage is applied to the power control hybrid IC. A power set control sends a desired output power level command to the power control IC which in turn regulates the DC voltage to the first RF-amplifier to maintain the desired output power level.

Because the power control IC consumes some current in the "TX Unkeyed" condition, a switch circuit is included to reduce the current drain during idle periods. Drive power to the first stage of the PA is sampled and detected by a diode circuit. When drive is present, a DC voltage then turns on the voltage regulator included in the monolithic IC chip. The turn-on is sequenced such that the feedback loop is brought up to power rather than coming on "full blast" and then regulating back.

A remote power reduction terminal is provided so the power can be reduced in a step function by the command system of the radio.

For ease of troubleshooting, a central metering jack provided in the PA to meter input drive from the exciter,



PA driver current, PA final amplifier current, control voltage, and voltage proportional to the forward power from the directional coupler.

DC power is brought into the PA through feedthrough bypass capacitors mounted in the PA shelf. These voltage leads are isolated from chassis ground causing the PA to float with respect to the DC levels of the vehicle. Some filtering is provided by a large electrolytic capacitor placed across the two connections.

The module is protected against accidental reverse voltage application by a large diode connected across the DC terminal. If the battery leads are connected to the wrong terminals, the diode conducts a large amount of current which then blows the fuse.

The PA is designed to operate over a DC battery voltage range of 10.8 to 16.6 volts. The output power is set to rated level at the EIA nominal voltage of approximately 13.8 voltage and will remain almost constant for all higher voltages. However, as the voltage is reduced below 13.8 the power will remain at rated level only as long as the control loop has excessive gain. At some voltage, the power output will start to decrease with decreasing voltage.

To prevent excessive spurious signal from being radiated the PA module is shielded by a metal cover. The printed board is held down to the heat sink by several screws. The shielding required between the active PA circuit and the lowpass filter is done by a separate filter cover.

TECHNICAL SPECIFICATIONS

FOR LOW PASS FILTER IN PA MODULE

Frequency range

66 - 88 MHz

Pass-band insertion loss

0.5 dB: 66 - 88 MHz

Stop band attenuation

≥45 dB from 132 MHz up to 792 MHz

Operating temperature range

-40°C to 85°C

Output load

The nominal load shall be 50 ohms non-reactive. The circuit shall not be damaged when operated at the EIA standard duty cycle into an infinite VSWR at 40 watts.

FOR PA MODULE

Power input

320 mW min. to 630 mW max.

Input VSWR

≤2.5: 1 at rated power output

Frequency range

66 - 88 MHz

Supply voltage at PA terminals

13.6 V nominal at pa power output.

Operating voltage range 12.5 to 15.5 V

Power output

25 W

Current consumption

6.0 A max.

Nominal load impedance

50 ohms non-reactive

Stability

Stable into any load with up to 3:1 VSWR. VSWR greater than 3:1 will not damage modules if operated at ≤ rated power with supply voltage less than 15.5 V.

Current with no RF drive

15.0 mA max.

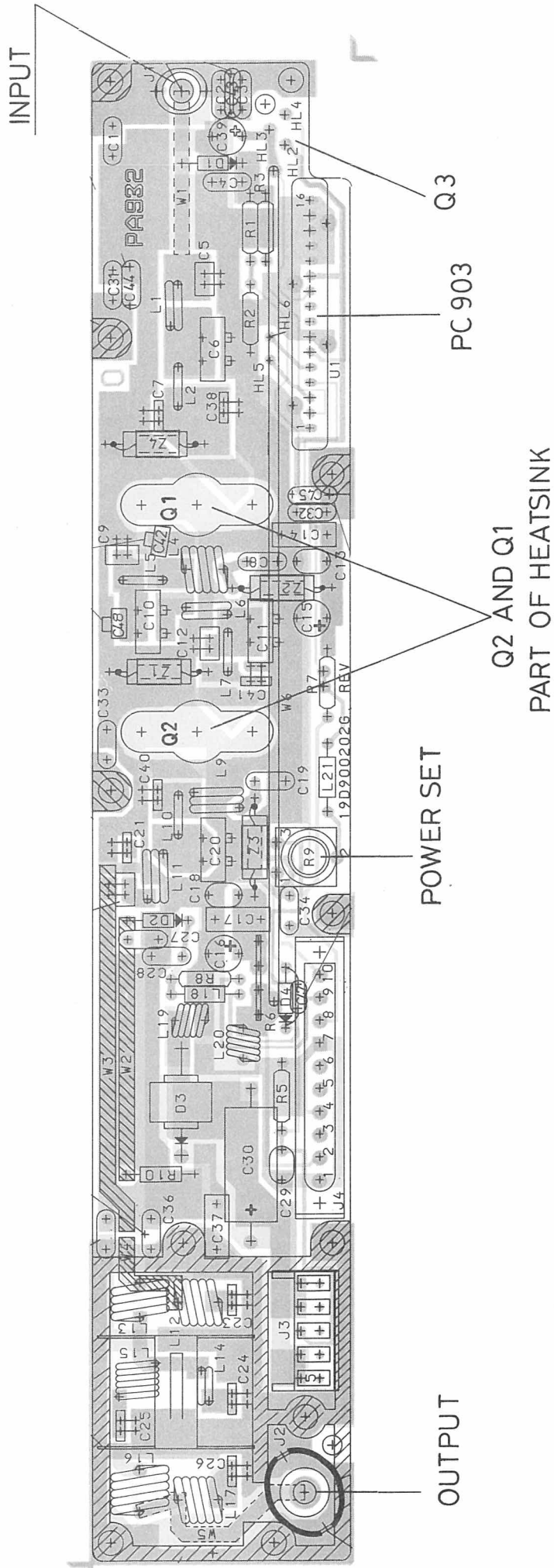
Temperature range

-40°C to 85°C

MODULE	POWER	CODE NO.
PA932	25W	D900461G2
PA932	25W	D900461G5 - GTC6115A (CQF933X ONLY)
PA932		D900476G2

**POWER AMPLIFIER PA932
COMPONENT LAYOUT**

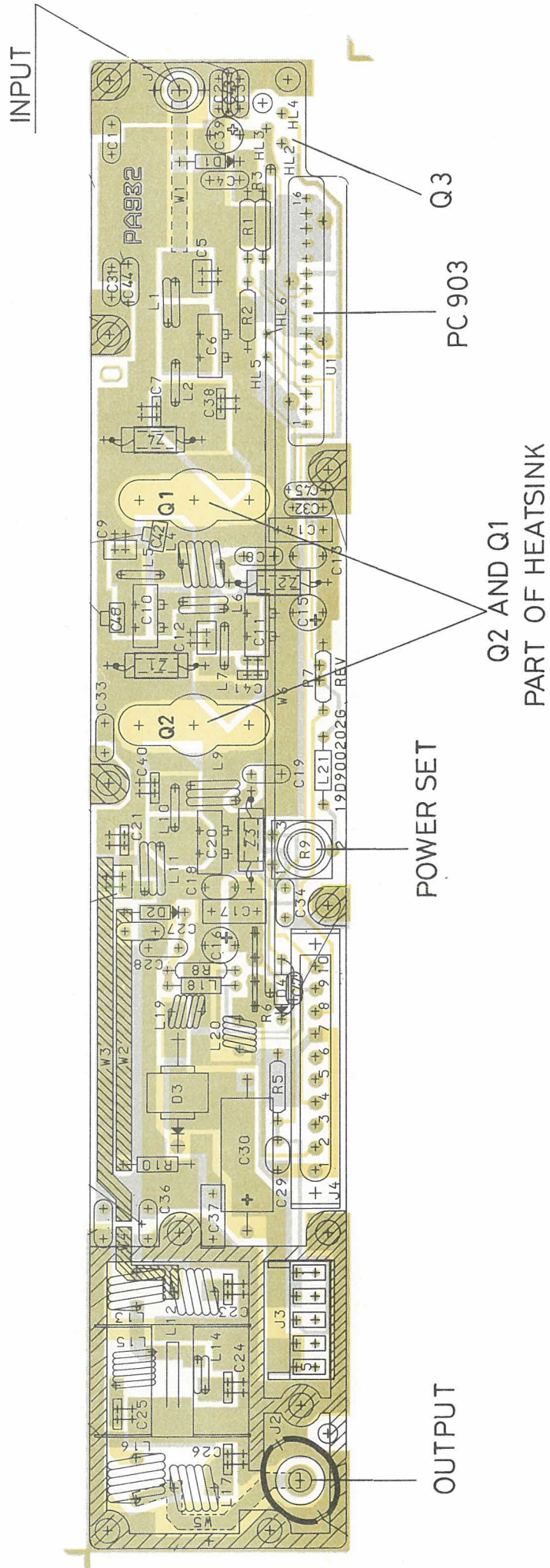
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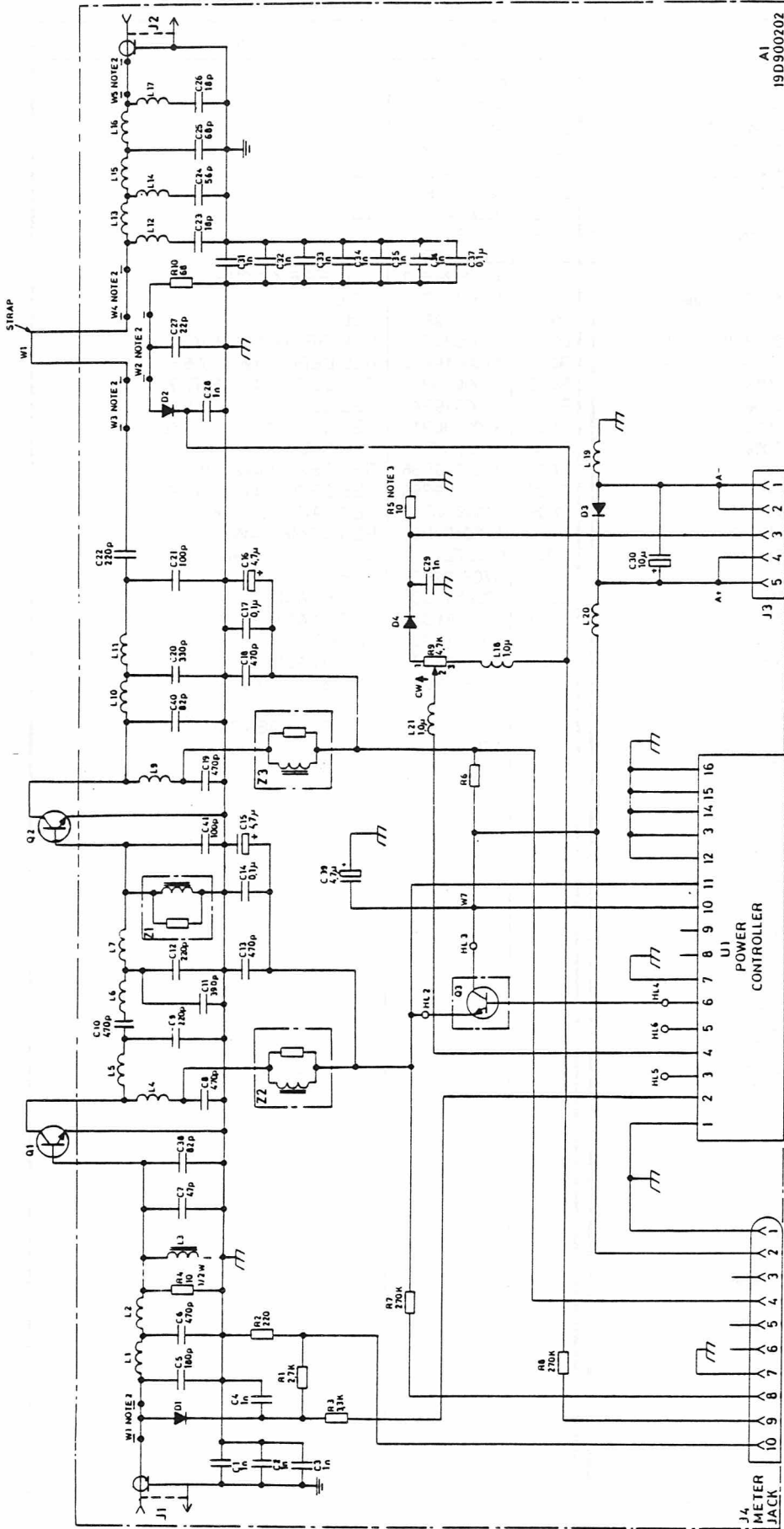


MODULE	POWER	CODE NO.
PA932	25W	D900461G2
PA932	25W	D900461G5 - GTC6115A (CQF933X ONLY)
PA932		D900476G2

**POWER AMPLIFIER PA932
COMPONENT LAYOUT**

D403.403/4





- NOTES:
 1: --- INDICATES CHASSIS GND
 2: PART OF PWB
 3: REMOVE R5 WHEN REMOTE POWER CONTROL OPTION IS INSTALLED

POWER AMPLIFIER PA932

MODULE	POWER	CODE NO.
PA932	25W	D900461G2
PA932	25W	D900461G5 - GTC6115A (COF933X ONLY)
PA932		D900476G2

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PARTS LIST FOR POWER AMPLIFIER PA932

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GTC6115A	D900461G5 PA932	L009	B800742P2	COIL
A001	0102720B89	D900202G1 PA932 PWR AMPL	L010	A701422P4	COIL
Q001	J708943P1	TSTR,NPN,SI RF-PWR 3W	L011	K805380P8	COIL
Q002	J708943P3	TSTR,NPN,SI RF-PWR 35W	L012	B800749P1	COIL
Q003	A700054P1	TSTR,NPN,SI BD 201	L013	B800749P2	COIL
W001	A701093P1	STRAP	L014	B800748P3	COIL
	2602034U02	K805619G1 HEAT SINK	L015	B800748P5	COIL
	A701887P1	HT SK	L016	B800749P3	COIL
	A701900P2	CLIP COMPR.	L017	B800749P4	COIL
	A700031P306	SCR PAN HD M-2.5X 6.0 (4 used)	L018	A700024P13	COIL RF FIX 1.0UH 10%
	0102720B83	D9000202G1 PA 932 PWR AMPL	L019	A701419P1	COIL
C001	A700233P7	CAP CER CL2 1N 20%	L020	A701419P1	COIL
C002	A700233P7	CAP CER CL2 1N 20%	L021	A700024P13	COIL RF FIX 1.0UH 10%
C003	A700233P7	CAP CER CL2 1N 20%	R001	A700019P42	RES DEPC 1/4W 2K7 5%
C004	A700233P7	CAP CER CL2 1N 20%	R002	A700019P29	RES DEPC 1/4W 220R 5%
C005	A701413P35	CAP MICA 110P 5%	R003	A700019P43	RES DEPC 1/4W 3K3 5%
C006	A700015P39	CAP PTFE 270P 5%	R005	A700106P15	RES COMP 1/4W 10R 5%
C007	A701413P32	CAP MICA 82P 5%	R006	J708143P2	RESISTOR
C008	A700227P89	CAP CER N1500 470P 5%	R007	A700019P66	RES DEPC 1/4W 270K 5%
C009	A701413P44	CAP MICA 220P 5%	R008	A700019P66	RES DEPC 1/4W 270K 5%
C010	A700015P45	CAP PTFE 470P 5%	R009	J708394P27	RES VAR CERM 4K7 20%
C011	A700015P43	CAP PTFE 390P 5%	R010	A700106P35	RES COMP 1/4W 68R 5%
C012	A701413P44	CAP MICA 220P 5%	U001	0102720B89	D900111G1 PC 903
C013	A700233P5	CAP CER CL2 470P 20%	W006	A702102P3	JMPR
C014	A700004P2	CAP PYES 100N 10%	Z001	J709081G3	FILTER ASM
C015	2313749D72	CAP TA SOL 4U7 35V	Z002	J709081G3	FILTER ASM
C016	2313749D72	CAP TA SOL 4U7 35V	Z003	J709081G3	FILTER ASM
C017	A700004P2	CAP PYES 100N 10%	Z004	J709081G3	FILTER ASM
C018	A700233P5	CAP CER CL2 470P 20%		8402003U64A	D900203P1 BD PW
C019	A700227P89	CAP CER N1500 470P 5%			NON REFERENCED ITEM:
C020	A700015P41	CAP PTFE 330P 5%		A702106P1	SHLD
C021	A701413P32	CAP MICA 82P 5%			
C022	A701413P44	CAP MICA 220P 5%			
C023	A701413P14	CAP MICA 18P 5%			
C024	A701413P28	CAP MICA 56P 5%			
C025	A701413P30	CAP MICA 68P 5%			
C026	A701413P14	CAP MICA 18P 5%			
C027	A700235P20	CAP CER N150 39P 5%			
C028	A700233P7	CAP CER CL2 1N 20%			
C029	A700233P7	CAP CER CL2 1N 20%			
C030	A700064P1	CAP ELECT 10U 25V			
C031	A700233P7	CAP CER CL2 1N 20%			
C032	A700233P7	CAP CER CL2 1N 20%			
C033	A700233P9	CAP CER CL2 2N2 20%			
C034	A700233P7	CAP CER CL2 1N 20%			
C035	A700233P7	CAP CER CL2 1N 20%			
C036	A700233P7	CAP CER CL2 1N 20%			
C037	A700004P2	CAP PYES 100N 10%			
C038	A701413P32	CAP MICA 82P 5%			
C039	2313749D72	CAP TA SOL 4U7 35V			
C040	A701413P32	CAP MICA 82P 5%			
C041	A701413P38	CAP MICA 150P 5%			
C042	A701413P34	CAP MICA 100P 5%			
C043	A700121P3	CAP CER 22N 20% 50V			
C044	A700121P3	CAP CER 22N 20% 50V			
C045	A700121P3	CAP CER 22N 20% 50V			
C047	A700233P7	CAP CER CL2 1N 20%			
C048	A701413P32	CAP MICA 82P 5%			
D001	A700047P3	DIO SI SIG 1N6263			
D002	A700047P3	DIO SI SIG 1N6263			
D003	A700082P1	DIO SI PWR MR 751			
D004	A700028P1	DIO SI SIG 1N4148			
J001	A700171P2	CONN PWB FEM			
J002	A700049P2	CONNECTOR RECET COAXIAL			
J003	A700102P13	CONN PWB FEM 05-CKT			
J004	J708085P10	CONN PWB FEM RECP 10-CKT			
L001	B800748P4	COIL			
L002	J707776P2	COIL			
L004	B800749P1	COIL			
L005	A701422P4	COIL			
L006	B800748P6	COIL			
L007	A701422P1	COIL			

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DATE: 09/20/90

PA933

POWER AMPLIFIER

PA933 is a broadband power amplifier for use in the 80 MHz band. This module contains three RF amplifier stages, a directional coupler, a low-pass filter and a

hybrid IC power control circuit.

This module is intended for use in both simplex and duplex radios. The PA covers 66 - 88 MHz.

CIRCUIT DESCRIPTION

A signal of at least 320 mW and on the desired carrier frequency is applied to the input connector of the PA. Wideband matching networks (no tuning) are used to convert the 50-ohm input impedance down to the input impedance of the first transistor and deliver the input signal to the base of the first amplifier where it is increased in level. The first amplifier uses a TO39 cased transistor with the silicon chip electrically isolated from the case. The emitter is connected to this case which is grounded by soldering to the printed board pattern.

The output signal from the first amplifier is impedance-matched to the input of the second stage with wideband networks. The second amplifier again increases the level of the RF signal to the desired amplitude and wideband networks match the output impedance of the second transistor to the third amplifier stage.

The final PA stage is placed between second amplifier and the directional coupler to raise the RF power level to at least 45 watts. The second and the third transistor are a 4-leaded flange devices.

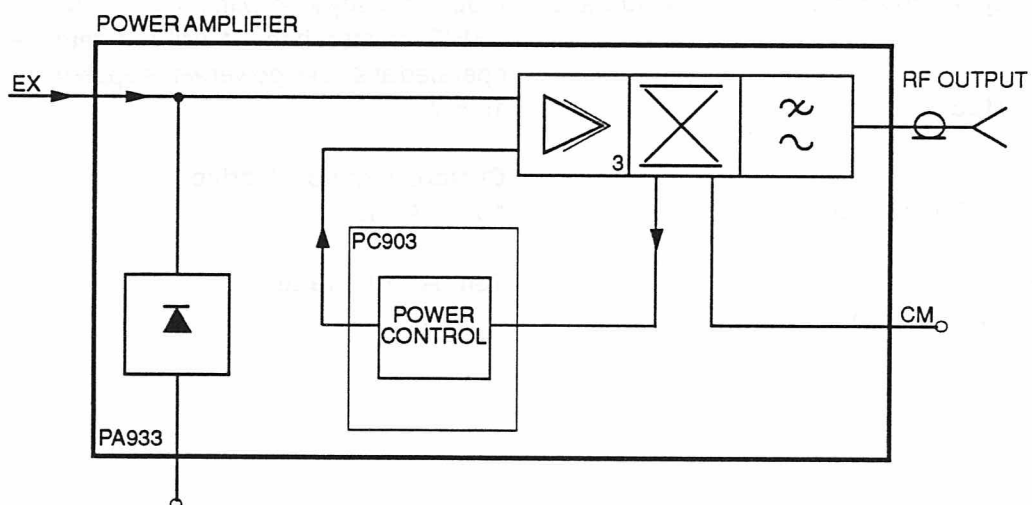
A 50 ohm microstrip line conducts the RF signal through a directional coupler to the low-pass filter where the

harmonic energy is removed from the RF signal. The desired RF level is then passed to the output connector along a 50 ohm microstrip line.

The directional coupler samples the forward power level and rectifies the RF producing a DC voltage proportional to the forward signal. This DC voltage is applied to the power control hybrid IC. A power set control sends a desired output power level command to the power control IC which in turn regulates the DC voltage to the first RF-amplifier to maintain the desired output power level.

Because the power control IC consumes some current in the "TX Unkeyed" condition, a switch circuit is included to reduce the current drain during idle periods. Drive power to the first stage of the PA is sampled and detected by a diode circuit. When drive is present, a DC voltage then turns on the voltage regulator included in the monolithic IC chip. The turn-on is sequenced such that the feedback loop is brought up to power rather than coming on "full blast" and then regulating back.

A remote power reduction terminal is provided so the power can be reduced in a step function by the command system of the radio.



For ease of troubleshooting, a central metering jack provided in the PA to meter input drive from the exciter, PA driver current, PA final amplifier current, control voltage, and voltage proportional to the forward power from the directional coupler.

DC power is brought into the PA through feedthrough bypass capacitors mounted in the PA shelf. These voltage leads are isolated from chassis ground causing the PA to float with respect to the DC levels of the vehicle. Some filtering is provided by a large electrolytic capacitor placed across the two connections.

The module is protected against accidental reverse voltage application by a large diode connected across the DC terminal. If the battery leads are connected to the wrong terminals, the diode conducts a large amount of current which then blows the fuse.

The PA is designed to operate over a DC battery voltage range of 10.8 to 16.6 volts. The output power is set to rated level at the EIA nominal voltage of approximately 13.8 voltage and will remain almost constant for all higher voltages. However, as the voltage is reduced below 13.8 the power will remain at rated level only as long as the control loop has excessivt gain. At some voltage, the power output will start to decrease with decreasing voltage.

To prevent excessive spurious signal from being radiated the PA module is shielded by a metal cover. The printed board is held down to the heat sink by several screws. The shielding required between the activ PA circuit and the lowpass filter is done by a separate filter cover.

TECHNICAL SPECIFICATIONS

FOR LOW PASS FILTER IN PA MODULE

Frequency range

66 - 88 MHz

Pass-band insertion loss

0.5 dB: 66 - 88 MHz

Stop band attenuation

≥45 dB from 132 MHz up to 792 MHz

Operating temperature range

-40°C to 85°C

Output load

The nominal load shall be 50 ohms non-reactive. The circuit shall not be damaged when operated at the EIA standard duty cycle into an infinite VSWR at 40 watts.

FOR PA MODULE

Power input

320 mW min. to 630 mW max.

Input VSWR

≤2.5: 1 at rated power output

Frequency range

66 - 88 MHz

Supply voltage at PA terminals

13.6 V nominal at pa power output.

Operating voltage range 12.5 to 15.5 V

Power output

40 W

Current consumption

10.0 A max.

Nominal load impedance

50 ohms non-reactive

Stability

Stable into any load with up to 3:1 VSWR.

VSWR greater than 3:1 will not damage modules if operated at ≤ rated power with supply voltage less than 15.5 V.

Current with no RF drive

15.0 mA max.

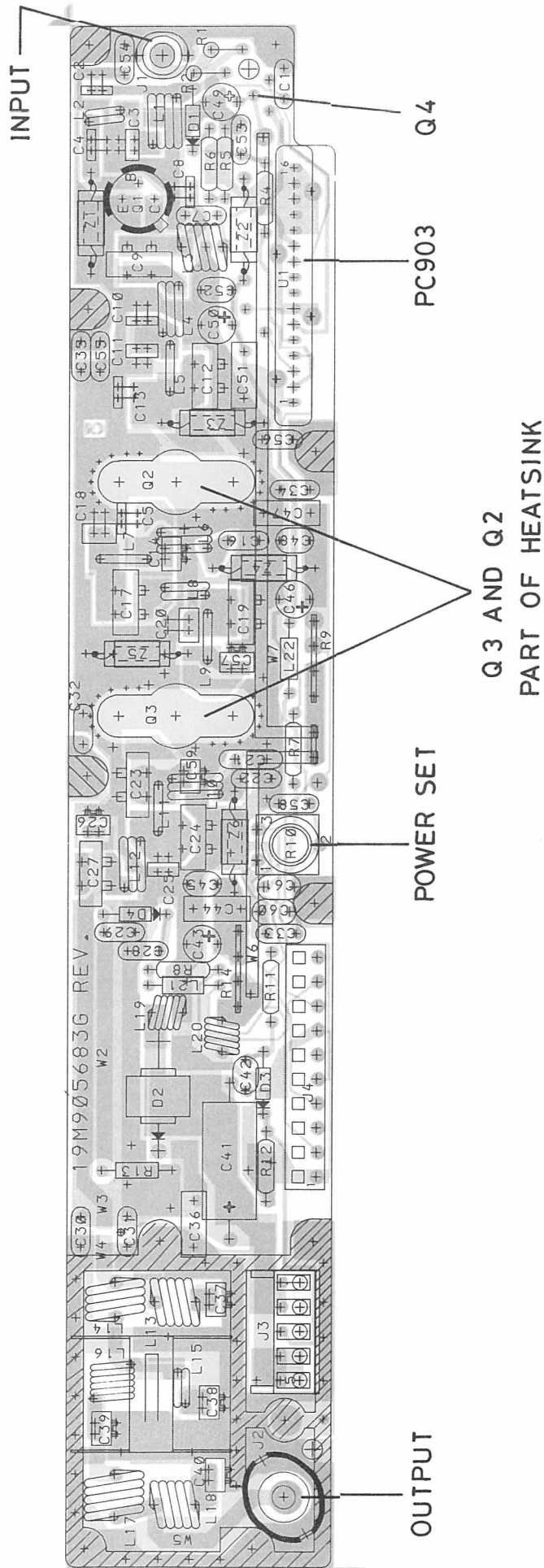
Temperature range

-40°C to 85°C

POWER AMPLIFIER PA933
COMPONENT LAYOUT

D403.788/4

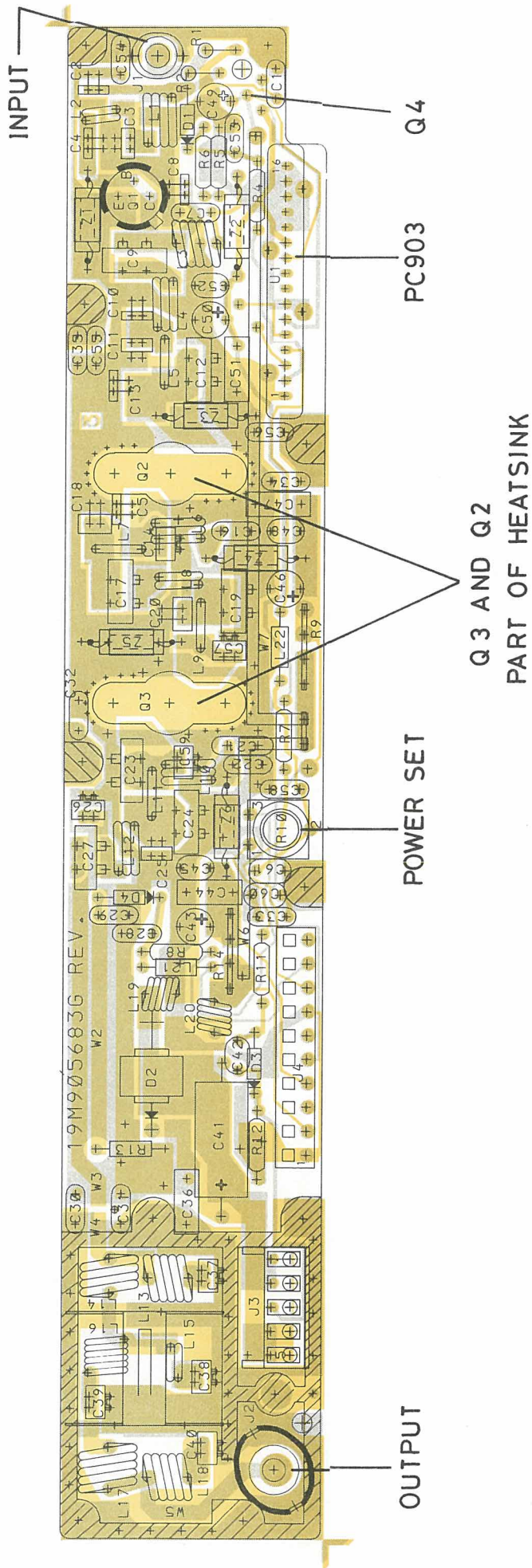
MODULE	POWER	CODE NO.
PA933	40W	M905686G1
PA933	40W	M905686G2
PA933	40W	M905686G2 - GTC6118A (CQF933X ONLY)

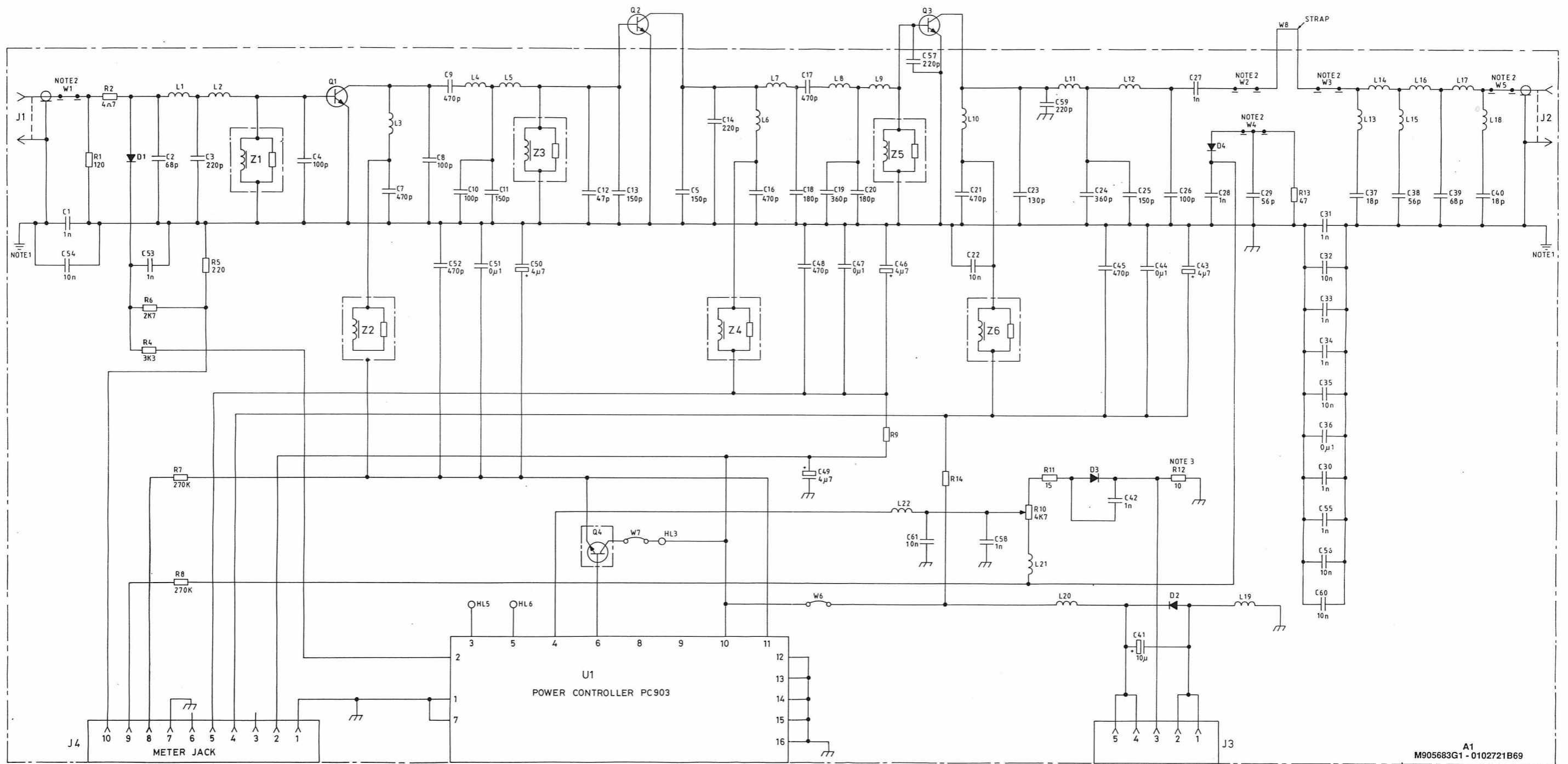


POWER AMPLIFIER PA933
COMPONENT LAYOUT

D403.788/4

MODULE	POWER	CODE NO.
PA933	40W	M905686G1
PA933	40W	M905686G2
PA933	40W	M905686G2 - GTC6118A (CQF933X ONLY)





- NOTES:
- ⏏ INDICATES CHASSIS GND
 - PART OF PWB
 - REMOVE R12 WHEN REMOTE POWER CONTROL OPTION IS INSTALLED

MODULE	POWER	CODE NO.
PA933	40W	D905686G1
PA933	40W	D905686G2
PA933	40W	D905686G3 - GTC6118A (CQF933X ONLY)

A1
M905683G1 - 0102721B69

POWER AMPLIFIER PA933

REV.A D403.790/5

PARTS LIST FOR POWER AMPLIFIER PA933

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GTC6118A	M905686G3 PA933			
A001	0102721B69	M905683G1 CPNT BD PW PA933 40W	D002	A700082P1	DIO SI PWR MR 75I
Q002	J708943P6	TSTR,NPN,SI RF-PWR 12W	D003	A700028P1	DIO SI SIG 1N4148
Q003	J708943P4	TSTR,NPN,SI RF-PWR 50W	D004	A700047P3	DIO SI SIG 1N6263
Q004	A700054P1	TSTR,NPN,SI BD 20I	J001	A700171P2	CONN PWB FEM
W008	A701093P1	STRAP	J002	A700049P2	CONNECTOR RECET COAXIAL
	2602034U02	K805561G1 HEAT SINK	J003	A700102P13	CONN PWB FEM 05-CKT
	A700031P306	SCR PAN HD M-2.5X 6.0 (4 used)	J004	J708085P10	CONN PWB FEM RECP 10-CKT
	A701887P1	HT SK	L001	K805380P1	COIL
	A701900P2	CLIP	L002	K805379P5	COIL
A001	0102721B69	M905683P1 PA933 PWR AMPL	L003	K805448P3	COIL
C001	A700233P7	CAP CER CL2 1N 20%	L004	K805379P5	COIL
C001	A701413P30	CAP MICA 68P 5%	L005	J707776P2	COIL
C002	A701413P30	CAP MICA 68P 5%	L006	K805379P6	COIL
C003	A701413P44	CAP MICA 220P 5%	L007	J707776P1	COIL
C004	A701413P34	CAP MICA 100P 5%	L008	K805380P3	COIL
C005	A701413P38	CAP MICA 150P 5%	L009	J707776P1	COIL
C007	A700233P5	CAP CER CL2 470P 20%	L010	K805379P6	COIL
C008	A701413P34	CAP MICA 100P 5%	L011	J707776P1	COIL
C009	A700015P45	CAP PTFE 470P 5%	L012	K805380P4	COIL
C010	A701413P34	CAP MICA 100P 5%	L013	K805448P1	COIL
C011	A701413P38	CAP MICA 150P 5%	L014	K805448P2	COIL
C012	A700015P21	CAP PTFE 47P 5%	L015	K805380P3	COIL
C013	A701413P38	CAP MICA 150P 5%	L016	K805380P5	COIL
C014	A701413P44	CAP MICA 220P 5%	L017	K805448P3	COIL
C016	A700233P5	CAP CER CL2 470P 20%	L018	K805448P4	COIL
C017	A700015P45	CAP PTFE 470P 5%	L019	A701419P1	COIL
C018	A701413P41	CAP MICA 180P 5%	L020	A701419P1	COIL
C019	A700015P42	CAP PTFE 360P 5%	L021	A700024P13	COIL RF FIX 1.0UH 10%
C020	A701413P41	CAP MICA 180P 5%	L022	A700024P13	COIL RF FIX 1.0UH 10%
C021	A700233P5	CAP CER CL2 470P 20%	Q001	A701941P1	TSTR NPN SI RF-PWR 2.0W
C022	A700234P7	CAP PYES 10N 10%	R001	A700106P41	RES COMP 1/4W 120R 5%
C023	A700015P32	CAP PTFE 130P 5%	R002	A700106P7	RES COMP 1/4W 4R7 5%
C024	A700015P42	CAP PTFE 360P 5%	R004	A700019P43	RES DEPC 1/4W 3K3 5%
C025	A701413P38	CAP MICA 150P 5%	R005	A700019P29	RES DEPC 1/4W 220R 5%
C026	A701413P34	CAP MICA 100P 5%	R006	A700019P42	RES DEPC 1/4W 2K7 5%
C027	A700015P53	CAP PTFE 1N 5%	R007	A700019P66	RES DEPC 1/4W 270K 5%
C028	A700233P7	CAP CER CL2 1N 20%	R008	A700019P66	RES DEPC 1/4W 270K 5%
C029	A700235P22	CAP CER N150 56P 5%	R009	J708143P2	RESISTOR
C030	A700233P7	CAP CER CL2 1N 20%	R010	J708394P27	RES VAR CERM 4K7 20%
C031	A700233P7	CAP CER CL2 1N 20%	R011	A700019P15	RES DEPC 1/4W 15R 5%
C032	A700234P7	CAP PYES 10N 10%	R012	A700106P15	RES COMP 1/4W 10R 5%
C033	A700233P7	CAP CER CL2 1N 20%	R013	A700019P21	RES DEPC 1/4W 47R 5%
C034	A700233P7	CAP CER CL2 1N 20%	R014	J708143P2	RESISTOR
C035	A700234P7	CAP PYES 10N 10%	U001	0102721B69	D900111G1 PC 903
C036	A700004P2	CAP PYES 100N 10%	W006	J708195P1	JUMPER
C037	A701413P14	CAP MICA 18P 5%	W007	J708196P1	JUMPER
C038	A701413P28	CAP MICA 56P 5%	Z001	J709081G3	FILTER AS
C039	A701413P30	CAP MICA 68P 5%	Z002	J709081G3	FILTER ASM
C040	A701413P14	CAP MICA 18P 5%	Z003	J709081G2	FILTER ASM
C041	A700064P1	CAP ELECT 10U 25V	Z004	J709081G3	FILTER ASM
C042	A700233P7	CAP CER CL2 1N 20%	Z005	J709081G2	FILTER ASM
C043	2313749D72	CAP TA SOL 4U7 35V	Z006	J709081G3	FILTER ASM
C044	A700004P2	CAP PYES 100N 10%		8402003U65A	M905684P1R3 BD PW
C045	A700233P5	CAP CER CL2 470P 20%			
C046	2313749D72	CAP TA SOL 4U7 35V			
C047	A700004P2	CAP PYES 100N 10%			
C048	A700233P5	CAP CER CL2 470P 20%			
C049	2313749D72	CAP TA SOL 4U7 35V			
C050	2313749D72	CAP TA SOL 4U7 35V			
C051	A700004P2	CAP PYES 100N 10%			
C052	A700233P5	CAP CER CL2 470P 20%			
C053	A700233P7	CAP CER CL2 1N 20%			
C054	A700234P7	CAP PYES 10N 10%			
C055	A700233P7	CAP CER CL2 1N 20%			
C056	A700234P7	CAP PYES 10N 10%			
C057	A701413P44	CAP MICA 220P 5%			
C058	A700233P7	CAP CER CL2 1N 20%			
C059	A701413P44	CAP MICA 220P 5%			
C060	A700234P7	CAP PYES 10N 10%			
C061	A700234P7	CAP PYES 10N 10%			
D001	A700028P1	DIO SI SIG 1N4148			

DATE: 09/20/90

X404.764/3

PA911

POWER AMPLIFIER

PA911 is a broadband power amplifier for use in the 160 MHz band-end contains two RF amplifier stages, a directional coupler, a low-pass filter and a hybrid IC

power control circuit.

This module is intended for use in both simplex and duplex radios. The PA covers 138 - 174 MHz.

CIRCUIT DESCRIPTION

A signal of at least 250 mW and on the desired carrier frequency is applied to the input connector of the PA. Wideband matching networks (no tuning) are used to convert the 50-ohm input impedance down to the input impedance of the first transistor and deliver the input signal to the base of the first amplifier where it is increased in level. The first amplifier uses a TO39 cased transistor with the silicon chip electrically isolated from the case. The emitter is connected to this case which is grounded by soldering to the printed board pattern.

The output signal from the first amplifier is impedance-matched to the input of the second stage with wideband networks. The second amplifier again increases the level of the RF signal to the desired amplitude and wideband networks match the output impedance of the second transistor to 50 ohms. The second transistor is a 4-lead flange device.

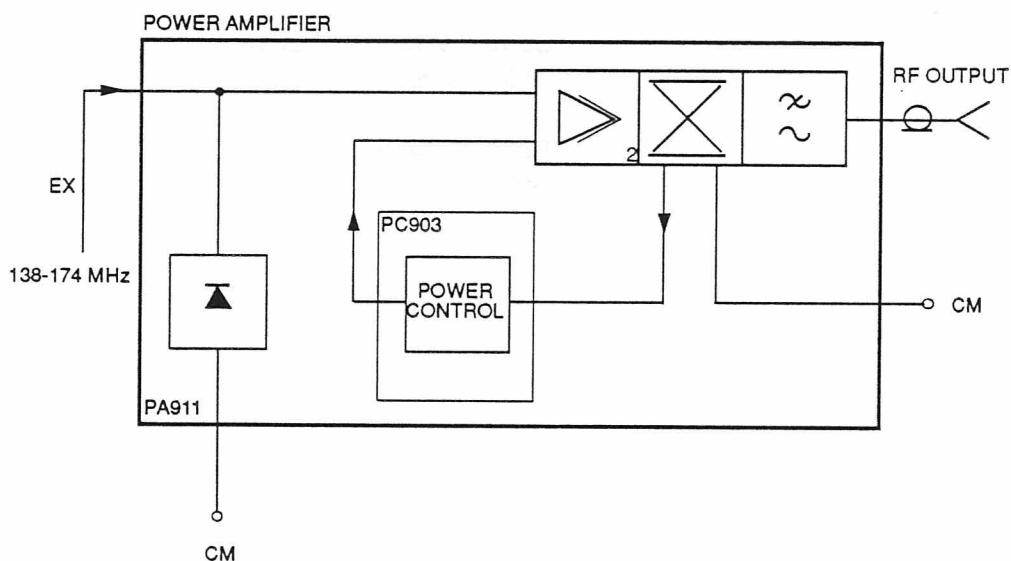
A 50 ohm microstrip line conducts the RF signal through a directional coupler to the low-pass filter where the harmonic energy is removed from the RF signal. The desired RF level is then passed to the output connector along a 50 ohm microstrip line.

The directional coupler samples the forward power level and rectifies the RF producing a DC voltage proportional to the forward signal. This DC voltage is applied to the power control hybrid IC. A power set control sends a desired output power level command to the power control IC which in turn regulates the DC voltage to the first RF-amplifier to maintain the desired output power level.

Because the power control IC consumes some current in the "TX Unkeyed" condition, a switch circuit is included to reduce the current drain during idle periods. Drive power to the first stage of the PA is sampled and detected by a diode circuit. When drive is present, a DC voltage then turns on the voltage regulator included in the monolithic IC chip. The turn-on is sequenced such that the feedback loop is brought up to power rather than coming on "full blast" and then regulating back.

A remote power reduction terminal is provided so the power can be reduced in a step function by the command system of the radio.

For ease of troubleshooting, a central metering jack provided in the PA to meter input drive from the exciter,



PA driver current, PA final amplifier current, control voltage, and voltage proportional to the forward power from the directional coupler.

DC power is brought into the PA through feedthrough bypass capacitors mounted in the PA shelf. These voltage leads are isolated from chassis ground causing the PA to float with respect to the DC levels of the vehicle. Some filtering is provided by a large electrolytic capacitor placed across the two connections.

The module is protected against accidental reverse voltage application by a large diode connected across the DC terminal. If the battery leads are connected to the wrong terminals, the diode conducts a large amount of current which then blows the fuse.

The PA is designed to operate over a DC battery voltage range of 11.0 to 16.6 volts. The output power is set to rated level at the EIA nominal voltage of approximately 13.8 voltage and will remain almost constant for all higher voltages. However, as the voltage is reduced below 13.8 the power will remain at rated level only as long as the control loop has excessivt gain. At some voltage, the power output will start to decrease with decreasing voltage.

To prevent excessive spurious signal from being radiated the PA module is shielded by a metal cover. The printed board is held down to the heat sink by several screws. The shielding required between the activ PA circuit and the lowpass filter is done by a separate filter cover.

TECHNICAL SPECIFICATIONS

FOR LOW PASS FILTER IN PA MODULE

Frequency range

135 - 185 MHz

Pass-band insertion loss

0.4 dB: 138 - 174 MHz

Stop band attenuation

50 dB

Operating temperature range

-40°C to 85°C

FOR PA MODULE

Power input

250 mW min. to 500 mW max.

Input VSWR

≤2.5: 1 at rated power output

Frequency range

138 - 174 MHz

Supply voltage at PA terminals

13.6 V nominal at pa power output.

Operating voltage range 12.5 to 15.5 V

Power output

10 W

Current consumption

3.5 A max.

Nominal load impedance

50 ohms non-reactive

Stability

Stable into any load with up to 3:1 VSWR.

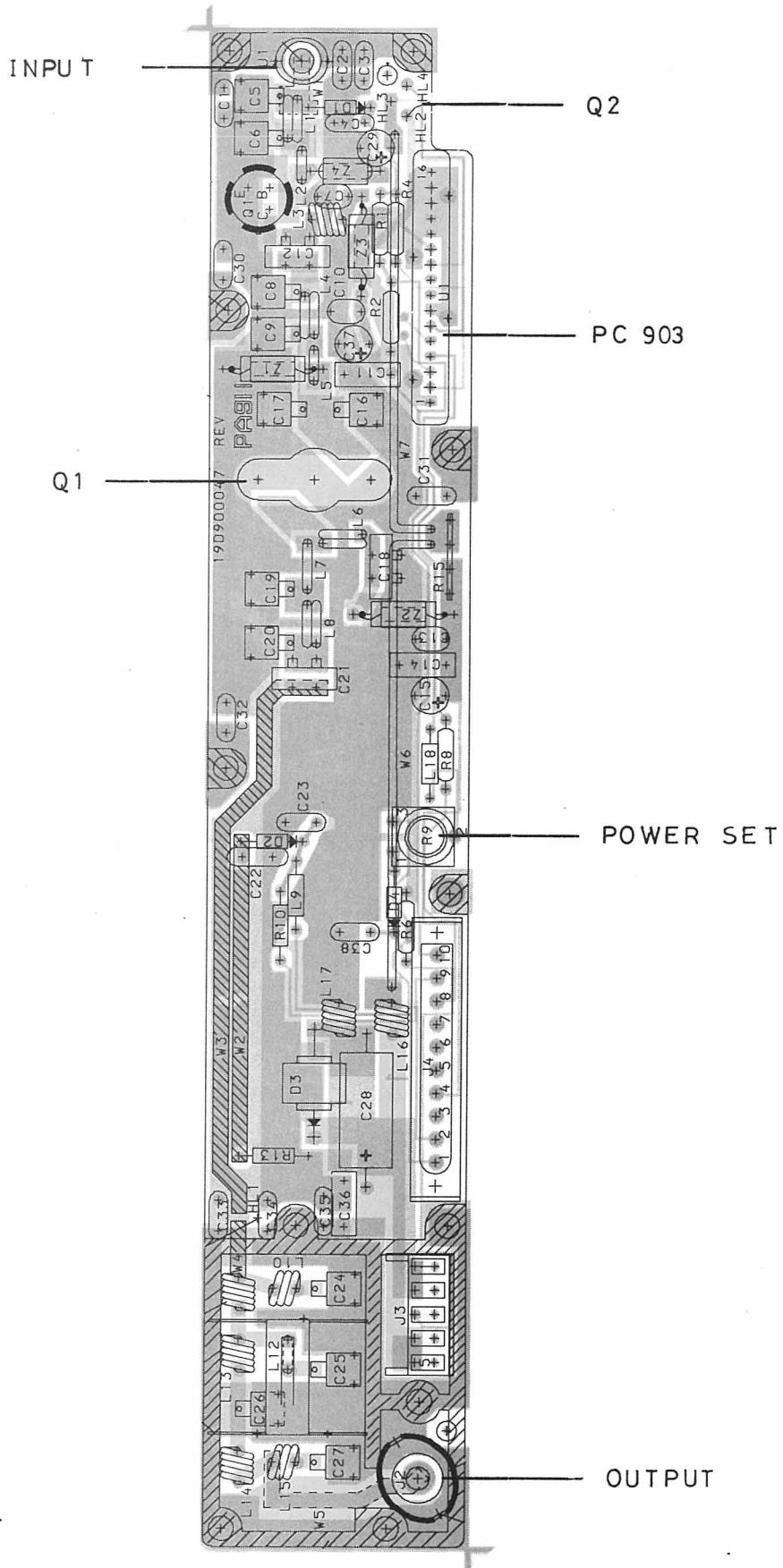
VSWR greater than 3:1 will not damage modules if operated at ≤ rated power with supply voltage less than 15.5 V.

Current with no RF drive

12.0 mA max.

Temperature range

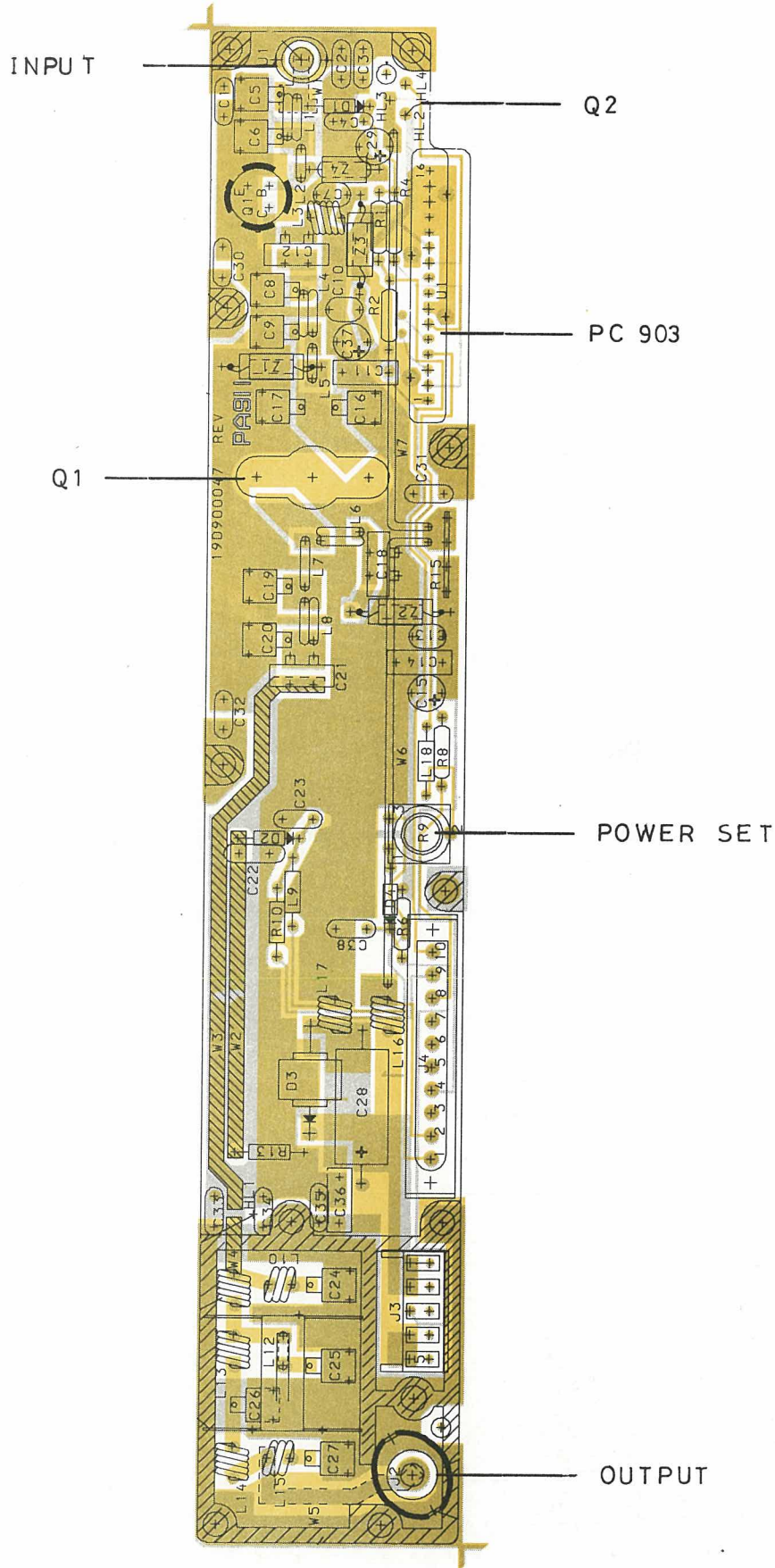
-40°C to 85°C



POWER AMPLIFIER PA911
COMPONENT LAYOUT

MODULE CODE NO. D900183G5 - GTD6136A
MOUNTED BOARD CODE NO. D900047G2 - 0102721B55

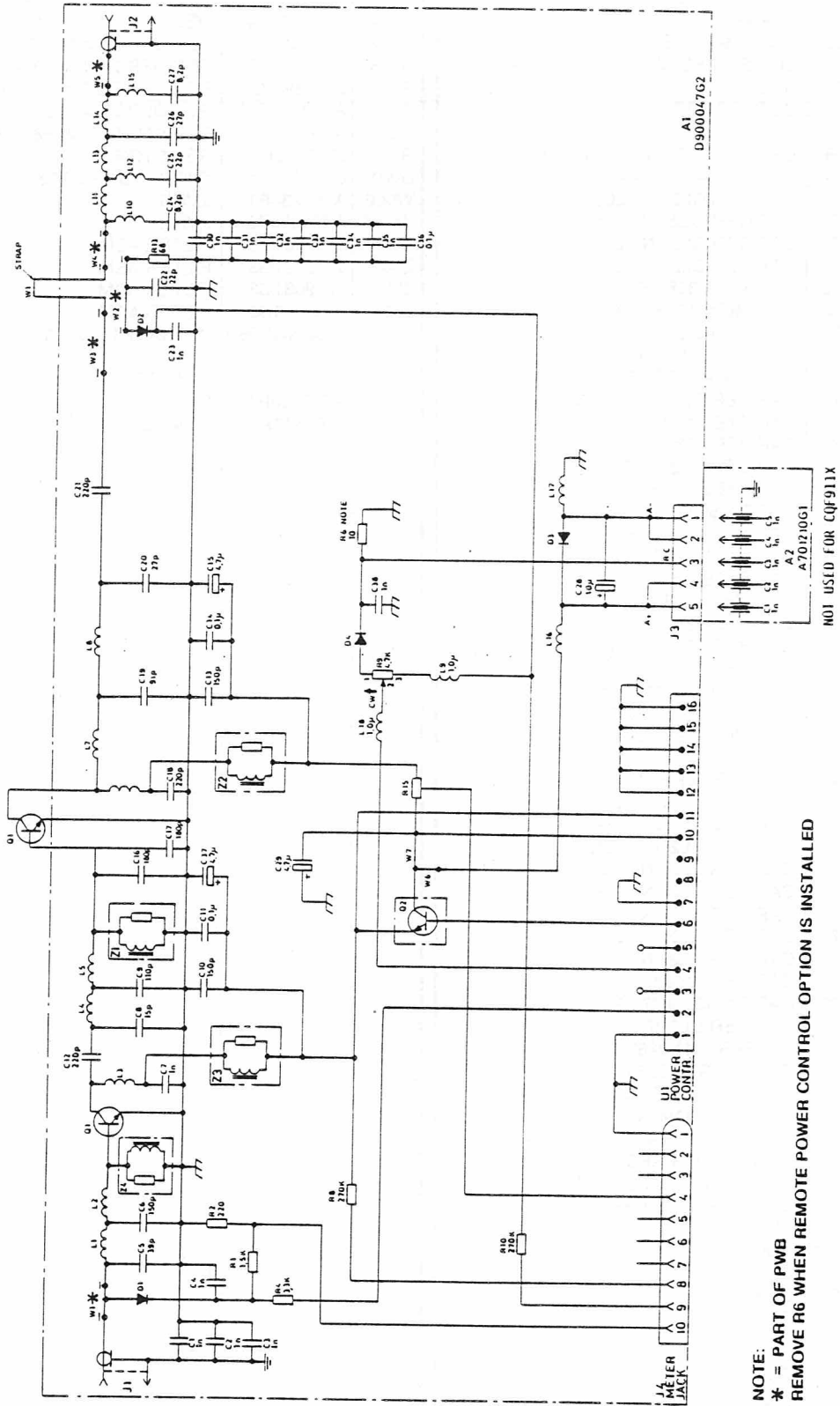
D403.115/5



POWER AMPLIFIER PA911
COMPONENT LAYOUT

MODULE CODE NO. D900183G5 - GTD6136A
MOUNTED BOARD CODE NO. D900047G2 - 0102721B55

D403.115/5



NOTE:
 * = PART OF PWB
 REMOVE R6 WHEN REMOTE POWER CONTROL OPTION IS INSTALLED

POWER AMPLIFIER PA911

MODULE CODE NO. D900183G5 - GTD6136A
 MOUNTED BOARD CODE NO. D900047G2 - 0102721B55

D405.628

PARTS LIST FOR POWER AMPLIFIER PA911

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GTD6136A	D900183G5 PA911			
A001	0102721B55	D900047G2 PA 911 PWR AMPL 6/10W	L017	A701419P1	COIL
Q001	A700063P2	TSTR,NPN,SI RF-PWR, 14W	L018	A700024P13	COIL,RF,FIX 1.0UH , 10%
Q003	A700054P1	TSTR,NPN,SI BD 201	Q001	A700063P1	TSTR,NPN,SI RF-PWR,2.0W
W001	A701093P1	STRAP	R001	A700019P39	RES,DEPC,1/4W 1K5 , 5%
	2602034U02	K805619G1 HEAT SINK	R002	A700019P29	RES,DEPC,1/4W 220R , 5%
	A700031P306	SCR,PAN HD M-2.5X 6.0 (2 used)	R004	A700019P43	RES,DEPC,1/4W 3K3 , 5%
	A701887P1	HT SK	R006	A700019P13	RES,DEPC,1/4W 10R , 5%
	A701900P2	CLIP, COMPR.	R008	A700019P66	RES,DEPC,1/4W 270K , 5%
A001	0102721B55	D900047G2 PA 911 PWR AMPL 6/10W	R009	J708394P27	RES,VAR,CERM 4K7 , 20%
C001	A700233P7	CAP,CER,CL2 1N , 20%	R010	A700019P66	RES,DEPC,1/4W 270K , 5%
C002	A700233P7	CAP,CER,CL2 1N , 20%	R013	A700106P35	RES,COMP,1/4W 68R , 5%
C003	A700233P7	CAP,CER,CL2 1N , 20%	R015	J708143P2	RESISTOR
C004	A700233P7	CAP,CER,CL2 1N , 20%	U001	0102720B18	D900111G1 PC 903
C005	A700006P23	CAP,MICA 39P , 5%	W006	A701234P1	JMRR
C006	A700006P38	CAP,MICA 150P , 5%	W007	A701234P2	JMPR
C007	A700233P2	CAP,CER,CL2 150P , 20%	Z001	J709081G3	FILTER ASM
C008	A700006P11	CAP,MICA 15P , 5%	Z002	J709081G3	FILTER ASM
C009	A700006P35	CAP,MICA 110P , 5%	Z003	J709081G3	FILTER ASM
C010	A700233P2	CAP,CER,CL2 150P , 20%	Z004	J709080G2	FILTER ASM
C011	A700004P2	CAP,PYES 100N , 10%		8402003U66A	D900046P1 BD PW
C012	A700015P37	CAP,PTFE 220P , 5%			
C013	A700233P2	CAP,CER,CL2 150P , 20%		A702106P1	NON REFERENCED ITEMS:
C014	A700004P2	CAP,PYES 100N , 10%		J706513P1	SHLD
C015	2313749D72	CAP,TA,SOL 4U7 , 35V			HEAT SINK
C016	A700006P41	CAP,MICA 180P , 5%			
C017	A700006P41	CAP,MICA 180P , 5%			
C018	A700015P37	CAP,PTFE 220P , 5%			
C019	A700006P33	CAP,MICA 91P , 5%			
C020	A700006P19	CAP,MICA 27P , 5%			
C021	A700015P37	CAP,PTFE 220P , 5%			
C022	A700235P17	CAP,CER,N150 22P , 5%			
C023	A700233P7	CAP,CER,CL2 1N , 20%			
C024	A700006P4	CAP,PTFE 8P2 , 10%			
C025	A700006P17	CAP,MICA 22P , 5%			
C026	A700006P19	CAP,MICA 27P , 5%			
C027	A700006P4	CAP,PTFE 8P2 , 10%			
C028	A700064P1	CAP,ELECT 10U , 25V			
C029	2313749D72	CAP,TA,SOL 4U7 , 35V			
C030	A700233P7	CAP,CER,CL2 1N , 20%			
C031	A700233P7	CAP,CER,CL2 1N , 20%			
C032	A700233P7	CAP,CER,CL2 1N , 20%			
C033	A700233P7	CAP,CER,CL2 1N , 20%			
C034	A700233P7	CAP,CER,CL2 1N , 20%			
C035	A700233P7	CAP,CER,CL2 1N , 20%			
C036	A700004P2	CAP,PYES 100N , 10%			
C037	2313749D72	CAP,TA,SOL 4U7 , 35V			
C038	A700233P7	CAP,CER,CL2 1N , 20%			
D001	A700047P3	DIO,SI,SIG 1N6263			
D002	A700047P3	DIO,SI,SIG 1N6263			
D003	A700082P1	DIO,SI,PWR MR 751			
D004	A700028P1	DIO,SI,SIG 1N4148			
J001	A700171P2	CONN,PWB,FEM			
J002	A700049P2	CONNECTOR RECET COAXIAL			
J003	A700102P13	CONN,PWB,FEM 05-CKT			
J004	J708085P10	CONN,PWB,FEM RECP,10-CKT			
L001	A701421P1	COIL			
L002	A701417P1	COIL			
L003	A701419P2	COIL			
L004	A701421P3	COIL			
L005	A701420P2	COIL			
L006	A701421P3	COIL			
L007	A701422P1	COIL			
L008	A701421P3	COIL			
L009	A700024P13	COIL,RF,FIX 1.0UH , 10%			
L010	A701418P1	COIL			
L011	A701419P1	COIL			
L012	A701417P1	COIL			
L013	A701419P1	COIL			
L014	A701419P1	COIL			
L015	A701418P1	COIL			
L016	A701419P1	COIL			

X405.545/2

DATE: 09/20/90

PA913

POWER AMPLIFIER

PA913 is a broadband power amplifier for use in the 160 MHz band-end contains two RF amplifier stages, a directional coupler, a low-pass filter and a hybrid IC

power control circuit. This module is intended for use in both simplex and duplex radios. The PA covers 138 - 174 MHz.

CIRCUIT DESCRIPTION

A signal of at least 250 mW and on the desired carrier frequency is applied to the input connector of the PA. Wideband matching networks (no tuning) are used to convert the 50-ohm input impedance down to the input impedance of the first transistor and deliver the input signal to the base of the first amplifier where it is increased in level. The first amplifier uses a TO39 cased transistor with the silicon chip electrically isolated from the case. The emitter is connected to this case which is grounded by soldering to the printed board pattern.

The output signal from the first amplifier is impedance-matched to the input of the second stage with wideband networks. The second amplifier again increases the level of the RF signal to the desired amplitude and wideband networks match the output impedance of the second transistor to 50 ohms. The second transistor is a 4-lead flange device.

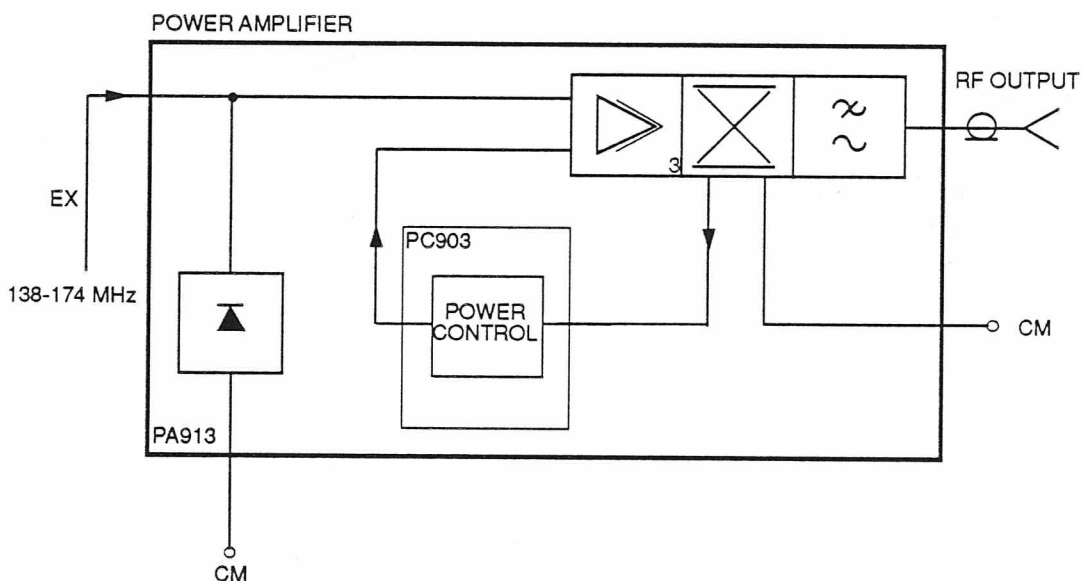
A 50 ohm microstrip line conducts the RF signal through a directional coupler to the low-pass filter where the harmonic energy is removed from the RF signal. The desired RF level is then passed to the output connector along a 50 ohm microstrip line.

The directional coupler samples the forward power level and rectifies the RF producing a DC voltage proportional to the forward signal. This DC voltage is applied to the power control hybrid IC. A power set control sends a desired output power level command to the power control IC which in turn regulates the DC voltage to the first RF-amplifier to maintain the desired output power level.

Because the power control IC consumes some current in the "TX Unkeyed" condition, a switch circuit is included to reduce the current drain during idle periods. Drive power to the first stage of the PA is sampled and detected by a diode circuit. When drive is present, a DC voltage then turns on the voltage regulator included in the monolithic IC chip. The turn-on is sequenced such that the feedback loop is brought up to power rather than coming on "full blast" and then regulating back.

A remote power reduction terminal is provided so the power can be reduced in a step function by the command system of the radio.

For ease of troubleshooting, a central metering jack provided in the PA to meter input drive from the exciter,



PA driver current, PA final amplifier current, control voltage, and voltage proportional to the forward power from the directional coupler.

DC power is brought into the PA through feedthrough bypass capacitors mounted in the PA shelf. These voltage leads are isolated from chassis ground causing the PA to float with respect to the DC levels of the vehicle. Some filtering is provided by a large electrolytic capacitor placed across the two connections.

The module is protected against accidental reverse voltage application by a large diode connected across the DC terminal. If the battery leads are connected to the wrong terminals, the diode conducts a large amount of current which then blows the fuse.

The PA is designed to operate over a DC battery voltage range of 11.0 to 16.6 volts. The output power is set to rated level at the EIA nominal voltage of approximately 13.8 voltage and will remain almost constant for all higher voltages. However, as the voltage is reduced below 13.8 the power will remain at rated level only as long as the control loop has excessivt gain. At some voltage, the power output will start to decrease with decreasing voltage.

To prevent excessive spurious signal from being radiated the PA module is shielded by a metal cover. The printed board is held down to the heat sink by several screws. The shielding required between the activ PA circuit and the lowpass filter is done by a separate filter cover.

TECHNICAL SPECIFICATIONS

FOR LOW PASS FILTER IN PA MODULE

Frequency range

135 - 185 MHz

Pass-band insertion loss

0.4 dB: 138 - 174 MHz

Stop band attenuation

50 dB

Operating temperature range

-40°C to 85°C

FOR PA MODULE

Power input

250 mW min. to 500 mW max.

Frequency range

138 - 174 MHz

Supply voltage at PA terminals

13.6 V nominal at pa power output.

Operating voltage range 12.5 to 15.5 V

Maximum PA current at rated Power output

(40 W): 9 A

(25 W): 6 A

Current consumption

6.0 A max.

Nominal load impedance

50 ohms non-reactive

Stability

Stable into any load with up to 3:1 VSWR.

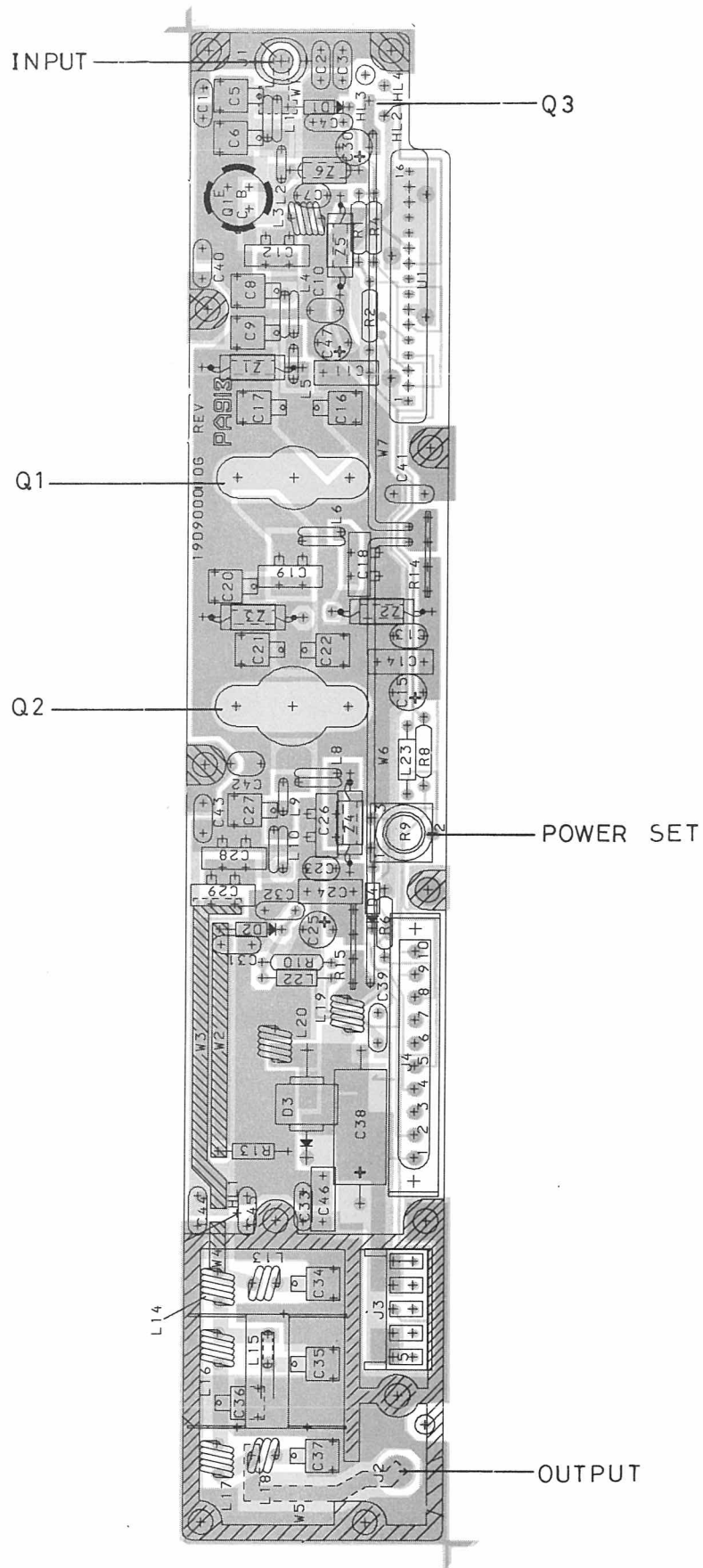
VSWR greater than 3:1 will not damage modules if operated at \leq rated power with supply voltage less than 15.5 V.

Current with no RF drive

22.0 mA max.

Temperature range

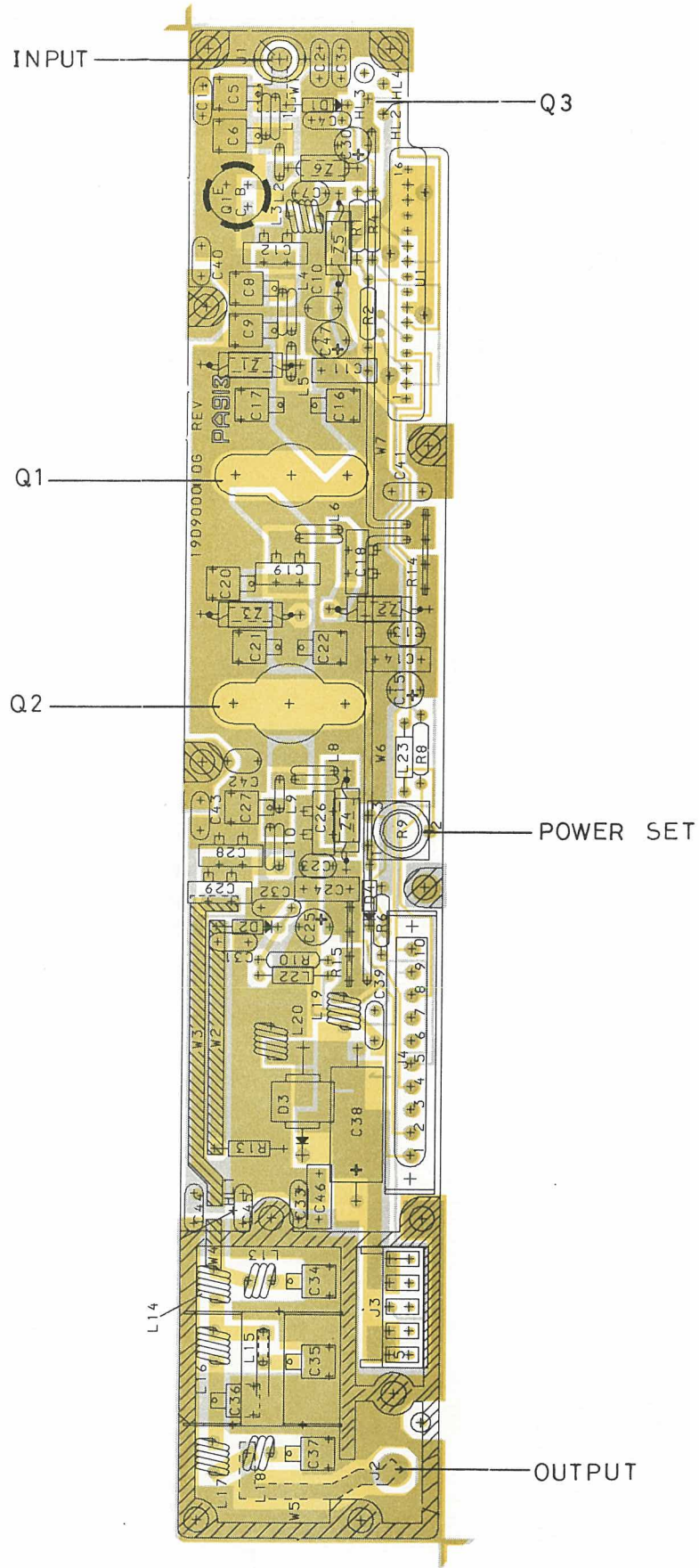
-40°C to 85°C



**POWER AMPLIFIER PA913
COMPONENT LAYOUT**

D403.114/4

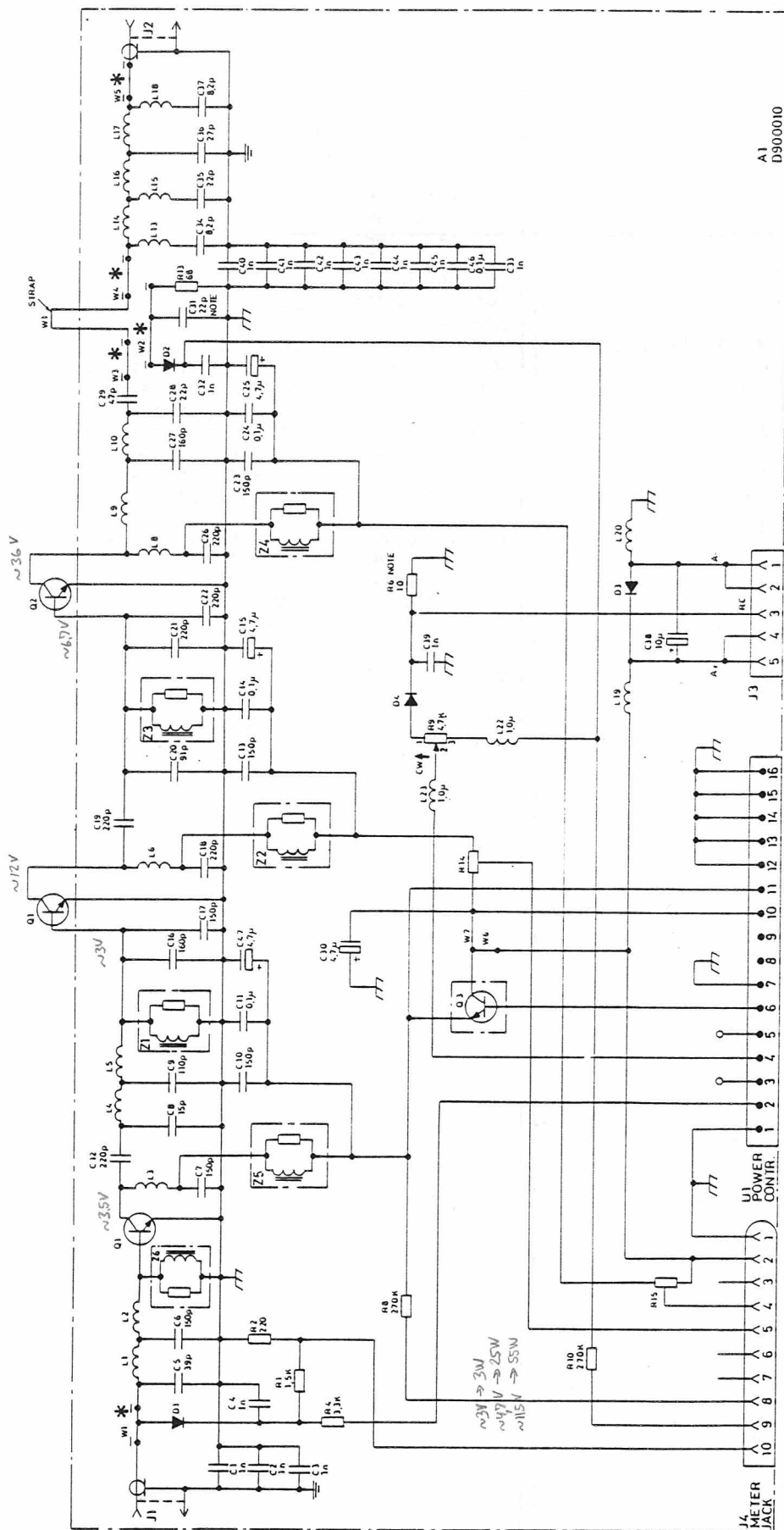
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MOUNTED BOARD CODE NO. D900010G2 - 0102720B90**



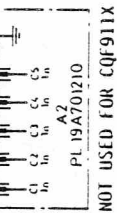
**POWER AMPLIFIER PA913
COMPONENT LAYOUT**

D403.114/4

**MODULE CODE NO. D900183G6 - GTD6135A
MOUNTED BOARD CODE NO. D900010G2 - 0102720B90**



A1
D900010



NOT USED FOR CQF911X

NOTE:
 * = PART OF PWB
 REMOVE R6 WHEN REMOTE POWER CONTROL OPTION IS INSTALLED
 C31 IS REMOVED WHEN EXTENDED LOWER RANGE POWER OPTION IS INCORPORATED

MODULE CODE NO. D900183G6 - GTD6135A
 MOUNTED BOARD CODE NO. D900010G2 - 0102720B90

POWER AMPLIFIER PA913

D405.629

PARTS LIST FOR POWER AMPLIFIER PA913

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GTD6135A	D900183G6 PA913	L005	A701420P2	COIL
A001	0102720B90	D900010G2 PA 913 PWR AMPL 25/40W	L006	A701421P3	COIL
Q001	A700063P2	TSTR,NPN,SI RF-PWR, 14W	L008	A701421P2	COIL
Q002	A700063P3	TSTR,NPN,SI RF-PWR, 45W	L009	A701417P1	COIL
Q003	A700054P1	TSTR,NPN,SI BD 201	L010	A701421P2	COIL
W001	A701093P1	STRAP	L013	A701418P1	COIL
	L855788P1	POWER AMPL PA 91X	L014	A701419P1	COIL
	2602034U02	K805619G1 HEAT SINK	L015	A701417P1	COIL
	A700031P306	SCR,PAN HD M-2.5X 6.0 (4 used)	L016	A701419P1	COIL
	A701887P1	HT SK	L017	A701419P1	COIL
	A701900P2	CLIP, COMPR.	L018	A701418P1	COIL
	C850600	INX REV LTR	L019	A701419P1	COIL
A001	0102720B90	D900010G2 PA 913 PWR AMPL 25/40W	L020	A701419P1	COIL
C001	A700233P7	CAP,CER,CL2 1N , 20%	L022	A700024P13	COIL,RF,FIX 1.0UH , 10%
C002	A700233P7	CAP,CER,CL2 1N , 20%	L023	A700024P13	COIL,RF,FIX 1.0UH , 10%
C003	A700233P7	CAP,CER,CL2 1N , 20%	Q001	A700063P1	TSTR,NPN,SI RF-PWR,2.0W
C004	A700233P7	CAP,CER,CL2 1N , 20%	R001	A700019P39	RES,DEPC,1/4W 1K5 , 5%
C005	A700006P23	CAP,MICA 39P , 5%	R002	A700019P29	RES,DEPC,1/4W 220R , 5%
C006	A700006P38	CAP,MICA 150P , 5%	R004	A700019P43	RES,DEPC,1/4W 3K3 , 5%
C007	A700233P2	CAP,CER,CL2 150P , 20%	R006	A700019P13	RES,DEPC,1/4W 10R , 5%
C008	A700006P11	CAP,MICA 15P , 5%	R008	A700019P66	RES,DEPC,1/4W 270K , 5%
C009	A700006P35	CAP,MICA 110P , 5%	R009	J708394P27	RES,VAR,CERM 4K7 , 20%
C010	A700233P2	CAP,CER,CL2 150P , 20%	R010	A700019P66	RES,DEPC,1/4W 270K , 5%
C011	A700004P2	CAP,PYES 100N , 10%	R013	A700106P35	RES,COMP,1/4W 68R , 5%
C012	A700015P37	CAP,PTFE 220P , 5%	R014	J708143P2	RESISTOR
C013	A700233P2	CAP,CER,CL2 150P , 20%	R015	J708143P2	RESISTOR
C014	A700004P2	CAP,PYES 100N , 10%	U001	D900111G1	PC 903
C015	2313749D72	CAP,TA,SOL 4U7 , 35V	W006	A701234P1	JMRR
C016	A700006P39	CAP,MICA 160P , 5%	W007	A701234P2	JMPR
C017	A700006P38	CAP,MICA 150P , 5%	Z001	J709081G3	FILTER ASM
C018	A700015P37	CAP,PTFE 220P , 5%	Z002	J709081G3	FILTER ASM
C019	A700015P37	CAP,PTFE 220P , 5%	Z003	J709081G1	FILTER ASM
C020	A700006P33	CAP,MICA 91P , 5%	Z004	J709081G3	FILTER ASM
C021	A700006P44	CAP,MICA 220P , 5%	Z005	J709081G3	FILTER ASM
C022	A700006P44	CAP,MICA 220P , 5%	Z006	J709080G2	FILTER ASM
C023	A700233P2	CAP,CER,CL2 150P , 20%		8402003U44A	D900009P1 BD PW
C024	A700004P2	CAP,PYES 100N , 10%			NON REFERENCED ITEMS:
C025	2313749D72	CAP,TA,SOL 4U7 , 35V	A702106P1		SHLD
C026	A700015P37	CAP,PTFE 220P , 5%			
C027	A700006P39	CAP,MICA 160P , 5%			
C028	A700015P12	CAP,PTFE 22P , 5%			
C029	A700015P21	CAP,PTFE 47P , 5%			
C030	2313749D72	CAP,TA,SOL 4U7 , 35V			
C031	A700235P17	CAP,CER,N150 22P , 5%			
C032	A700233P7	CAP,CER,CL2 1N , 20%			
C033	A700233P7	CAP,CER,CL2 1N , 20%			
C034	A700006P4	CAP,PTFE 8P2 , 10%			
C035	A700006P17	CAP,MICA 22P , 5%			
C036	A700006P19	CAP,MICA 27P , 5%			
C037	A700006P4	CAP,PTFE 8P2 , 10%			
C038	A700064P1	CAP,ELECT 10U , 25V			
C039	A700233P7	CAP,CER,CL2 1N , 20%			
C040	A700233P7	CAP,CER,CL2 1N , 20%			
C041	A700233P7	CAP,CER,CL2 1N , 20%			
C042	A700233P7	CAP,CER,CL2 1N , 20%			
C043	A700233P7	CAP,CER,CL2 1N , 20%			
C044	A700233P7	CAP,CER,CL2 1N , 20%			
C045	A700233P7	CAP,CER,CL2 1N , 20%			
C046	A700004P2	CAP,PYES 100N , 10%			
C047	2313749D72	CAP,TA,SOL 4U7 , 35V			
D001	A700047P3	DIO,SI,SIG 1N6263			
D002	A700047P3	DIO,SI,SIG 1N6263			
D003	A700082P1	DIO,SI,PWR MR 751			
D004	A700028P1	DIO,SI,SIG 1N4148			
J001	A700171P2	CONN,PWB,FEM			
J002	A700049P2	CONNECTOR RECET COAXIAL			
J003	A700102P13	CONN,PWB,FEM 05-CKT			
J004	J708085P10	CONN,PWB,FEM RECP,10-CKT			
L001	A701421P1	COIL			
L002	A701417P1	COIL			
L003	A701419P2	COIL			
L004	A701421P3	COIL			

X405.546/2

DATE: 09/20/90

PA961

POWER AMPLIFIER

The UHF power amplifier module (PA) contains two broadband stages, a directional coupler, a lowpass

filter, and power control micromodule PC903. The module can be used in both simplex and duplex radios.

CIRCUIT DESCRIPTION

The signal from the exciter, at least 320 mW, is applied to the input connector, and a broadband, untuned matching network transforms the 50 ohm input impedance to the low impedance of the first transistor stage. The output signal from the first amplifier stage is impedance-matched to the second stage with broadband networks. The second amplifier boosts the signal to the required power and a network adapts the amplifier impedance to 50 ohm.

A 50 ohm microstrip line conducts the RF signal through a directional coupler to the lowpass filter which attenuates the harmonic frequencies. A second microstrip line passes the signal to the output connector.

The directional coupler samples the forward power and rectifies the sampled signal. The resulting DC voltage is proportional to the RF output level and is applied to the power control micromodule, PC903.

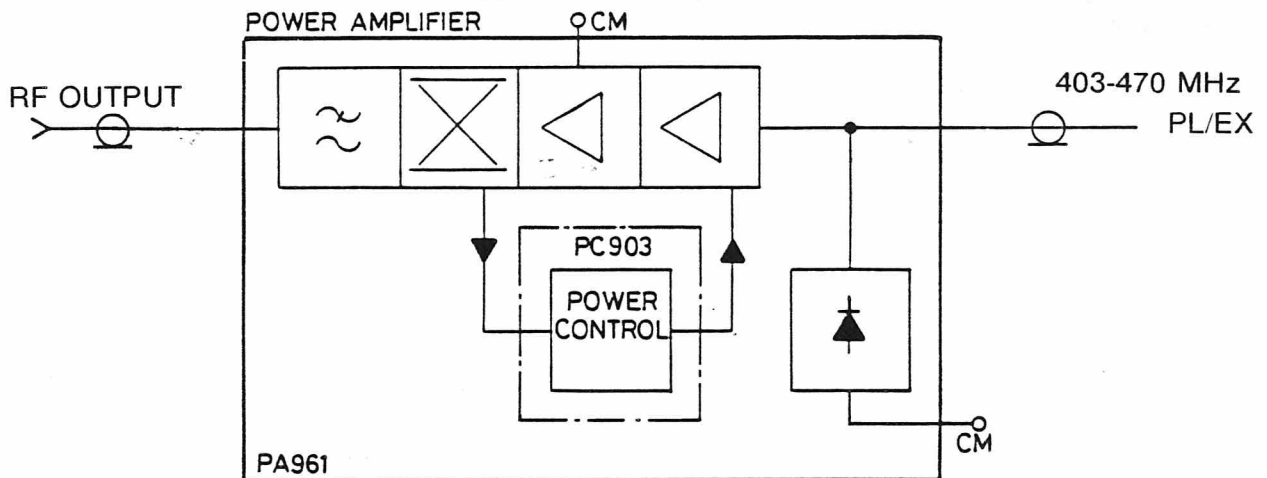
The PC903 regulates the DC voltage supply to the first RF amplifier stage to maintain the required power level. A power set control is used to adjust the control voltage to the PC903 micromodule.

Because the power control circuit consumes some current in the "TX Unkeyed" condition, a switching circuit reduces the current drain during idle periods. The drive power to the PA stage is sampled and detected by a diode circuit and when drive signal is present, a DC voltage turns on the voltage regulator in the integrated circuit of the PC903 micromodule. The turn-on is sequenced such that the feedback loop is gradually brought up to the required power level.

A remote power reduction terminal is provided so the power may be reduced in steps by the command system of the radio.

Central metering is used in the PA module to measure the input from the exciter, the PA driver current in the final PA stage, The power control voltage, and the voltage from the directional coupler.

DC voltage is applied to the PA module through feedthrough capacitors mounted in the PA shelf. The voltage leads are isolated from chassis ground causing the PA stage to float with respect to the vehicle chassis. Some filtering is provided by a large electrolytic capacitor placed across the voltage input terminals.



A large diode connected across the DC terminals protects against accidental application of reverse battery leads are reversed the diode will conduct and the large current will blow the fuse.

The PA module is designed to operate over a DC battery voltage range of 10.8 to 16.6 volts. The output power is set to rated level at 13.5 volts and will remain almost constant for all higher voltages. However, if the voltage is reduced below 13.5 volts the power will

remain at rated level only as long as the control loop has excess gain. At a certain voltage the power output will decrease with decreasing voltage.

To prevent excessive radiation of spurious signal, the PA is shielded by a metal cover, and the printed wiring board is held to the heat sink by several screws. The shield between the active PA circuitry and the harmonic filter is a separate filter cover.

TECHNICAL SPECIFICATIONS

FOR LOWPASS FILTER IN PA MODULE

Frequency range

403 -470 MHz

Pass.Band insertion loss

0.4 dB: 403 -470 MHz

Stop band attenuation

38 dB

Operating temperature range

-40°C to 85°C

FOR PA MODULE

Power input

320 mW min. to 500 mW max.

Input VSWR

≤2.5: 1 at rated power output

Frequency range

403 - 470 MHz

Supply voltage at PA terminals

13.2 V nominal for rated power output.

Operating voltage range 12.5 to 15.5 V

Power output

10 W

Current consumption

3.5 A max.

Nominal load impedance

50 ohms non-reactive

Stability

Stable into any load with up to 3:1 VSWR.

VSWR grater than 3:1 will not damage modules if operated at ≤ rated power with supply voltage less than 15.5 V.

Current with no RF drive

12.0 mA max.

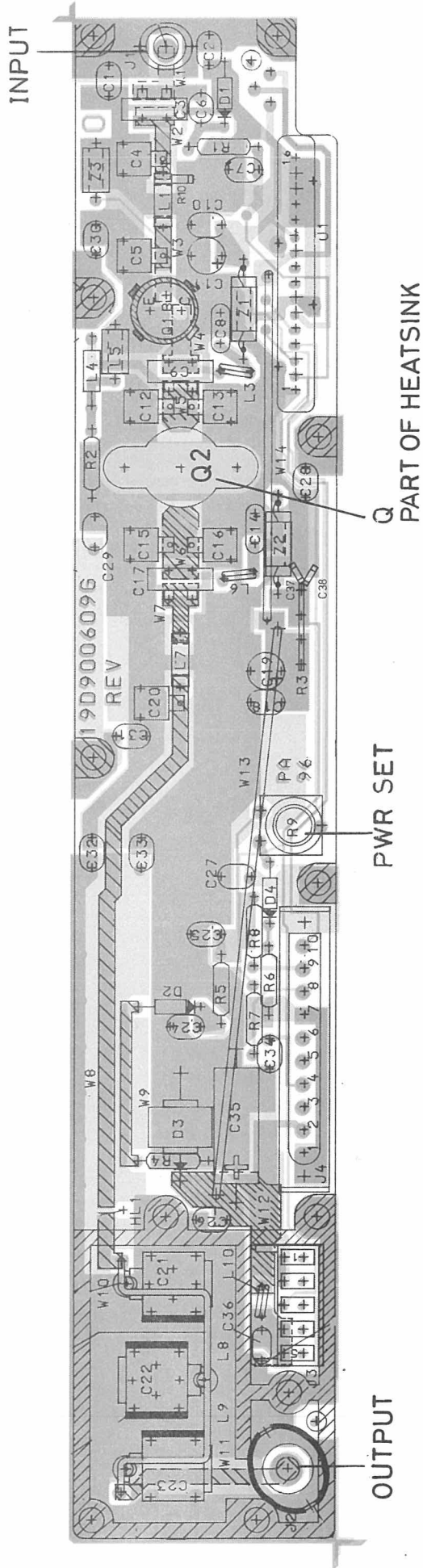
Temperature range

-40°C to 85°C

COMPONENT LAYOUT
POWER AMPLIFIER PA961

D402.958/7

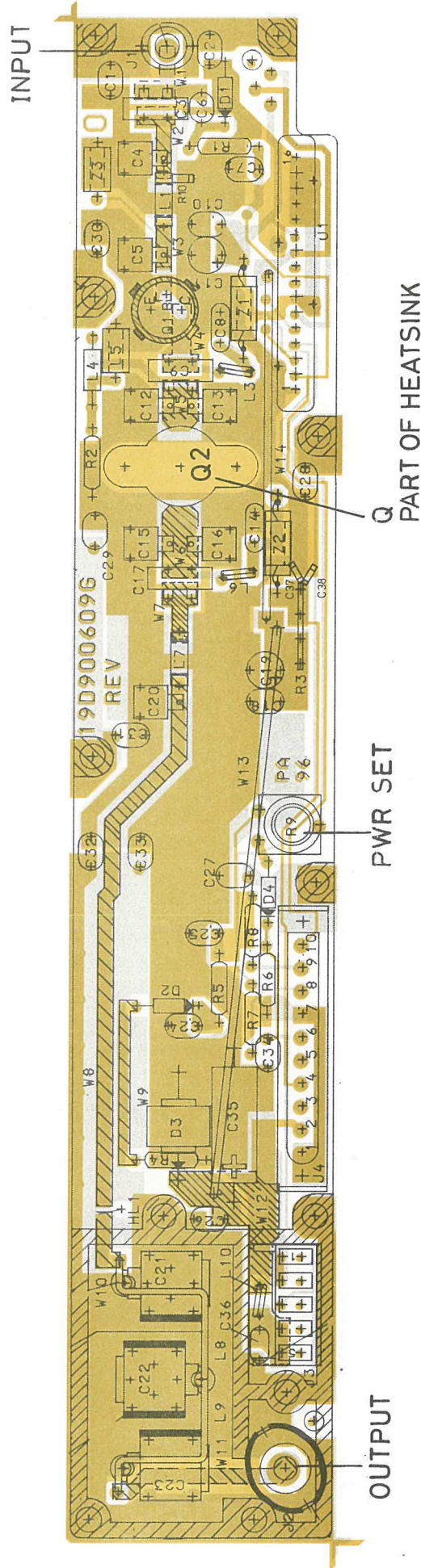
MODULE	POWER	CODE NO.
PA961	10W	D900093G14 (CQF 966X ONLY) - GTE6001A

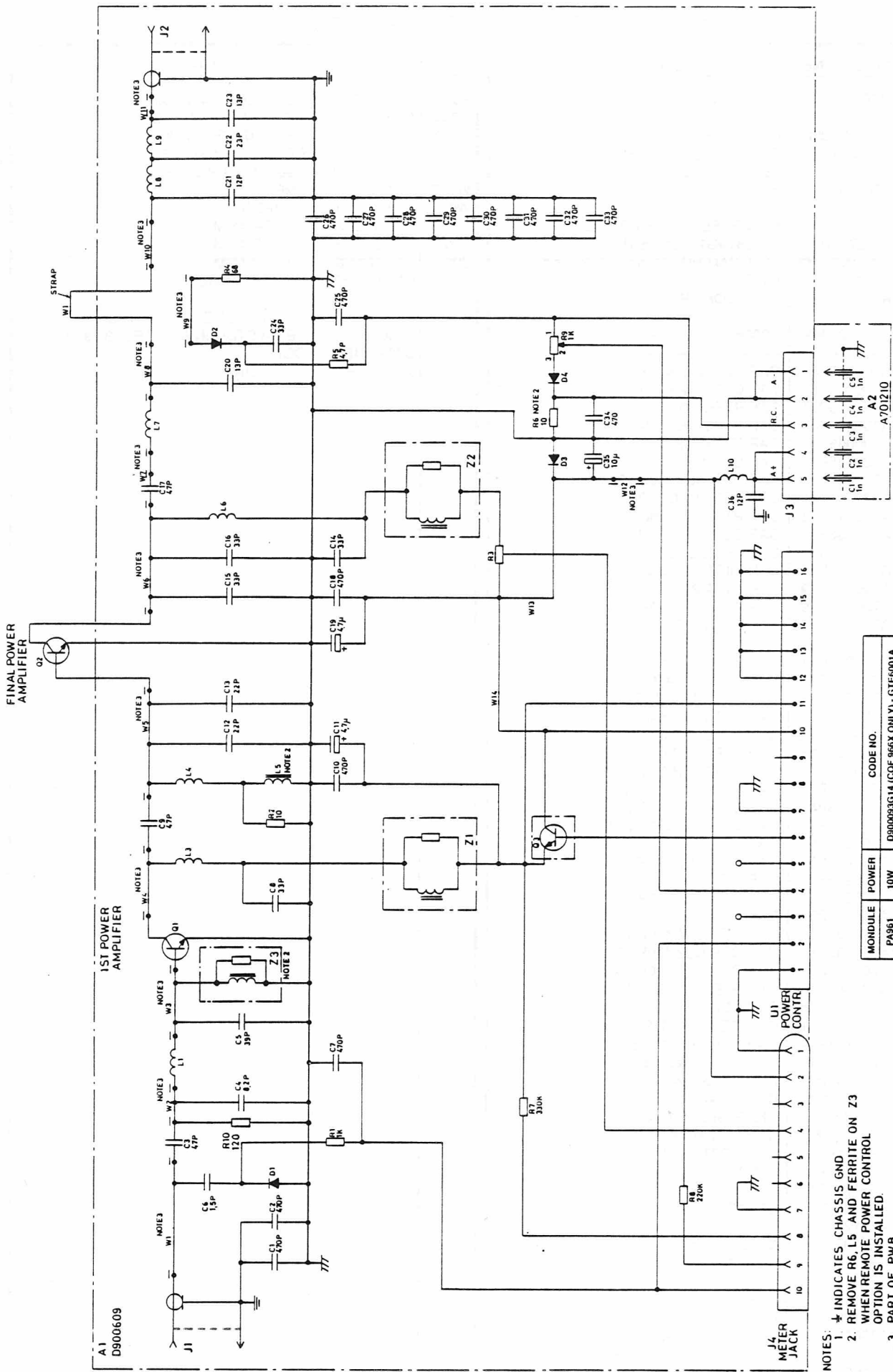


COMPONENT LAYOUT
POWER AMPLIFIER PA961

D402.958/7

MODULE	POWER	CODE NO.
PA961	10W	D900093G14 (CQF 966X ONLY) - GTE6001A





- NOTES:
1. † INDICATES CHASSIS GND
 2. REMOVE R6, L5 AND FERRITE ON Z3 WHEN REMOTE POWER CONTROL OPTION IS INSTALLED.
 3. PART OF PWB

MODULE	POWER	CODE NO.
PA961	10W	D900093G14 (COF 966X ONLY) - GTE6001A

CODE NO. M900168G1 - GTE6001A

POWER AMPLIFIER PA961

D402.929/6

PARTS LIST FOR POWER AMPLIFIER PA961

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GTE6001A	D900093G14 PA961	R007	A700019P67	RES DEPC 1/4W 330K 5%
A001	0102720B92	D900609G1 BD PW SEE BELOW	R008	A700019P65	RES DEPC 1/4W 220K 5%
Q001	J710015P1	TSTR, NPN, SI RF-PRW, 13W	R009	J708394P25	RES VAR CERM 1K0 20%
Q003	A700054P1	TSTR, NPN, SI BD 201	R010	0611077A70	RES MFLM 1/8W 680R 5%
W001	A701093P1	STRAP	U001	0102720B18	D900111G1 PC 903
		NON REFERENCED ITEMS:	W013	A701233P1	JMPR
	0102720B88	K805619G1 HEAT SINK	W014	A701105P1	JUMPER
	A700031P306	SCR, PAN HD M-2.5 x 6.0 (2 used)	Z001	J709081G3	FILTER ASM
	A701887P1	HT SK	Z002	J709081G3	FILTER ASM
	A701900P2	CLIP, COMPR.	Z003	J709081G3	FILTER ASM
A001	0102720B92	D900609G1 BD PW		8402003U79A	D900610P1 BD PW
					NON REFERENCED ITEMS:
C001	A700233P5	CAP CER CL2 470P 20%		A700114P1	TERM STUD INSULATED (3 used)
C002	A700233P5	CAP CER CL2 470P 20%		B800554P1	COIL
C003	A700015P21	CAP PTFE 47P 5%		J706513P1	HEAT SINK
C004	A700006P4	CAP PTFE 8P2 10%			
C005	A700006P23	CAP MICA 39P 5%			
C006	A700235P3	CAP CER N150 1P5 .25P			
C007	A700233P5	CAP CER CL2 470P 20%			
C008	A700235P19	CAP CER N150 33P 5%			
C009	A700015P21	CAP PTFE 47P 5%			
C010	A700233P5	CAP CER CL2 470P 20%			
C011	2313749D72	CAP TA SOL 4U7 35V			
C012	A700006P17	CAP MICA 22P 5%			
C013	A700006P19	CAP MICA 27P 5%			
C014	A700235P19	CAP CER N150 33P 5%			
C015	A700006P19	CAP MICA 27P 5%			
C016	A700006P19	CAP MICA 27P 5%			
C017	A700015P21	CAP PTFE 47P 5%			
C018	A700233P5	CAP CER CL2 470P 20%			
C019	2313749D72	CAP TA SOL 4U7 35V			
C020	A700006P9	CAP MICA 13P 5%			
C021	A700131P12	CAP PTFE 12P 0.5P			
C022	A700131P23	CAP PTFE 23P 0.5P			
C023	A700131P13	CAP PTFE 13P 0.5P			
C024	A700235P19	CAP CER N150 33P 5%			
C025	A700233P5	CAP CER CL2 470P 20%			
C026	A700233P5	CAP CER CL2 470P 20%			
C027	A700233P5	CAP CER CL2 470P 20%			
C028	A700233P5	CAP CER CL2 470P 20%			
C029	A700233P5	CAP CER CL2 470P 20%			
C030	A700233P5	CAP CER CL2 470P 20%			
C031	A700233P5	CAP CER CL2 470P 20%			
C032	A700233P5	CAP CER CL2 470P 20%			
C033	A700233P5	CAP CER CL2 470P 20%			
C034	A700233P5	CAP CER CL2 470P 20%			
C035	A700064P1	CAP ELECT 10U 25V			
C036	A700235P14	CAP CER N150 12P 5%			
C037	J707809P19	CAP CER NP0 33P 5%			
C038	J707809P19	CAP CER NP0 33P 5%			
D001	A700047P3	DIO SI SIG 1N6263			
D002	A700047P3	DIO SI SIG 1N6263			
D003	A700082P1	DIO SI PWR MR 751			
D004	A700028P1	DIO SI SIG 1N4148			
J001	A700171P2	CONN PWB FEM			
J002	A700049P2	CONNECTOR RECET COAXIAL			
J003	A700102P13	CONNECTOR 5CKT			
J004	J708085P10	CONN MTR			
L001	A701006P7	STRAP			
L003	A701237P1	COIL			
L004	A700024P1	COIL RF FIX 0.1UH 10%			
L005	J709078G1	COIL ASM			
L006	A701237P1	COIL			
L007	A701006P4	STRAP			
L010	A701237P1	COIL			
Q001	A700066P2	TSTR NPN SI RF-PWR 2.0W			
R001	A700019P37	RES DEPC 1/4W 1K0 5%			
R002	A700019P13	RES DEPC 1/4W 10R 5%			
R003	J708143P2	RESISTOR			
R004	A700019P23	RES DEPC 1/4W 68R 5%			
R005	A700019P45	RES DEPC 1/4W 4K7 5%			
R006	A700019P13	RES DEPC 1/4W 10R 5%			

X404.768/3

DATE: 09/20/90

PA962 & PA963

POWER AMPLIFIER

The UHF power output amplifier module (PA) contains three RF amplifier stages, a directional coupler, a

lowpass filter, and power control micromodule PC903. The module can be used in both simplex and duplex radios.

CIRCUIT DESCRIPTION

The signal from the exciter, at least 320 mW, is applied to the input connector, and a broadband, untuned matching network transforms the 50 ohm input impedance to the low impedance of the first transistor stage. The output signal from the first amplifier stage is impedance-matched to the second stage with broadband networks. The second amplifier boosts the signal power and a network adapts the amplifier impedance to the third amplifier.

The additional stage placed between the second amplifier and the directional coupler to boost the RF level to at least 25 watts

A 50 ohm microstrip line conducts the RF signal through a directional coupler to the lowpass filter which attenuates the harmonic frequencies. A second microstrip line passes the signal to the output connector.

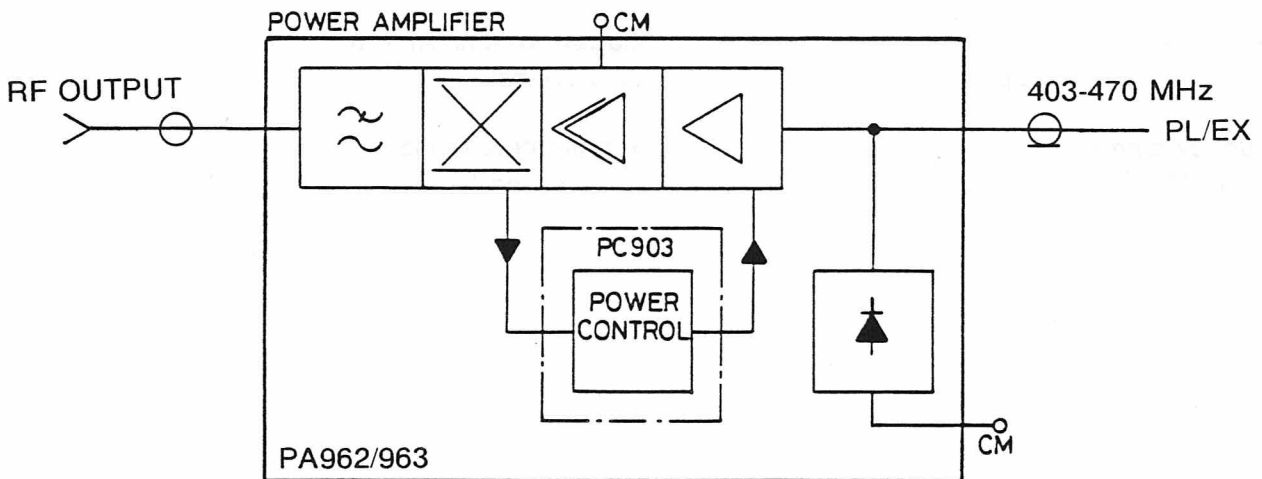
The directional coupler samples the forward power and rectifies the sampled signal. The resulting DC voltage is proportional to the RF output level and is applied to the power control micromodule, PC903.

The PC903 regulates the DC voltage supply to the first RF amplifier stage to maintain the required power level. A power set control is used to adjust the control voltage to the PC903 micromodule.

Because the power control circuit consumes some current in the "TX Unkeyed" condition, a switching circuit reduces the current drain during idle periods. The drive power to the PA stage is sampled and detected by a diode circuit and when drive signal is present, a DC voltage turns on the voltage regulator in the integrated circuit of the PC903 micromodule. The turn-on is sequenced such that the feedback loop is gradually brought up to the required power level.

A remote power reduction terminal is provided so the power may be reduced in steps by the command system of the radio.

Central metering is used in the PA module to measure the input from the exciter, the PA driver current in the final PA stage, the power control voltage, and the voltage from the directional coupler.



DC voltage is applied to the PA module through feedthrough capacitors mounted in the PA shelf.

The voltage leads are isolated from chassis ground causing the PA stage to float with respect to the vehicle chassis. Some filtering is provided by large electrolytic capacitor placed across the voltage input terminals.

A large diode connected across the DC terminals protects against accidental application of reverse battery polarity. If the battery leads are reversed the diode will conduct and the large current will blow the fuse.

The PA module is designed to operate over a DC battery voltage range of 10.8 to 16.6 volts. The output power is set to rated level at 13.5 volts and will remain almost constant for all higher voltages. However, if the voltage is reduced below 13.5 volts the power will remain at rated level only as long as the control loop has excess gain. At a certain voltage the power output will decrease with decreasing voltage.

To prevent excessive radiation of spurious signals, the PA is shielded by a metal cover, and the printed wiring board is held to the heat sink by several screws. The shield between the active PA circuitry and the harmonic filter is a separate filter cover.

TECHNICAL SPECIFICATIONS

FOR LOWPASS FILTER IN PA MODULE

Frequency range

403 - 470 MHz

Pass-band insertion loss

0.4 dB: 403 - 470 MHz

Stop band attenuation

38 dB

Operating temperature range

-40°C to +85°C

FOR PA MODULE

Power input

320 mW min. to 500 mW max

Input VSWR

≤2.5:1 at rated power output

Frequency range

403 - 470 MHz

Supply voltage at PA terminals

13.2 V nominal for rated power output.
operating voltage range 12.5 to 15.5 V

Maximum PA current at rated power output

PA962 (25 W) : 6.5 A
PA963 (40 W) : 10.0 A

Current consumption

3.5 A max.

Nominal load impedance

50 ohms non-reactive

Stability

Stable into load with up to 3:1 VSWR.
VSWR greater than 3:1 will not damage modules if operated at ≤ rated power with supply voltage less than 15.5 V.

Current with no RF drive

22.0 mA max.

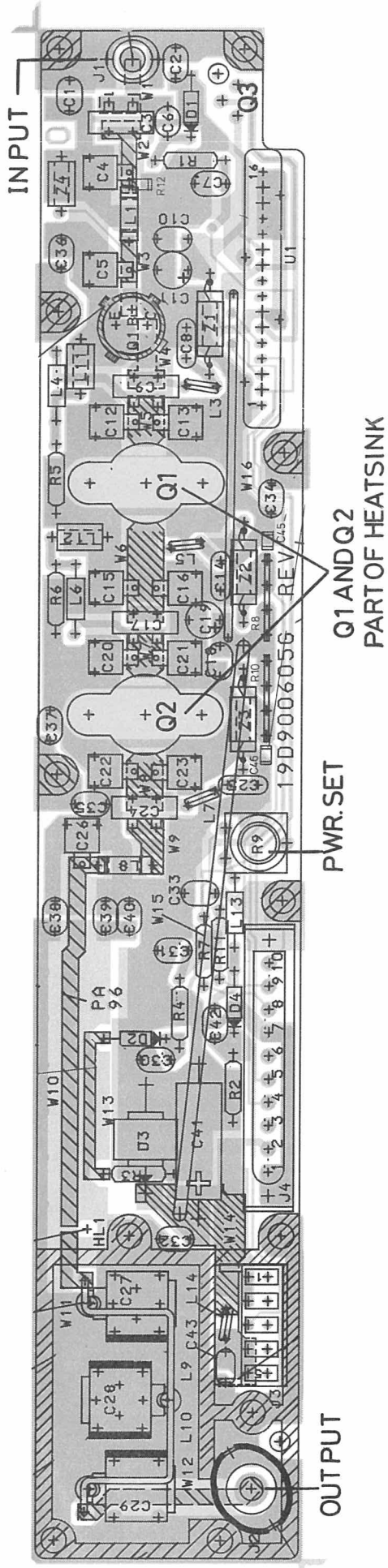
Temperature range

-40°C to +85°C

MODULE	POWER	CODE NO.
PA962	25W	D900093G15 (CQF 966X ONLY) - GTE6002A
PA963	40W	D900093G16 (CQF 966X ONLY) - GTE6003A

POWER AMPLIFIER PA962, PA963
COMPONENT LAYOUT

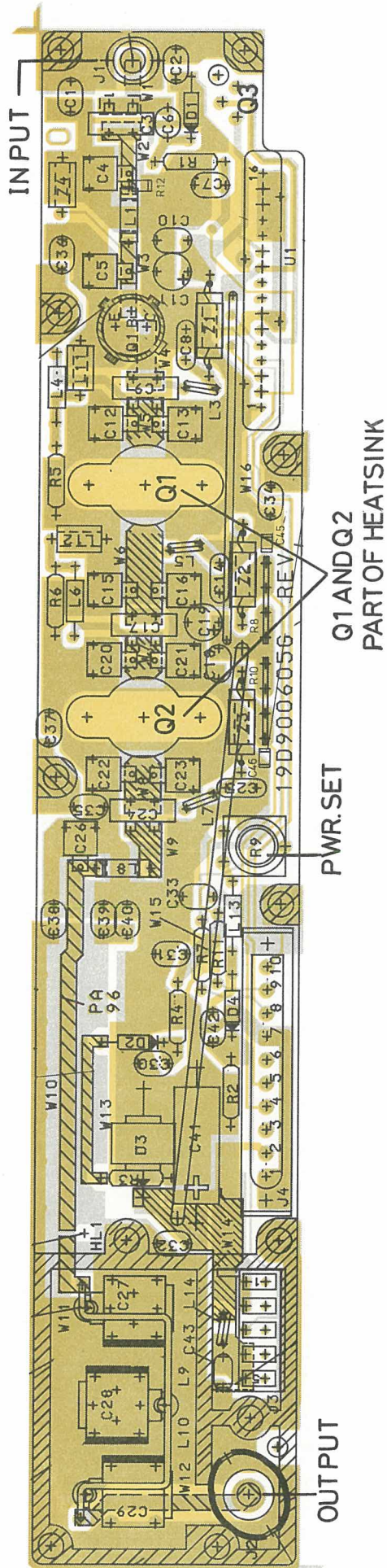
D402.959/8

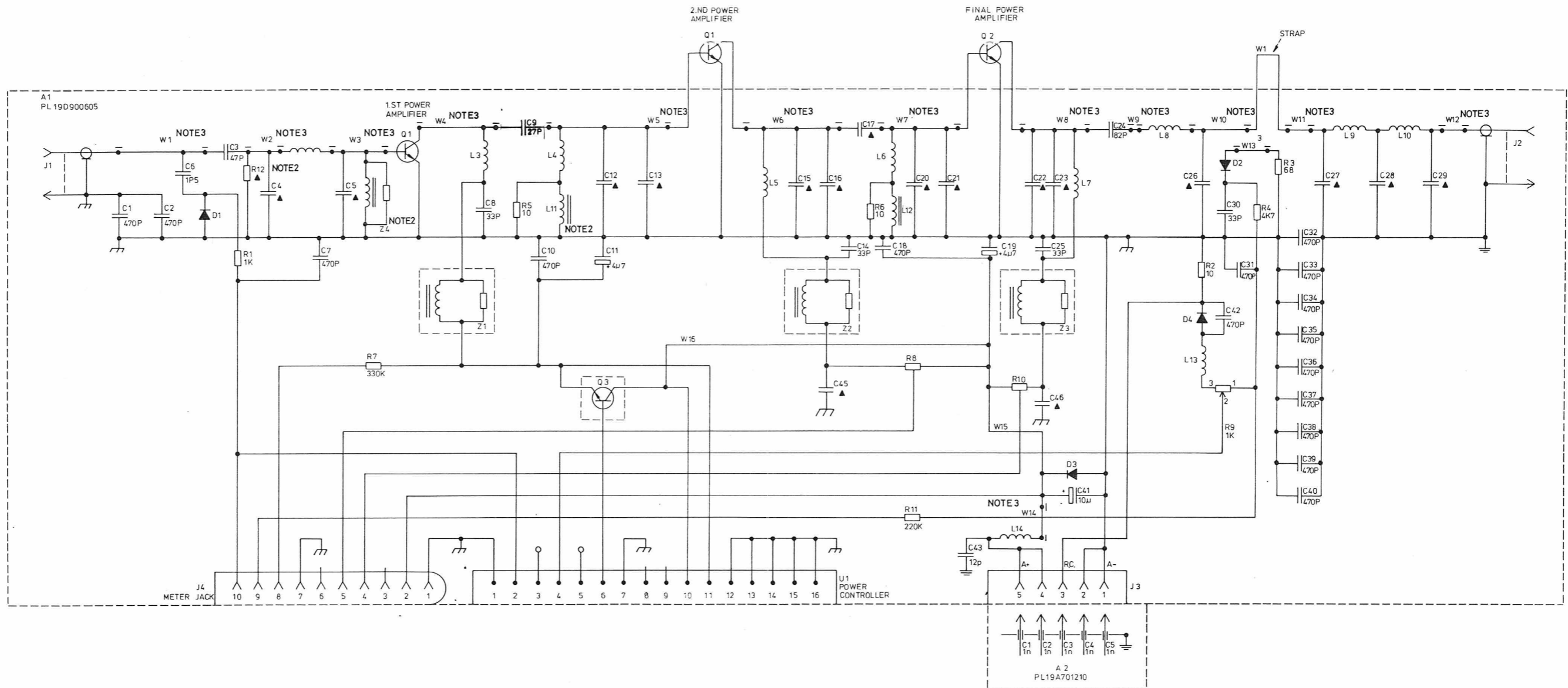


MODULE	POWER	CODE NO.
PA962	25W	D900093G15 (CQF 966X ONLY) - GTE6002A
PA963	40W	D900093G16 (CQF 966X ONLY) - GTE6003A

POWER AMPLIFIER PA962, PA963
COMPONENT LAYOUT

D402.959/8





- NOTES:
- INDICATES A-
 - INDICATES CHASSIS GND
 - REMOVE R12, L11 AND FERRITE ON Z4 WHEN REMOTE POWER CONTROL OPTION IS INSTALLED
 - PART OF PWB

CODE NO. D900605			
	G1	G2	G3
▲			
CAPACITOR	PA962		PA963
C4	8.2P		8.2P
C5	39P		39P
C12	22P		22P
C13	22P		33P
C15	20P		15P
C16	15P		20P
C17	15P		15P
C20	27P		27P
C21	27P		27P
C22	43P		43P
C23	43P		43P
C26	14P		15P
C27	12P		12P
C28	23P		23P
C29	13P		13P
C45	33P		33P
C46	33P		33P
R12	680		680

MODULE	POWER	CODE NO.
PA962	25W	D900093G15 (CQF966X ONLY) - GTE6002A
PA963	40W	D900093G16 (CQF966X ONLY) - GTE6003A

PARTS LIST FOR POWER AMPLIFIER PA962

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GTE6002A	D900093G15 PA962	L007	A701237P1	COIL
A001	0102720B93	D900605G1 BD PW SEE BELOW	L008	A701006P4	STRAP
Q001	J710015P1	TSTR, NPN, SI RF-PRW, 13W	L011	J709078G1	COIL ASM
Q002	J700052P2	TSTR, NPN, SI RF-PRW, 35W	L012	J709078G1	COIL ASM
Q003	A700054P1	TSTR, NPN, SI BD 201	L013	A700024P15	COIL RF FIX 1.5UH 10%
W001	A701093P1	STRAP	L014	A701237P1	COIL
		NON REFERENCED ITEMS:	Q001	A700066P2	TSTR NPN SI RF-PWR 2.0W
	0102720B88	K805619G1 HEAT SINK	R001	A700019P37	RES DEPC 1/4W 1K0 5%
	A700031P306	SCR, PAN HD M-2.5 x 6.0	R002	A700019P13	RES DEPC 1/4W 10R 5%
	A701887P1	HT SK	R003	A700019P23	RES DEPC 1/4W 68R 5%
	A701900P2	CLIP, COMPR.	R004	A700019P45	RES DEPC 1/4W 4K7 5%
A001	0102720B93	D900605G1 BD PW	R005	A700019P13	RES DEPC 1/4W 10R 5%
C001	A700233P5	CAP CER CL2 470P 20%	R006	A700019P13	RES DEPC 1/4W 10R 5%
C002	A700233P5	CAP CER CL2 470P 20%	R007	A700019P67	RES DEPC 1/4W 330K 5%
C003	A700015P21	CAP PTFE 47P 5%	R008	J708143P2	RESISTOR
C004	A700006P4	CAP PTFE 8P2 10%	R009	J708394P25	RES VAR CERM 1K0 20%
C005	A700006P23	CAP MICA 39P 5%	R010	J708143P2	RESISTOR
C006	A700235P3	CAP CER N150 1P5 .25P	R011	A700019P65	RES DEPC 1/4W 220K 5%
C007	A700233P5	CAP CER CL2 470P 20%	R012	0611077A771	RES MFLM 1/8W 680R 5%
C008	A700235P19	CAP CER N150 33P 5%	U001	D900111G1	PC 903
C009	A700015P21	CAP PTFE 47P 5%	W015	A701233P1	JMPR
C010	A700233P5	CAP CER CL2 470P 20%	W016	A701105P1	JUMPER
C011	2313749D72	CAP TA SOL 4U7 35V	Z001	J709081G3	FILTER ASM
C012	A700006P17	CAP MICA 22P 5%	Z002	J709081G3	FILTER ASM
C013	A700006P17	CAP MICA 22P 5%	Z003	J709081G3	FILTER ASM
C014	A700235P19	CAP CER N150 33P 5%	Z004	J709080G3	FILTER ASM
C015	A700006P16	CAP MICA 20P 5%		8402003U78A	D900606P1 BD PW
C016	A700006P11	CAP MICA 15P 5%		A700114P1	NON REFERENCED ITEMS:
C017	A700015P8	CAP PTFE 15P 5%		B800554P1	TERM STUD INSULATED (3 used)
C018	A700233P5	CAP CER CL2 470P 20%		J706513P1	COIL
C019	2313749D72	CAP TA SOL 4U7 35V			HEAT SINK
C020	A700006P19	CAP MICA 27P 5%			
C021	A700006P19	CAP MICA 27P 5%			
C022	A700006P27	CAP MICA 51P 5%			
C023	A700006P24	CAP MICA 43P 5%			
C024	A700015P27	CAP PTFE 82P 5%			
C025	A700235P19	CAP CER N150 33P 5%			
C026	A700006P10	CAP MICA 14P 5%			
C027	A700131P12	CAP PTFE 12P 0.5P			
C028	A700131P23	CAP PTFE 23P 0.5P			
C029	A700131P13	CAP PTFE 13P 0.5P			
C030	A700235P19	CAP CER N150 33P 5%			
C031	A700233P5	CAP CER CL2 470P 20%			
C032	A700233P5	CAP CER CL2 470P 20%			
C033	A700233P5	CAP CER CL2 470P 20%			
C034	A700233P5	CAP CER CL2 470P 20%			
C035	A700233P5	CAP CER CL2 470P 20%			
C036	A700233P5	CAP CER CL2 470P 20%			
C037	A700233P5	CAP CER CL2 470P 20%			
C038	A700233P5	CAP CER CL2 470P 20%			
C039	A700233P5	CAP CER CL2 470P 20%			
C040	A700233P5	CAP CER CL2 470P 20%			
C041	A700064P1	CAP ELECT 10U 25V			
C042	A700233P5	CAP CER CL2 470P 20%			
C043	A700235P14	CAP CER N150 12P 5%			
C045	J707809P19	CAP CER NP0 33P 5%			
C046	J707809P19	CAP CER NP0 33P 5%			
D001	A700047P3	DIO SI SIG 1N6263			
D002	A700047P3	DIO SI SIG 1N6263			
D003	A700082P1	DIO SI PWR MR 751			
D004	A700028P1	DIO SI SIG 1N4148			
J001	A700171P2	CONN PWB FEM			
J002	A700049P2	CONNECTOR RECET COAXIAL			
J003	A700102P13	CONN PWB FEM 05-CKT			
J004	B800555G1	CONN METERING			
L001	A701006P6	STRAP			
L002	J709078G1	COIL ASM			
L003	A701237P1	COIL			
L004	A700024P1	COIL RF FIX 0.1UH 10%			
L005	A701237P1	COIL			
L006	A700024P1	COIL RF FIX 0.1UH 10%			

DATE: 09/20/90

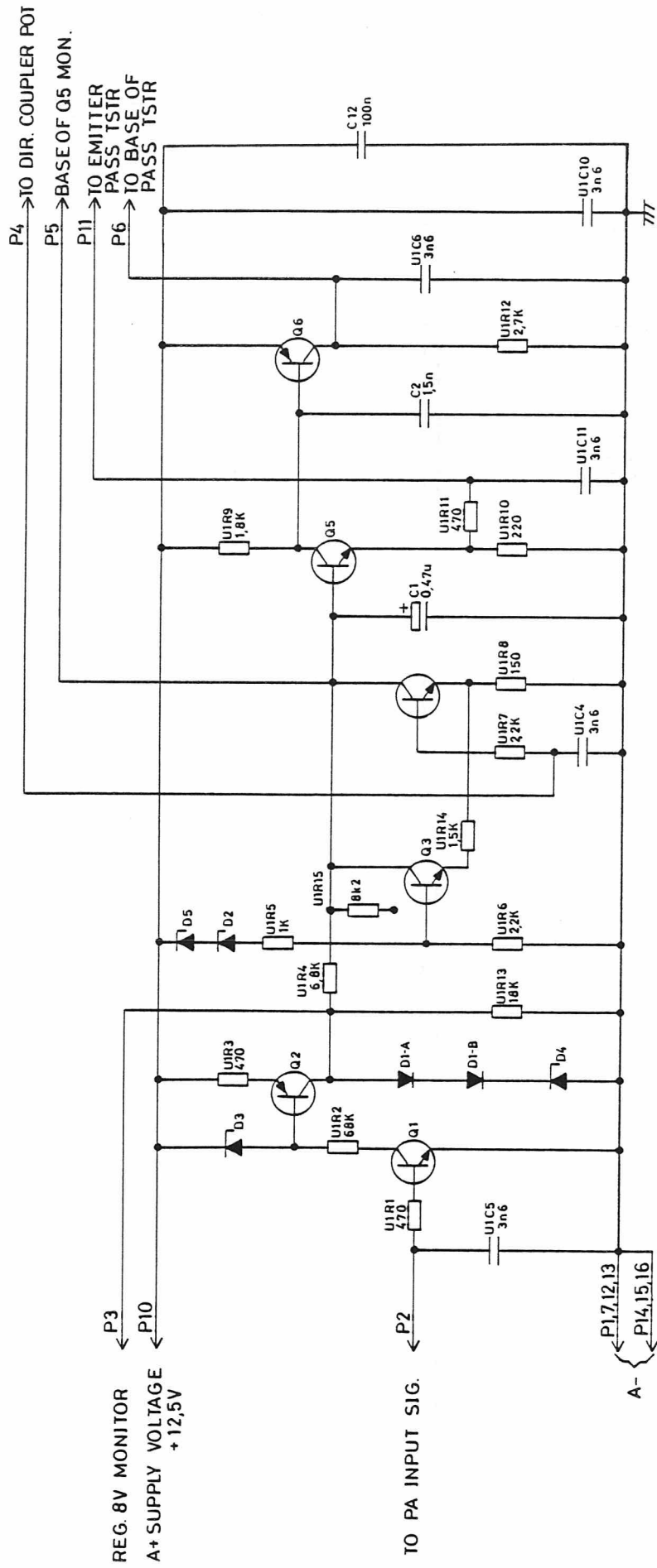
X404.657/3

PARTS LIST FOR POWER AMPLIFIER PA963

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GTE6003A	D900093G16 PA963	L007	A701237P1	COIL
Q001	4802220Y01		L008	A701006P5	STRAP
A001	0102720B94	D900605G3 BD PW SEE BELOW	L011	J709078G1	COIL ASM
Q001	J710015P1	TSTR, NPN, SI RF-PRW, 13W <i>MRF641</i>	L012	J709078G1	COIL ASM
Q002	J700052P2	TSTR, NPN, SI RF-PRW, 35W	L013	A700024P15	COIL RF FIX 1.5UH 10%
Q003	A700054P1	TSTR, NPN, SI BD 201	L014	A701237P1	COIL
W001	A701093P1	STRAP	Q001	A700066P2	TSTR NPN SI RF-PWR 2.0W
Q002	48-2158N02	TSTR, NPN, SI RF-PRW, 47W	R001	A700019P37	RES DEPC 1/4W 1K0 5%
-11-	(A700056P2)	NON REFERENCED ITEMS:	R002	A700019P13	RES DEPC 1/4W 10R 5%
	0102720B88	K805619G1 HEAT SINK	R003	A700019P23	RES DEPC 1/4W 68R 5%
	A700031P306	SCR, PAN HD M-2.5 x 6.0	R004	A700019P45	RES DEPC 1/4W 4K7 5%
	A701887P1	HT SK	R005	A700019P13	RES DEPC 1/4W 10R 5%
	A701900P2	CLIP, COMPR.	R006	A700019P13	RES DEPC 1/4W 10R 5%
A001	0102720B94	D900605G3 BD PW	R007	A700019P67	RES DEPC 1/4W 330K 5%
C001	A700233P5	CAP CER CL2 470P 20%	R008	J708143P2	RESISTOR
C002	A700233P5	CAP CER CL2 470P 20%	R009	J708394P25	RES VAR CERM 1K0 20%
C003	A700015P21	CAP PTFE 47P 5%	R010	J708143P2	RESISTOR
C004	A700006P4	CAP PTFE 8P2 10%	R011	A700019P65	RES DEPC 1/4W 220K 5%
C005	A700006P23	CAP MICA 39P 5%	R012	0611077A70	RES MFLM 1/8W 680R 5%
C006	A700235P3	CAP CER N150 1P5 .25P	U001	0102720B18	D900111G1 PC 903
C007	A700233P5	CAP CER CL2 470P 20%	W015	A701233P1	JMPR
C008	A700235P19	CAP CER N150 33P 5%	W016	A701105P1	JUMPER
C009	A700015P15	CAP PTFE 27P 5%	Z001	J709081G3	FILTER ASM
C010	A700233P5	CAP CER CL2 470P 20%	Z002	J709081G3	FILTER ASM
C011	2313749D72	CAP TA SOL 4U7 35V	Z003	J709081G3	FILTER ASM
C012	A700006P17	CAP MICA 22P 5%	Z004	J709080G3	FILTER ASM
C013	A700006P21	CAP MICA 33P 5%		8402003U78A	D900606P1 BD PW
C014	A700235P19	CAP CER N150 33P 5%			NON REFERENCED ITEMS:
C015	A700006P11	CAP MICA 15P 5%		A700114P1	TERM STUD INSULATED
C016	A700006P16	CAP MICA 20P 5%		B800554P1	COIL
C017	A700015P8	CAP PTFE 15P 5%		J706513P1	HEAT SINK
C018	A700233P5	CAP CER CL2 470P 20%			
C019	2313749D72	CAP TA SOL 4U7 35V			
C020	A700006P19	CAP MICA 27P 5%			
C021	A700006P19	CAP MICA 27P 5%			
C022	A700006P24	CAP MICA 43P 5%			
C023	A700006P24	CAP MICA 43P 5%			
C024	A700015P27	CAP PTFE 82P 5%			
C025	A700235P19	CAP CER N150 33P 5%			
C026	A700006P11	CAP MICA 15P 5%			
C027	A700131P12	CAP PTFE 12P 0.5P			
C028	A700131P23	CAP PTFE 23P 0.5P			
C029	A700131P13	CAP PTFE 13P 0.5P			
C030	A700235P19	CAP CER N150 33P 5%			
C031	A700233P5	CAP CER CL2 470P 20%			
C032	A700233P5	CAP CER CL2 470P 20%			
C033	A700233P5	CAP CER CL2 470P 20%			
C034	A700233P5	CAP CER CL2 470P 20%			
C035	A700233P5	CAP CER CL2 470P 20%			
C036	A700233P5	CAP CER CL2 470P 20%			
C037	A700233P5	CAP CER CL2 470P 20%			
C038	A700233P5	CAP CER CL2 470P 20%			
C039	A700233P5	CAP CER CL2 470P 20%			
C040	A700233P5	CAP CER CL2 470P 20%			
C041	A700064P1	CAP ELECT 10U 25V			
C042	A700233P5	CAP CER CL2 470P 20%			
C043	A700235P14	CAP CER N150 12P 5%			
C045	J707809P19	CAP CER NP0 33P 5%			
C046	J707809P19	CAP CER NP0 33P 5%			
D001	A700047P3	DIO SI SIG 1N6263			
D002	A700047P3	DIO SI SIG 1N6263			
D003	A700082P1	DIO SI PWR MR 751			
D004	A700028P1	DIO SI SIG 1N4148			
J001	A700171P2	CONN PWB FEM			
J002	A700049P2	CONNECTOR RECET COXIAL			
J003	A700102P13	CONN PWB FEM 05-CKT			
J004	B800555G1	CONN METERING			
L001	A701006P6	STRAP			
L002	J709078G1	COIL ASM			
L003	A701237P1	COIL			
L004	A700024P1	COIL RF FIX 0.1UH 10%			
L005	A701237P1	COIL			
L006	A700024P1	COIL RF FIX 0.1UH 10%			

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DATE: 09/20/90



POWER CONTROL PC903

19D900111G1 - 0102720B18

D402.928/4

PARTS LIST FOR POWER CONTROL PC903

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	0102720B18	D900111G1 PC903			
C001	A700045P16	CAP,TA,SOL U47, 20V			
C002	A700011P4	CAP,CER,CL2 1N5 , 20%			
C012	A700009P5	CAP,CER,CL2 100N , 20%			
D001	A700053P1	DIO,SI,SIG BAV 99			
D002	A700083P6	DIO,SI,ZENR 10V,5%,0.2W			
D003	A700083P1	DIO,SI,ZENR 4V7,5%,0.2W			
D004	A700083P4	DIO,SI,ZENR 6V8,5%,0.2W			
D005	A700083P1	DIO,SI,ZENR 4V7,5%,0.2W			
Q001	A700076P1	TSTR,NPN,SI MMBT 3904			
Q002	A700059P1	TSTR,PNP,SI MMBT 3906			
Q003	A700076P1	TSTR,NPN,SI MMBT 3904			
Q004	A700076P1	TSTR,NPN,SI MMBT 3904			
Q005	A700076P1	TSTR,NPN,SI MMBT 3904			
Q006	A701509P1	TSTR,PNP,SI MMBT 2907			
U001	D900110G1R1	INTEGRATED CKT THK FILM			
		NON REFERENCED ITEMS			
	A701611G1	CAN COATED			
	M905917P1	RETAINER			

PL961

INJECTION SIGNAL SOURCE

The injection signal for the mixer is generated by a phase locked loop module.

PL961 covers the 381 - 449 MHz band, corresponding to the receiver input frequency band 403 - 470 MHz. The loop is locked to an 11 - 21 MHz channel synthesizer.

The module consists of a printed wiring board and 3 micromodules, the MX961, the PD901, and the XO. MX901 and PD901 are soldered in. The XO is a plug-in type.

The voltage controlled oscillator (VCO) is working at the frequency and is an LC Clapp oscillator with a dual gate MOS-FET as the active element. The tuning coil is a piece of 90 ohm transmission line shorter than a quarter wavelength at the highest frequency. The transmission line transforms the tuning capacitor, which is used for the main frequency setting, into an equivalent inductance. The voltage tuning is done by two varicap diodes placed across the tuned circuitry.

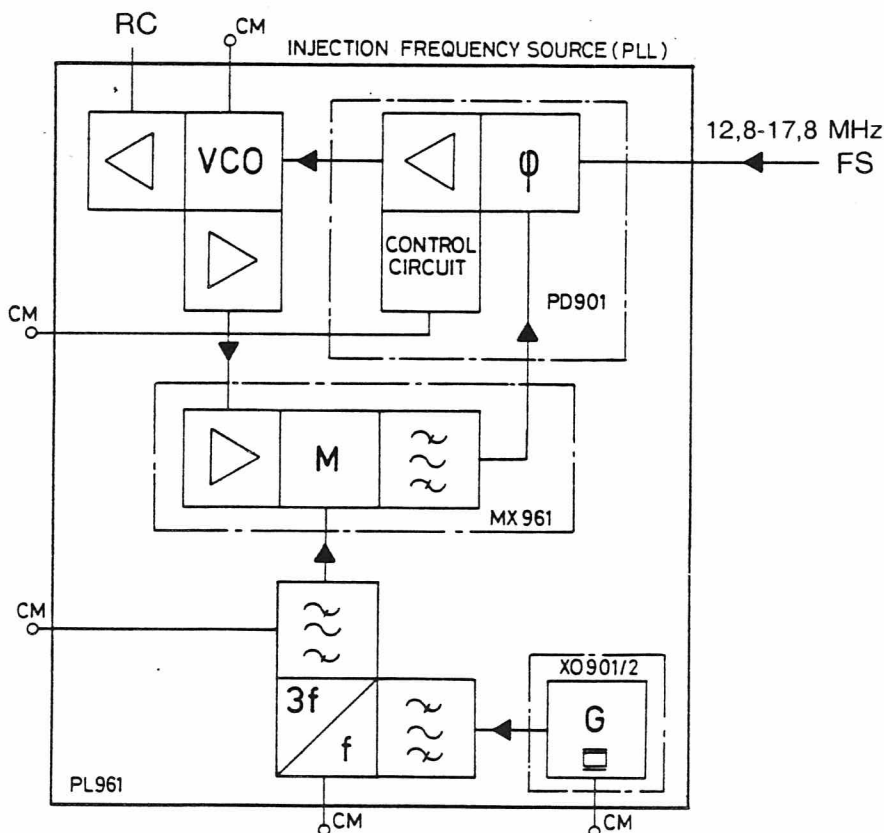
The VCO is followed by a broadband buffer stage for achieving adequate output level, and it isolates the

VCO from its load. From the output of the buffer a portion of the signal is fed to the isolation amplifier. The buffer is followed by a lowpass filter which removes the harmonic contents of the signal.

The isolation amplifier feeds the injection frequency (F_o) to the mixer and prevents the reference frequency (F_r) from entering the VCO circuit. The amplifier consists of two broadband, untuned stages, of which the first stage is placed on the p.w.b. along with the VCO and the second stage is placed in the mixer micromodule. The total isolation is approximately 80 dB.

The PLL mixer micromodule (MX961) contains a J-FET mixer, a bandpass filter, and a part of the isolation amplifier.

The mixer has two inputs, F_o and F_r , both broadband and approximately 100 MHz wide. To achieve a high signal-to-noise ratio in the loop, the mixer is driven with high signal levels ($f_o=+7$ dBm and $F_r=-6$ dBm). The bandwidth of the mixer output is determined by the bandpass filter which removes the harmonics, and is approximately 10 MHz wide (11 - 21 MHz).



The phase comparator micromodule (PD901) compares two signals in the 11 - 21 MHz band, one from the PLL mixer and one from the channel synthesizer. The output from the phase comparator is fed to an amplifier through a loop filter. The amplifier produces the tuning control voltage (2 - 5.5 V) for the varicap diodes in the VCO.

The phase comparator actually consists of two detectors, a phase detector and a frequency detector. If the

loop is out of lock, the frequency detector will activate a search oscillator, a ramp generator, and switch off the loop filter. When the mixer signal is within the capture range of the frequency detector, the ramp generator stops and the loop filter is switched on. Then the loop filter is locked and the phase detector is comparing the two signals. Most of the comparator circuitry is contained in a custom designed integrated circuit. The micromodule has two metering points, one for checking the lock function and one for measuring the tuning voltage to the VCO.

TECHNICAL SPECIFICATIONS

ALL SPECIFICATIONS AT 25°C.

Input frequency

11 - 21 MHz

Input level

-1 dB/+3 dB

Impedance

50 ohm

Output frequency

381 - 449 MHz

Output level

+10 to +13 dBm

Power supply voltage

9 V \pm 5%

Power supply voltage for XO only

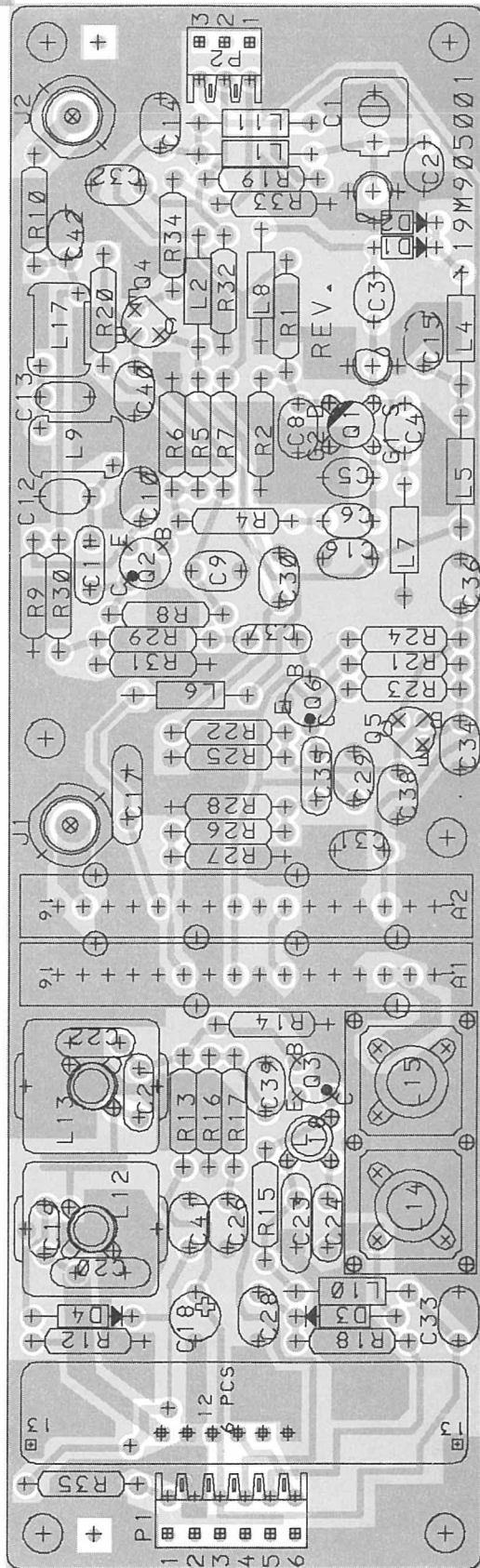
9 V \pm 0.5%

Current consumption

less than 150 mA

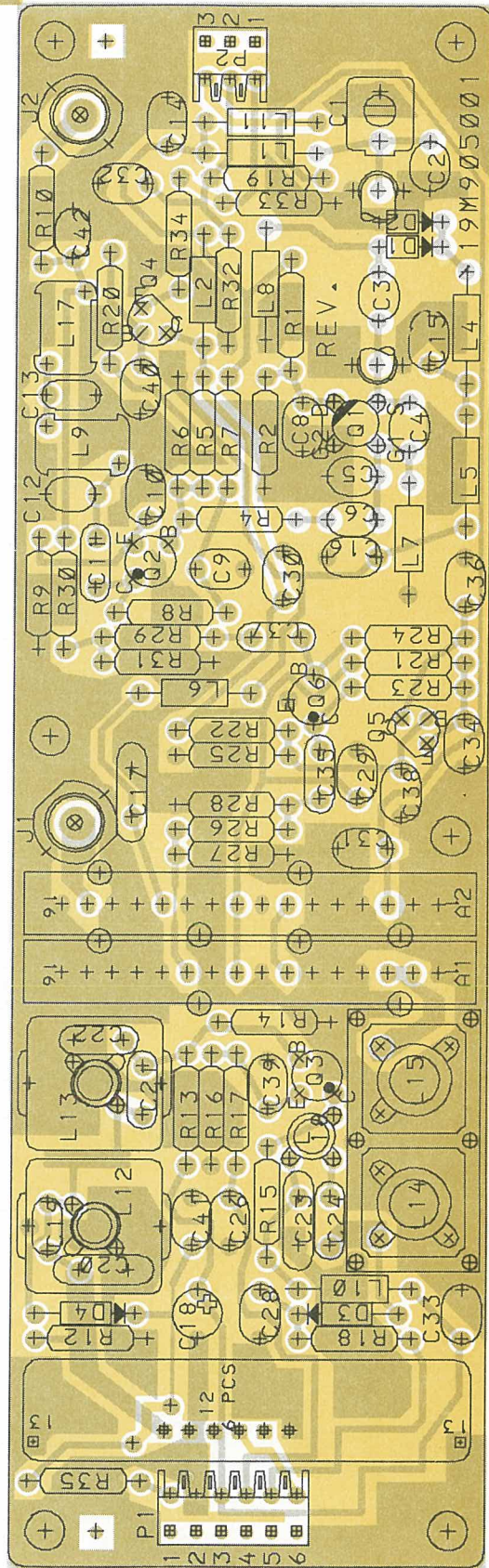
Temperature range

-40°C to +85°C



RX PHASE LOCKED LOOP PL961
COMPONENT LAYOUT

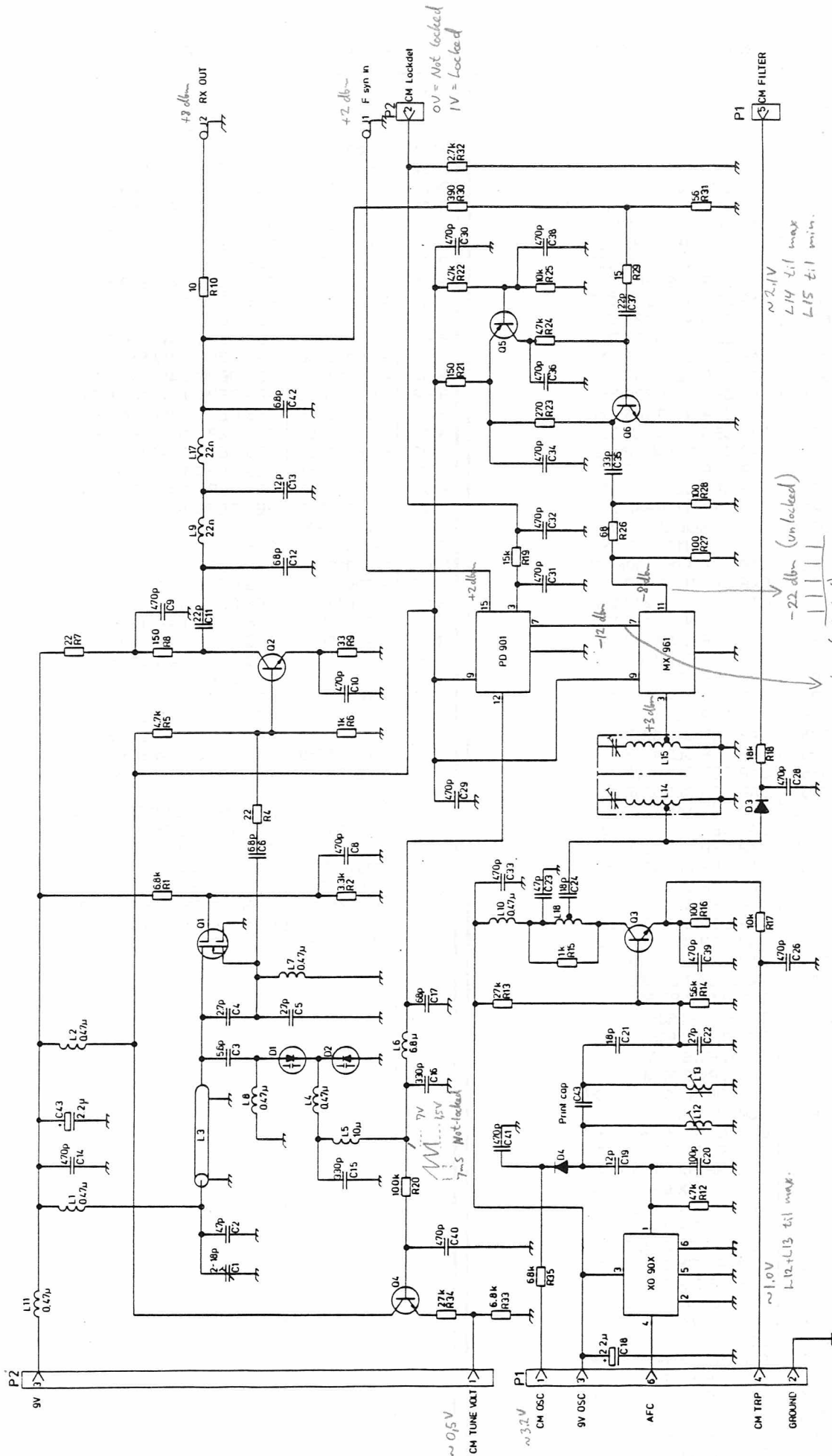
D402.975/6 REV.7 CODE NO.M905002G1 - GRE6018A



RX PHASE LOCKED LOOP PL961
COMPONENT LAYOUT

D402.975/6

REV.7 CODE NO.M905002G1 - GRE6018A



RX PHASE LOCKED LOOP PL961

REV D CODE NO.M905002G1 - GRE6018A

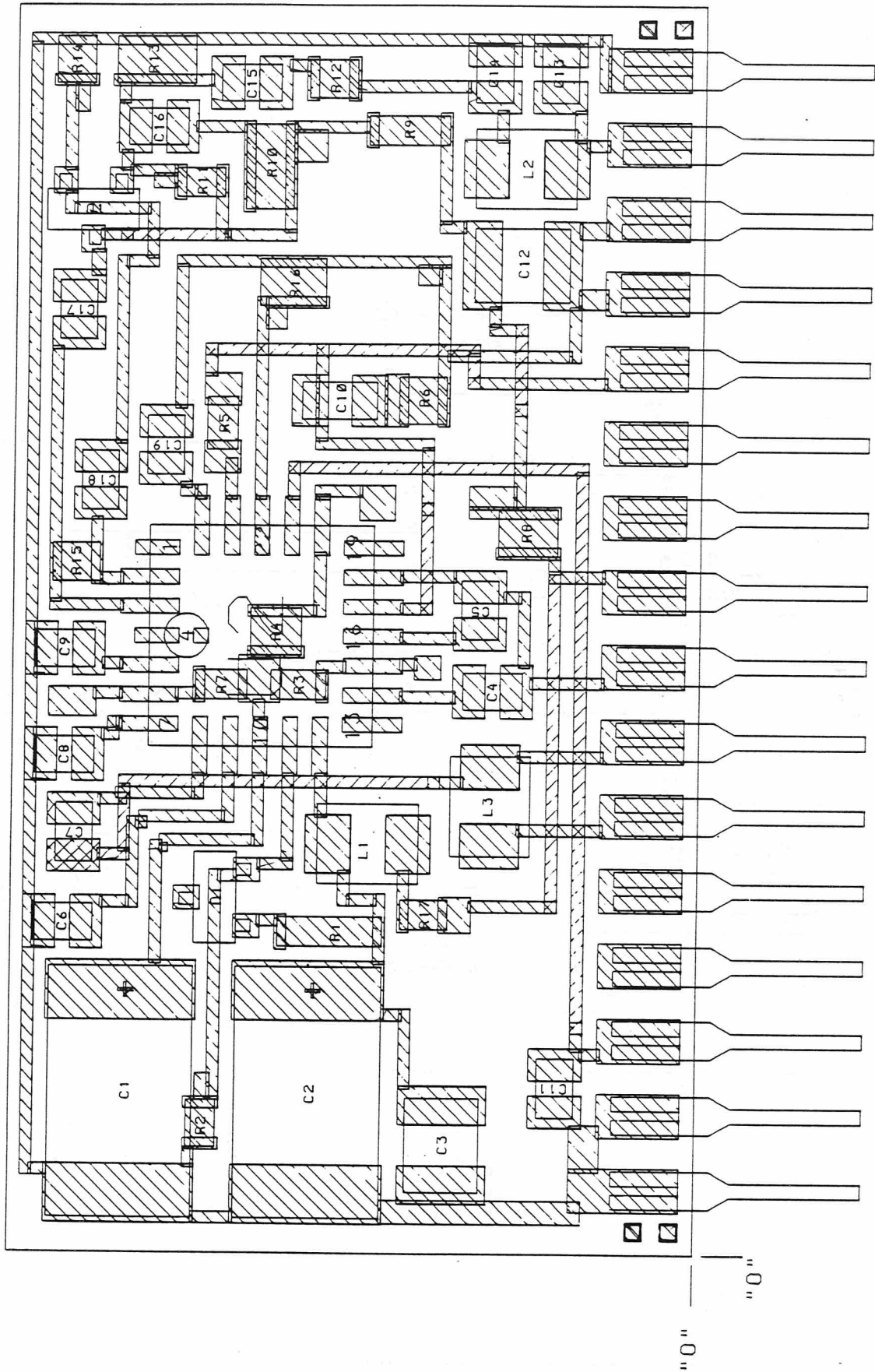
D402.942/7

PARTS LIST FOR RXPHASE LOCKED LOOP PL961

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GRE6018A	M905002G1 PL961	Q006	J706011P1	TSTR NPN SI BFR 91
A001	0102720B82	M905061G1 MIXER MX 961 SEE X405.103	R001	A700019P47	RES DEPC 1/4W 6K8 5%
A002	0102720B81	M905011G1 PD 901 SEE X405.102	R002	A700019P43	RES DEPC 1/4W 3K3 5%
C001	J706003P2	CAP VAR FILM 2.0/18 PF	R004	A700019P17	RES DEPC 1/4W 22R 5%
C002	A700235P9	CAP CER N150 4P7 .25P	R005	A700019P45	RES DEPC 1/4W 4K7 5%
C003	A700235P11	CAP CER N150 6P8 .25P	R006	A700019P37	RES DEPC 1/4W 1K0 5%
C004	A700235P6	CAP CER N150 2P7 .25P	R007	A700019P17	RES DEPC 1/4W 22R 5%
C005	A700235P6	CAP CER N150 2P7 .25P	R008	A700019P27	RES DEPC 1/4W 150R 5%
C006	A700235P11	CAP CER N150 6P8 .25P	R009	A700019P19	RES DEPC 1/4W 33R 5%
C008	A700233P5	CAP CER CL2 470P 20%	R010	A700019P13	RES DEPC 1/4W 10R 5%
C009	A700233P5	CAP CER CL2 470P 20%	R012	A700019P45	RES DEPC 1/4W 4K7 5%
C010	A700233P5	CAP CER CL2 470P 20%	R013	A700019P54	RES DEPC 1/4W 27K 5%
C011	A700235P17	CAP CER N150 22P 5%	R014	A700019P46	RES DEPC 1/4W 5K6 5%
C012	A700235P11	CAP CER N150 6P8 .25P	R015	A700019P37	RES DEPC 1/4W 1K0 5%
C013	A700235P14	CAP CER N150 12P 5%	R016	A700019P25	RES DEPC 1/4W 100R 5%
C014	2113740A71	CAP CER NP0 470P 5%	R017	A700019P49	RES DEPC 1/4W 10K 5%
C015	A700233P4	CAP CER CL2 330P 20%	R018	A700019P52	RES DEPC 1/4W 18K 5%
C016	A700233P4	CAP CER CL2 330P 20%	R019	A700019P51	RES DEPC 1/4W 15K 5%
C017	A700235P23	CAP CER N150 68P 5%	R020	A700019P61	RES DEPC 1/4W 100K 5%
C018	2313749D64	CAP TA SOL 2U2 35V	R021	A700019P27	RES DEPC 1/4W 150R 5%
C019	A700235P14	CAP CER N150 12P 5%	R022	A700019P45	RES DEPC 1/4W 4K7 5%
C020	A700235P25	CAP CER N150 100P 5%	R023	A700019P30	RES DEPC 1/4W 270R 5%
C021	A700235P16	CAP CER N150 18P 5%	R024	A700019P45	RES DEPC 1/4W 4K7 5%
C022	A700235P18	CAP CER N150 27P 5%	R025	A700019P49	RES DEPC 1/4W 10K 5%
C023	A700235P21	CAP CER N150 47P 5%	R026	A700019P23	RES DEPC 1/4W 68R 5%
C024	A700235P16	CAP CER N150 18P 5%	R027	A700019P25	RES DEPC 1/4W 100R 5%
C026	A700233P5	CAP CER CL2 470P 20%	R028	A700019P25	RES DEPC 1/4W 100R 5%
C028	A700233P5	CAP CER CL2 470P 20%	R029	A700019P15	RES DEPC 1/4W 15R 5%
C029	A700233P5	CAP CER CL2 470P 20%	R030	A700019P32	RES DEPC 1/4W 390R 5%
C030	A700233P5	CAP CER CL2 470P 20%	R031	A700019P22	RES DEPC 1/4W 56R 5%
C031	A700233P5	CAP CER CL2 470P 20%	R032	A700019P42	RES DEPC 1/4W 2K7 5%
C032	A700233P5	CAP CER CL2 470P 20%	R033	A700019P47	RES DEPC 1/4W 6K8 5%
C033	A700233P5	CAP CER CL2 470P 20%	R034	A700019P54	RES DEPC 1/4W 27K 5%
C034	A700233P5	CAP CER CL2 470P 20%	R035	A700019P59	RES DEPC 1/4W 68K 5%
C035	A700235P19	CAP CER N150 33P 5%		8402003U80A	M905001P1R8 BD PW
C036	A700233P5	CAP CER CL2 470P 20%			NON REFERENCED ITEMS:
C037	A700235P17	CAP CER N150 22P 5%	A700069P1		COIL CAN 13.7X13.7 (2 used)
C038	A700233P5	CAP CER CL2 470P 20%	K805050P1		CSTG HEL (2 used)
C039	A700233P5	CAP CER CL2 470P 20%	J706109P1		SCREW TUNING (2 used)
C040	A700233P5	CAP CER CL2 470P 20%	J706110P1		SPG TUN (6 used)
C041	A700233P5	CAP CER CL2 470P 20%	J706281P2		CORE SCREW FERR U 10 (2 used)
C042	A700235P11	CAP CER N150 6P8 .25P	J708925P2		CONN PT PIN L11.70MM
C043	2313749D64	CAP TA SOL 2U2 35V	A700090P4		CONTACT
D001	J706007P1	DIO SI CAP BB 505B			
D002	J706007P1	DIO SI CAP BB 505B			
D003	A700047P1	DIO SI SIG 2835			
D004	A700047P1	DIO SI SIG 2835			
J001	A700171P2	CONN PWB FEM			
J002	A700171P2	CONN PWB FEM			
L001	A700024P9	COIL RF FIX 0.47UH 10%			
L002	A700024P9	COIL RF FIX 0.47UH 10%			
L003	L855090G1	COIL COAX PL961/PL962			
L004	A700024P9	COIL RF FIX 0.47UH 10%			
L005	A700024P25	COIL RF FIX 10UH 10%			
L006	A700024P23	COIL RF FIX 6.8UH 10%			
L007	A700024P9	COIL RF FIX 0.47UH 10%			
L008	A700024P9	COIL RF FIX 0.47UH 10%			
L009	J706085P1	COIL RF FIX 2-1/2T			
L010	A700024P9	COIL RF FIX 0.47UH 10%			
L011	A700024P9	COIL RF FIX 0.47UH 10%			
L012	J706083P8	COIL RF VAR 3-1/2T			
L013	J706083P8	COIL RF VAR 3-1/2T			
L014	J706154P2	COIL RF FIX 7-1/2T TAP			
L015	J706154P2	COIL RF FIX 7-1/2T TAP			
L017	J706085P1	COIL RF FIX 2-1/2T			
L018	J706083P7	COIL RF VAR 3-1/2T TAP			
P001	A700041P5	CONN PWB FEM 06-CKT			
P002	A700041P2	CONN PWB FEM 03-CKT			
Q001	J706019P1	TSTR MFET SI BF 960			
Q002	J706011P1	TSTR NPN SI BFR 91			
Q003	J706011P1	TSTR NPN SI BFR 91			
Q004	A700017P2	TSTR NPN SI BC 548C			
Q005	A700020P1	TSTR PNP SI BC 558A/B			

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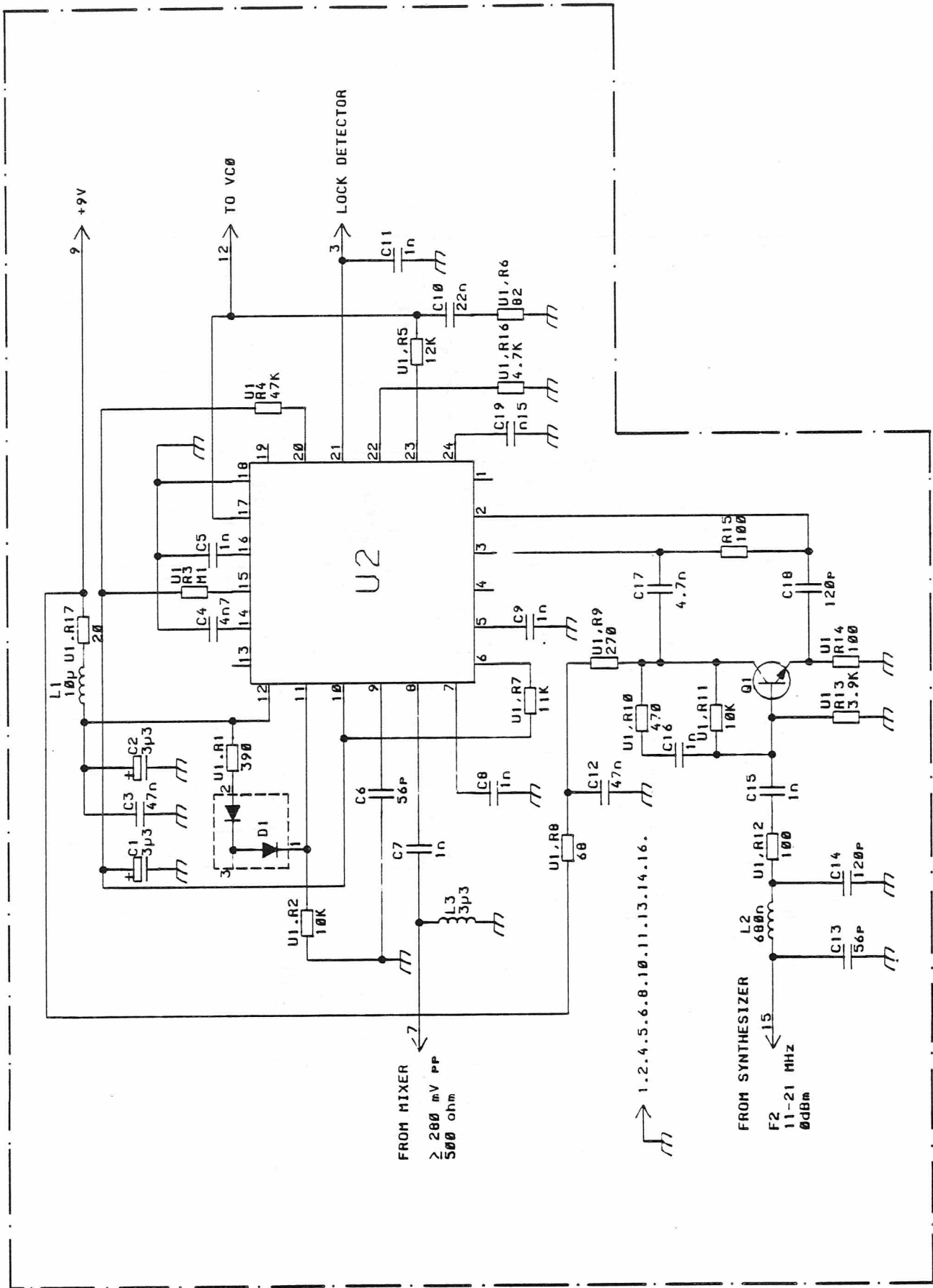
DATE: 09/20/90



**PHASE DISCRIMINATOR PD901
INTERGRATED CIRCUIT**

CODE NO. M905011G1 - 0102720B81

D405.106/2



PHASE DISCRIMINATOR PD901

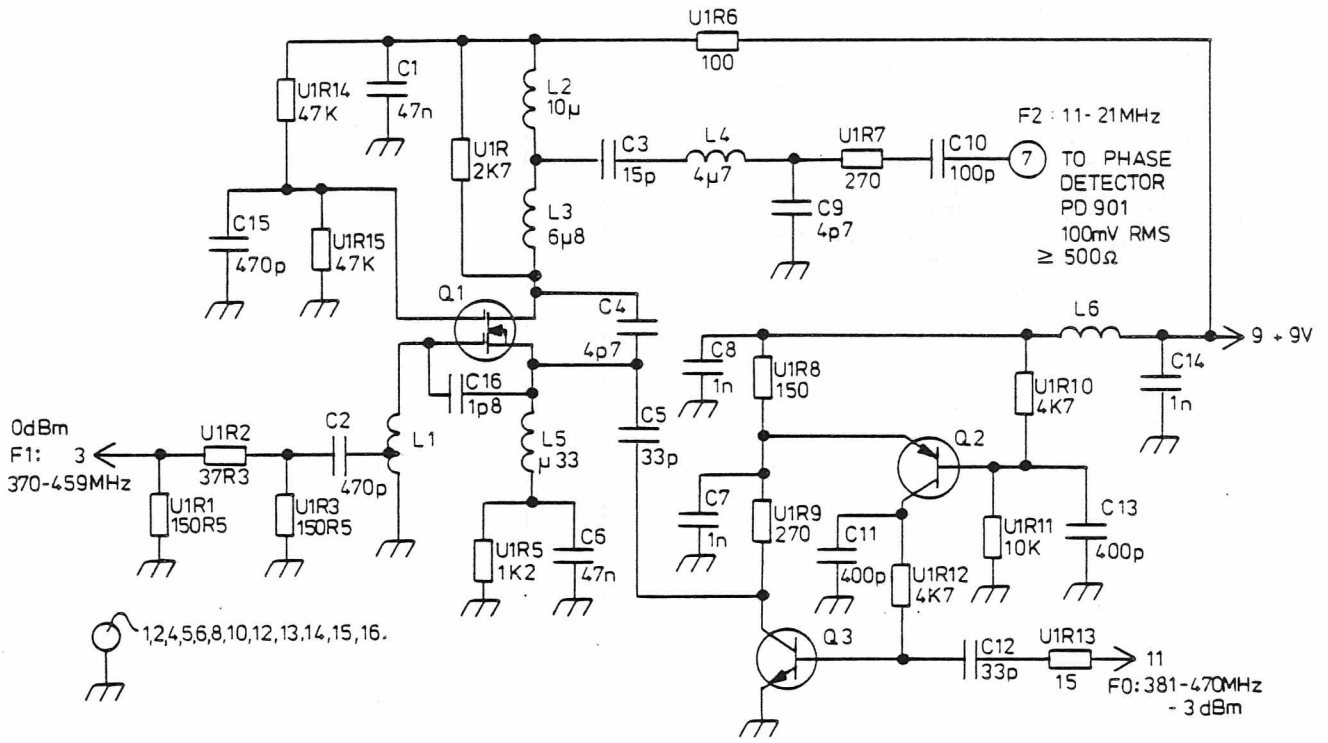
D402.921/5 REV A CODE NO. M905011G1 - 0102720B81

PARTS LIST FOR PHASE DISCRIMINATOR PD901

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	0102720B81	M905011G1 PD901			
C001	A700045P213	CAP,TA,SOL 3U3 , 15V			
C002	A700045P213	CAP,TA,SOL 3U3 , 15V			
C003	2113741C09	CAP,CER,CL2 47N , 5%			
C004	2113741M37	CAP,CER,CL2 4N7 , 10%			
C005	2113741M21	CAP,CER,CL2 1N0 , 10%			
C006	2113740A49	CAP,CER,NP0 56P , 5%			
C007	2113741M21	CAP,CER,CL2 1N0 , 10%			
C008	2113741M21	CAP,CER,CL2 1N0 , 10%			
C009	2113741M21	CAP,CER,CL2 1N0 , 10%			
C010	2113741M53	CAP,CER,CL2 22N , 10%			
C011	2113741M21	CAP,CER,CL2 1N0 , 10%			
C012	2113741C09	CAP,CER,CL2 47N , 5%			
C013	2113740A49	CAP,CER,NP0 56P , 5%			
C014	2113740A57	CAP,CER,NP0 120P , 5%			
C015	2113741M21	CAP,CER,CL2 1N0 , 10%			
C016	2113741M21	CAP,CER,CL2 1N0 , 10%			
C017	2113741M37	CAP,CER,CL2 4N7 , 10%			
C018	2113740A57	CAP,CER,NP0 120P , 5%			
C019	2113740A59	CAP,CER,NP0 150P , 5%			
D001	J707389P1	DIO,SI,SIG BAV 99			
L001	J710333P37	COIL,RF,FIX 10UH 10%			
L002	J710333P23	COIL,RF,FIX 0.680UH 20%			
L003	J710333P31	COIL,RF,FIX 3.30UH 20%			
Q001	J708418P1	TSTR,NPN,SI BFS 20			
U001	M905010G1R2	INT CKT			
U002	J710924P1	IC,PLL,PH DET CUSTOM DES			
		NON REFERENCED ITEMS:			
	C850517P2	CAN			
	M905917P1	RETAINER			

DATE: 09/20/90

X405.102/3



1,2,4,5,6,8,10,12,13,14,15,16.

MIXER CIRCUIT MX961

CODE NO.M905061G1

D402.919/4

PARTS LIST FOR MIXER CIRCUIT MX961

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	0102720B82	M905061G1 MX961			
C1	2113741C09	CAP CER CL2 47N 5%			
C2	J709524P65	CAP CER RF 470P 5%			
C3	2113740A33	CAP CER NPO 15P 5%			
C4	J707809P9	CAP CER NPO 4P7 25P			
C5	J707809P19	CAP CER NPO 33P 5%			
C6	2113741C09	CAP CER CL2 47N 5%			
C7	2113741B73	CAP CER NPO 1N 5%			
C8	2113741B73	CAP CER NPO 1N 5%			
C9	2113740A19	CAP CER NPO 4P7 25P			
C10	2113740A55	CAP CER NPO 100P 5%			
C11	2113740A71	CAP CER NPO 470P 5%			
C12	J707809P19	CAP CER NPO 33P 5%			
C13	2113740A71	CAP CER NPO 470P 5%			
C14	2113741B73	CAP CER NPO 1N 5%			
C15	J709524P65	CAP CER RF 470P 5%			
C16	J707809P2	CAP CER NPO 1P2 25P			
L2	J710333P37	COIL RF FIX 10UH 10%			
L3	J710333P35	COIL RF FIX 6.80UH 20%			
L4	J710333P33	COIL RF FIX 4.70UH 20%			
L5	J710333P19	COIL RF FIX 0.33UH 20%			
L6	J710333P37	COIL RF FIX 10UH 10%			
Q001	J707433P1	TSTR MFET SI BF 989			
Q002	J707387P1	TSTR PNP SI BCW			
Q003	J707771P1	TSTR NPN SI BFR			
		NON REFERENCED ITEMS:			
	C850517P2	CAN			
	DELETED	STRAP			
	M905917P1	RETAINER			

DATE: 09/20/90

X405.103/4

PL962

TRANSMITTER SIGNAL SOURCE

PL962 is used for the 403 - 470 MHz band. It generates the modulated signal for the PA module.

The phase locked loop module consists of an voltage controlled oscillator (VCO), a buffer amplifier, RA962, a PA driver, RA961, a mixer, MX961, a phase detector, PD901, an oscillator, a frequency tripler, and an audio processor AA901/902. Furthermore the module contains some logic function circuits, and has several metering points for testing and adjusting the module.

The circuit is almost identical to the receiver PLL module (PL961), and for a detailed description refer to the receiver description. However, compared to the PL961 module, the PL962 has three additional micro-modules and some control logic, which are described in the following.

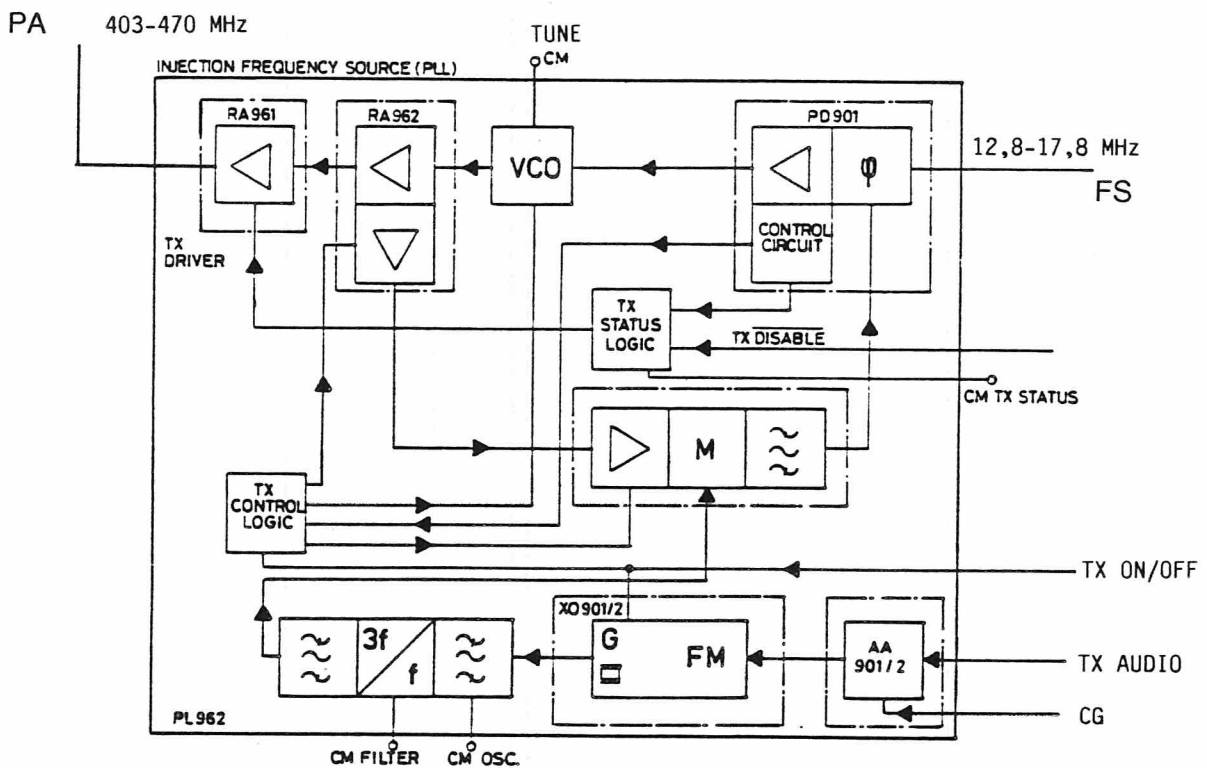
The transmitter PA driver, RA961, is a two-stage broadband amplifier for the 403 - 470 MHz band. It drives the PA stages via a harmonic filter placed on the p.w.b. The module has a central metering point for measuring the output level. It is soldered in.

The buffer amplifier, RA962, contains a broadband amplifier which follows the VCO, and the first stage of the isolation amplifier. The second stage is placed in the mixer micromodule, refer to PL961. It is soldered in.

The control logic is placed on the p.w.b. and prevents the transmitter from being keyed when the PLL circuit, or the frequency synthesizer is out of lock.

The audio processor micromodule, AA901 is for use in 20/25 kHz equipment and AA902 is for use in 12.5 kHz equipment. It contains a pre-emphasis circuit, an audio amplifier, a limiter, a channel guard level control, and two roll-off filters. The circuitry shapes the audio properly to produce a phase-modulated carrier when used in conjunction with a frequency modulated oscillator, and limits the deviation to be within the values required by the authorities. An audio input is provided prior to the pre-emphasis and limiting circuits, and a channel guard tone input is provided after these circuits.

The microphone bias is provided via the TX audio pin. The audio micromodule which is a plug-in type utilizes



a quad-op-amp to provide the necessary gain. The microphone signal is fed to the first amplifier through a passive preemphasis network to achieve a rising audio characteristic which is needed with the true FM oscillator. The oscillator thus produces a phase-modulated type of signal.

Limiting diodes are used to ensure that the second amplifier is not being overdriven.

The second amplifier performs the actual audio limiting by using biased diodes in the feedback network. If the

audio signals exceed a pre-set level these diodes will conduct and prevent any further increase of the output.

After the limiter, the signal passes a roll-off filter which prevents interference on adjacent channels by limiting the audio frequencies above 3 kHz. The filter is an active type and utilizes the other two op-amps contained in the IC.

Channel guard signals are applied before the roll-off filter and their amplitude must be adjusted separately to produce the correct modulation.

TECHNICAL SPECIFICATIONS

CG input level

300 mV \pm 2 dB

AF input

100 mV \pm 2 dB with preemphasis
 Δf : 3 kHz, Δf mod : 1 kHz

AF input impedance

600 ohm

Output frequency

403 - 470 MHz (bandwidth 10 MHz)

RF output level

+25 to +27 dBm

RF impedance

50 ohm

Power supply

Voltage : 9 V \pm 5%
Voltage for XO only : 9 V \pm 0.5%

Current consumption

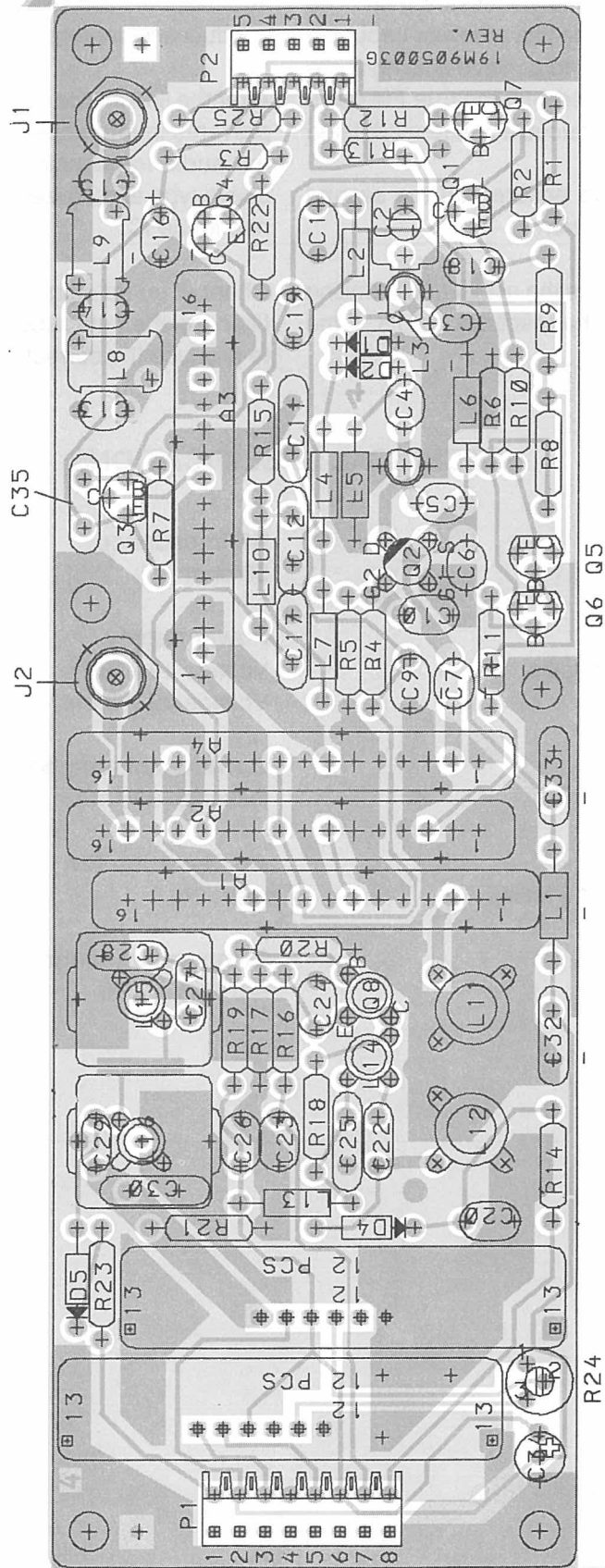
less than 300 mA

AF distortion EIA

max. 2%

Temperature range

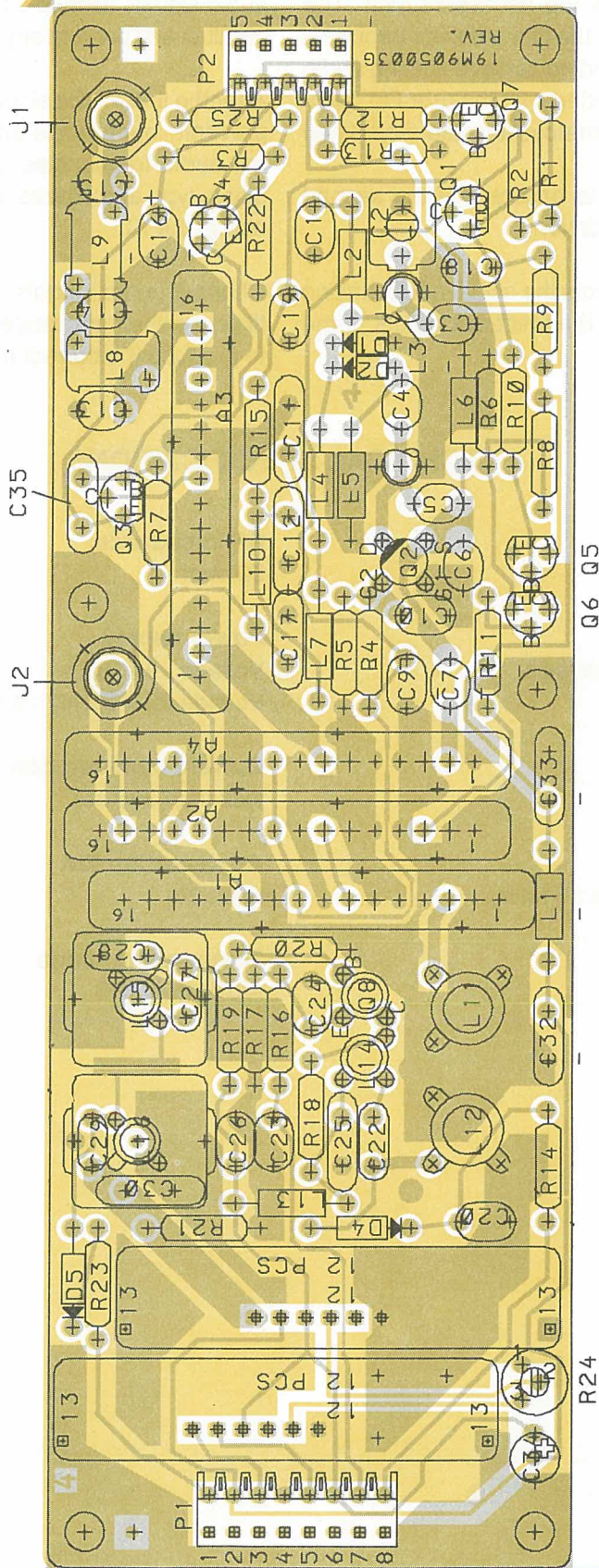
-40°C to +85°C



**TX PHASE LOCKED LOOP PL962
COMPONENT LAYOUT**

D402.976/4

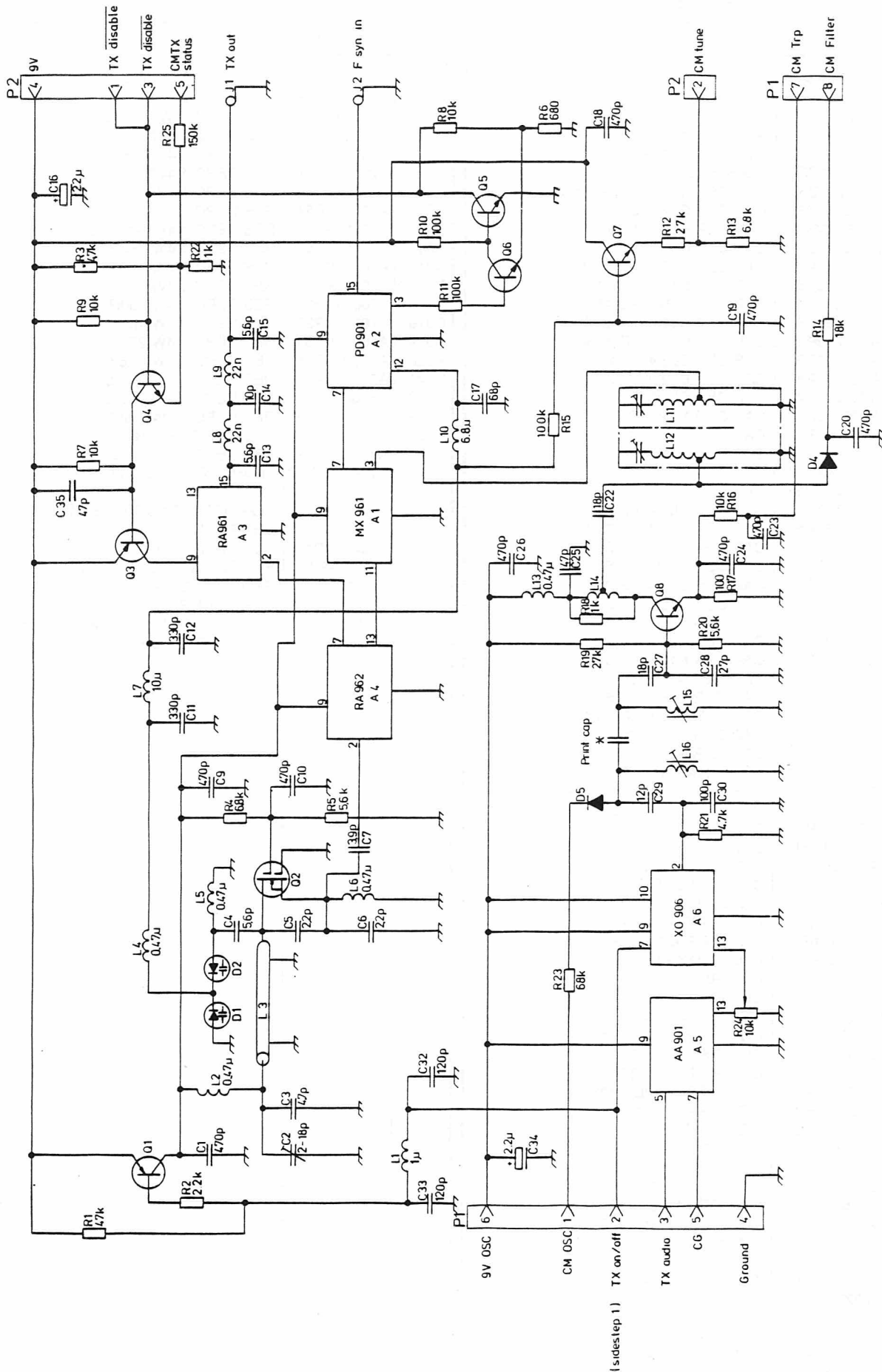
REV.4 CODE NO.M905003G1 - GRE6005A



TX PHASE LOCKED LOOP PL962
COMPONENT LAYOUT

D402.976/4

REV.4 CODE NO.M905003G1 - GRE6005A



TX PHASE LOCKED LOOP PL962

REV B CODE NO. M905003G1 - GTE6005A

D402.974/6

PARTS LIST FOR TX PHASE LOCKED LOOP PL962

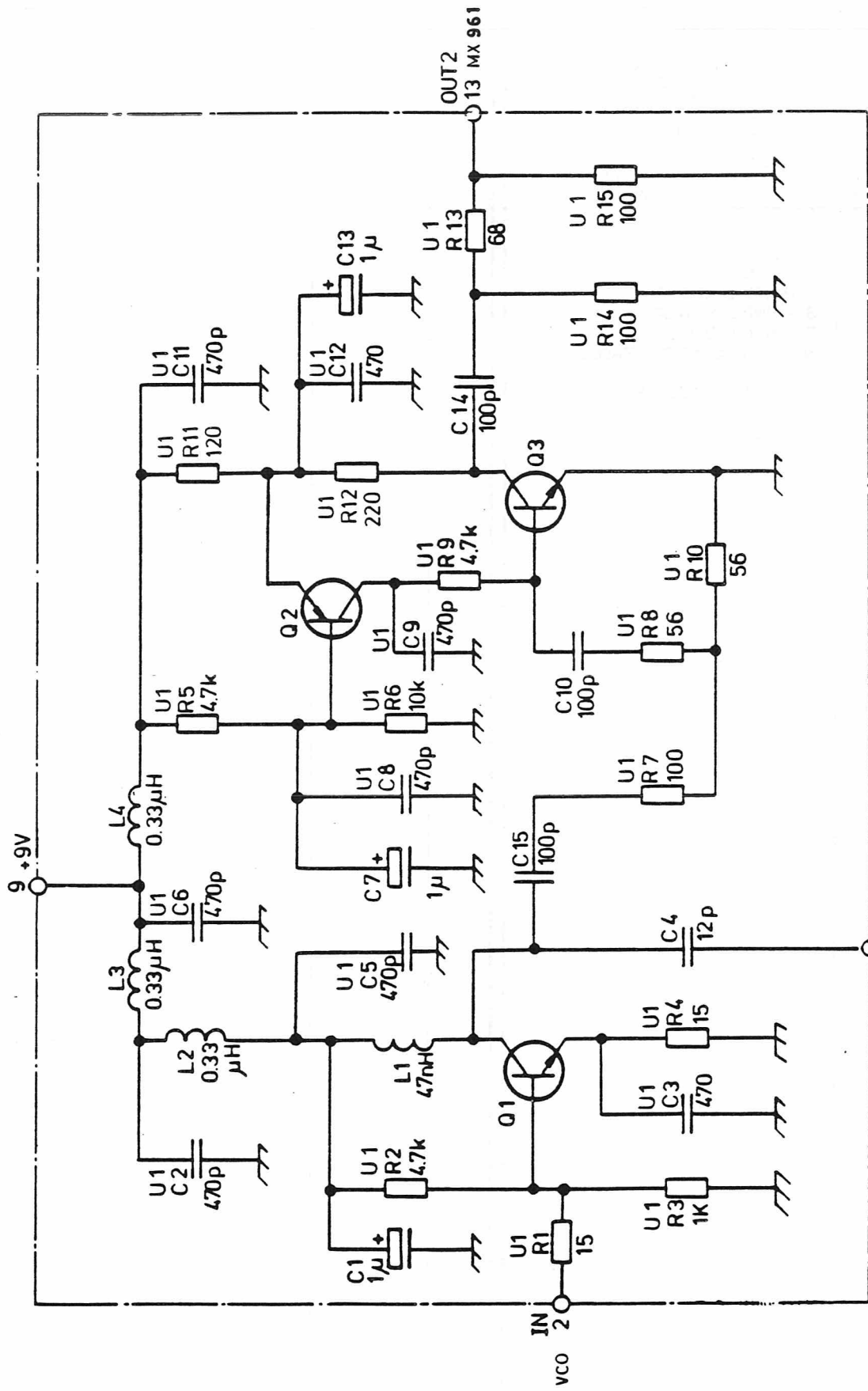
Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GTE6005A	M905003G1 PL962	R005	A700019P46	RES DEPC 1/4W 5K6 5%
A001	0102720B82	M905061G1 MIXER MX 961 SEE X405.103	R006	A700019P35	RES DEPC 1/4W 680R 5%
A002	0102720B81	M905011G1 PD901 SEE X405.102	R007	A700019P49	RES DEPC 1/4W 10K 5%
A003	0102721B50	M905057G1 RA961 SEE X405.104	R008	A700019P49	RES DEPC 1/4W 10K 5%
A004	0102721B51	M905059G1 RA962 SEE X405.105	R009	A700019P49	RES DEPC 1/4W 10K 5%
C001	A700233P5	CAP CER CL2 470P 20%	R010	A700019P61	RES DEPC 1/4W 100K 5%
C002	J706003P2	CAP VAR FILM 2.0/18 PF	R011	A700019P61	RES DEPC 1/4W 100K 5%
C003	A7000235P9	CAP CER N150 4P7 .25P	R012	A700019P54	RES DEPC 1/4W 27K 5%
C004	A700235P10	CAP CER N150 5P6 .25P	R013	A700019P47	RES DEPC 1/4W 6K8 5%
C005	A700235P5	CAP CER N150 2P2 .25P	R014	A700019P52	RES DEPC 1/4W 18K 5%
C006	A700235P5	CAP CER N150 2P2 .25P	R015	A700019P61	RES DEPC 1/4W 100K 5%
C007	A700235P8	CAP CER N150 3P9 .25P	R016	A700019P49	RES DEPC 1/4W 10K 5%
C009	A700233P5	CAP CER CL2 470P 20%	R017	A700019P25	RES DEPC 1/4W 100R 5%
C010	A700233P5	CAP CER CL2 470P 20%	R018	A700019P37	RES DEPC 1/4W 1K0 5%
C011	A700233P4	CAP CER CL2 330P 20%	R019	A700019P54	RES DEPC 1/4W 27K 5%
C012	A700233P4	CAP CER CL2 330P 20%	R020	A700019P46	RES DEPC 1/4W 5K6 5%
C013	A700235P10	CAP CER N150 5P6 .25P	R021	A700019P45	RES DEPC 1/4W 4K7 5%
C014	A700235P13	CAP CER N150 10P 5%	R022	A700019P37	RES DEPC 1/4W 1K0 5%
C015	A700235P10	CAP CER N150 5P6 .25P	R023	A700019P59	RES DEPC 1/4W 68K 5%
C016	2313749D64	CAP TA SOL 2U2 35V	R024	A700016P4	RES VAR CERM 10K 10%
C017	A700235P23	CAP CER N150 68P 5%	R025	A700019P63	RES DEPC 1/4W 150K 5%
C018	2313749D64	CAP CER CL2 470P 20%		8402003U81A	M905004P1R4 BD PW
C019	A700233P5	CAP CER CL2 470P 20%			NON REFERENCED ITEMS:
C020	A700233P5	CAP CER CL2 470P 20%	K805050P1		CSTG HEL
C022	A700235P16	CAP CER N150 18P 5%	A700069P1		COIL CAN 13.7X13.7 (2 used)
C023	A700233P5	CAP CER CL2 470P 20%	J706109P1		SCREW TUNING (2 used)
C024	A700233P5	CAP CER CL2 470P 20%	J706110P1		SPG TUN (2 used)
C025	A700235P21	CAP CER N150 47P 5%	J706281P2		CORE SCREW FERR U 10 (2 used)
C026	A700233P5	CAP CER CL2 470P 20%	J708925P2		CONN PT PIN L11.70MM (12 used)
C027	A700235P16	CAP CER N150 18P 5%	A700090P4		CONTACT (4 used)
C028	A700235P18	CAP CER N150 27P 5%			
C029	A700235P14	CAP CER N150 12P 5%			
C030	A700235P25	CAP CER N150 100P 5%			
C032	A700235P26	CAP CER N750 120P 5%			
C033	A700235P26	CAP CER N750 120P 5%			
C034	2313749D64	CAP TA SOL 2U2 35V			
C035	A700235P21	CAP CER N150 47P 5%			
D001	J706007P1	DIO SI CAP BB 505B			
D002	J706007P1	DIO SI CAP BB 505B			
D004	A700047P1	DIO SI SIG 2835			
D005	A700047P1	DIO SI SIG 2835			
J001	A700171P2	CONN PWB FEM			
J002	A700171P2	CONN PWB FEM			
L001	A700024P13	COIL RF FIX 1.0UH 10%			
L002	A700024P9	COIL RF FIX 0.47UH 10%			
L003	L855090G1	COIL COAX PL961/PL962			
L004	A700024P9	COIL RF FIX 0.47UH 10%			
L005	A700024P9	COIL RF FIX 0.47UH 10%			
L006	A700024P9	COIL RF FIX 0.47UH 10%			
L007	A700024P25	COIL RF FIX 10UH 10%			
L008	J706085P1	COIL RF FIX 2-1/2T			
L009	J706085P1	COIL RF FIX 2-1/2T			
L010	A700024P23	COIL RF FIX 6.8UH 10%			
L011	J706154P2	COIL RF FIX 7-1/2T TAP			
L012	J706154P2	COIL RF FIX 7-1/2T TAP			
L013	A700024P9	COIL RF FIX 0.47UH 10%			
L014	J706083P7	COIL RF VAR 3-1/2T TAP			
L015	J706083P8	COIL RF VAR 3-1/2T			
L016	J706083P8	COIL RF VAR 3-1/2T			
P001	A700041P7	CONN PWB FEM 08-CKT			
P002	A700041P4	CONN PWB FEM 05-CKT			
Q001	A700026P1	TSTR PNP SI BC 369			
Q002	J706019P1	TSTR MFET SI BF 960			
Q003	A700026P1	TSTR PNP SI BC 369			
Q004	A700017P1	TSTR NPN SI BC 548A/B			
Q005	A700017P1	TSTR NPN SI BC 548A/B			
Q006	A700017P1	TSTR NPN SI BC 548A/B			
Q007	A700017P2	TSTR NPN SI BC 548C			
Q008	J706011P1	TSTR NPN SI BFR 91			
R001	A700019P57	RES DEPC 1/4W 47K 5%			
R002	A700019P41	RES DEPC 1/4W 2K2 5%			
R003	A700019P45	RES DEPC 1/4W 4K7 5%			
R004	A700019P47	RES DEPC 1/4W 6K8 5%			

X403.349/7

DATE: 09/20/90

PARTS LIST FOR RF AMPLIFIER RA961

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	0102721B50	M905057G1 RA961			
C001	2113740A55	CAP CER NP0 100P 0%			
C002	2113740A19	CAP CER NP0 4P7 0.5P			
C005	2113740A55	CAP CER NP0 00P 10%			
C006	A700045P206	CAP TA SOL 1U 10V			
C009	2113740A11	CAP CER NP0 2P2 0.5P			
C010	2113740A55	CAP CER NP0 100P 10%			
C012	A700045P206	CAP TA SOL 1U 10V			
D001	J707390P1	DIO SI SIG BAV 74			
L001	J710590P17	COIL RF FIX 220NH 10%			
L002	J710590P6	COIL RF FIX 27NH 20%			
Q001	J707388P1	TSTR NPN SI BFR 53			
Q002	J706013P2	TSTR PNP SI BCW 30			
Q003	J707387P1	TSTR NPN SI BFQ 18A			
	0102721B04	M905056G1R2 INT CKT RA961			
		NON REFERENCED ITEMS:			
	C850517P2	CAN			
	M905917P1	RETAINER			



RA 961
 PIN 1, 3, 4, 5, 6, 10, 11, 12, 14, 15, 16 IS GROUND.

RF AMPLIFIER RA962

CODE NO. M905059G1 - 0102721B51

D403.078/5

PARTS LIST FOR RF AMPLIFIER RA962

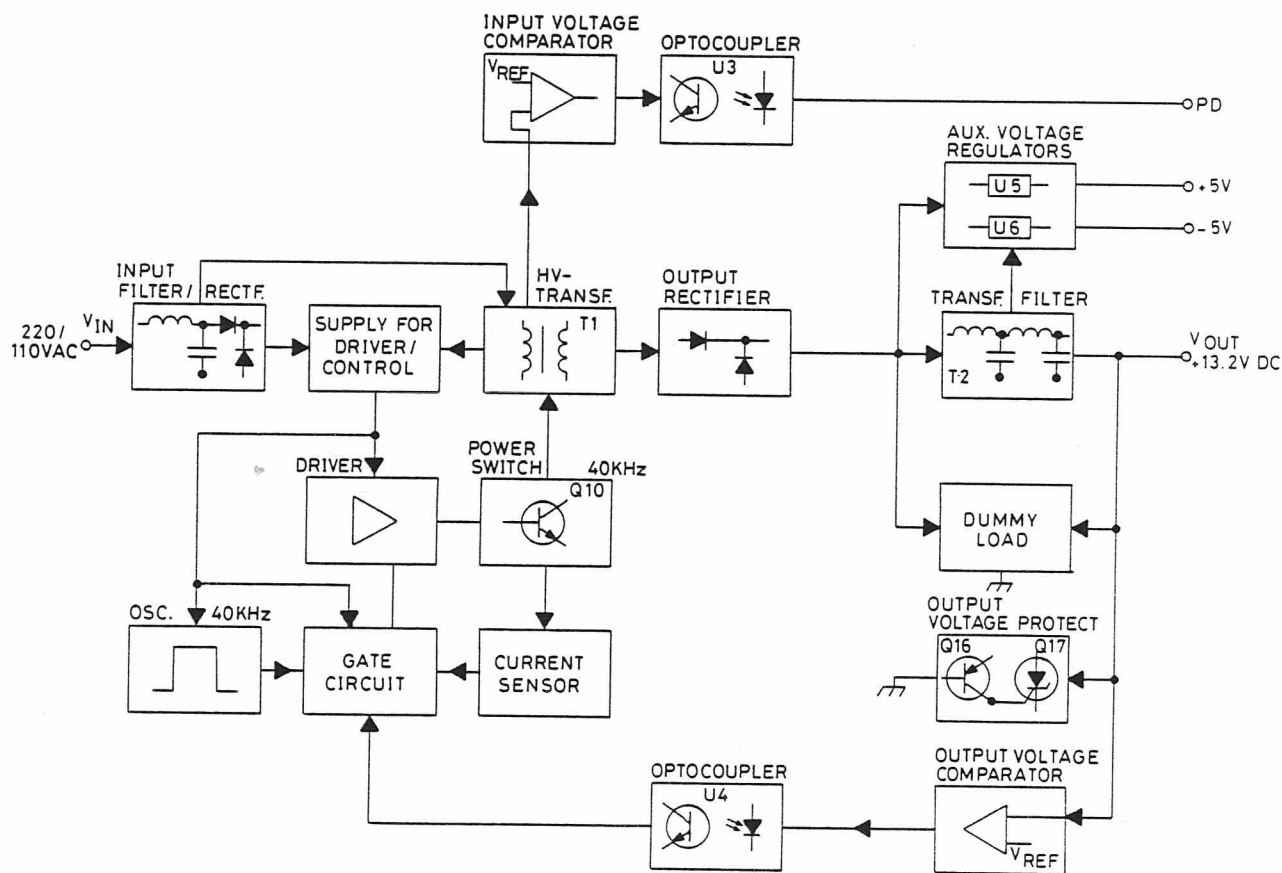
Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	0102721B71	M905059G1 RA962			
C001	A700045P206	CAP TA SOL 1U 20% 10V			
C004	2113740A31	CAP CER NPO 12P 5% 50V			
C007	A700045P206	CAP TA SOL 1U 20% 10V			
C010	2113740A55	CAP CER NPO 100P 5% 50V			
C013	A700045P206	CAP TA SOL 1U 20% 10V			
C014	2113740A55	CAP CER NPO 100P 5% 50V			
C015	2113740A55	CAP CER NPO 100P 5% 50V			
L001	J710590P17	COIL RF 47NH			
L002	J710590P19	COIL 0.33UH			
L003	J710590P19	COIL 0.33UH			
L004	J710590P19	COIL 0.33UH			
Q001	J706014P2	TSTR NPN SI BFQ 19			
Q002	J707387P1	TSTR PNP SI BCW 30			
Q003	J707139P1	TRST NPN SI BFR 93			
	0102721B03	M905058G1R2 INT CKT RA962			
		NON REFERENCED ITEMS :			
	C850517P2	HOUSING			
	M905917P1	RETAINER			

PS907

POWER SUPPLY

PS907 is a switch-mode power supply unit for use in Stornophone F9xxx, fixed-/base radio stations. It converts 220 V/110 V AC to 13.2 V/11 A, 5 V/2 A and -5 V/50 mA DC. The PS907 interfaces the base station to the mains

and can be strapped for 220 V AC or 110 V AC operation. It withstands continuous short circuits on all outputs and overloads for a shorter period of time. An indication of input power failure is provided.



BLOCK DIAGRAM PS907
D403950

MODE OF OPERATION

The PS907 is a forward step down switch mode power supply operating directly from the rectified mains with a switching frequency of 40 kHz. Consult the block diagram.

The rectified mains is converted to approximately 27 V AC in the power converter consisting of the high voltage transformer, switching transistor, driver/control circuits and the 40 kHz oscillator. The 27 V AC is rectified and filtered in a LC-filter to obtain 13.2 V DC at the main output. A

circuit senses the main output voltage and sends information via an opto-coupler to the control circuit, which controls the duty cycle of the power switch.

The voltage sense- and control circuits will hold the main output voltage constant, within specified limits of input voltage and load.

A circuit senses the input voltage and sends information via an opto-coupler to the P.D. output in case of input power failure.

A stabilized supply voltage for the driver/control/oscillator circuits is obtained via the supply circuit from the transformer, or from the rectified mains during start-up.

A current sensor reduces the duty cycle of the power converter, if the current limit in the power

switch is exceeded. Thus the power supply is protected against overload and short circuit.

An over voltage protection circuit short circuits the main output, thus activating the current limiter, if the main output voltage exceeds 16 V.

Auxiliary voltages (+5 V and -5 V) are obtained from secondary windings on the output filter/transformer via rectifiers and voltage stabilizers with built-in overload protections.

A dummy load circuit is activated, maintaining a certain minimum current through the output transformer, when the external load of the main output is decreased.

This prevents auxiliary voltages from dropping at low or interrupted main loads, without reducing efficiency at heavy main loads.

CIRCUIT DESCRIPTION

INPUT FILTER AND RECTIFIER

Rectification of the mains is made in either a bridge rectifier for 220 V operation or a voltage doubler for 110 V operation.

By inserting a single jumper, W1, operation is changed from 220 V to 110 V.

In this way the power switch is always operating on a voltage close to 300 V DC. The input filter C1, L1, C2, C6, C7, C8 takes care of damping of spikes from the mains and prevent noise from being conducted to the mains cable. R1 limits the peak start current and C4, C5 are reservoir capacitors for the rectified mains. The capacitors are able to hold the voltage within the operating limits of the power converter during one missing period from the mains.

POWER CONVERTER AND TRANSFORMERS

The power converter is basically a forward step down type utilizing the flyback principle to pro-

vide auxiliary voltages. While switching transistor Q10 is on, energy is transformed through transformer T1, rectifier diode D8 conducts and energy is stored in T2 and also delivered to the main output load.

When Q10 is turned off the polarity of the voltage across T1 is reversed and D8 is cut off.

During turn off flywheel diode D9 conducts and T2 continues to deliver energy to the main output load.

C18, L2, C19 and C20 reduces the ripple caused by transistor switching. Demagnetizing diode D7 ensures a continued flow of the magnetizing current while Q10 is off, thus leading the stored magnetic energy in T1 back to the reservoir capacitors.

When all energy stored in T1 is removed, a new cycle can begin without risk of transformer saturation leading to excess current spikes. As the number of turns of the primary and recovery windings of T1 are equal, the duty cycle must be kept below 0.5 to ensure safe operation.

Auxiliary voltages are obtained from the energy

stored in T2 at the end of transistor conduction (flyback principle). When transistor Q10 is cut off, the voltage across the primary of T2 is, ideally, equal to the main output voltage.

Therefore, if the main output voltage is stabilized, the secondary voltages will also be stabilized.

This, however, requires that a certain amount of current is always flowing through the primary of T2, which is ensured by the dummy load. Leakage between the primary and secondary windings of T2 affects load regulation of the secondary voltages to some extent, and therefore further stabilization of the auxiliary voltages has been provided.

Q10 is driven as a nonsaturated switch by means of the clamp diodes D14 and D15. Excess of current are delivered to Q10, when it is turned on and off, by Q8, Q9, R50, R51 and C30.

START CIRCUIT

To start the PS907 the mains supply voltage is switched on causing C12 to be charged through R13.

When the voltage across C12 reaches approx. 16 volts the voltage stabilizer Q1, Q2, Q3, D5 is switched on, supplying 10 V DC to the driver, control and oscillator circuits, and the power converter is started. Once the converter is running, power to these circuits (app. 150 mA) is taken from the drive winding of transformer T1 via rectifier diode D6 and the voltage stabilizer.

POWER FAILURE INDICATION

When the power converter is running the voltage across C12 is proportional to the rectified mains voltage.

The voltage across C12 is sensed by the comparator U1.4. When the rectified mains voltage becomes lower than app. 82% of the nominal value, corresponding to app. 11.5 volts across C12, the comparator output goes low and the opto-coupler U3 is cut off.

The power converter is able to hold the output voltages constant down to app. 70% of the nominal input voltage. This, together with the size of the reservoir capacitors, ensures that the output voltages are held constant, even at full load, for at least 10 ms after the power down transition, when the mains supply voltage is switched off.

MAIN OUTPUT VOLTAGE REGULATION

The power converter is driven via transistor Q7 from a pulse width modulated 40 kHz oscillator. The main output voltage is compared to the reference voltage across zenerdiode D18 in transistor Q14. The output of Q14 is fed back to the regulation circuit via opto-coupler U4 to control the duty cycle.

The oscillator formed by comparators U1.1 and U1.2 is running at 40 kHz with a duty cycle of 0.45.

Frequency and duty cycle are determined by R18, R19, R20, R24, R22 and C22. The output of U1.1 is inverted in U1.2 and compared to the sawtooth voltage across C22 in comparator U1.3. By pulling down the output voltage of U1.2, the duty cycle can be varied between 0 and 0.45 on the output of U1.3.

This limitation of the maximum duty cycle ensures safe operation of the switch transistor Q10, even if regulation fails. At start up C23 is charged through R25, D12 and R27 causing the duty cycle to increase slowly from 0 to the final value determined by the voltage regulator.

AUXILIARY VOLTAGE REGULATION

The auxiliary voltages +5 V/2 A and -5 V/50 mA, obtained from the secondary windings of transformer T2 via rectifiers D10 and D11, are stabilized by the fixed voltage regulators U5 and U6 also providing short circuit and overload protection of the auxiliary outputs.

The input voltages of these circuits must be greater than app. 7.5 volts at full auxiliary loads. For the +5 V/2 A regulator U5 this can only be ensured with a minimum current of app. 1.2 Amps

flowing through the primary of T2, which is achieved by means of the dummy load Q12, Q13, controlled by transistor Q11 and zenerdiode D17. At external main loads greater than app. 1.2 Amps the input voltage of U5 will always be greater than 7.5 volts, so that Q11 is conducting, Q12 and Q13 are cut off and no power is dissipated in the dummy load.

With little or no external main load the input voltage of U5 tends to drop below 7.5 volts when the +5 V output is loaded, so that Q11 is cut off, Q12 and Q13 are conducting and a current, limited to app. 1.2 Amps by R59 and zenerdiode D19, is flowing through the dummy load maintaining the minimum input voltage of the +5 V regulator.

CURRENT LIMIT CIRCUIT

The current through the switch transistor Q10 is sensed by the comparators U2.3 and U2.4 via R53 and the filter R47, C29, which prevents inductive transients from accidentally shutting the regulator down.

In order to provide fold back current limitation, with automatic reset to full load when the short circuit is removed, two trigger levels of emitter current are employed.

If the maximum output load of 11 A is increased further comparator U2.4 is triggered when the pulsed emitter current exceeds app. 2.53 Amps. This immediately discharges capacitor C24 and triggers comparator U2.2, which is used as a "one shot" multivibrator to cut off the rest of the duty cycle by pulling the base of Q7 low. Positive AC feedback via R40, C27 is used to ensure that C24 is completely discharged. When Q10 is cut off U2.4 is reset and C24 recharged through R33. The time constant C24, R33 together

with R31 and R32 determines the off time (app. 13 μ s) of comparator U2.2, so that Q10 remains off for the rest of the period. Thus, by increasing the load, the output current is kept almost constant at app. 12 Amps, while the output voltage is dropping, until a point is reached where the on time cannot be decreased further (app. 2 μ s) due to internal delays in the switch transistor and control system.

If the load is increased further the emitter current rises and triggers comparator U2.3 at a level of app. 3.00 Amps.

This immediately discharges capacitor C25 and triggers comparator U2.1 which is used similar to U2.2 but with a different time constant.

The output of U2.1 also discharges C23 via transistor Q6. The result is that the converter is stopped for app. 10 ms followed by a soft restart. Restart is attempted every 10 ms until the overload or short circuit is removed from the output, which will reestablish normal operation. This arrangement gives a maximum overload current of app. 15 Amps and a short circuit current of app. 2 Amps on the main output.

Note: If the main output is short circuited the auxiliary voltages will drop without any previous warning.

OVERVOLTAGE PROTECTION

The main output is protected against excessive voltages by the circuit Q15, Q16, Q17. The main output voltage is compared to the reference voltage across D20 in transistor Q15. If the voltage exceeds 15.5 volts thyristor Q17 is triggered via Q16 and short circuits the main output, thereby activating the current limiter.

SPECIFICATIONS

INPUT VOLTAGE

Mains

220 V RMS +10% -15% at 40-60 Hz or
110 V RMS +10% -15% at 40-60 Hz

Max transients

800 V RMS <100 μ s

Mains failure condition

Output voltage remains within specified limits, with input voltage at lower limit, during complete mains failure for one period. (20 ms at 50 Hz).

OUTPUT VOLTAGE

Nominal output

Main output: 13.2 V DC, maximum 11 A cont.
 Aux. output: +5 V DC, maximum 2 A cont.
 Aux. output: -5 V DC, maximum 50 mA cont.

Ripple voltage

Main output: <5 mV pk/pk
 Aux. outputs: <5 mV pk/pk

Short circuit protection

Main output: Fold back current limit to app. 2 A at short circuit, with auto reset to normal operation at full load.

Aux. outputs: Current limited.

All outputs withstands continuous short circuit

Over voltage protection

Main output short circuited if voltage exceeds 15.5 V.

Power failure indication

As an output signal. All output voltages are held within specified limits for at least 10 ms after the transition if the mains are switched off or accidentally interrupted.

Load change response

Main output:

Voltage drop at load change 0-11 A less than 1.0 V.
 Voltage jump at load change 11-0 A less than 1.0 V.
 Recovery times less than 0.5 sec.

Efficiency

Main output load 5-11 A, total efficiency $\geq 80\%$.
 Efficiency decreasing continuously below 5 A.

Temperature range

-25°C/+70°C

Mechanical dimensions

Height= 80 mm
 Width= 274 mm
 Depth= 150 mm
 Volume: app. 2.4 liters
 Weight: app. 2.1 kg

ITEM NUMBER	DESCRIPTION
L855742G1	POWER SUPPLY ASM 220/110V
=====	
M905859G1	A001 : CPNT BD PW PS 907

P A R T S L I S T :

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
---------------------	--------------------------	--------------------------	----------

A001	M905859G1	CPNT BD PW PS 907 NOTE: SEE EXPLOSION BELOW!	1

F001	J706998P7	FUSE CTG 2.0A	1
F002	J706998P9	FUSE CTG 4.0A	1
W001	A700184P1	WIRE JUMPER (ZEROHM)	1
W002	A700184P1	WIRE JUMPER (ZEROHM)	1
0005	A700242P15	SUBSTRATE PLT	1
0006	A701983P2	INS BUSH	5
0007	A700115P3	INSULATOR PLATE	5
0008	J707015P2	CLAMP	1
0009	J706181P308	SCREW NYLON	1
0010	J707033P3	LABLE	1
0011	J707543P1	LABEL, MARK, EARTH	1
0012	L855728G1	CAN ASM	1
0013	J706902P1	CLAMP	1
0014	L855757P1	INSULATION SHEET	1
0015	J707033P2	LABEL	1
0016	A700031P306	SCR. PAN HD M-2.5 X 6.0MM	2
0017	A700031P410	SCR. PAN HD M-3.0 X 10.0MM	2
0018	A700031P406	SCR. PAN HD M-3.0 X 6.0MM	4
0019	A700031P408	SCR. PAN HD M-3.0 X 8.0MM	13
0020	A700034P4	NUT HEX M-3.0 X 0.50MM	5

A001 : M905859G1 : CPNT BD PW PS 907 :

C001	J706993P4	CAP PYES 2U2 10% 250V	1
C002	J706995P1	CAP CER CL2 1N 20% (5KV)	1
C004	J707002P3	CAP ELEC 680U+30-20% 250V	1
C005	J707002P3	CAP ELEC 680U+30-20% 250V	1
C006	J707940P1	CAP PPR 22NF 250V	1
C007	J707940P1	CAP PPR 22NF 250V	1
C008	J707940P1	CAP PPR 22NF 250V	1
C009	J706005P4	CAP ELECT 100U +100-10% 16V	1
C011	A700234P7	CAP PYES 10N 10% 50V	1
C012	J706005P10	CAP ELECT 220U +100-10% 16V	1
C013	J706005P18	CAP ELECT 3300U 10V	1
C014	A701534P8	CAP TA SOL 22U 20% 16V	1

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
C016	J706005P5	CAP ELECT 220U+100-10% 16V	1
C017	A701534P8	CAP TA SOL 22U 20% 16V	1
C018	J707002P4	CAP ELEC 6M8+30-20% 16V	1
C019	J706005P6	CAP ELECT 470U+100-10% 16V	1
C020	J706005P6	CAP ELECT 470U+100-10% 16V	1
C021	A701534P4	CAP TA SOL 1U0 20% 35V	1
C022	A700234P1	CAP PYES 1N0 10% 50V	1
C023	A701534P6	CAP TA SOL 4U7 20% 35V	1
C024	A700234P1	CAP PYES 1N0 10% 50V	1
C025	A700234P10	CAP PYES 33N 10% 50V	1
C026	A700234P5	CAP PYES 4N7 10% 50V	1
C027	J706079P17	CAP CER NPO 22P 5% 500V	1
C028	J707412P9	CAP PYES 100N 10% 63V	1
C029	A700234P1	CAP PYES 1N0 10% 50V	1
C030	J707412P13	CAP PYES 470N 10% 63V	1
C031	J706995P3 *	CAP CER CL2 1N8 20% 5KV	1
C032	J707412P9	CAP PYES 100N 10% 63V	1
C033	J707412P9	CAP PYES 100N 10% 63V	1
D001	J706026P2 P3	DIO SI PWR 1N5404 5408	1
D002	J706026P2 P3	DIO SI PWR 1N5404 -	1
D003	J706026P2 P3	DIO SI PWR 1N5404 -	1
D004	J706026P2 P3	DIO SI PWR 1N5404 -	1
D005	A700025P7	DIO SI ZENR 5V6 5% 0,4W	1
D006	J706282P1	DIO SI PWR 1N4933	1
D007	J707017P1	DIO SI PWR BYW 96D	1
D008	J706023P1	DIO SI PWR BYW 29-50	1
D009	J706023P1	DIO SI PWR BYW 29-50	1
D010	J708734P1	DIO SI PWR BYV 28-100	1
D011	J706282P1	DIO SI PWR 1N4933	1
D012	A700028P1	DIO SI SIG 1N4148	1
D013	A700028P1	DIO SI SIG 1N4148	1
D014	J706282P1	DIO SI PWR 1N4933	1
D015	J707017P1	DIO SI PWR BYW 96D	1
D016	J707017P1	DIO SI PWR BYW 96D	1
D017	A700025P8	DIO SI ZENR 6V8 5% 0,4W	1
D018	A700025P7	DIO SI ZENR 5V6 5% 0,4W	1
D019	A700025P18	DIO SI ZENR 2V4 5% 0,4W	1
D020	A700025P7	DIO SI ZENR 5V6 5% 0,4W	1
D021	A700025P12	DIO SI ZENR 15V 5% 0,4W	1
J001	J708068P108	CONNECTOR PIN SNAP LOCK	1
J002	J706683P1	TABS RECP L-16.5 MM	1
J003	J706683P1	TABS RECP L-16.5 MM	1
L001	J708697G1	COIL ASM 2X10MH	1
L002	J708682P1	COIL RF FIX	1
L003	J708732P1	COIL RF FIX	1
OOXF	J706903P1	FUSE HLR	1
Q001	J707435P1	TSTR PNP SI BC 369	1
Q002	J707435P1	TSTR PNP SI BC 369	1
Q003	J707511P1	TSTR NPN SI BC 548A/B	1

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
Q006	J707674P1	TSTR PNP SI BC 558A/B	1
Q007	J707511P1	TSTR NPN SI BC 548A/B	1
Q008	J707673P1	TSTR NPN SI BC 368	1
Q009	J707435P1	TSTR PNP SI BC 369	1
Q010	J707022P1 <i>J710617 P1</i>	TSTR NPN SI BU 426A <i>SGSIV 48A</i>	1
Q011	J707511P1	TSTR NPN SI BC 548A/B	1
Q012	J707511P1	TSTR NPN SI BC 548A/B	1
Q013	A700054P1	TSTR NPN SI BD 201	1
Q014	J707511P1	TSTR NPN SI BC 548A/B	1
Q015	J707511P1	TSTR NPN SI BC 548A/B	1
Q016	J707674P1	TSTR PNP SI BC 558A/B	1
Q017	J708735P1	THYRSTR SCR BT 151-500R	1
Q018	J707511P1	TSTR NPN SI BC 548A/B	1
Q019	J707511P1	TSTR NPN SI BC 548A/B	1
R001	J706958P4 <i>J710616P1</i>	RES W W 1R0 10% 5W <i>10R NTC</i>	1
R002	A700019P45	RES DEPC 4K7 5% 1/4W	1
R003	A700019P45	RES DEPC 4K7 5% 1/4W	1
R004	A700019P6	RES DEPC 2R7 5% 1/4W	1
R005	A700019P6	RES DEPC 2R7 5% 1/4W	1
R006	A700019P37	RES DEPC 1K0 5% 1/4W	1
R007	A700019P45	RES DEPC 4K7 5% 1/4W	1
R008	A700019P54	RES DEPC 27K 5% 1/4W	1
R009	A700019P54	RES DEPC 27K 5% 1/4W	1
R010	A700019P57	RES DEPC 47K 5% 1/4W	1
R011	A700016P4	RES VAR CERM 10K 10% 1/2W	1
R012	A700019P56	RES DEPC 39K 5% 1/4W	1
R013	J708692P3	RES MFILM 68K 5% 2W	1
R014	A700019P29	RES DEPC 220R 5% 1/4W	1
R015	A700019P17	RES DEPC 22R 5% 1/4W	1
R016	J706042P4	RES VAR 100 OHM 0,1 W	1
R018	A700019P53	RES DEPC 22K 5% 1/4W	1
R019	A700019P54	RES DEPC 27K 5% 1/4W	1
R020	A700019P56	RES DEPC 39K 5% 1/4W	1
R021	A700019P53	RES DEPC 22K 5% 1/4W	1
R022	A700019P45	RES DEPC 4K7 5% 1/4W	1
R023	A700019P53	RES DEPC 22K 5% 1/4W	1
R024	A700019P54	RES DEPC 27K 5% 1/4W	1
R025	A700019P45	RES DEPC 4K7 5% 1/4W	1
R026	A700019P61	RES DEPC 100K 5% 1/4W	1
R027	A700019P45	RES DEPC 4K7 5% 1/4W	1
R028	A700019P23	RES DEPC 68R 5% 1/4W	1
R029	A700019P53	RES DEPC 22K 5% 1/4W	1
R030	A700019P49	RES DEPC 10K 5% 1/4W	1
R031	A700019P53	RES DEPC 22K 5% 1/4W	1
R032	A700019P57	RES DEPC 47K 5% 1/4W	1
R033	A700019P49	RES DEPC 10K 5% 1/4W	1
R034	A700019P49	RES DEPC 10K 5% 1/4W	1
R035	A700019P57	RES DEPC 47K 5% 1/4W	1
R036	A700019P57	RES DEPC 47K 5% 1/4W	1
R037	A700019P25	RES DEPC 100R 5% 1/4W	1
R038	A700019P25	RES DEPC 100R 5% 1/4W	1
R039	A700019P37	RES DEPC 1K0 5% 1/4W	1
R040	A700019P37	RES DEPC 1K0 5% 1/4W	1

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
R041	A700019P49	RES DEPC 10K 5% 1/4W	1
R042	A700019P49	RES DEPC 10K 5% 1/4W	1
R043	A700019P53	RES DEPC 22K 5% 1/4W	1
R044	A700019P32	RES DEPC 390R 5% 1/4W	1
R045	A700019P40	RES DEPC 1K8 5% 1/4W	1
R046	J706008P1	RES VAR CERM 1K 20% 1/2W	1
R047	A700019P33	RES DEPC 470R 5% 1/4W	1
R048	A700019P21	RES DEPC 47R 5% 1/4W	1
R049	A700019P30	RES DEPC 270R 5% 1/4W	1
R050	A700112P15	RES COMP 10R 5% 1/1W	1
R051	A700112P15	RES COMP 10R 5% 1/1W	1
R052	A700019P21	RES DEPC 47R 5% 1/4W	1
R053	J708536P6	RES WW 0R33 10% 2W	1
R054	J708692P1	RES MFILM 220R 5% 2W	1
R055	A700019P33	RES DEPC 470R 5% 1/4W	1
R056	A700019P39	RES DEPC 1K5 5% 1/4W	1
R057	A700019P25	RES DEPC 100R 5% 1/4W	1
R058	A700019P37	RES DEPC 1K0 5% 1/4W	1
R059	J708536P9	RES WW 1R0 10% 2W	1
R060	A700019P41	RES DEPC 2K2 5% 1/4W	1
R061	A700019P36	RES DEPC 820R 5% 1/4W	1
R062	A700019P32	RES DEPC 390R 5% 1/4W	1
R063	J706008P2	RES VAR CERM 220R 20% 1/2W	1
R064	A700019P32	RES DEPC 390R 5% 1/4W	1
R065	A700019P52	RES DEPC 18K 5% 1/4W	1
R066	A700019P49	RES DEPC 10K 5% 1/4W	1
R067	J706008P8	RES VAR CERM 4K7 20% 1/2W	1
R068	A700019P45	RES DEPC 4K7 5% 1/4W	1
R069	A700019P45	RES DEPC 4K7 5% 1/4W	1
R070	A700019P30	RES DEPC 270R 5% 1/4W	1
R071	A700019P42	RES DEPC 2K7 5% 1/4W	1
R072	A700019P25	RES DEPC 100R 5% 1/4W	1
R073	A700019P49	RES DEPC 10K 5% 1/4W	1
R074	A700019P49	RES DEPC 10K 5% 1/4W	1
R075	A700019P61	RES DEPC 100K 5% 1/4W	1
R076	A700019P69	RES DEPC 470K 5% 1/4W	1
T001	J708726P1	TRANSFORMER INVTR 160VA	1
T002	J708727P1	TRANSFORMER INVTR	1
U001	J706018P1	IC LIN CMPAR 3302	1
U002	J706018P1	IC LIN CMPAR 3302	1
U003	J707020P1	CPLR, OPTO- , H24A1	1
U004	J707020P1	CPLR, OPTO- , H24A1	1
U005	J708555P1	IC LIN VR FIX MC 78T05CT	1
U006	J708332P1	IC LIN VR, FIX 79L05AC	1
X001	J706973P1	TERM,SLD 2.3 SQ HOLE	1
X002	J706973P1	TERM,SLD 2.3 SQ HOLE	1
X003	J706973P1	TERM,SLD 2.3 SQ HOLE	1
* 0002	* M9-----P1R0	* BD PW., REVISION NO.:0	* 1

07/06/'85

STORNO - DEPT. OF SERVICE CO-ORDINATION

X403.89

PS907

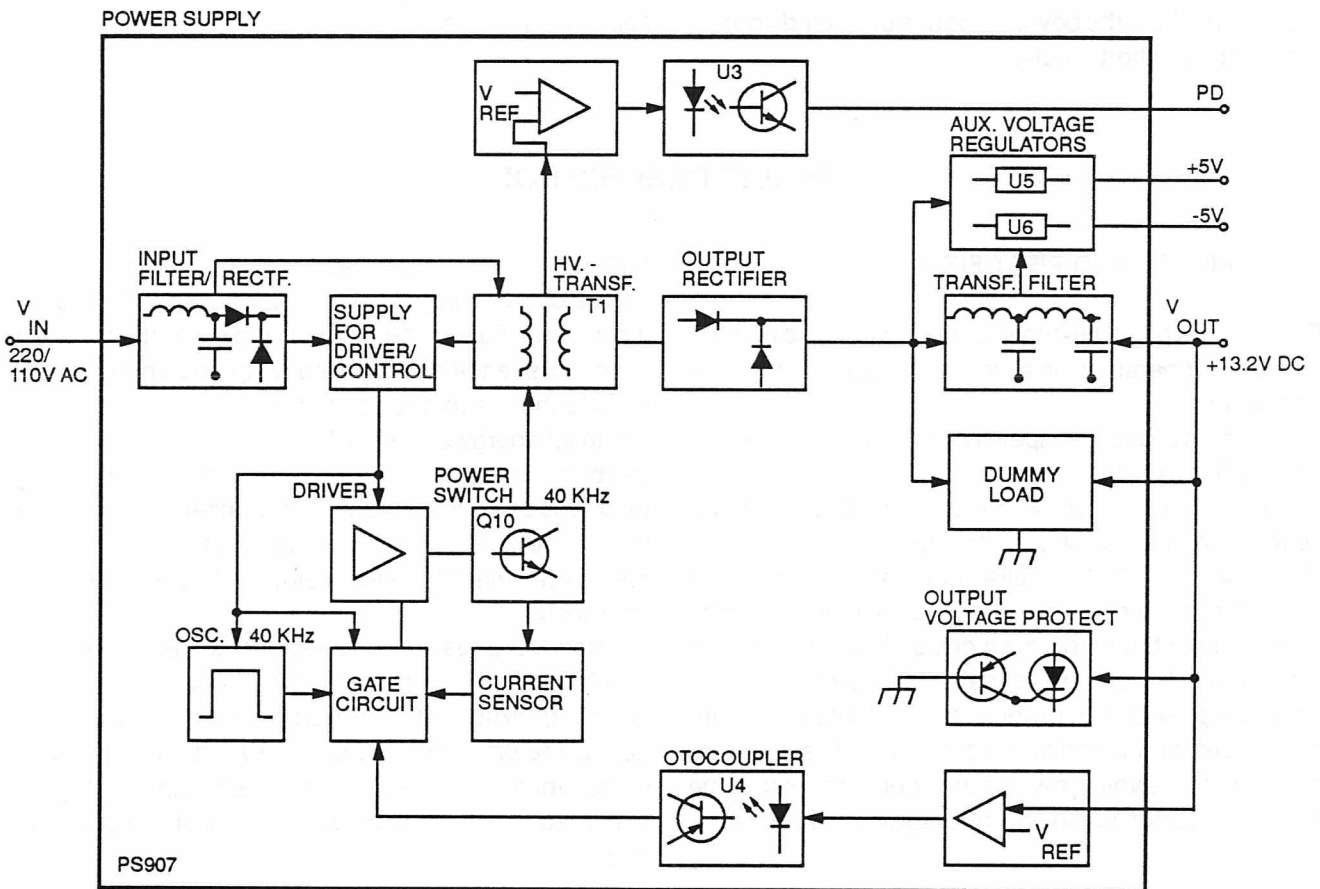
POWER SUPPLY

PS907 is a switch-mode power supply unit converting 220 V/110 V AC to 13.2 V/11 A, 5 V/2 A and -5 V/50 mA DC.

The PS907 interfaces the base station to mains and

can be strapped for 220 V AC or 110 V AC operation.

It withstands continuous short circuits on all outputs and overloads for a shorter period of time. An indication of input power failure is provided.



MODE OF OPERATION

The PS907 is a forward step down switch mode power supply operating directly from the rectified mains with a switching frequency of 40 kHz.

The rectified mains is converted to approximately 27 V AC in the power converter consisting of the high

voltage transformer, switching transistor, driver/control circuits and the 40 kHz oscillator.

The 27 V AC is rectified and filtered in a LC-filter to obtain 13.2 V DC at the main output.

A circuit senses the main output voltage and sends information via an opto-coupler to the control circuit, which controls the duty cycle of the power switch.

The voltage sense and control circuits will hold the main output voltage constant within specified limits of input voltage and load.

A circuit senses the input voltage and sends information via an opto-coupler to the P.D. output in case of input power failure.

A stabilised supply voltage for the driver/control/oscillator circuits is obtained via the supply circuit from the transformer, or from the rectified mains during start-up.

A current sensor reduces the duty cycle of the power converter if the current limit in the power switch is exceeded. Thus, the power supply is protected against overload and short circuit.

An overvoltage protection circuit short circuits the main output, thus activating the current limiter, if the main output voltage exceeds 16 V.

Auxiliary voltages (+5 V and -5 V) are obtained from secondary windings on the output filter/transformer via rectifiers and voltage stabilizers with built-in overload protections.

A dummy load circuit is activated, maintaining a certain minimum current through the output transformer, when the external load of the main output has decreased. This prevents auxiliary voltages from dropping at low or interrupted main loads, without reducing efficiency at heavy main loads.

CIRCUIT DESCRIPTION

INPUT FILTER AND RECTIFIER

Rectification of mains is made in either a bridge rectifier for 220 V operation or a voltage doubler for 110 V operation.

By inserting a single jumper, W1, operation is changed from 220 V to 110 V.

In this way the power switch is always operating at a voltage close to 300 V DC. The input filter C1, C6, C7, C8, C34, L1, L4, L5 make sure that the limits for interference are not exceeded, and prevent noise from being conducted to the main cable. The 1st harmonic of the switch frequency is damped by a notch circuit. R1 limits the peak start current and C4, C5 are reservoir capacitors for the rectified mains. The capacitors are able to hold the voltage within the operating limits of the power converter during one missing period from mains.

POWER CONVERTER AND TRANSFORMERS

The power converter is basically a forward step down type utilising the flyback principle to provide auxiliary voltages. While switching transistor Q10 is on, energy is transformed through transformer T1, rectifier diode D8 conducts and energy is stored in T2 and also delivered to the main output load.

When Q10 is turned off the polarity of the voltage across T1 is reversed and D8 is cut off.

During turn off flywheel diode D9 conducts and T2 continues to deliver energy to the main output load.

C18, L2, C19 and C20 reduce the ripple caused by transistor switching. Demagnetizing diode D7 ensures a continued flow of the magnetizing current while Q10 is off, thus leading the stored magnetic energy in T1 back to the reservoir capacitors.

When all energy stored in T1 is removed, a new cycle can begin without risk of transformer saturation leading to excess current spikes. As the number of turns of the primary and recovery windings of T1 are equal, the duty cycle must be kept below 0.5 to ensure safe operation.

Auxiliary voltages are obtained from the energy stored in T2 at the end of transistor conduction (flyback principle). When transistor Q10 is cut off, the voltage across the primary of T2 is, ideally, equal to the main output voltage. Therefore, if the main output voltage is stabilized, the secondary voltages will also be stabilized.

This, however, requires that a certain amount of current is always flowing through the primary of T2, which is ensured by the dummy load. Leakage between the primary and secondary windings of T2 effects load regulation of the secondary voltages to some extent, and therefore further stabilization of the auxiliary voltages has been provided.

Q10 is driven as a nonsaturated switch by means of the clamp diodes D14 and D15. Excess of current are delivered to Q10 when it is turned on, and off, by Q8, Q9, R50, R51 and C30.

START CIRCUIT

To start the PS907 the mains supply voltage is switched on causing C12 to be charged through R13. When the voltage across C12 reaches approx. 16 volts the voltage stabilizer Q1, Q2, Q3, D5 is switched on, supplying 10 V DC to the driver, control and oscillator circuits, and the power converter is started. Once the converter is running, power to these circuits (app. 150 mA) is taken from the drive winding of transformer T1 via rectifier diode D6 and the voltage stabilizer.

POWER FAILURE INDICATION

When the power converter is running the voltage across C12 is proportional to the rectified mains voltage.

The voltage across C12 is sensed by the comparator U1.4. When the rectified mains voltage becomes lower than app. 82% of the nominal value, corresponding to app. 11.5 volts across C12, the comparator output goes low and the opto-coupler U3 is cut off.

The power converter is able to hold the output voltages constant down to app. 70% of the nominal input voltage. This, together with the size of the reservoir capacitors, ensures that the output voltages are held constant, even at full load, for at least 10 ms after the power down transition, when the mains supply voltage is switched off.

MAIN OUTPUT VOLTAGE REGULATION

The power converter is driven via transistor Q7 from a pulse width modulated 40 kHz oscillator. The main output voltage is compared to the reference voltage across zener-diode D18 in transistor Q14. The output of Q14 is fed back to the regulation circuit via opto-coupler U4 to control the duty cycle.

The oscillator formed by comparators U1.1 and U1.2 is running at 40 kHz with a duty cycle of 0.45.

Frequency and duty cycle are determined by R18, R19, R20, R24, R22 and C22. The output of U1.1 is inverted in 1.2 and compared to the sawtooth voltage across C22 in comparator U1.3. By pulling down the output voltage of U1.2, the duty cycle can be varied between 0 and 0.45 on the output of U1.3.

This limitation of the maximum duty cycle ensures safe operation of the switch transistor Q10, even if regulation fails. At start up C23 is charged through R25, D12 and R27 causing the duty cycle to increase slowly from 0 to the final value determined by the voltage regulator.

AUXILIARY VOLTAGE REGULATION

The auxiliary voltages +5 V/2 A and -5 v/50 mA, obtained from the secondary windings of transformer T2 via rectifiers D10 and D11, are stabilized by the fixed voltage regulators U5 and

U6 also providing short circuit and overload protection of the auxiliary outputs.

The input voltages of these circuits must be greater than app. 7.5 volts at full auxiliary loads. For the +5 V/ 2 A regulator U5 this can only be ensured with a minimum current of app. 1 A flowing through the primary of T2, which is achieved by a load on the main output.

CURRENT LIMIT CIRCUIT

The current through the switch transistor Q10 is sensed by the comparators U2.3 and U2.4 via R53 and the filter R47, C29, which prevents inductive transients from accidentally shutting the regulator down.

In order to provide fold back current limitation, with automatic reset to full load when the short circuit is removed, two trigger levels of emitter current are employed.

If the maximum output load of 11 A is increased further comparator U2.4 is triggered when the pulsed emitter current exceeds app. 2.53 A. This immediately discharges capacitor C24 and triggers comparator U2.2, which is used as a "one shot" multivibrator to cut off the rest of the duty cycle by pulling the base of Q7 low.

Positive AC feedback via R40, C27 is used to ensure that C24 is completely discharged. When Q10 is cut off U2.4 is reset and C24 recharged through R33. The time constant C24, R33 together with R31 and R32 determines the off time (app. 13 us) of comparator U2.2, so that Q10 remains off for the rest of the period. Thus, by increasing the load, the output current is kept almost constant at app. 12 A, while the output voltage is dropping, until a point is reached where the on time cannot be decreased further (app. 2 us) due to internal delays in the switch transistor and control system.

If the load is increased further the emitter current rises and triggers comparator U2.3 at a level of app. 3.00 Amps.

This immediately discharges capacitor C25 and triggers comparator U.2.1 which is used similar to U2.2 but with a different time constant.

The output of U2.1 also discharges C23 via transistor Q6. The result is that the converter is stopped for app. 10 ms followed by a soft restart. Restart is attempted every 10 ms until the overload or short circuit is

removed from the output, which will reestablish normal operation. This arrangement gives a maximum overload current of app. 15 A and a short circuit current of app. 2 A on the main output.

Note: If the main output is short circuited the auxiliary voltages will drop without any previous warning.

OVERVOLTAGE PROTECTION

The main output is protected against excessive voltages by the circuit Q15, Q16, Q17. The main output voltage is compared to the reference voltage across D20 in transistor Q15. If the voltage exceeds 15.5 volts thyristor Q17 is triggered via Q16 and short circuits the main output, thereby activating the current limiter.

SPECIFICATIONS

INPUT VOLTAGE

Mains

220 V RMS +20% -15% at 40-60 Hz or
110 V RMS +20% -15% at 40-60 Hz

Max transients

800 V RMS <100 us

Mains failure condition

Output voltage remains within specified limits, with input voltage at lower limit, during complete mains failure for one period. (20 ms at 50 Hz).

OUTPUT VOLTAGE

Output currents

Main output: 13.2 V DC, maximum 11 A cont.
Auxiliary output: +5 V DC, maximum 2 A cont.
Auxiliary output: -5 V DC, maximum 50 mA cont.

Ripple/noise at outputs

Main output:
Ripple/noise below 500 Hz: max. 25 mV pk/pk
Ripple/noise above 500 Hz: max. 10 mV pk/pk
Auxiliary outputs:
Ripple/noise: max. 10 mV pk/pk

Short circuit protection

Main output:

Fold back current limit to app. 2 A at short circuit, with auto reset to normal operation at full load.

Auxiliary outputs:

Current limited.

All outputs withstands continuous short circuit

Over voltage protection

Main output short circuited if voltage exceeds: 15.5 V.

Power failure indication

As an output signal. All output voltages are held within specified limits for at least 10 ms after the transition if the mains are switched off or accidentally interrupted.

Load change response

Main output:

Voltage drop at load change 0-11 A less than 1.0 V.
Voltage jump at load change 11-0 A less than 1.0 V.
Recovery times less than 0.5 sec.

Efficiency

Main output load 5 - 11 A, total efficiency > 80%.
Efficiency decreasing continuously below 5 A.

Temperature range

-25°C to +70°C

Mechanical dimensions

Height: 80 mm
Width: 274 mm
Depth: 150 mm

Weight:

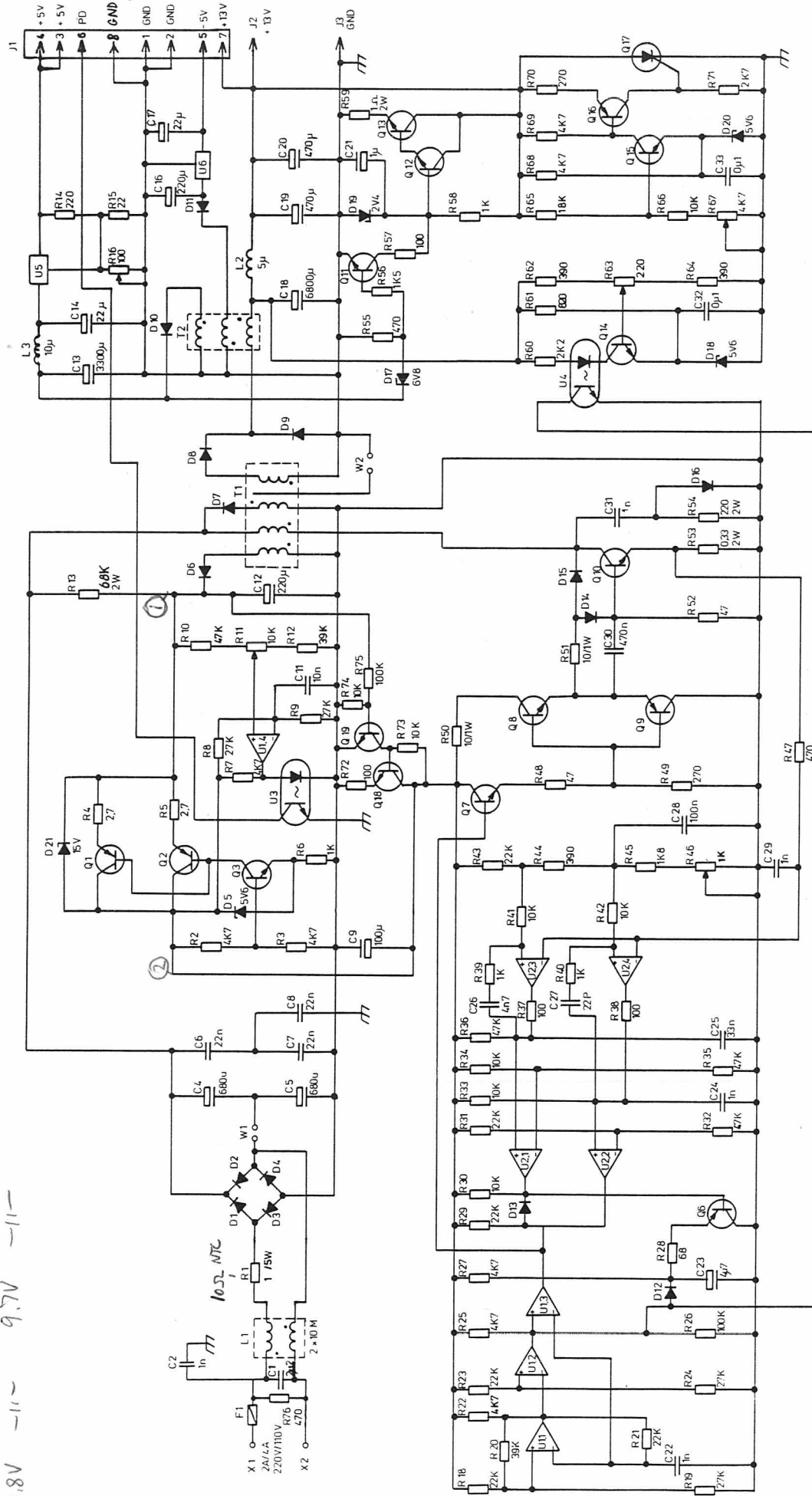
app. 2.1 kg

Storno

①: 16.9V v. 230Vac 10.7V v. 150Vac

②: 9.8V -11- 9.7V -11-

Storno



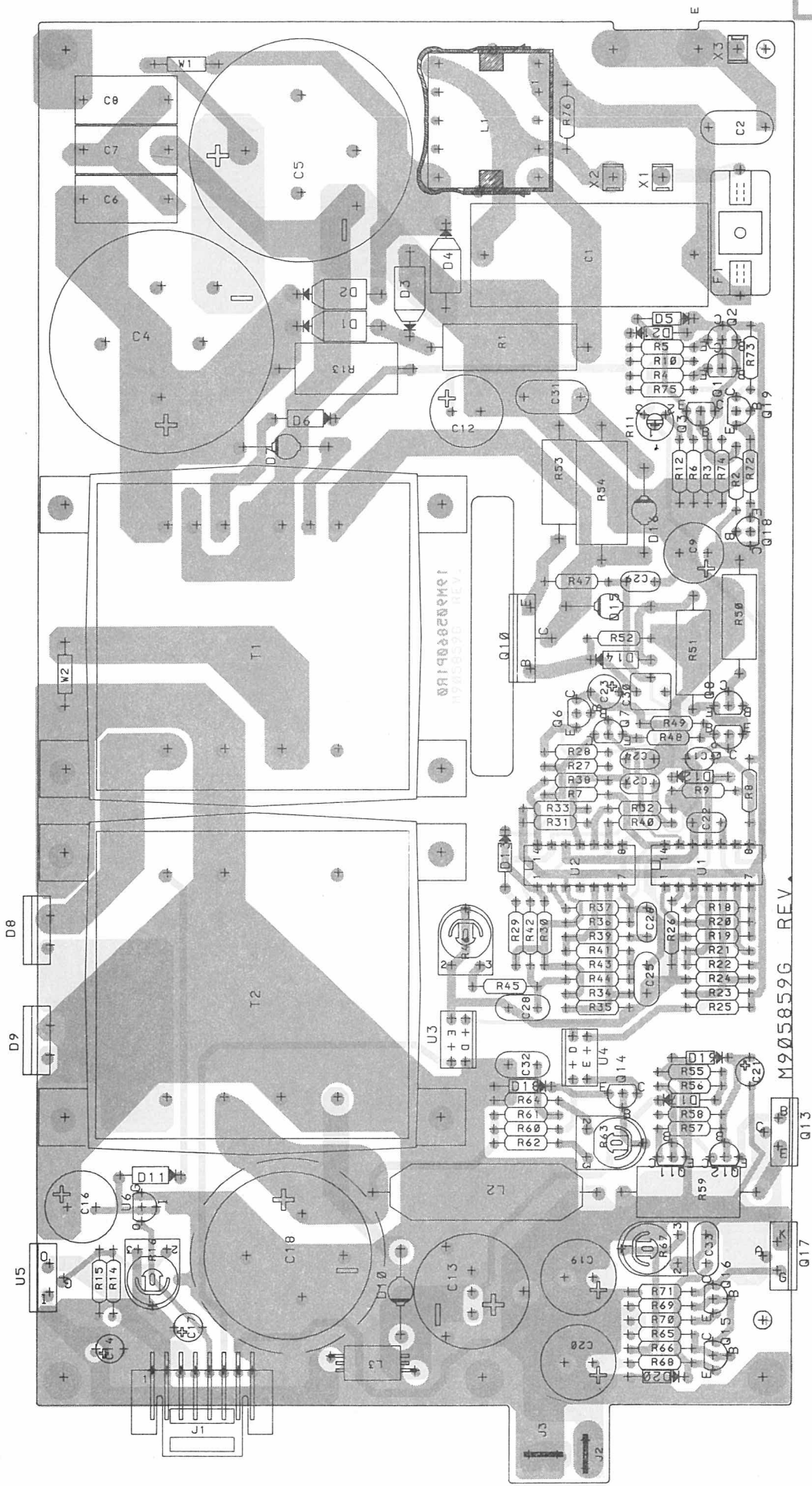
MOUNTED BOARD CODE NO. M905859 G1

MODULE CODE NO. L855742 G1

POWER SUPPLY PS907

REV.D

D403.858/13

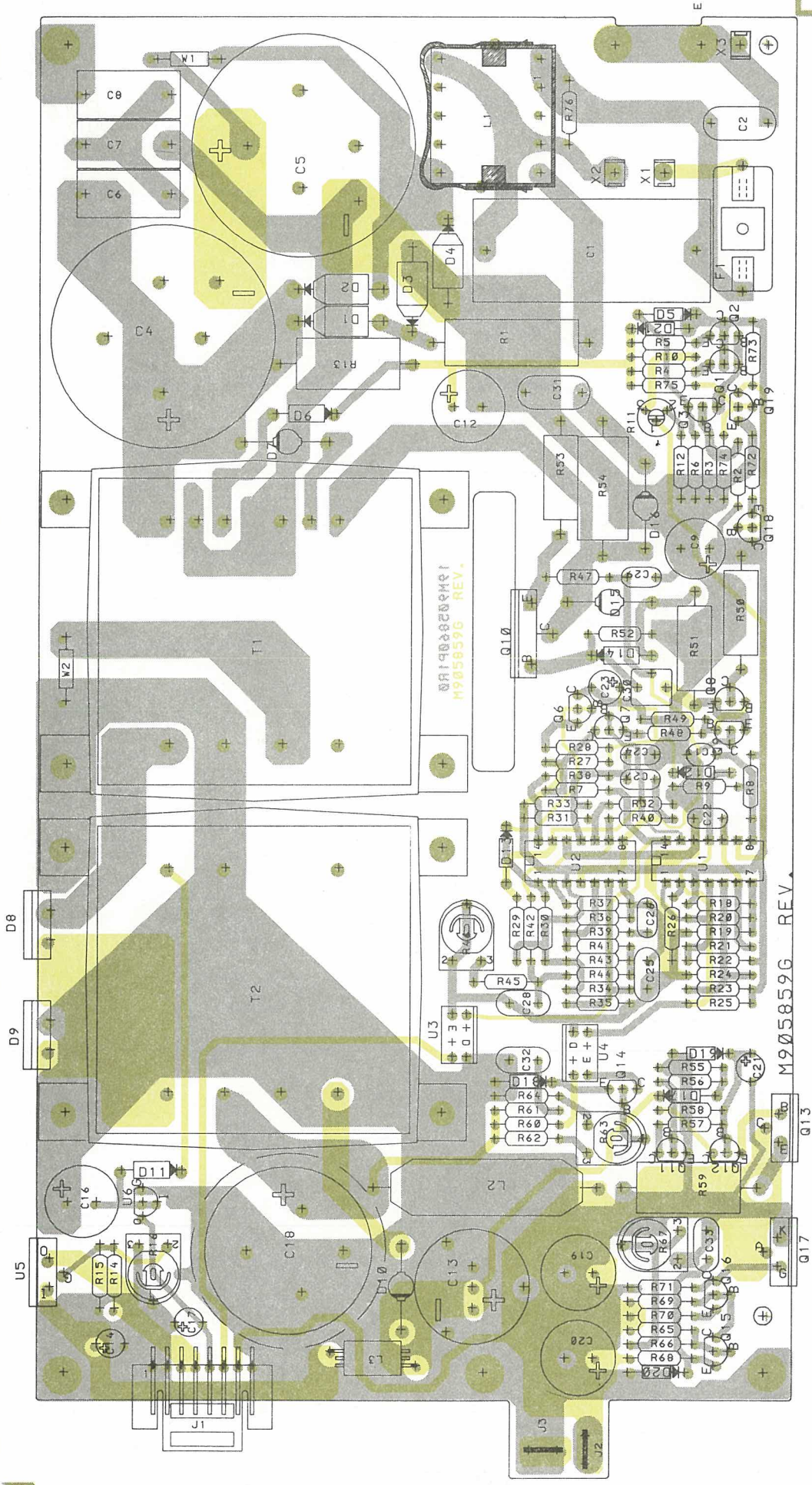


MOUNTED BOARD CODE NO. M905859G1

MODULE CODE NO. L855742G1

COMPONENT BOARD FOR PS907

D403.905/2

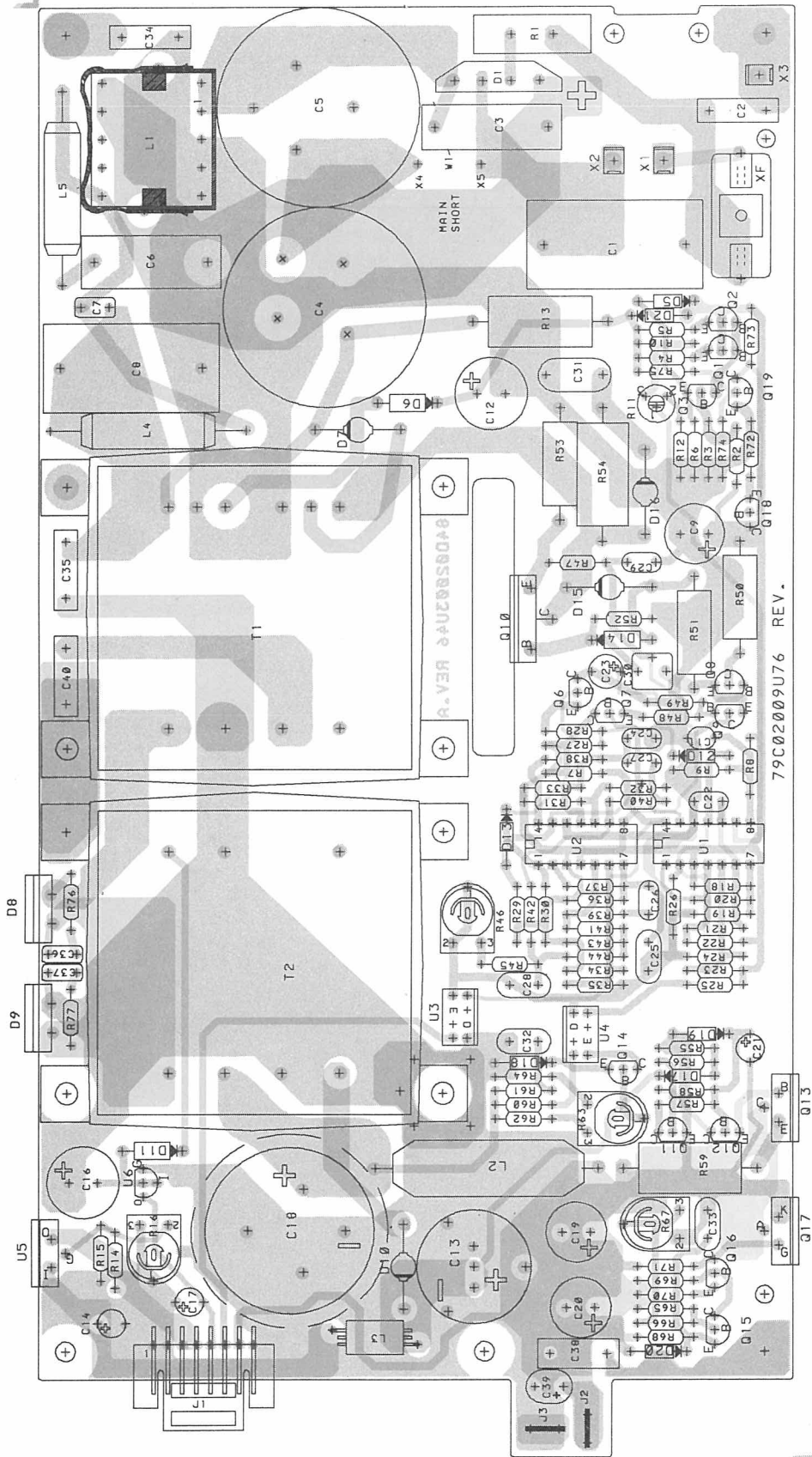


MOUNTED BOARD CODE NO. M9058596 G1

MODULE CODÈ NO. L855742 G1

COMPONENT BOARD FOR PS907

D403.905/2



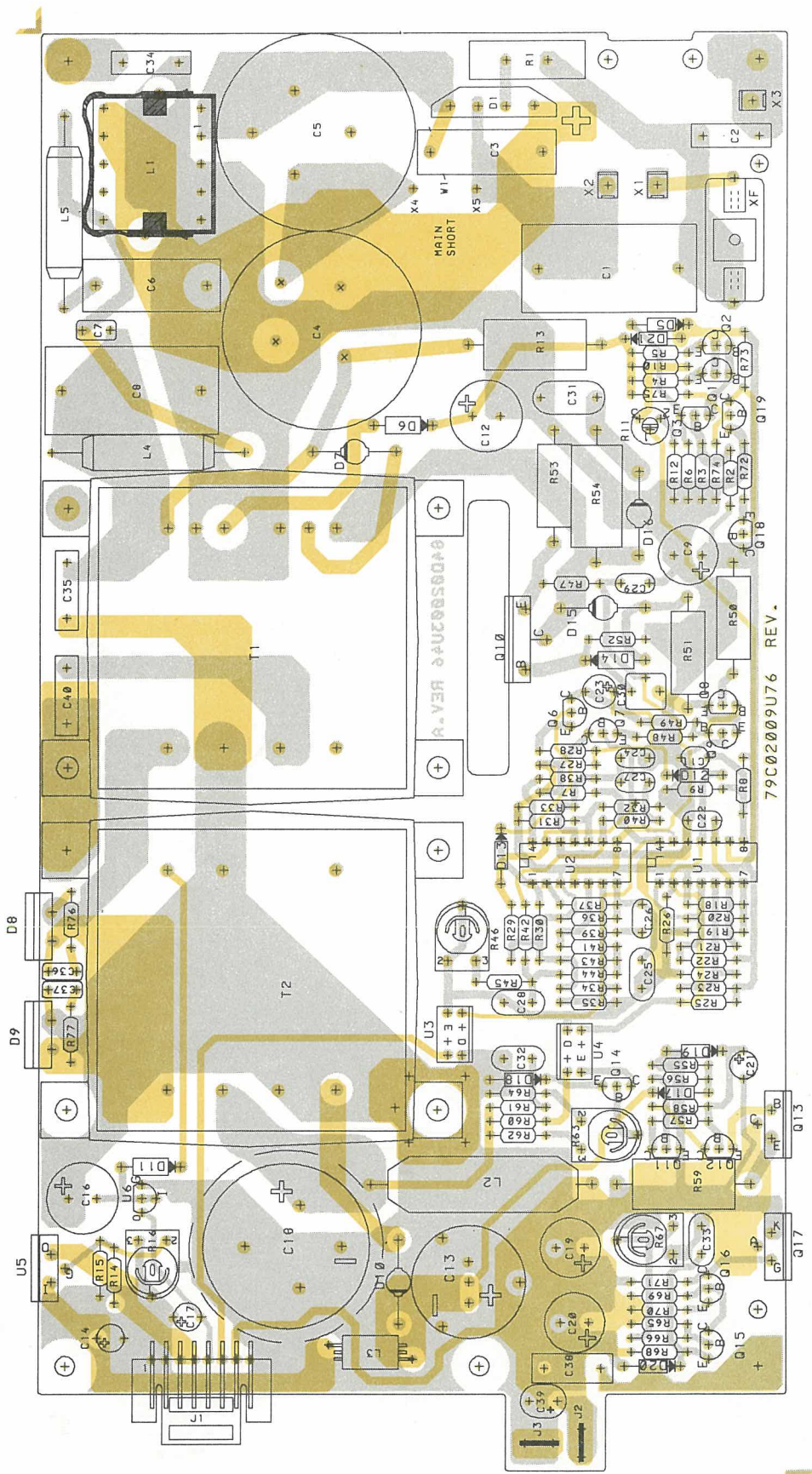
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POWER SUPPLY PS907
COMPONENT LAYOUT

MODULE CODE NO. L855742G2 - GPN6128A
MOUNTED BOARD CODE NO. M905859G3 - 0102720B22

D403.905/5

REV 2



POWER SUPPLY PS907
COMPONENT LAYOUT

D403.905/5

REV 2

MODULE CODE NO. L855742G2 - GPN6128A
MOUNTED BOARD CODE NO. M905859G3 - 0102720B22

PARTS LIST FOR POWER SUPPLY PS907 220/110 V

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GPN6128A	L855742G2 PS 907	D017	A700025P8	DIO SI ZENR 6V8 5% 0.4W
F001	J706998P7	FUSE CTG 2.0A	D018	A700025P7	DIO SI ZENR 5V6 5% 0.4W
		NON REFERENCED ITEMS:	D019	A700025P18	DIO SI ZENR 2V4 5% 0.4W
	J710927P1	LABEL WARNING 25X25X25	D020	A700025P7	DIO SI ZENR 5V6 5% 0.4W
	J710444P1	CLP SPG FOR SOT-93	D021	A700025P12	DIO SI ZENR 15V 5% 0.4W
	0102720B23	J709966G1 SPRING ASM (5 used)	J001	J708068P108	CONN PWB MALE RECP 08-CKT
	J709928P1	INSULATOR	J002	J706683P1	TERM SPADE TAB 6.3MM
	J709929P1	INSULATOR	J003	J706683P1	TERM SPADE TAB 6.3MM
	J709968P1	INSULATOR	L001	J708697G1	COIL ASM 2X10MH
	0102720B20	L855728G2 CAN ASM	L002	J708682P1	COIL RF FIX 5UH 20%
	J706902P1	CLAMP (2 used)	L003	J708732P1	COIL RF FIX 2-1/2T
	L855996P1	INSULATION SHEET	L004	J710852P1	COIL RF FIX 100UH 20%
	J707033P2	LABEL	L005	J710852P1	COIL RF FIX 100UH 20%
	J710600P3	NAME PLATE	Q001	J707435P1	TSTR PNP SI BC 369
	A700031P412	SCR PAN HD M-3.0X12.0 (2 used)	Q002	J707435P1	TSTR PNP SI BC 369
	A700031P406	SCR PAN HD M-3.0X 6.0 (5 used)	Q003	J707511P1	TSTR NPN SI BC 548A/B
	A700031P408	SCR PAN HD M-3.0X 8.0 (13 used)	Q006	J707674P1	TSTR PNP SI BC 558A/B
	J707995P1	TAPE WDH 15MM	Q007	J707511P1	TSTR NPN SI BC 548A/B
	0102720B22	L855773G1 COVER ASM	Q008	J707673P1	TSTR NPN SI BC 368 <i>4802628 N01</i>
			Q009	J707435P1	TSTR PNP SI BC 369 <i>4802605 N01</i>
	0102720B22	M905859G3 CPNT BD PW PS 907	Q010	J710617P1	TSTR NPN SI SGSIV 48A
C001	J707940P7	CAP PAPER 600N 10%	Q011	J707511P1	TSTR NPN SI BC 548A/B
C002	J707940P3	CAP PAPER 2N2 20%	Q012	J707511P1	TSTR NPN SI BC 548A/B
C003	J707940P5	CAP PAPER 100N 20%	Q013	A700054P1	TSTR NPN SI BD 201
C004	J707002P8	CAP ELECT 680U 200V	Q014	J707511P1	TSTR NPN SI BC 548A/B
C005	J707002P8	CAP ELECT 680U 200V	Q015	J707511P1	TSTR NPN SI BC 548A/B
C006	J707940P6	CAP PAPER 150N 10%	Q016	J707674P1	TSTR PNP SI BC 558A/B
C007	J707412P6	CAP PYES 33N 10%	Q017	J708735P1	THYRSTR SCR BT 151-500R <i>48020 57Y01</i>
C008	J707940P7	CAP PAPER 600N 10%	Q018	J707511P1	TSTR NPN SI BC 548A/B
C009	J706005P4	CAP ELECT 100U 16V	Q019	J707511P1	TSTR NPN SI BC 548A/B
C011	A700234P7	CAP PYES 10N 10%	R001	J710616P1	RES THERM NTC 10R 25%
C012	J706005P10	CAP ELECT 220U 25V	R002	A700019P45	RES DEPC 1/4W 4K7 5%
C013	J706005P18	CAP ELECT 3M3 10V <i>2313748E32</i>	R003	A700019P45	RES DEPC 1/4W 4K7 5%
C014	2313749C48	CAP TA SOL 22U 16V	R004	A700019P6	RES DEPC 1/4W 2R7 5%
C016	J706005P5	CAP ELECT 220U 16V	R005	A700019P6	RES DEPC 1/4W 2R7 5%
C017	2313749C48	CAP TA SOL 22U 16V	R006	A700019P37	RES DEPC 1/4W 1K0 5%
C018	J707002P4	CAP ELECT 6M8 16V	R007	A700019P45	RES DEPC 1/4W 4K7 5%
C019	J706005P19	CAP ELECT 470U 16V	R008	A700019P54	RES DEPC 1/4W 27K 5%
C020	J706005P19	CAP ELECT 470U 16V	R009	A700019P54	RES DEPC 1/4W 27K 5%
C021	2313749D52	CAP TA SOL 1U 35V	R010	A700019P57	RES DEPC 1/4W 47K 5%
C022	A700234P1	CAP PYES 1N0 10%	R011	A700016P4	RES VAR CERM 10K 10%
C023	2313749D72	CAP TA SOL 4U7 35V	R012	A700019P56	RES DEPC 1/4W 39K 5%
C024	A700234P1	CAP PYES 1N0 10%	R013	J708692P3	RES MFLM 2W 68K 5% <i>0602436M59</i>
C025	A700234P10	CAP PYES 33N 10%	R014	A700019P29	RES DEPC 1/4W 220R 5%
C026	A700234P5	CAP PYES 4N7 10%	R015	A700019P17	RES DEPC 1/4W 22R 5%
C027	J706079P17	CAP CER NP0 22P 5%	R016	J706042P4	RES VAR DEPC 100R 20%
C028	J707412P9	CAP PYES 100N 10%	R018	A700019P53	RES DEPC 1/4W 22K 5%
C029	A700234P1	CAP PYES 1N0 10%	R019	A700019P54	RES DEPC 1/4W 27K 5%
C030	J707412P13	CAP PYES 470N 10%	R020	A700019P56	RES DEPC 1/4W 39K 5%
C031	J706995P3	CAP CER CL2 1N8 5020	R021	A700019P53	RES DEPC 1/4W 22K 5%
C032	J707412P9	CAP PYES 100N 10%	R022	A700019P45	RES DEPC 1/4W 4K7 5%
C033	J707412P9	CAP PYES 100N 10%	R023	A700019P53	RES DEPC 1/4W 22K 5%
C034	J707940P3	CAP PAPER 2N2 20%	R024	A700019P54	RES DEPC 1/4W 27K 5%
C035	J707940P3	CAP PAPER 2N2 20%	R025	A700019P45	RES DEPC 1/4W 4K7 5%
C036	J707412P1	CAP PYES 4N7 10%	R026	A700019P61	RES DEPC 1/4W 100K 5%
C037	J707412P1	CAP PYES 4N7 10%	R027	A700019P57	RES DEPC 1/4W 47K 5%
C038	J707940P4	CAP PAPER 4N7 20%	R028	A700019P23	RES DEPC 1/4W 68R 5%
C039	J706339P7	CAP AL SOL 15U 16V	R029	A700019P53	RES DEPC 1/4W 22K 5%
C040	J707940P3	CAP PAPER 2N2 20%	R030	A700019P49	RES DEPC 1/4W 10K 5%
D001	J710974P1	DIO SI PWR BRIDGE	R031	A700019P53	RES DEPC 1/4W 22K 5%
D005	A700025P7	DIO SI ZENR 5V6 5% 0.4W	R032	A700019P57	RES DEPC 1/4W 47K 5%
D006	J706282P1	DIO SI PWR 1N4933 <i>48-2472 N01</i>	R033	A700019P49	RES DEPC 1/4W 10K 5%
D007	J707017P1	DIO SI PWR BYW 96D	R034	A700019P49	RES DEPC 1/4W 10K 5%
D008	J706023P1	DIO SI PWR BYW 29-50	R035	A700019P57	RES DEPC 1/4W 47K 5%
D009	J706023P1	DIO SI PWR BYW 29-50	R036	A700019P57	RES DEPC 1/4W 47K 5%
D010	J708734P1	DIO SI PWR BYV 28-100	R037	A700019P25	RES DEPC 1/4W 100R 5%
D011	J706282P1	DIO SI PWR 1N4933	R038	A700019P25	RES DEPC 1/4W 100R 5%
D012	A700028P1	DIO SI SIG 1N4148	R039	A700019P37	RES DEPC 1/4W 1K0 5%
D013	A700028P1	DIO SI SIG 1N4148	R040	A700019P37	RES DEPC 1/4W 1K0 5%
D014	J706282P1	DIO SI PWR 1N4933	R041	A700019P49	RES DEPC 1/4W 10K 5%
D015	J707017P1	DIO SI PWR BYW 96D	R042	A700019P49	RES DEPC 1/4W 10K 5%
D016	J707017P1	DIO SI PWR BYW 96D	R043	A700019P53	RES DEPC 1/4W 22K 5%
			R044	A700019P32	RES DEPC 1/4W 390R 5%
			R045	A700019P40	RES DEPC 1/4W 1K8 5%
			R046	J706008P1	RES VAR CERM 1K 20%

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PARTS LIST FOR POWER SUPPLY PS907 220/110 V

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
R047	A700019P33	RES DEPC 1/4W 470R 5%			
R048	A700019P21	RES DEPC 1/4W 47R 5%			
R049	A700019P30	RES DEPC 1/4W 270R 5%			
R050	A700112P15	RES COMP 1/1W 10R 5%			
R051	A700112P15	RES COMP 1/1W 10R 5%			
R052	A700019P21	RES DEPC 1/4W 47R 5%			
R053	J708536P6	RES WW 2W 0R33 10% 1702011 Y06			
R054	J708692P4	RES MFLM 2W 220R 5% 0602436 H29			
R055	A700019P33	RES DEPC 1/4W 470R 5%			
R056	A700019P39	RES DEPC 1/4W 1K5 5%			
R057	A700019P25	RES DEPC 1/4W 100R 5%			
R058	A700019P37	RES DEPC 1/4W 1K0 5%			
R059	J708536P113	RES WW 2W 5R06 10%			
R060	A700019P41	RES DEPC 1/4W 2K2 5%			
R061	A700019P36	RES DEPC 1/4W 820R 5%			
R062	A700019P32	RES DEPC 1/4W 390R 5%			
R063	J706008P2	RES VAR CERM 220R 20%			
R064	A700019P32	RES DEPC 1/4W 390R 5%			
R065	A700019P52	RES DEPC 1/4W 18K 5%			
R066	A700019P49	RES DEPC 1/4W 10K 5%			
R067	J706008P8	RES VAR CERM 4K7 20%			
R068	A700019P45	RES DEPC 1/4W 4K7 5%			
R069	A700019P45	RES DEPC 1/4W 4K7 5%			
R070	A700019P30	RES DEPC 1/4W 270R 5%			
R071	A700019P42	RES DEPC 1/4W 2K7 5%			
R072	A700019P25	RES DEPC 1/4W 100R 5%			
R073	A700019P49	RES DEPC 1/4W 10K 5%			
R074	A700019P49	RES DEPC 1/4W 10K 5%			
R075	A700019P61	RES DEPC 1/4W 100K 5%			
R076	A700019P13	RES DEPC 1/4W 10R 5%			
R077	A700019P13	RES DEPC 1/4W 10R 5%			
T001	J708726P1	TRANSFORMER INVTR 160VA			
T002	J708727P1	TRANSFORMER INVTR			
U001	J706018P1	IC LIN CMPAR 3302			
U002	J706018P1	IC LIN CMPAR 3302			
U003	J707020P1	CPLR OPTO H24A1			
U004	J707020P1	CPLR OPTO H24A1			
U005	J708555P1	IC LIN VR FIX 78T05 51-2013 Y01			
U006	J708332P1	IC LIN VR FIX 79L05AC			
X001	J706973P1	TERM SLD 2.3 SQ HOLE			
X002	J706973P1	TERM SLD 2.3 SQ HOLE			
X003	J706973P1	TERM SLD 2.3 SQ HOLE			
X004	J710991P1	TERM STUD SLT			
X005	J710991P1	TERM STUD SLT			
00XF	J706903P1	FUSE HOLDER 5.0X20.0MM			
F002	J706998P9	FUSE CTG 4.0A T			
W001	A700184P1	RES WIRE JMPR OR JUMPER			
	8402003U46A	M905860P1R2 BD PW			

PS9011/PS9012

POWER SUPPLY MODULES

The power supply modules PS9011 and PS9012 are used with the CQF9000 series.

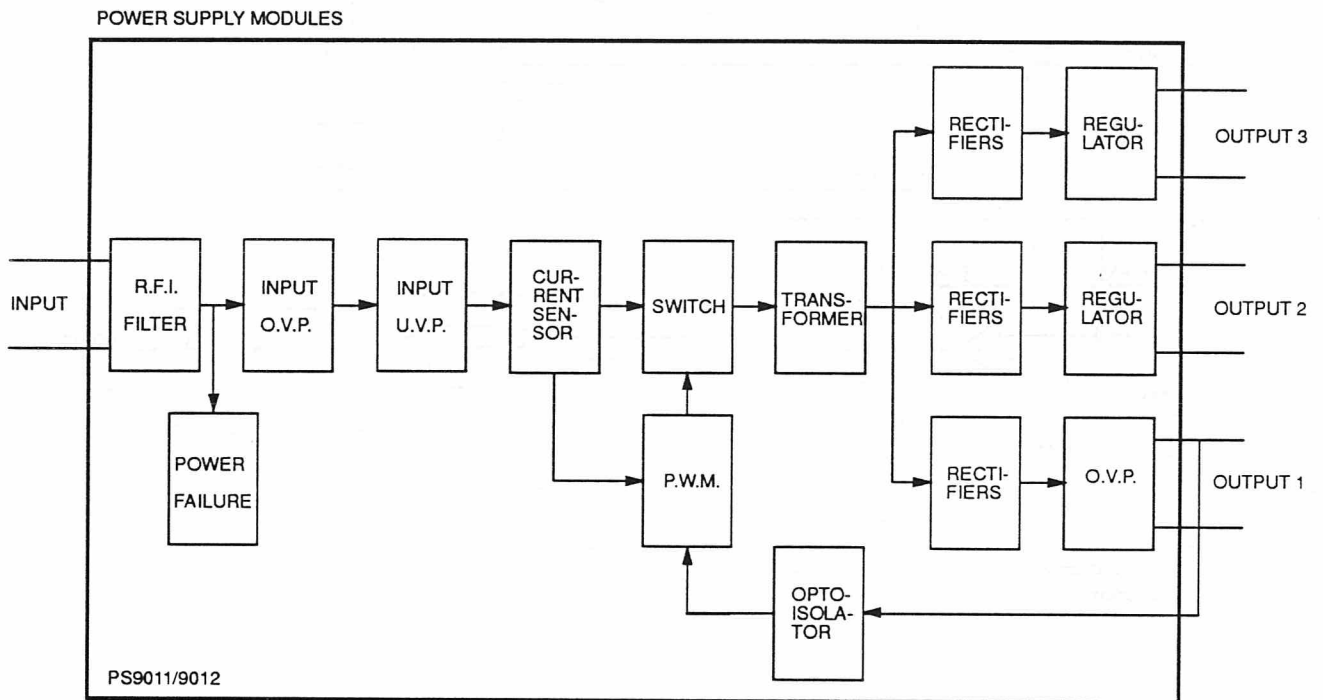
PS9011 is used for 24 V input voltage.

PS9012 is used for 48 V input voltage.

The housing is rugged and steady against hard envi-

ronmental conditions. The power supply module is built on a single printing wiring board. The connectors for in and outputs are mounted directly on the board.

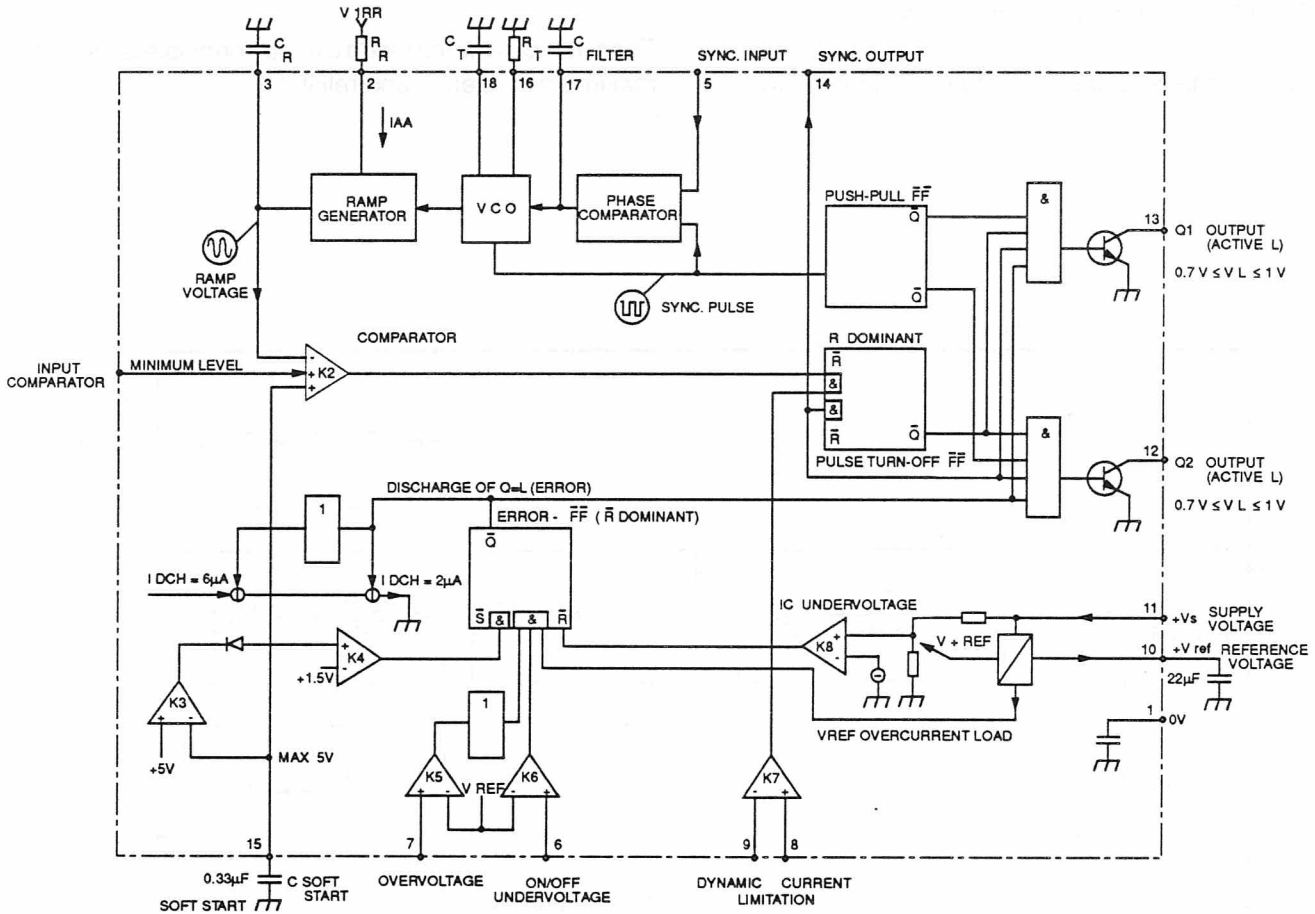
The push-pull switch mode circuitry principle is used for maximum efficiency and reliability.



The switch frequency is set to approx. 50 kHz. The integrated circuit Q1 operates as a switch control, while

resistor R6 and capacitor C6 sets the switching frequency.

SWITCH CONTROL Q1
BLOCK DIAGRAM TDA4718



The slope of the ramp generator is controlled by the resistor R5. The resistors R11 and R12 divide the current limiter voltage. The voltage across the resistor R15 (Manganin) controls furthermore the current limiter. The capacitor C4 sets the "soft start time".

A part of Q1 controls the voltage. If the voltage is below the level at pin 6, pin 10 (-Vref) and pin 11 (-Vs), the complete system shuts down and the soft start-up is initiated.

The integrated circuit Q2 (CD 4049 UBE) functions as a buffer for two FET-switches, Q4 and Q5. The 13.2 V

output voltage is controlled via Q8 (LM 723) and Q6 (CNY 17 II).

Q9 functions as a current amplifier using the R35 (Manganin) voltage drop as a reference. The control signal is sent via optocoupler (CNY 17 II) back to primary control Q3 (LM 301) and Q1.

The 13.2 Volt mains output is protected against over voltages (transients) by Q60.

SPECIFICATIONS

Input Voltage

24 V DC (18-36 V DC)

Output Voltage

- output 1: 13.2 V/11 A
- output 2: +5 V/2 A
- output 3: -5 V/50 mA

Output Efficiency

>75%

Output Ripple

- output 1: <7 mVpp
- output 2: <7 mVpp
- output 3: <10 mVpp

Current limit

11.5 - 12.5 A

Over voltage protection

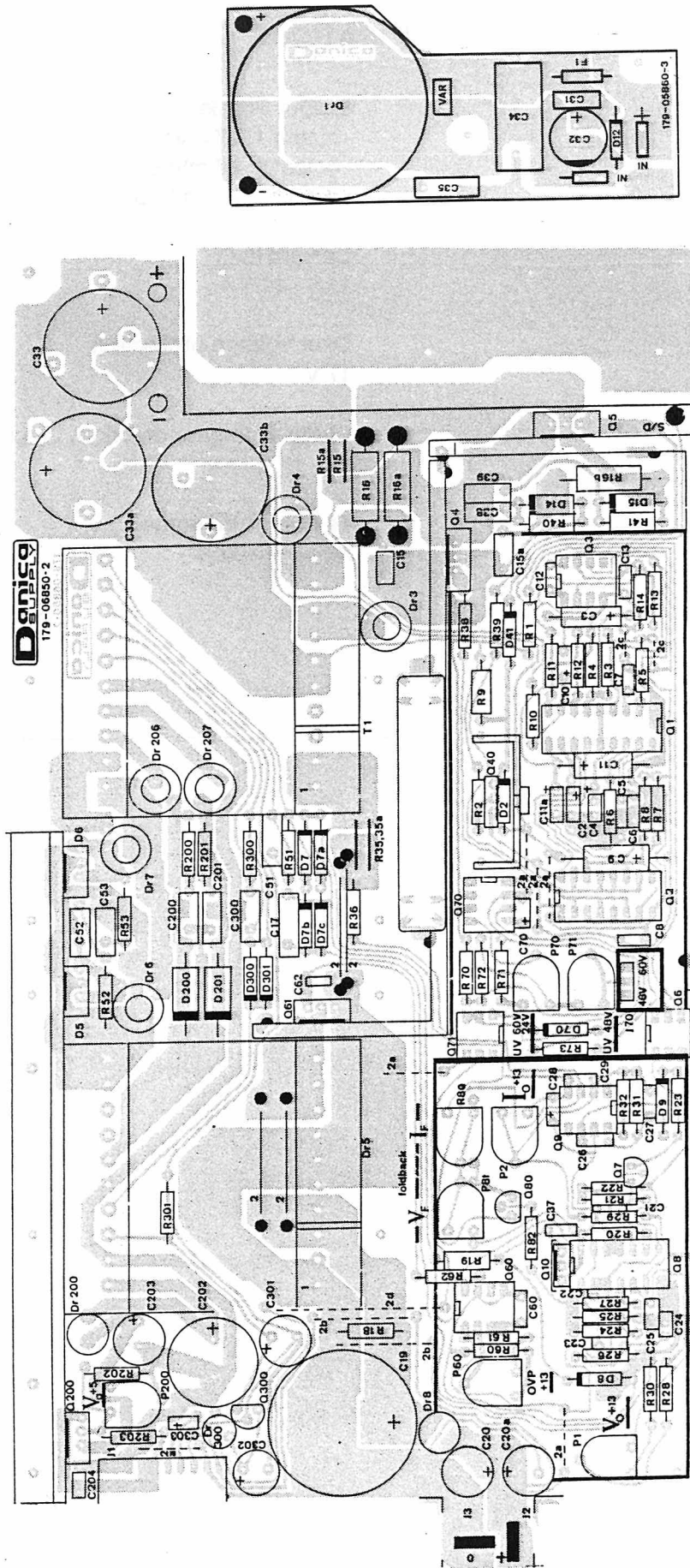
17 V

Under voltage protection, input

16 - 18 V

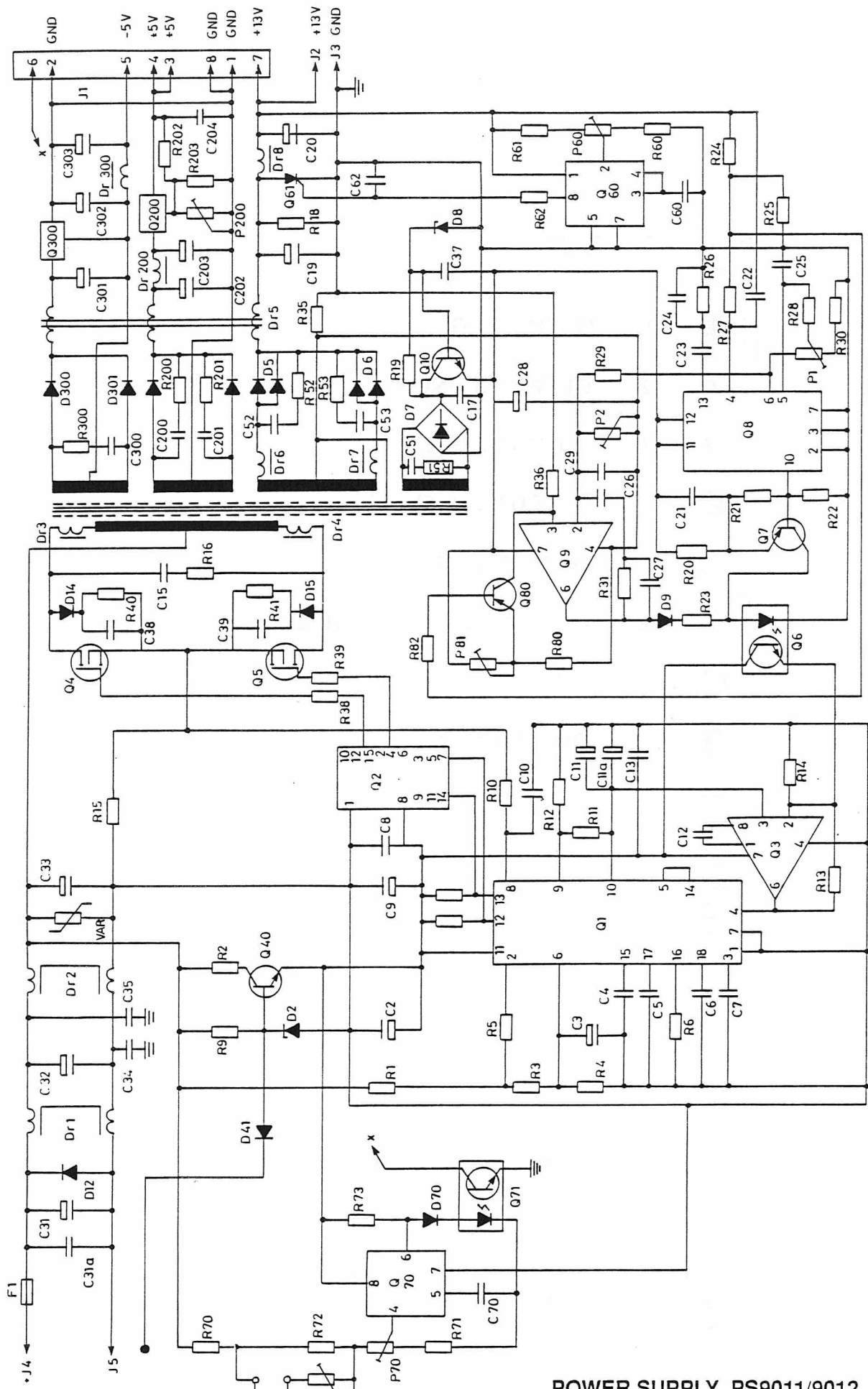
Temperature range

-25°C to +60°C



**POWER AMPLIFIER PS9011/9012
COMPONENT LAYOUT**

D404.678/2

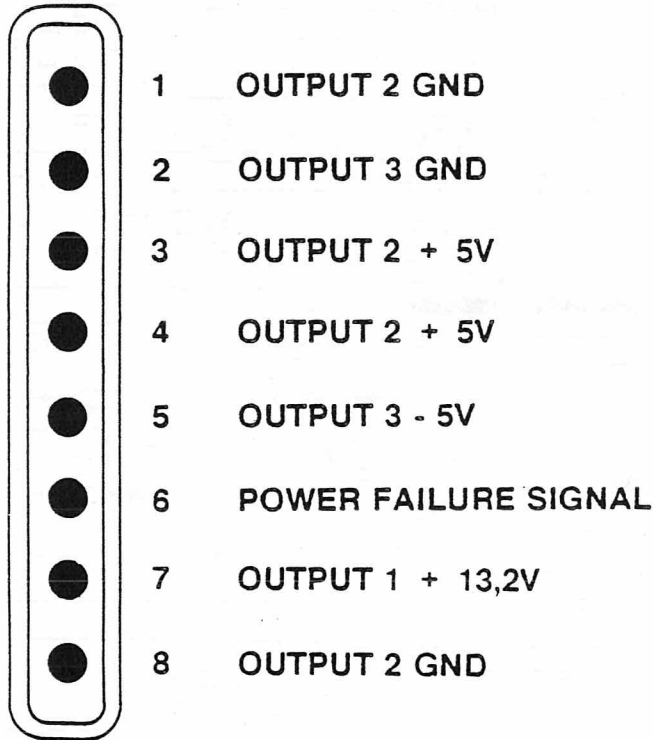


POWER SUPPLY PS9011/9012

PS9011: CODE NO. J709793P1 - GPN6132A
 PS9012: CODE NO. J709793P2 - GPN6131A

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CONNECTOR J1



J2



J3



J4



J5



CONNECTIONS PS9011/9012

D404.856

PARTS LIST FOR POWER SUPPLY PS9011

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GPN6132A	J709793P1 PS9011	D008	J710341P72	DIO SI ZENR 0.4W 16V
C002	J707411P300	CAP PYES 220N/63V 10%	D009	A700028P1	DIO SI SIG 1N4148
C003	J710341P41	CAP ELECT 10U 16V	D012	J710341P170	DIO 1N4007
C004	J707411P300	CAP PYES 220N/63V 10%	D014	J710341P320	DIO SI BYV 27-200
C005	J710341P42	CAP CER 4N7 100V	D015	J710341P320	DIO SI BYV 27-200
C006	J710341P43	CAP CER 1N 100V	D016	J710341P325	TRANSZORB ICTE 68
C007	J710341P43	CAP CER 1N 100V	D017	J710341P325	TRANSZORB ICTE 68
C008	J710341P44	CAP CER 22N 63V	D041	J710341P73	DIO SI 1N4003
C009	J710341P41	CAP ELECT 10U 16V	D070	A700028P1	DIO SI SIG 1N4148
C010	A701352P7	TANTAL 1U 16V	D200	J710341P74	DIO SI BYW 98-150
C011	J706024P3	CAP ELECT 22U 10V	D201	J710341P74	DIO SI BYW 98-150
11a	J710341P45	CAP 100N 63V	D300	J706282P3	DIO SI PWR 1N4935
C012	J710341P46	CAP CER 470P 100V	D301	J706282P3	DIO SI PWR 1N4935
C013	J710341P44	CAP CER 22N 63V	F001	J710341P308	FUSE 15A
C015	J710341P303	CAP 4N7 400V	J001	J708068P108	CONN PWB MALE RECP 08-CKT.
C017	J710341P49	CAP 100N 250V	J002	J710341P130	TERM 6.3 MM
C018	J710341P231	CAP 100N 400V	J003	J710341P130	TERM 6.3 MM
C019	J710341P50	CAP ELECT 6800U 16V	J004	J710341P130	TERM 6.3 MM
C020	A701225P8	CAP ELECT 470U 16V	J005	J710341P130	TERM 6.3 MM
20a	A701225P8	CAP ELECT 470U 16V	P001	J706008P3	RES VAR CERM 2K2 20%
C021	J710341P44	CAP CER 22N 63V	P002	J706008P2	RES VAR CERM 220R 20%
C022	J710341P44	CAP CER 22N 63V	P060	J706008P4	RES VAR CERM 10K 20%
C023	J710341P45	CAP 100N 63V	P070	J706008P4	RES VAR CERM 10K 20%
C024	J710341P43	CAP CER 1N 100V	P081	J706008P7	RES VAR CERM 22K 20%
C025	J710341P51	CAP 22N 63V	P200	J710341P80	RES VAR CERM 100R 20%
C026	J710341P45	CAP 100N 63V	Q001	J710341P90	IC TDA4718
C027	J710341P45	CAP 100N 63V	Q002	A700176P1	IC DIG BUFR 4049U
C028	J709426P12	TANTAL 4U7 16V	Q003	J710341P91	IC CA301 AC
C029	J710341P45	CAP 100N 63V	Q004	J710341P304	TSTR FET SI IRF 540
C031	J710341P160	CAP 220N 100V	Q005	J710341P304	TSTR FET SI IRF 540
C032	J710341P161	CAP ELECT 220U 63V	Q006	J710341P93	DIO OPTO CNY 17-2
C033	J710341P302	CAP ELECT 2200u/40V	Q007	J710341P94	TSTR NPN SI BC 307
33a	J710341P302	CAP ELECT 2200u/40V	Q008	J706017P1	IC LIN VR SI 723
33b	J710341P302	CAP ELECT 2200u/40V	Q009	J710341P95	IC LTN OP-AMP CA 3140E
C034	J710341P162	CAP 22N 1500V REV.2	Q010	J710341P96	TSTR NPN SI MJE 340
C034	J710341362	CAP 22N 1500V REV.3	Q040	J710341P305	TSTR NPN SI 2N6099
C035	J710341P163	CAP CER 4N7 5000V	Q060	J710341P226	IC LIN DET MC3423
C037	J710341P51	CAP 22N 63V	Q061	J710341P227	THYRSTR SCR TYN685
C038	J710341P303	CAP 4N7 400V	Q070	J709452P1	IC LIN DET MC3423
C039	J710341P303	CAP 4N7 400V	Q071	J710341P93	DIO OPTO CNY 17-2
C051	J710341P53	CAP 1N 400V	Q080	J710341P94	TSTR NPN SI BC 307
C052	J710341P53	CAP 1N 400V	Q200	J708555P1	IC LIN VR FIX 78T05
C053	J710341P53	CAP 1N 400V	Q300	J706031P1	IC LIN VR FIX 78L05
C060	J710341P51	CAP 22N 63V	R001	A700184P1	JUMPER
C062	J710341P51	CAP 22N 63V	R002	J710341P2	RES MFLM 1/4W 100R
C070	A701352P7	TANTAL 1U 16V	R003	A701250P351	RES MFLM 1/4W 33K2 1%
C200	J710341P53	CAP 1N 400V	R004	A701250P273	RES MFLM 1/4W 5K62 1%
C201	J710341P53	CAP 1N 400V	R005	A701250P489	RES MFLM 1/4W 825K 1%
C202	J710341P54	CAP ELECT 3300U 16V	R006	J710341P3	RES MFLM 1/4W 10K 1%
C203	J710341P55	CAP ELECT 22U 16V	R007	J710341P4	RES MFLM 1/4W 2K2 1%
C204	J709426P8	TANTAL 1U 35V	R008	J710341P4	RES MFLM 1/4W 2K2 1%
C300	J710341P53	CAP 1N 400V	R009	J710341P13	RES MFLM 1/4W 2K7 1%
C301	J710341P56	CAP ELECT 220U 16V	R010	J710341P2	RES MFLM 1/4W 100R
C302	J710341P55	CAP ELECT 22U 16V	R011	J710341P6	RES MFLM 1/4W 18K
C303	J709426P12	TANTAL 4U7 16V	R012	J710341P7	RES MFLM 1/4W 1K
DR:			R013	J710341P8	RES MFLM 1/4W 560R
001	J710341P175	COIL 2 X 1.8MH 10A	R014	J710341P7	RES MFLM 1/4W 1K
003	J710341P306	COIL Ø-10	R015	J710341P10	RES 0R01
004	J710341P306	COIL Ø-10	15a	J710341P10	RES 0R01
005	J710341P113	COIL ETD 49	R016	J710341P23	RES MFLM 1/2W 10R
006	J710341P110	COIL Ø-10	R018	J710341P12	RES MFLM 1.6W 330R
007	J710341P110	COIL Ø-10	R019	J710341P5	RES MFLM 1.6W 10K
008	J710341P114	COIL Ø-12	R020	J710341P7	RES MFLM 1/4W 1K
200	J710341P111	COIL	R021	J710341P14	RES MFLM 1/4W 470R
206	J710341P110	COIL Ø-10	R022	J710341P4	RES MFLM 1/4W 2K2 1%
207	J710341P110	COIL Ø-10	R023	J710341P7	RES MFLM 1/4W 1K
300	J710341P112	COIL	R024	J710341P8	RES MFLM 1/4W 560R
D002	A700025P11	DIO SI ZENR 0.4W 12V	R025	J710341P14	RES MFLM 1/4W 470R
D005	J710341P70	DIO SI UES 2404	R026	J710341P16	RES MFLM 1/4W 4K7
D006	J710341P70	DIO SI UES 2404	R027	J710341P17	RES MFLM 1/4W 5K6
D007	J710341P71	DIO SI BAV 21	R028	J710341P16	RES MFLM 1/4W 4K7
07a	J710341P71	DIO SI BAV 21	R029	J710341P18	RES MFLM 1/4W 12K
07b	J710341P71	DIO SI BAV 21	R030	J710341P19	RES MFLM 1/4W 8K2
07c	J710341P71	DIO SI BAV 21	R031	J710341P18	RES MFLM 1/4W 12K
			R032	J710341P20	RES MFLM 1/4W 100K

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PARTS LIST FOR POWER SUPPLY PS9011

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
R035	J710341P10	RES 0R01			
35a	J710341P10	RES 0R01			
R036	J710341P2	RES MFLM 1/4W 100R			
R038	J710341P21	RES MFLM 1/4W 47R			
R039	J710341P21	RES MFLM 1/4W 47R			
R040	J710341P22	RES MFLM 1.6W 180R			
R041	J710341P22	RES MFLM 1.6W 180R			
R051	J710341P23	RES MFLM 0.5W 10R			
R052	J710341P23	RES MFLM 0.5W 10R			
R053	J710341P23	RES MFLM 0.5W 10R			
R060	J710341P7	RES MFLM 1/4W 1K			
R061	J710341P24	RES MFLM 1/4W 22K			
R062	J710341P25	RES MFLM 1/4W 68R			
R070	A700184P1	JUMPER			
R071	A700184P1	JUMPER			
R072	J710341P24	RES MFLM 1/4W 22K			
R073	J710341P7	RES MFLM 1/4W 1K			
R080	J710341P27	RES MFLM 1/4W 27K			
R082	J710341P24	RES MFLM 1/4W 22K			
R200	J710341P23	RES MFLM 0.5W 10R			
R201	J710341P23	RES MFLM 0.5W 10R			
R202	J710341P28	RES MFLM 1/4W 22R			
R203	J710341P29	RES MFLM 1/4W 220R			
R300	J710341P23	RES MFLM 0.5W 10R			
R301	J710341P9	RES MFLM 1/4W 1K5			
T001	J710341P115	TRANSFORMER ETD 49			
VAR	J710341P150	VARISTOR SiOV			
		NON REFERENCED ITEMS:			
	J710341P120	HEATSINK FOR Q4			
	J710341P121	HEATSINK FOR Q5			
	J710341P122	HEATSINK FOR Q5+6-Q200			
	J710341P123	HEATSINK FOR Q10			
	J710341P124	HEATSINK FOR Q40			
	J710341P140	BUSH SOLDER 12MM (5 used)			
	J710341P141	BUSH SOLDER 20MM (4 used)			
	J710341P142	JUMPER			
	J710341P307	CURRENTSLEEVE 25.4MM (4 used)			
	J710341P145	STRAP			
	J710341P146	PRINT			
	J710341P190	NUT M-3 (2 used)			
	J710341P191	SCR M-3X6 (5 used)			
	J710341P192	SCR M-3X6 (3 used)			
	J710341P193	SCR M-4X10			
	J710341P194	WASH 3MM			
	J710341P195	SPRING 3MM			
	J710341P196	WASH 4MM			
	J710341P197	SPRING 4MM			
	J710341P198	WASH 3MM (7 used)			
	J710341P200	INS FOR TO-220 (6 used)			
	J710341P201	CLIPS FOR TO-220 (6 used)			
	J710341P180	CHASSIS			
	J710341P385	PRINTED WIRING BOARD			

PARTS LIST FOR POWER SUPPLY PS9012

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GPN6131A	J709793P2 PS9012	D009	A700028P1	DIO SI SIG 1N4148
C002	J710341P40	CAP PYES 220N 63V	D012	J710341P170	DIO 1N4007
C003	J710341P41	CAP ELECT 10U 16V	D014	J710341P320	DIO SI BYV 27-200
C004	J710341P40	CAP PYES 220N 63V	D015	J710341P320	DIO SI BYV 27-200
C005	J710341P42	CAP CER 4N7 100V	D016	J710341P325	TRANSZORB ICTE 68
C006	J710341P43	CAP CER 1N 100V	D017	J710341P325	TRANSZORB ICTE 68
C007	J710341P43	CAP CER 1N 100V	D041	J710341P73	DIO SI 1N4003
C008	J710341P44	CAP CER 22N 63V	D070	A700028P1	DIO SI SIG 1N4148
C009	J710341P41	CAP ELECT 10U 16V	D200	J710341P74	DIO SI BYW 98-150
C010	A701352P7	TANTAL 1U 16V	D201	J710341P74	DIO SI BYW 98-150
C011	J706024P3	CAP ELECT 22U 10V	D300	J706282P3	DIO SI PWR 1N4935
11a	J710341P45	CAP 100N 63V	D301	J706282P3	DIO SI PWR 1N4935
C012	J710341P46	CAP CER 470P 100V	F001	J707468P13	FUSE 10A
C013	J710341P44	CAP CER 22N 63V	J001	J708068P108	CONN PWB MALE RECP 08-CKT.
C015	J710341P53	CAP 1N0 400V	J002	J710341P130	TERM 6.3 MM
C017	J710341P49	CAP 100N 250V	J003	J710341P130	TERM 6.3 MM
C018	J710341P231	CAP CER 100N	J004	J710341P130	TERM 6.3 MM
C019	J710341P50	CAP ELECT 6800U 16W	J005	J710341P130	TERM 6.3 MM
C020	A701225P8	CAP ELECT 470U 16V	J070	J710341P131	CONN 03-CKT
20a	A701225P8	CAP ELECT 470U 16V	P001	J706008P3	RES VAR CERM 2K2 20%
C021	J710341P44	CAP CER 22N 63V	P002	J706008P2	RES VAR CERM 220R 20%
C022	J710341P44	CAP CER 22N 63V	P060	J706008P4	RES VAR CERM 10K 20%
C023	J710341P45	CAP 100N 63V	P070	J706008P4	RES VAR CERM 10K 20%
C024	J710341P43	CAP CER 1N 100V	P071	J706008P7	RES VAR CERM 22K 20%
C025	J710341P51	CAP 22N 63V	P081	J706008P7	RES VAR CERM 22K 20%
C026	J710341P45	CAP 100N 63V	P200	J710341P80	RES VAR CERM 100R 20%
C027	J710341P45	CAP 100N 63V	Q001	J710341P90	IC TDA4718
C028	J709426P12	TANTAL 4U7 16V	Q002	A700176P1	IC DIG BUFR 4049U
C029	J710341P45	CAP 100N 63V	Q003	J710341P91	IC CA301 AC
C031	J710341P160	CAP 220N 100V	Q004	J710341P92	TSTR FET IRF 640
C032	J710341P161	CAP ELECT 220U 63V	Q005	J710341P92	TSTR FET IRF 640
C033	J710341P52	CAP ELECT 470U 100V	Q006	J710341P93	DIO OPTO CNY 17-2
33a	J710341P52	CAP ELECT 470U 100V	Q007	J710341P94	TSTR NPN SI BC 307
33b	J710341P52	CAP ELECT 470U 100V	Q008	J706017P1	IC LIN VR VAR 723
C034	J710341P162	CAP 22N 1500V REV.2	Q009	J710341P95	IC LTN OP-AMP CA 3140E
C034	J710341P362	CAP 22N 1500V REV.3	Q010	J710341P96	TSTR NPN SI MJE 340
C035	J710341P163	CAP CER 4N7 5000V	Q040	J710341P225	TSTR NPN SI TIP29D
C037	J710341P51	CAP 22N 63V	Q060	J710341P226	IC LIN DET MC3423
C038	J710341P53	CAP 1N 400V	Q061	J710341P227	THYRSTR SCR TYN685
C051	J710341P53	CAP 1N 400V	Q070	J709452P1	IC LIN DET MC3423
C052	J710341P53	CAP 1N 400V	Q071	J710341P93	DIO OPTO CNY 17-2
C053	J710341P53	CAP 1N 400V	Q080	J710341P94	TSTR NPN SI BC 307
C060	J710341P51	CAP 22N 63V	Q200	J708555P1	IC LIN VR FIX 78T05
C062	J710341P51	CAP 22N 63V	Q300	J706031P1	IC LIN VR FIX 78L05
C070	A701352P7	TANTAL 1U 16V	R001	A701250P342	RES MFLM 1/4W 26K7 1%
C200	J710341P53	CAP 1N 400V	R002	J710341P2	RES MFLM 1/4W 100R
C201	J710341P53	CAP 1N 400V	R003	A701250P251	RES MFLM 1/4W 3K32 1%
C202	J710341P54	CAP ELECT 3300U 16V	R004	A701250P236	RES MFLM 1/4W 2K32 1%
C203	J710341P55	CAP ELECT 22U 16V	R005	A701250P409	RES MFLM 1/4W 121K 1%
C204	J709426P8	TANTAL 1U 35V	R006	J710341P3	RES MFLM 1/4W 10K
C300	J710341P53	CAP 1N 400V	R007	J710341P4	RES MFLM 1/4W 2K2
C301	J710341P56	CAP ELECT 220U 16V	R008	J710341P4	RES MFLM 1/4W 2K2
C302	J710341P55	CAP ELECT 22U 16V	R009	J710341P5	RES MFLM 1.6W 10K
C303	J709426P12	TANTAL 4U7 16V	R010	J710341P2	RES MFLM 1/4W 100R
DR:			R011	J710341P6	RES MFLM 1/4W 18K
001	J710341P175	COIL 2 X 1.8MH 10A	R012	J710341P7	RES MFLM 1/4W 1K
003	J710341P110	COIL Ø-10	R013	J710341P15	RES MFLM 1/4W 560R
004	J710341P110	COIL Ø-10	R014	J710341P7	RES MFLM 1/4W 1K
005	J710341P113	COIL ETD 49	R015	J710341P10	RES 0R01
006	J710341P110	COIL Ø-10	15a	J710341P10	RES 0R01
007	J710341P110	COIL Ø-10	R016	J710341P23	RES MFLM 1.2W 10R
008	J710341P114	COIL Ø-12	16a	J710341P11	RES MFLM 2.5W 22R
200	J710341P111	COIL	R018	J710341P12	RES MFLM 1.6W 330R
206	J710341P110	COIL Ø-10	R019	J710341P5	RES MFLM 1.6W 10K
207	J710341P110	COIL Ø-10	R020	J710341P7	RES MFLM 1/4W 1K
300	J710341P112	COIL	R021	J710341P14	RES MFLM 1/4W 470R
D002	A700025P11	DIO SI ZENR 0.4W 12V	R022	J710341P4	RES MFLM 1/4W 2K2
D005	J710341P70	DIO TO-220 200V	R023	J710341P7	RES MFLM 1/4W 1K
D006	J710341P70	DIO TO-220 200V	R024	J710341P15	RES MFLM 1/4W 560R
D007	J710341P71	DIO SI BAV 21	R025	J710341P14	RES MFLM 1/4W 470R
07a	J710341P71	DIO SI BAV 21	R026	J710341P4	RES MFLM 1/4W 2K2
07b	J710341P71	DIO SI BAV 21	R027	J710341P17	RES MFLM 1/4W 5K6
07c	J710341P71	DIO SI BAV 21	R028	J710341P16	RES MFLM 1/4W 4K7
D008	J710341P72	DIO SI ZENR 0.4W 16V	R029	J710341P18	RES MFLM 1/4W 12K
			R030	J710341P19	RES MFLM 1/4W 8K2

DATE: 09/20/90

X404.774/5

PARTS LIST FOR POWER SUPPLY PS9012

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
R031	J710341P18	RES MFLM 1/4W 12K			
R032	J710341P20	RES MFLM 1/4W 100K			
R035	J710341P10	RES 0R01			
35a	J710341P10	RES 0R01			
R036	J710341P21	RES MFLM 1/4W 100R			
R038	J710341P21	RES MFLM 1/4W 47R			
R039	J710341P21	RES MFLM 1/4W 47R			
R040	J710341P22	RES MFLM 1.6W 180R			
R041	J710341P22	RES MFLM 1.6W 180R			
R051	J710341P23	RES MFLM 0.5W 10R			
R052	J710341P23	RES MFLM 0.5W 10R			
R053	J710341P23	RES MFLM 0.5W 10R			
R060	J710341P7	RES MFLM 1/4W 1K			
R061	J710341P24	RES MFLM 1/4W 22K			
R062	J710341P25	RES MFLM 1/4W 68R			
R070	J710341P26	RES MFLM 1/4W 68K			
R071	A700184P1	JUMPER			
R072	J710341P24	RES MFLM 1/4W 22K			
R073	J710341P7	RES MFLM 1/4W 1K			
R080	J710341P27	RES MFLM 1/4W 27K			
R082	J710341P24	RES MFLM 1/4W 22K			
R200	J710341P23	RES MFLM 0.5W 10R			
R201	J710341P23	RES MFLM 0.5W 10R			
R202	J710341P28	RES MFLM 1/4W 22R			
R203	J710341P29	RES MFLM 1/4W 220R			
R300	J710341P23	RES MFLM 0.5W 10R			
R301	J710341P9	RES MFLM 1/4W 1K5			
T001	J710341P115	TRANSFORMER ETD 49			
VAR	J710341P150	VARISTOR Si0V			
		NON REFERENCED ITEMS:			
	J710341P120	HEATSINK FOR Q4			
	J710341P121	HEATSINK FOR Q5			
	J710341P122	HEATSINK FOR Q5+6-Q200			
	J710341P123	HEATSINK FOR Q10			
	J710341P124	HEATSINK FOR Q40			
	J710341P140	BUSH SOLDER 12MM (5 used)			
	J710341P141	BUSH SOLDER 20MM (4 used)			
	J710341P143	JUMPER-B 2-CKT			
	J710341P144	RAIL CURRENT 25.4MM (4 used)			
	J710341P145	STRAP			
	J710341P146	PRINT			
	J710341P190	NUT M-3 (2 used)			
	J710341P191	SCR M-3X6 (5 used)			
	J710341P192	SCR M-3X6 (3 used)			
	J710341P193	SCR M-4X10			
	J710341P194	WASH 3MM			
	J710341P195	SPRING 3MM			
	J710341P196	WASH 4MM			
	J710341P197	SPRING 4MM			
	J710341P198	WASH 3MM (7 used)			
	J710341P200	INS FOR TO-220 (6 used)			
	J710341P201	CLIPS FOR TO-220 (6 used)			
	J710341P180	CHASSIS			
	J710341P385	PRINTED WIRING BOARD			

RC931

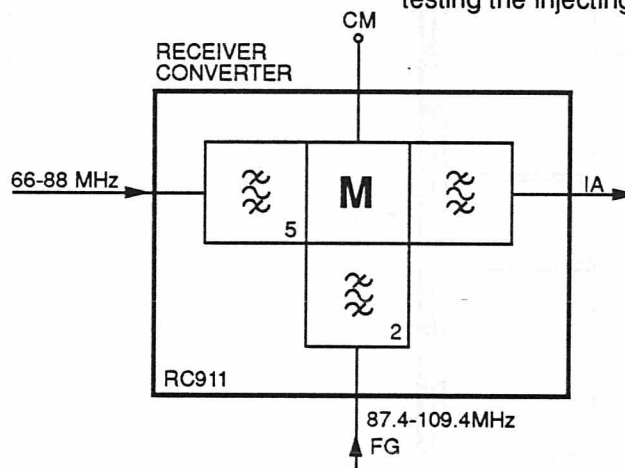
RECEIVER FRONT END

This receiver front-end is the low intermodulation module with narrow-band front-end. It can be turned over the 66 - 88 MHz band.

The output from the front-end is the 21.4 MHz IF signal.

This module is used when high intermodulation and blocking attenuation is needed, and in duplex applications.

The receiver front-end consists of a helical VHF band-pass filter with 5 resonators and a J-FET mixer. Between the bandpass filter and the mixer is an LC-circuit for matching the filter to the mixer gate. The injection signal is fed to the FET mixer's source through a two circuit bandpass filter for suppressing spurious signal in the injection signal. The drain of the FET mixer is connected to an IF resonant circuit which adapts the output impedance to the crystal filter in the IA module. The receiver circuit has a central metering point for testing the injecting signal level.



TECHNICAL SPECIFICATIONS

Antenna impedance
50 ohm

Signal level
<2 V

Injection impedance
50 ohm

Output, IF impedance
1600 ohm $\pm 10\%$

Supply voltage
13.6 V $\pm 20\%$

Current consumption
<5 mA

Antenna frequency, (tunable)
66 - 88 MHz

Bandwidth, 1 dB
Room temp. <2.5 MHz

Bandwidth, 3 dB
Room temp. <3.5 MHz

Injection frequency, (tunable)
87.4 - 109.4 MHz

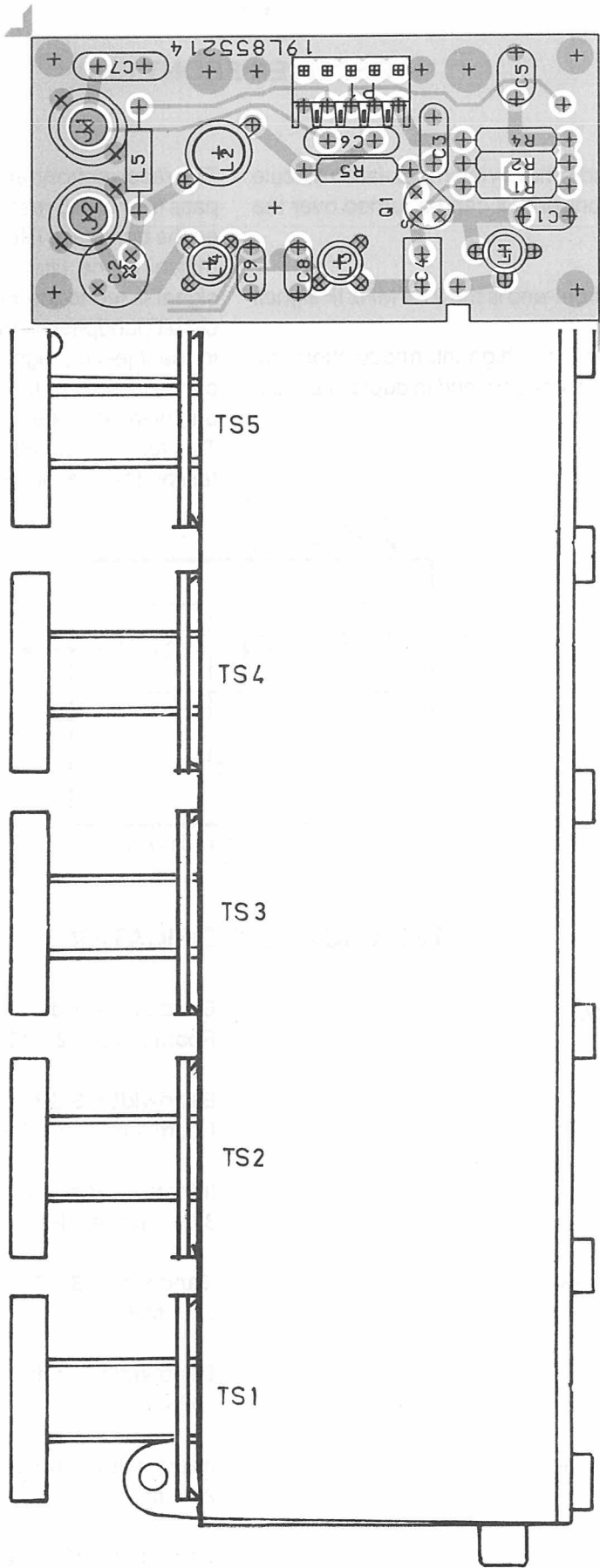
Bandwidth, 3 dB
>3.5 MHz

Bandwidth, 20 dB
40 MHz

Intermediate frequency
21.4 MHz

Sensitivity, 12 dB EIA 1/2 EMF
 $\leq 0.30 \mu\text{V}$

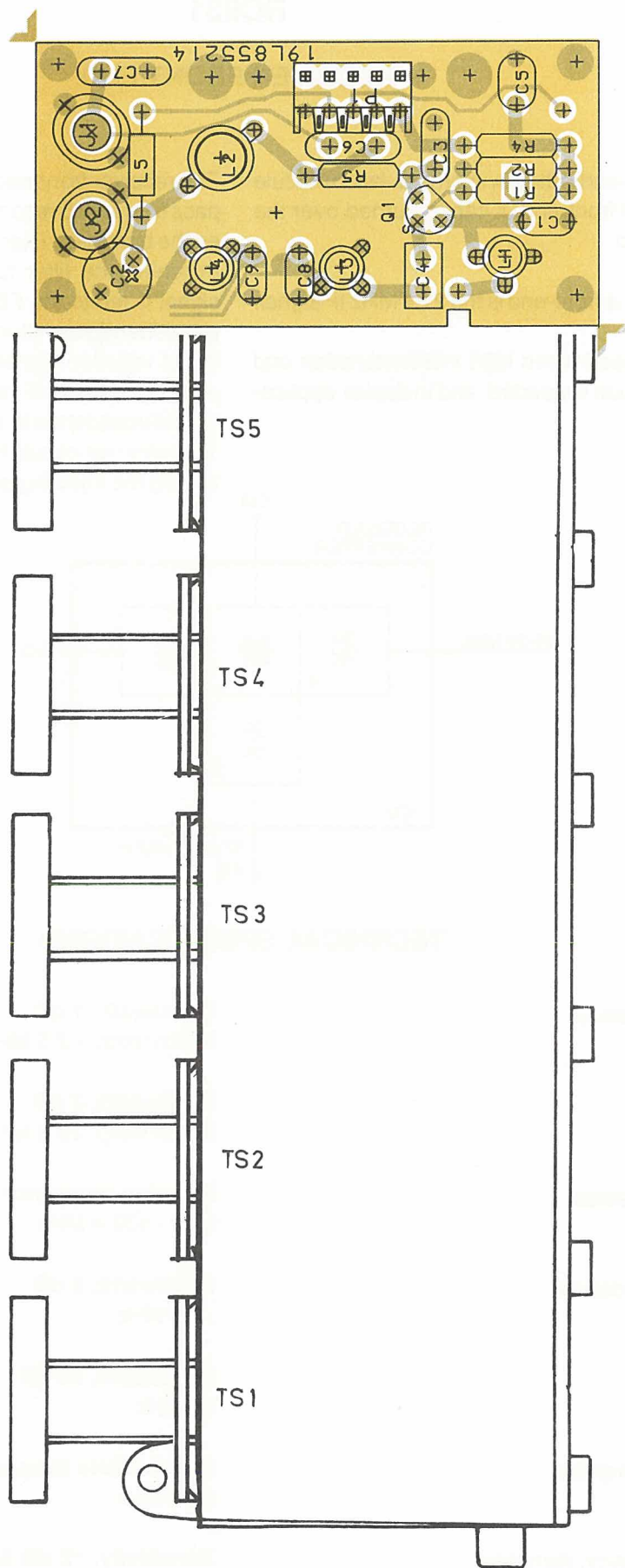
Intermodulation, EIA
 $\geq 85 \text{ dB}$



RECEIVER CONVERTER RC931
COMPONENT LAYOUT

D403.268/3

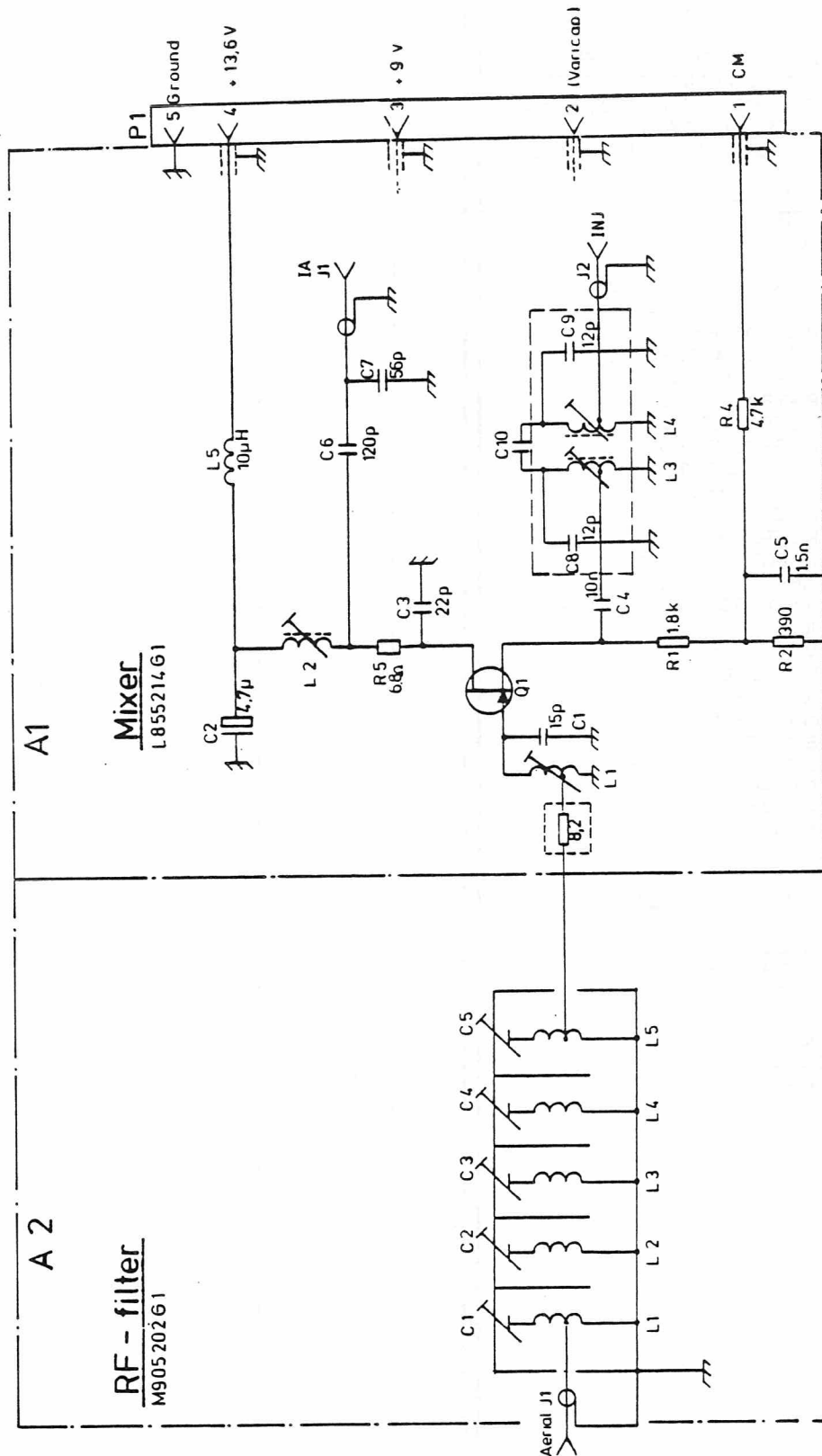
CODE NO. M905214G1 - GRC6026A



RECEIVER CONVERTER RC931
COMPONENT LAYOUT

D403.268/3

CODE NO. M905214G1 - GRC6026A



RECEIVER CONVERTER RC931

CODE NO. M905214G1 - GRC6026A

D403.200/5

PARTS LIST FOR RECEIVER CONVERTER RC931

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GRC6026A	M905214G1 RC 931			
A01	0102721B23	L855214G1 - CPNT BD, MIXER			
A02	0102721B25	M905202G1 - CPNT BD, RF-FILTER			
	A700036P408	SCREW PAN HD M 3.0X8.0 (17 used)			
	J706076P5	WASHER SPG 3.0X6.4			
	0102720B24	J706303G1 ASM TUN SLUG FOR L1 -			
L5	J707755G2	NUT M11 FOR L1 - L5			
	L855144P1	COVER			
	M905016G3	HSG			
	0102721B23	L855214G1 CPNT BD MIXER			
C01	A700235P15	CAP CER 15PF 50V			
C02	2313749D72	CAP TA SOL 4U7 20% 35V			
C03	A700235P17	CAP CER 22PF 50V			
C04	A700234P7	CAP PYES 10N 10% 50V			
C05	A700233P8	CAP CER 1.5NF 50V			
C06	A700235P26	CAP CER 120PF 50V			
C07	A700235P22	CAP CER 56PF 50V			
C08	A700235P14	CAP CER 12PF 50V			
C09	A700235P14	CAP CER 12PF 50V			
C11	2113741C05	CAP,CER,33N 5%			
J01	A700171P2	CONNECTOR COAX			
J02	A700171P2	CONNECTOR COAX			
L01	J706751G1	ASM COIL RC93X			
L02	J706538G1	COIL			
L03	J706752G1	ASM COIL RC93X			
L04	J706752G2	ASM COIL RC93X			
L05	A700024P25	COIL FIX 10UH			
P01	A700041P4	CONN,-PWB. FEM. 5 PIN			
R01	A700019P40	RES DEPC 1K8 5% 1/4W			
R02	A700019P32	RES DEPC 390R 5% 1/4W			
R04	A700019P45	RES DEPC 4K7 5% 1/4W			
R05	A700019P11	RES DEPC 6R8 5% 1/4W			
Q01	J706038P1	TSTR JFET SI 2N5245			
	8402003U88A	BD PW			
	0102721B25	M905202G1 - CPNT BD, RF-FILTER			
J01	A700171P2	CONNECTOR COAX			
	K805092P1	SUPPORT CONN			
	K805174P1	COVER			
L01	L855204P2	COIL HEL			
L02	L855204P1	COIL HEL			
L03	L855204P1	COIL HEL			
L04	L855204P1	COIL HEL			
L05	L855204P2	COIL HEL			

RC911

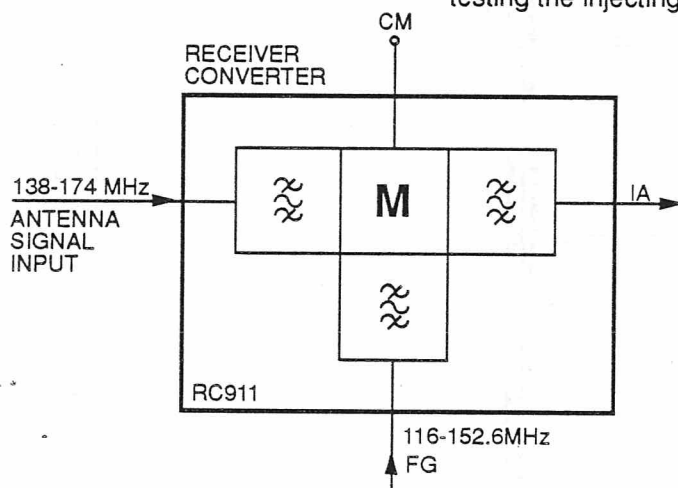
RECEIVER FRONT END

This receiver front-end is the high intermodulation attenuation module with narrow-band front-end. It can be turned over the 138 - 174 MHz band.

The output from the front-end is the 21.4 MHz IF signal.

This module is used when high intermodulation and blocking attenuation is needed, and in duplex applications.

The receiver front-end consists of a helical VHF band-pass filter with 5 resonators and a J-FET mixer. Between the bandpass filter and the mixer is an LC-circuit for matching the filter to the mixer gate. The injection signal is fed to the FET mixer's source through a two circuit bandpass filter for suppressing spurious signal in the injection signal. The drain of the FET mixer is connected to an IF resonant circuit which adapts the output impedance to the crystal filter in the IA module. The receiver circuit has a central metering point for testing the injecting signal level.



TECHNICAL SPECIFICATIONS

Antenna impedance
50 ohm

Signal level
<2 V

Injection impedance
50 ohm

Output, IF impedance
1600 ohm $\pm 10\%$

Supply voltage
13.6 V $\pm 20\%$

Current consumption
<5 mA

Antenna frequency, (tunable)
138 - 174 MHz

Bandwidth, 1 dB
Room temp. <3.0 MHz

Bandwidth, 3 dB
Room temp. <5.0 MHz

Injection frequency, (tunable)
116 - 153 MHz

Bandwidth, 3 dB
>3.5 MHz

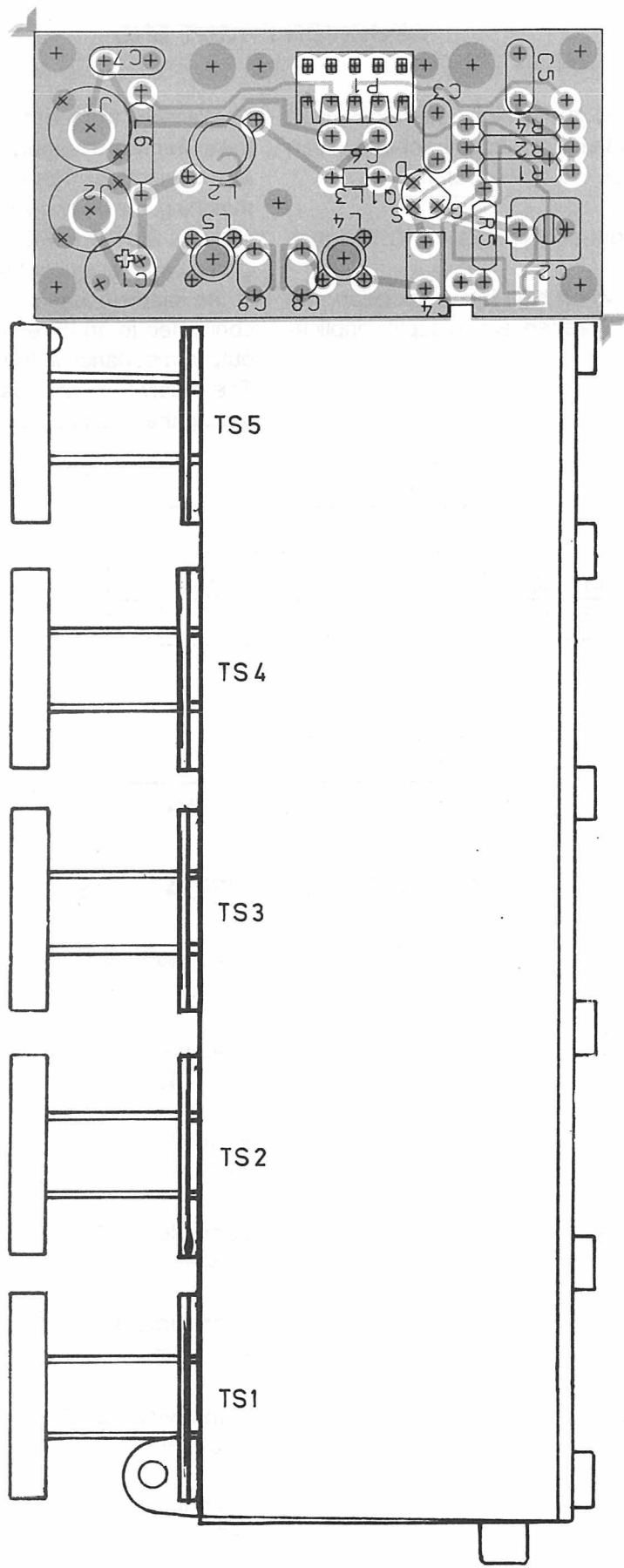
Bandwidth, 20 dB
40 MHz

Intermediate frequency
21.4 MHz

Sensitivity, 12 dB EIA 1/2 EMF
 $\leq 0.35 \mu\text{V}$

Intermodulation, EIA
 $\geq 85 \text{ dB}$

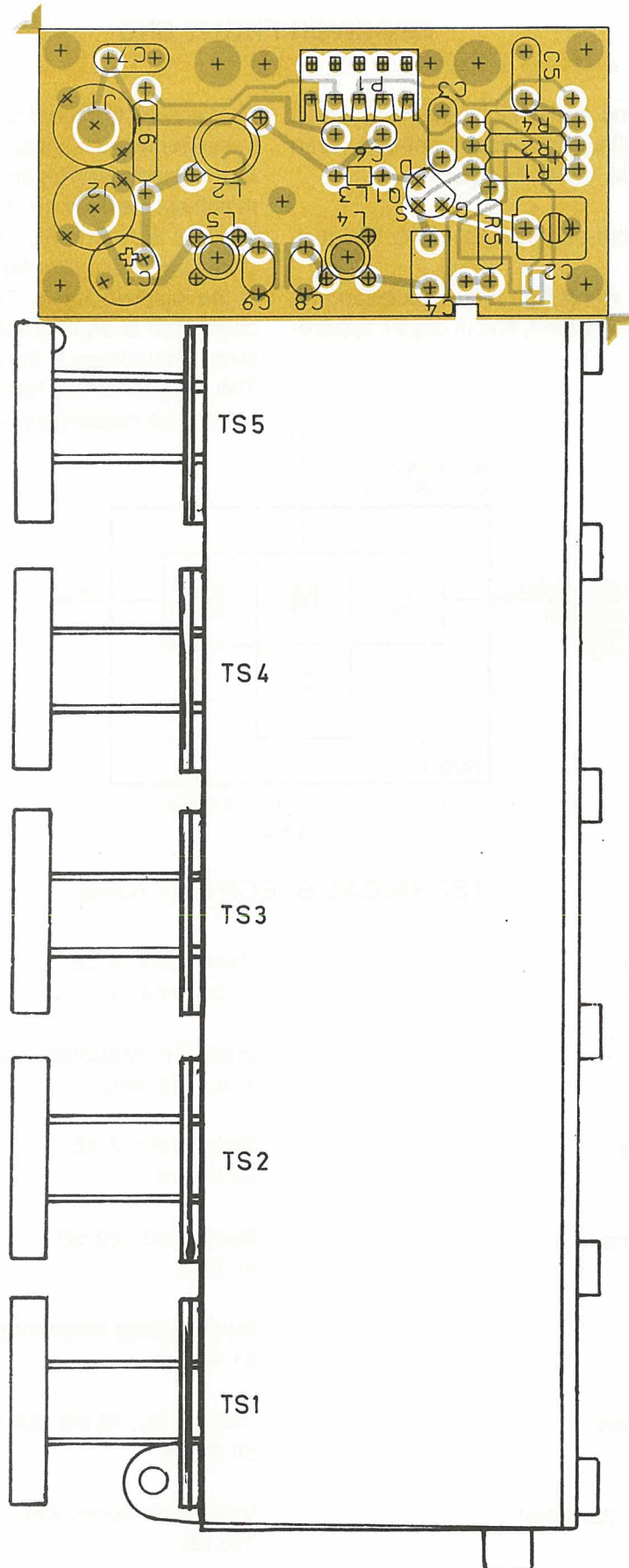
Temperature range
40°C to +85°C



RECIVER CONVERTER RC911
 COMPONENT LAYOUT

D402.962/4

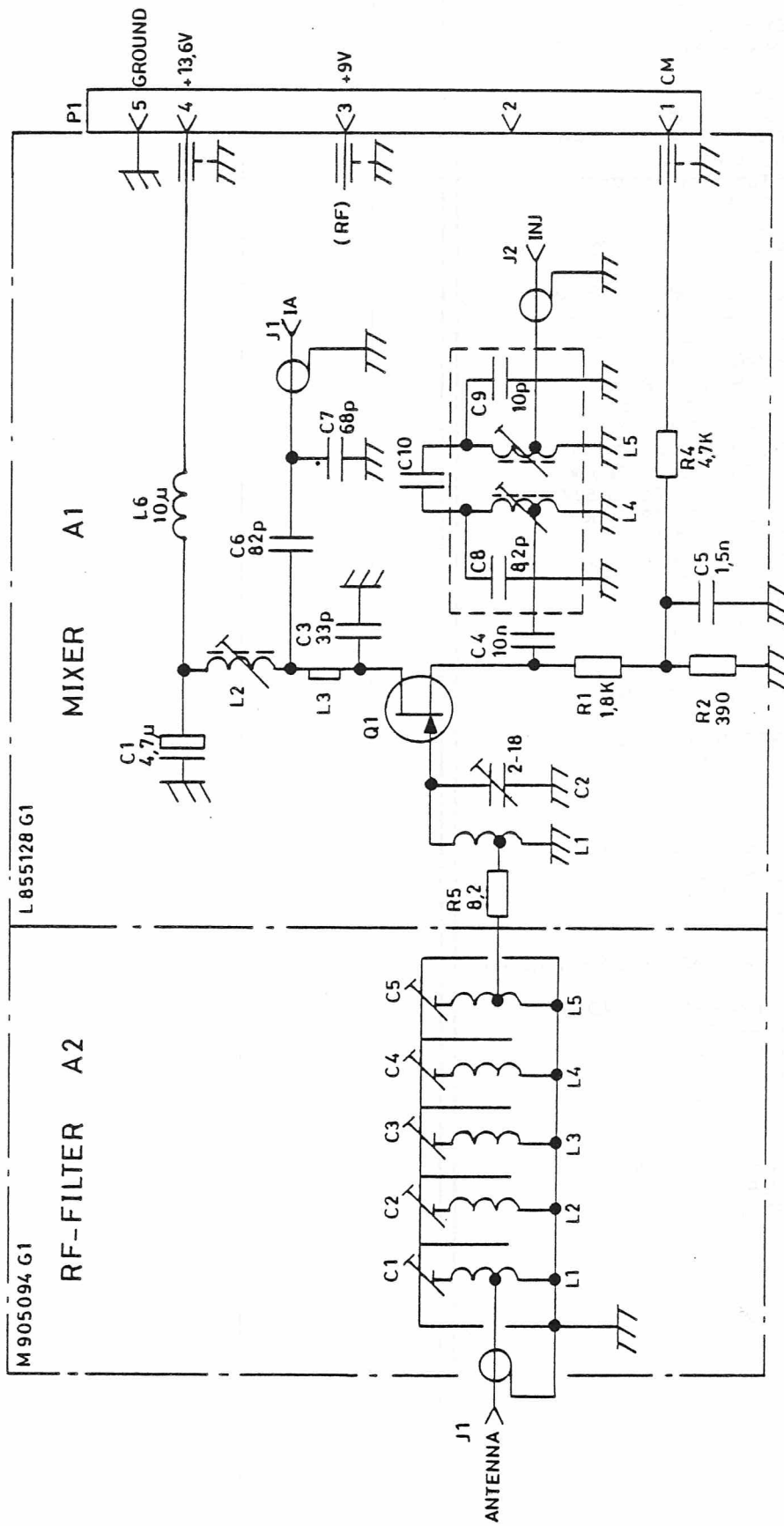
CODE NO. M905093G1 - GRD6107A



**RECIVER CONVERTER RC911
COMPONENT LAYOUT**

D402.962/4

CODE NO. M905093G1 - GRD6107A



RECEIVER CONVERTER RC911
 CODE NO. M905093 G1 - GRD6107A
 REV.A

D403.121/4

PARTS LIST FOR RECEIVER CONVERTER RC911

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GRD6107A	M905093G1 RC911			
A1	0102721B48	L855128G1 A1 - SUB ASM MIX. RC 911			
A2	0102721B33	M905094G1 A2 - SUB ASM HEL.FLT.			
RC 911	L855144P1	COVER			
	J707755G2	NUT M11 (5 used)			
	0102721B48	J706303G1 TUN ASM (5 used)			
	J706304P1	CORE TUN. FOR J706303G1			
	K805055P1	CAN TUN. FOR J706303G1			
	M905016G1	HOUSING RC911			
	A701293P102	SLEEVE			
	A700036P408	SCREW PAN HD M 3.0X8.0 (17 used)			
A1	0102721B48	L855128G1 ASM MIXER RC 911			
C01	2313749D72	CAP TA SOL 4U7 20% 35V			
C02	J706003P2	CAP VAR 2/18PF			
C03	A700235P19	CAP CER N150 33P 5% 50V			
C04	A700234P7	CAP PYES 10N 10% 50V			
C05	A700233P8	CAP CER 1N5 10% 50V			
C06	A700235P24	CAP CER N150 82P 5% 50V			
C07	A700235P21	CAP CER N150 47P 5% 50V			
C08	A700235P12	CAP CER N150 8P2.25P 50V			
C09	A700235P13	CAP CER N150 10P 5% 50V			
C11	2113741C05	CAP CER CL2 33N			
J01	A700171P2	CONN PWB FEM PHONO-RF			
J02	A700171P2	CONN PWB FEM PHONO-RF			
L02	J706538G1	COIL			
	J706281P3	CORE TUN. FOR POS L02			
L03	J706128G1	COIL			
L04	J706537G2	COIL			
	J706281P2	CORE TUN. FOR POS L04			
L05	J706537G1	COIL			
	J706281P2	CORE TUN. FOR POS L05			
L06	A700024P25	COIL FIX 10MH			
Q01	J706038P1	TSTR JFET SI 2N5245			
P01	A700041P4	CONN PWB FEM 05 CKT			
R01	A700019P40	RES DEPC 1K8 5% 1/4W			
R02	A700019P32	RES DEPC 390R 5% 1/4W			
R04	A700019P45	RES DEPC 4K7 5% 1/4W			
R05	A700019P12	RES DEPC 8R2 5% 1/4W			
	8402003U87A	BD PW			
A2	0102721B33	M905094G1 ASM.-HELIX FLT. RC 911			
J001	A700171P2	CONN PWB FEM PHONO			
L001	L855129P1	COIL HELICAL			
L002	L855129P2	COIL HELICAL			
L003	L855129P2	COIL HELICAL			
L004	L855129P2	COIL HELICAL			
L005	L855129P3	COIL HELICAL			
	K805099P1	NON REFERENCED ITEMS: COVER			
	K805092P1	SUPPORT			

RC912

RECEIVER FRONT END

This receiver front-end is the high sensitivity module containing an RF-amplifier.

The RC912 is a broad-band front-end which can be turned over the 138 - 174 MHz band.

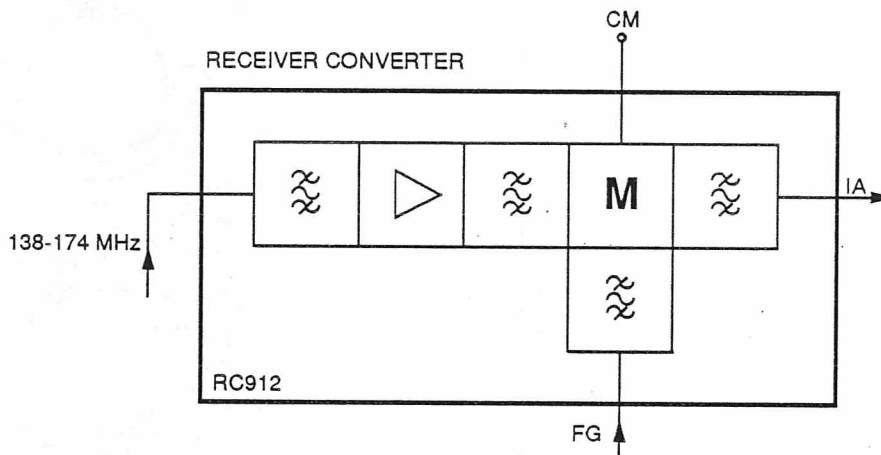
The output from the front-end is the 21.4 MHz IF signal. This receiver front-end is used when high RF sensitivity is required, and for simplex only.

The module consists of a dual-resonator helical bandpass filter, a RF amplifier, a triple helical resonator bandpass filter, and a J-FET mixer.

The input bandpass filter is rather wide and has low

insertion loss, approx. 1 dB. The RF amplifier is a bipolar transistor which is driven at a relative high current in order to obtain good intermodulation performance. The following bandpass filter is rather narrow for obtaining the necessary RF selectivity and its insertion loss is approx. 3 dB. For mixer description refer to RC911.

The receiver front-end is built on a printed wiring board on which the helical coils and the RF amplifier is mounted. The assembly is then screwed onto a casting which forms the rest of the receiver front-end.



TECHNICAL SPECIFICATIONS

Antenna impedance
50 ohm

Signal level
<2 V

Injection impedance
50 ohm

Output, IF impedance
1600 ohm $\pm 10\%$ Cp max.= 12 pF

Supply voltage
9.0 V $\pm 5\%$

Current consumption
<20 mA

Antenna frequency, (tunable)
138 - 174 MHz

Bandwidth, 3 dB
4.5 MHz 25°C

Injection frequency, (tunable)
116 - 153 MHz

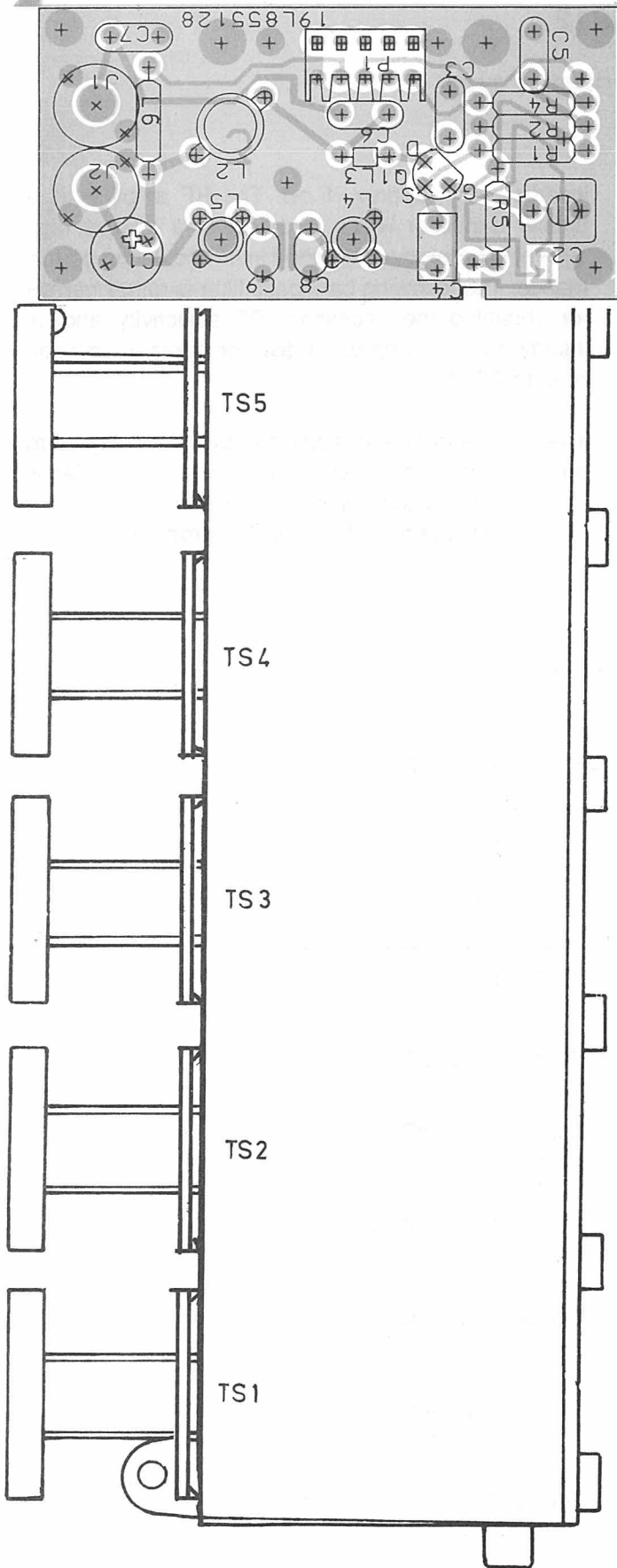
Bandwidth, 3 dB
3.5 MHz 25°C

Intermediate frequency
21.4 MHz

Sensitivity, 12 dB EIA 1/2 EMF
 $\leq 0.18 \mu\text{V}$

Intermodulation, EIA
 $\geq 80 \text{ dB}$

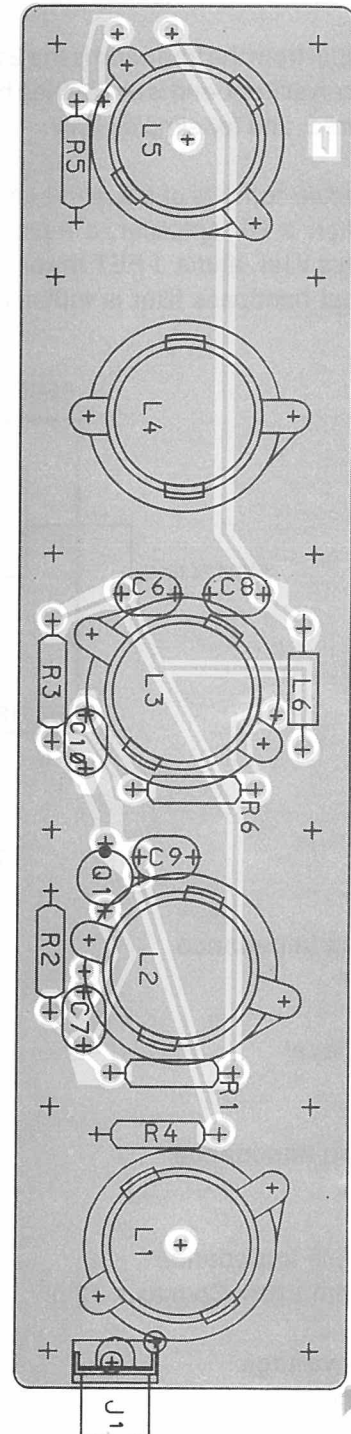
Temperature range
40°C to +85°C

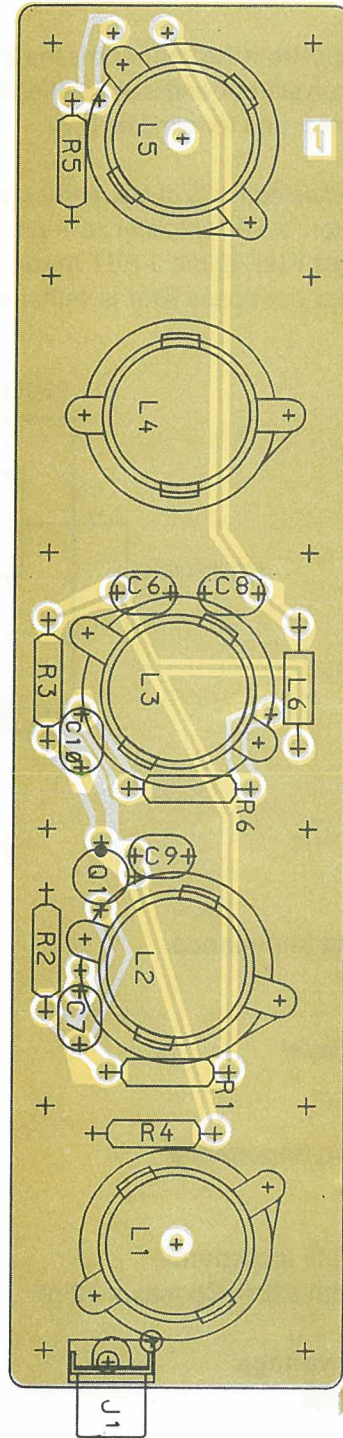
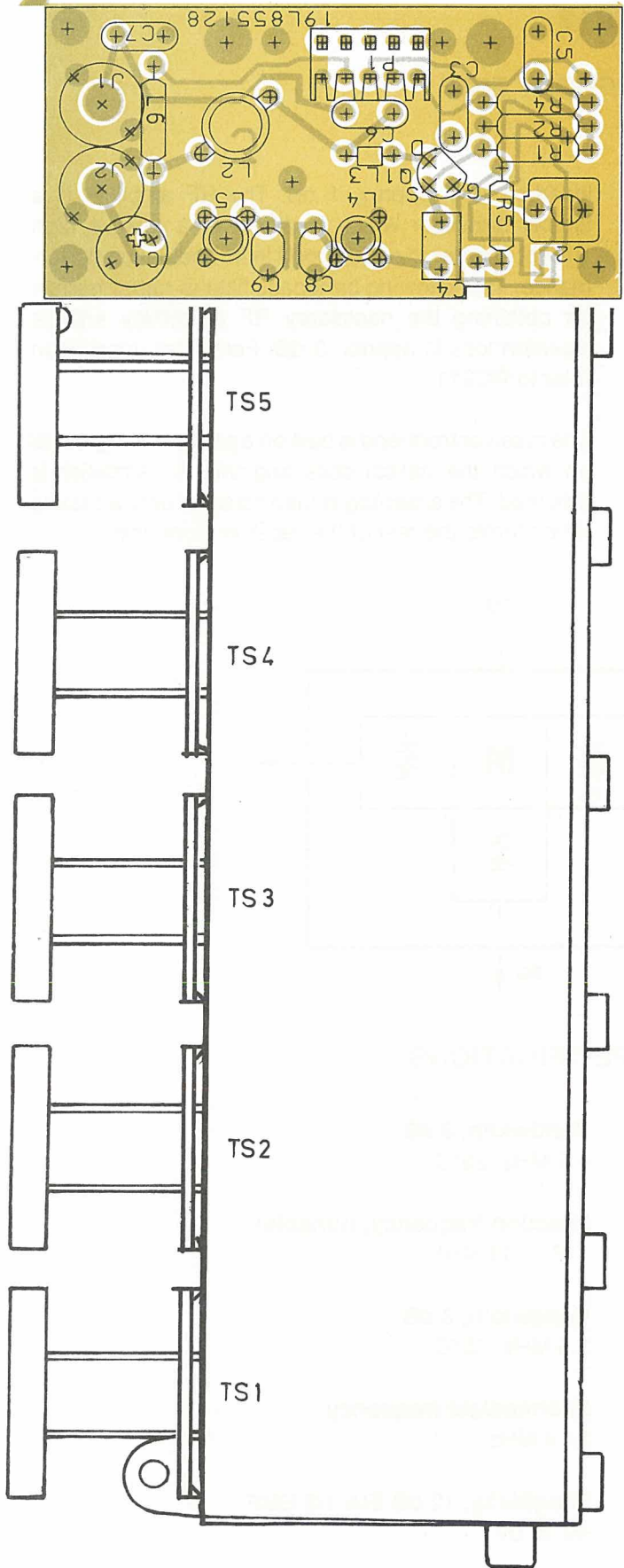


RECEIVER CONVERTER RC912
COMPONENT LAYOUT

D403.441/2

CODE NO. M905095G1 - GRD6113A





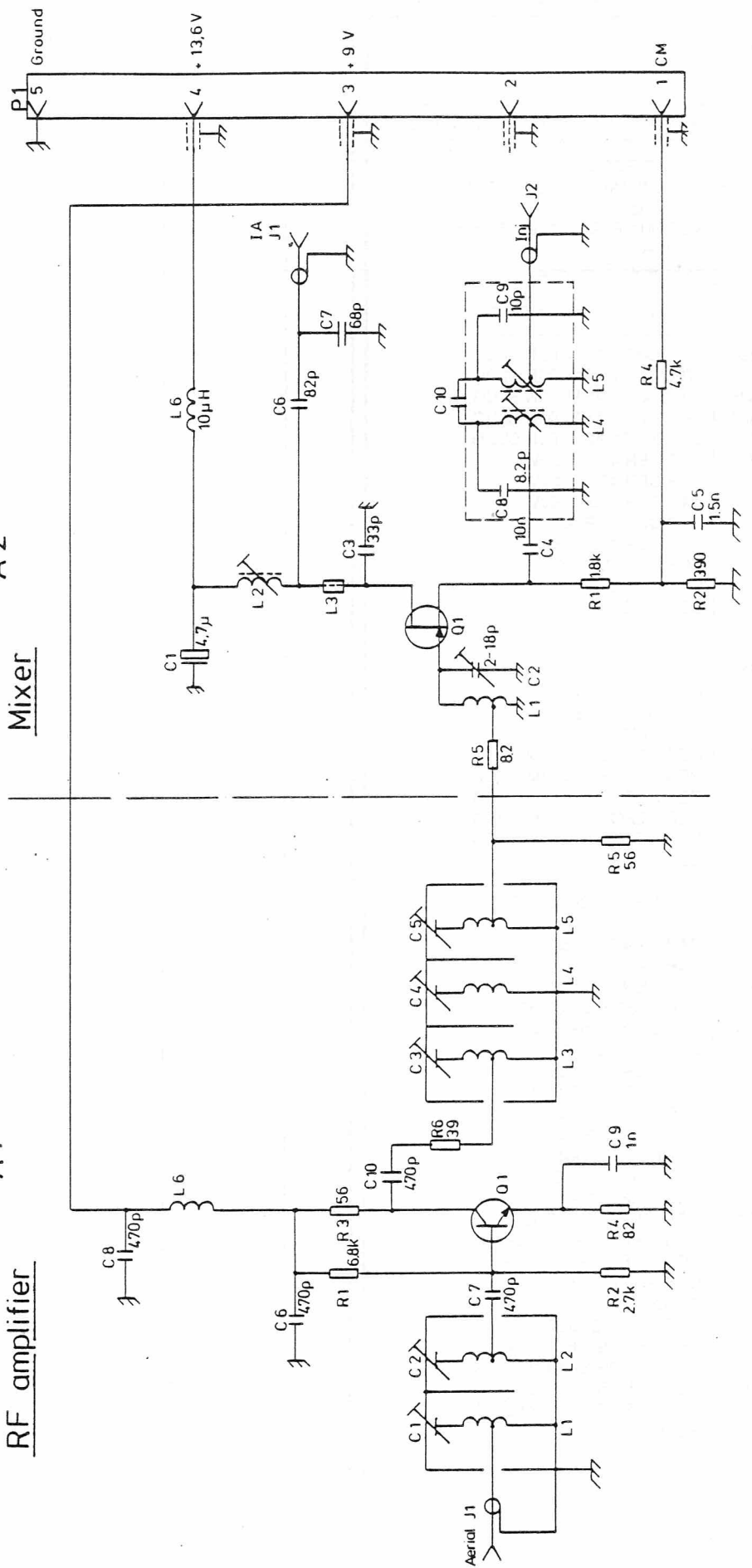
RECEIVER CONVERTER RC912
COMPONENT LAYOUT

D403.441/2

CODE NO. M905095G1 - GRD6113A

A 1 Mixer A 2

RF amplifier Mixer



RECEIVER CONVERTER RC912
 CODE NO. M905095G1 - GRD6113A
 REV.A

D403.188/4

PARTS LIST FOR RECEIVER CONVERTER RC912

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GRD6113A	M905095G1 RC912			
A1	0102721B49	M905092G1 A1 - ASM AMPL RC912			
A2	0102721B48	L855128G1 A2 - ASM CPNT BD MIXER RC912			
	A700036P406	SCREW PAN HD M3.0 X 6.0MM (21 used)			
	J707755G2	NUT M11 F. A1:-L1 -L5 (5 used)			
	L855144P1	COVER			
	M905016G2	HOUSING F. RC912			
A1	0102721B49	M905092G1 ASM AMPL RC912			
C01	0102720B24	J706303G1 ASM TUN SLUG			
C02	0102720B24	J706303G1 ASM TUN SLUG			
C03	0102720B24	J706303G1 ASM TUN SLUG			
C04	0102720B24	J706303G1 ASM TUN SLUG			
C05	0102720B24	J706303G1 ASM TUN SLUG			
C06	A700233P5	CAP CER 470PF 50V			
C07	A700233P5	CAP CER 470PF 50V			
C08	A700233P5	CAP CER 470PF 50V			
C09	A700233P7	CAP CER 1NF 50V			
C10	A700233P5	CAP CER 470PF 50V			
J1	A700171P2	CONN RF PHONO			
L1	L855129P4	COIL - HELICAL			
L2	L855129P5	COIL - HELICAL			
L3	L855129P5	COIL - HELICAL			
L4	L855129P2	COIL - HELICAL			
L5	L855129P5	COIL - HELICAL			
L6	A700024P17	COIL FIX 2,0 UH			
Q1	J706011P1	TSTR NPN SI BFR91			
R1	A700019P47	RES DEPOS 6.8K 0.25W			
R2	A700019P42	RES DEPOS 2.7K 0.25W			
R3	A700019P22	RES DEPOS 56 OHM 0,25W			
R4	A700019P24	RES DEPOS 82 OHM 0,25W			
R5	A700019P22	RES DEPOS 56 OHM 0,25W			
R6	A700019P20	RES DEPOS 39 OHM 0,25W			
	8402003U86A	BD PW			
A2	0102721B48	L855128G1 ASM MIX RC912			
C01	2313749D72	CAP TA 4,7 UF 35V			
C02	J706003P2	CAP VAR 2/18PF			
C03	A700235P19	CAP CER 33PF 50V			
C04	A701234P7	CAP PYES 0.01 UF 50V			
C05	A700233P8	CAP CER 1,5NF 50V			
C06	A700235P24	CAP CER 82PF 50V			
C07	A700235P21	CAP CER 47PF 50V			
C08	A700235P12	CAP CER 8,2PF 50V			
C09	A700235P13	CAP CER 10PF 50V			
C11	2113741C05	CAP CER CL2 33N			
J1	A700171P2	CONN RF PHONO			
J2	A700171P2	CONN RF PHONO			
L2	J706538G1	COIL - RF, VAR 12,5 TURN			
L3	J706128G1	COIL W. FERR. BEAD			
L4	J706537G2	COIL - RF, VAR 5,5 TURN			
L5	J706537G1	COIL - RF, VAR 5,5 TURN			
L6	A700024P25	COIL FIX 10 UH			
P1	A700041P4	CONN 5 PIN			
Q1	J706038P1	TSTR JFET 2N5245			
R1	A700019P40	RES DEPOS 1,8K 0,25W			
R2	A700019P32	RES DEPOS 390OHM 0.25W			
R4	A700019P45	RES DEPOS 4.7K 0.25W			
R5	A700019P12	RES DEPOS 8,2 OHM 0,25W			
	8402003U87A	BD PW			

RC962

RECEIVER FRONT END

This receiver front-end is the high sensitivity module containing an RF-amplifier.

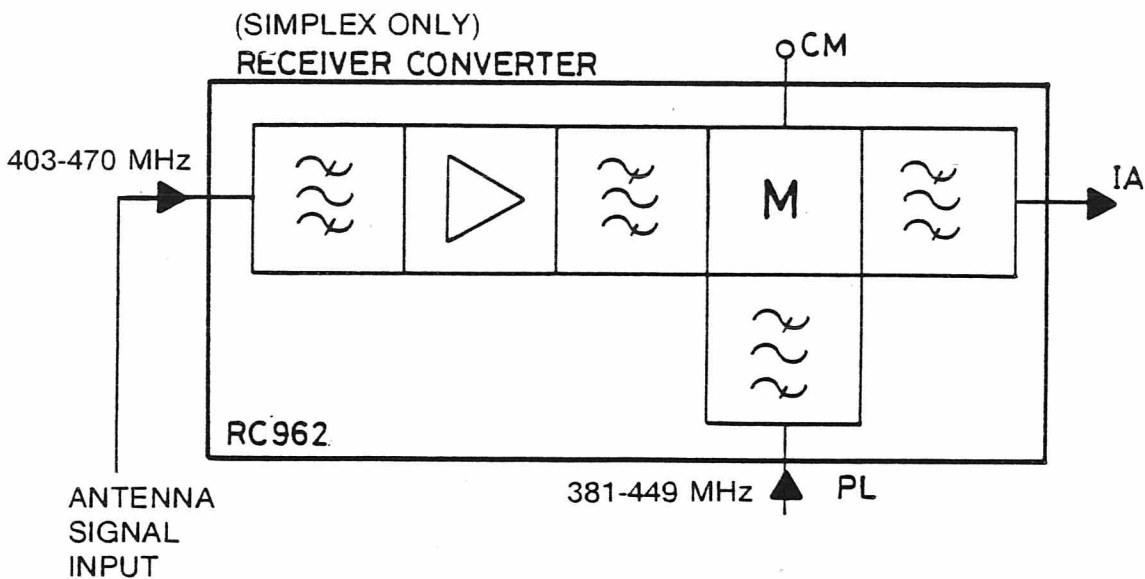
The RC962 is a broad-band front-end which can be tuned over the 403 - 470 MHz band.

The output from the front-end is the 21.4 MHz IF signal. This receiver front-end is used when high RF sensitivity is required, and for simplex only.

The module consists of a dual-resonator helical bandpass filter, and RF amplifier, a triple helical resonator bandpass filter, and a J-FET mixer. The input band-

pass filter is rather wide and has low insertion loss, approximately 1 dB. The RF amplifier is a bipolar transistor which is driven at a relative high current in order to obtain good intermodulation performance. The following bandpass filter is rather narrow for obtaining the necessary RF selectivity and its insertion loss is approximately 3 dB. For mixer description refer to RC969.

The receiver front-end is built on a printed wiring board on which the helical coils and the RF amplifier is mounted. The assembly is then screwed onto a casting which forms the rest of the receiver front-end.



TECHNICAL SPECIFICATIONS

Antenna impedance
50 ohm

Signal level
<2 V

Injection impedance
50 ohm

Output, IF impedance
1600 ohm $\pm 10\%$ Cp max. = 12pF

Supply voltage
9.0 V $\pm 5\%$

Current consumption
<10 mA

Antenna frequency

403 - 470 MHz

Bandwidth 1 dB

4.5 MHz

Bandwidth 3 dB

5.5 MHz

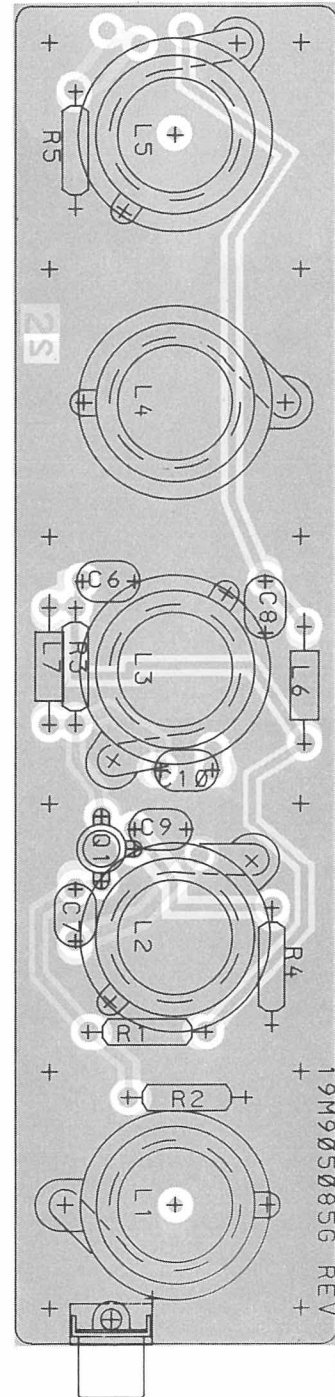
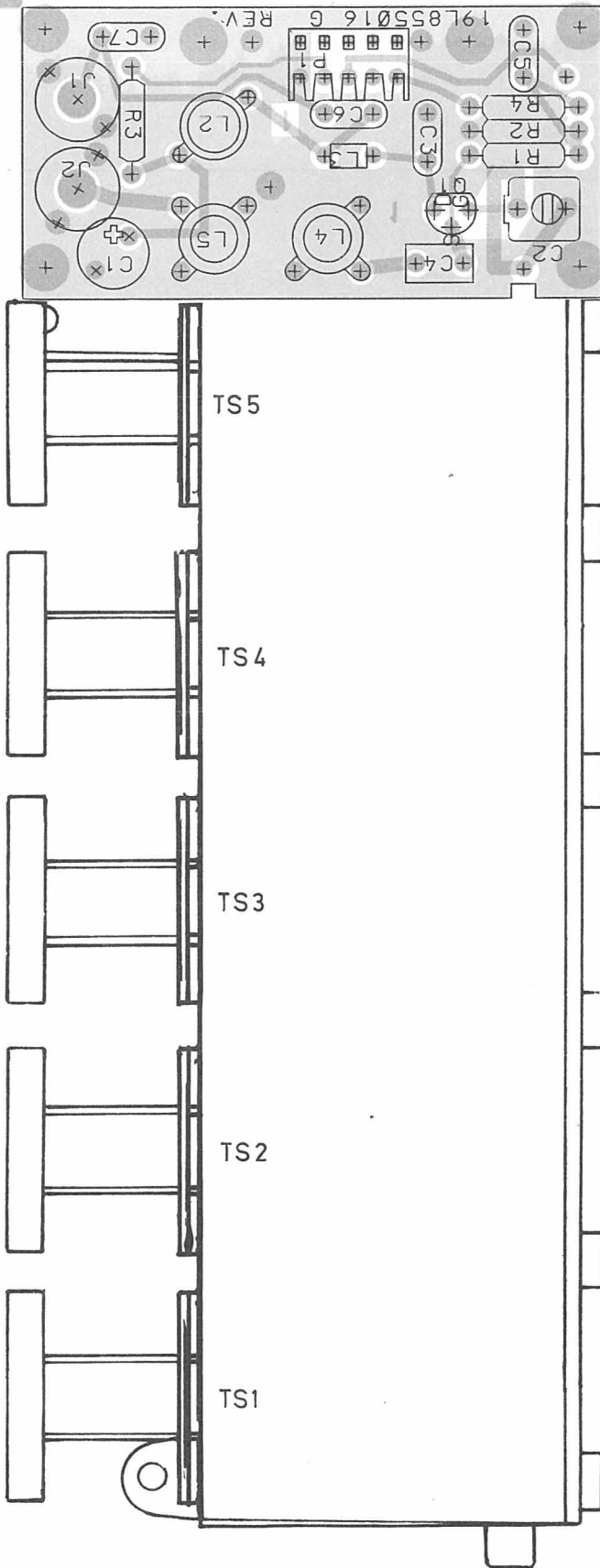
Injection frequency

381 - 449 MHz

Intermediate frequency

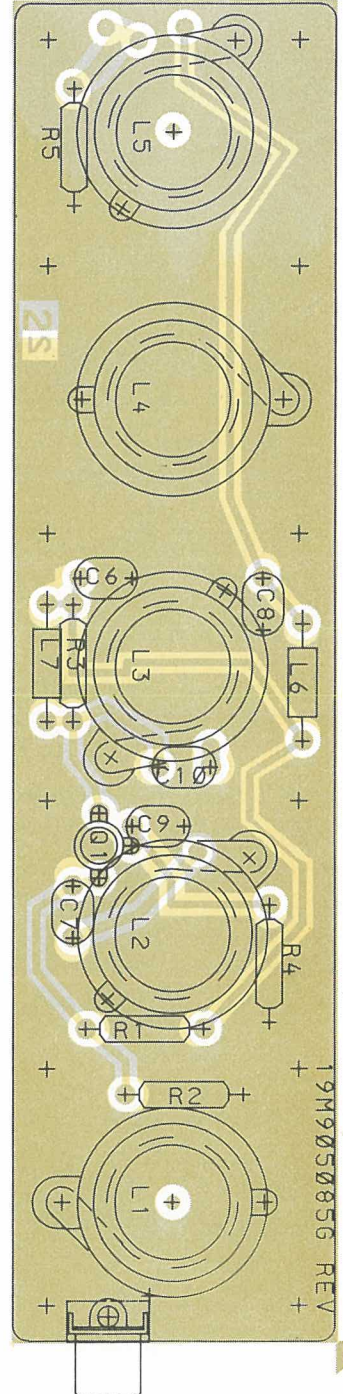
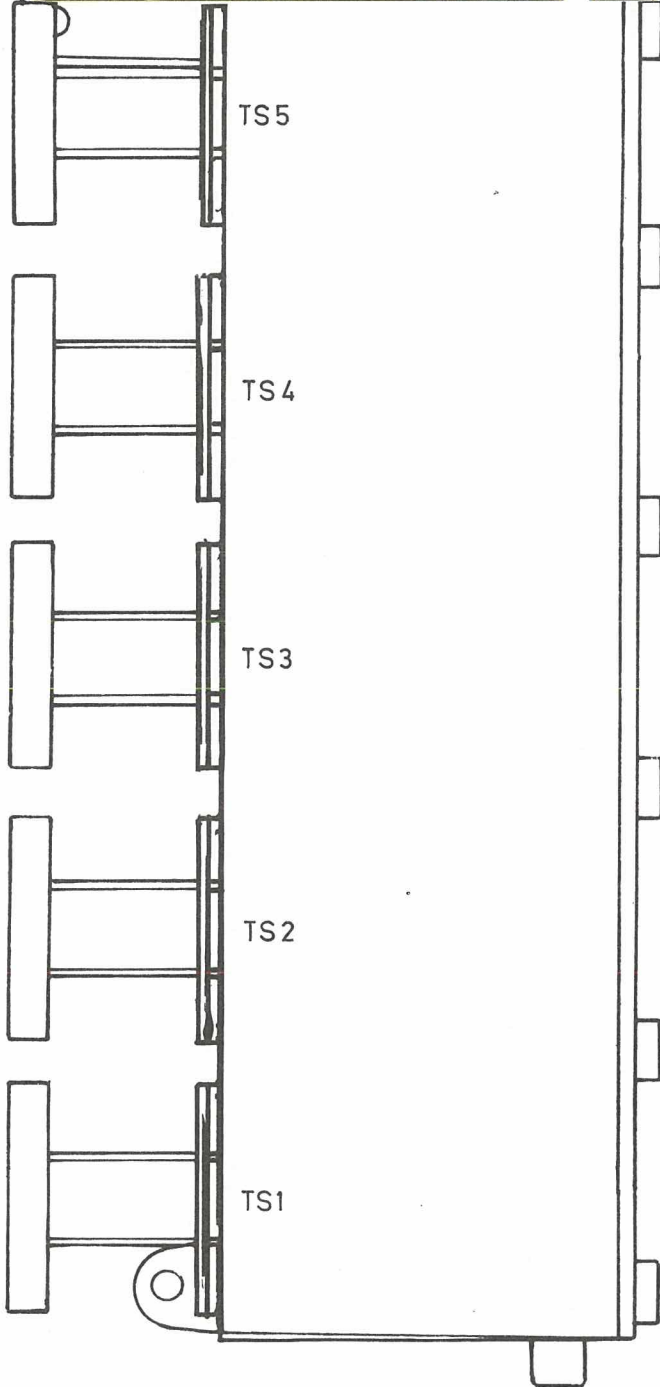
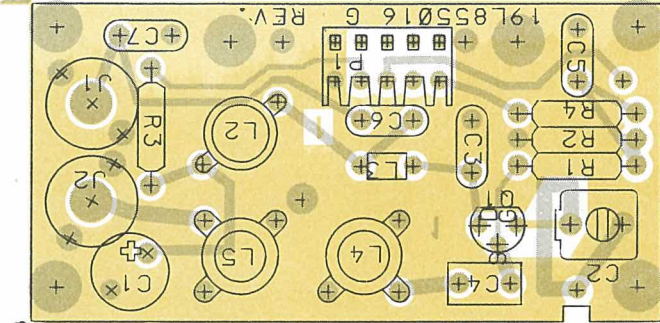
21.4 MHz

Sensitivity 12 dB EIA 1/2 EMF $\leq 0.20 \mu\text{V}$ **Intermodulation EIA** $\geq 80 \text{ dB}$ **Temperature range** -40°C to $+85^{\circ}\text{C}$



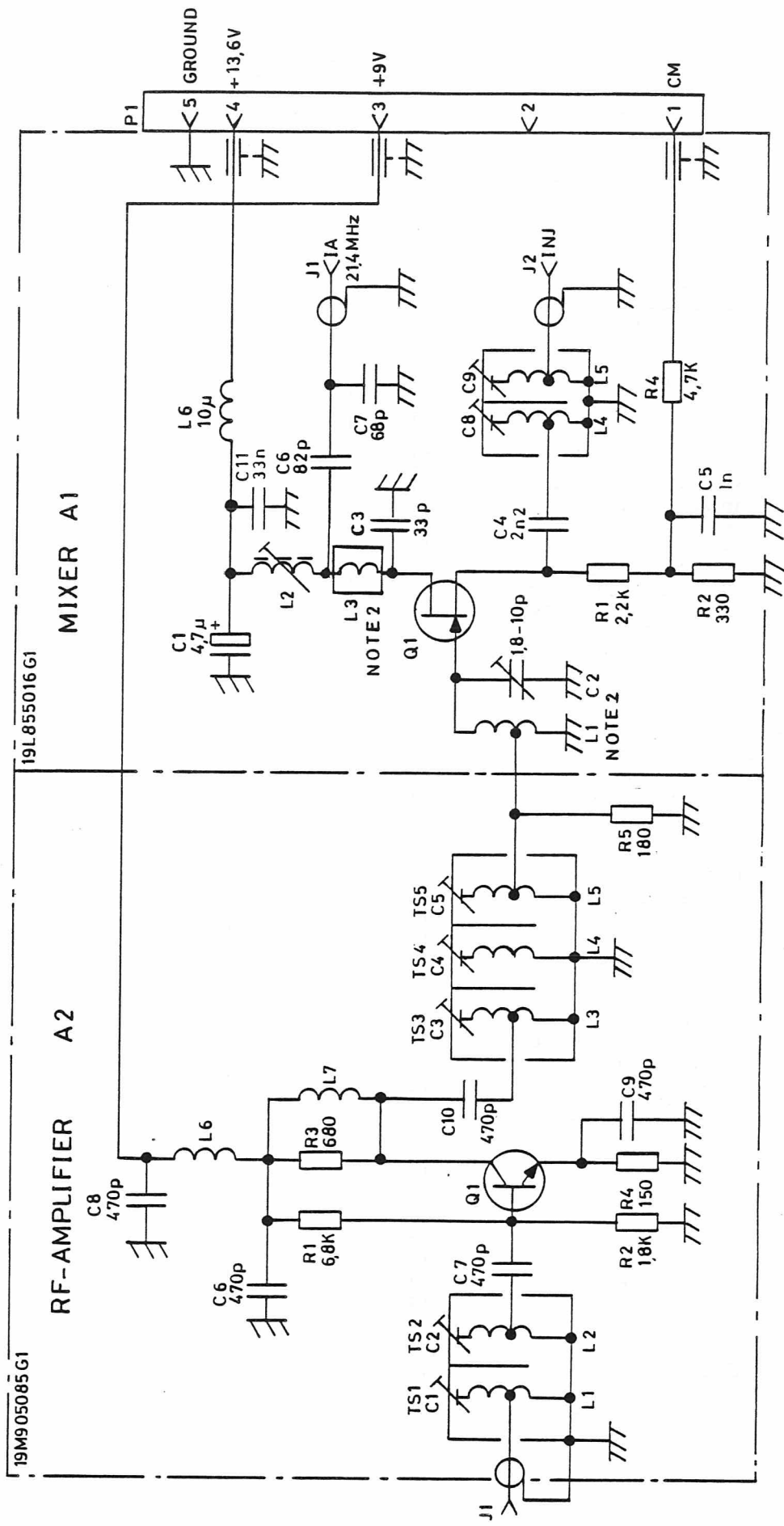
RECEIVER CONVERTER RC962
COMPONENT LAYOUT

D402.963/3 COMPONENT NO. M905020G1 - GRE6021A



RECEIVER CONVERTER RC962
COMPONENT LAYOUT

D402.963/3 CODE NO. M905020G1 - GRE6021A



19L855016 G1

19M905085 G1

RECEIVER CONVERTER RC962

REV.C MODULE CODE NO. M905020G1 - GRE6021

D402.910/6

PARTS LIST FOR RECEIVER CONVERTER RC962

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GRE6021A	M905020G1 RC962			
A01	0102720B72	L855016G1 BD PW, MIXER F. RC96X			
A02	0102721B03	M905085G1 RF AMPL RC962			
		NON REFERENCED ITEMS:			
	J707755G1	NUT M9 (5 used)			
	J706109P1	SCR TUN (2 used)			
	J706110P1	SPG TUN (2 used)			
	M905016G6	HOUSING RC962			
	0102720B05	J706108G1 ASM TUNING R961 (5 used)			
	A701293P102	SLV			
	A700031P408	SCREW PAN HD M 3.0X8.0 (17 used)			
A01	0102720B72	L855016G1 BD PW, MIXER RC96X			
C01	2313749D72	CAP TA SOL 4U7 20% 35V			
C02	J706003P1	CAP VAR 1,8/10PF			
C03	A700235P19	CAP CER N150 33P 5% 50V			
C04	A700233P9	CAP CER CL2 2N2 20%			
C05	A700233P7	CAP CER CL2 1N 20%			
C06	A700235P24	CAP CER N150 82P 5% 50V			
C07	A700235P23	CAP CER N150 68P 5% 50V			
C11	2113741C05	CAP CER CL2 33N 5%			
J01	A700171P2	CONN PWB FEM PHONO			
J02	A700171P2	CONN PWB FEM PHONO			
L02	J706538G1	COIL			
L03	J706128G1	COIL			
L04	J706154P1	COIL RF FIX 7-1/2T TAP			
L05	J706154P1	COIL RF FIX 7-1/2T TAP			
L06	A700024P25	COIL FIX 10,0UH 10%			
P01	A700041P4	CONN PWB FEM 05 CKT			
Q01	J706038P1	TSTR JFET SI 2N5245			
R01	A700019P41	RES DEPC 2K2 5% 1/4W			
R02	A700019P31	RES DEPC 330R 5% 1/4W			
R04	A700019P45	RES DEPC 4K7 5% 1/4W			
	8402003U74A	M905172P2R1 BD PW			
A02	0102721B03	M905085G1 RF AMPL RC962 :			
C06	A700233P5	CAP CER CL2 470P 20% 50V			
C07	A700233P5	CAP CER CL2 470P 20% 50V			
C08	A700233P5	CAP CER CL2 470P 20% 50V			
C09	A700233P5	CAP CER CL2 470P 20% 50V			
C10	A700233P5	CAP CER CL2 470P 20% 50V			
J01	A700171P2	CONN PWB FEM PHONO			
L01	L855133P4	COIL HEL			
L02	L855133P5	COIL HEL			
L03	L855133P8	COIL HEL			
L04	L855133P2	COIL HEL			
L05	L855133P4	COIL HEL			
L06	A700024P17	COIL FIX 2,2UH 10%			
L07	A700024P1	COIL FIX 100NH 10%			
Q01	J706011P2	TSTR NPN SI BFR 91A			
R01	A700019P47	RES DEPC 6K8 5% 1/4W			
R02	A700019P40	RES DEPC 1K8 5% 1/4W			
R03	A700019P35	RES DEPC 680R 5% 1/4W			
R04	A700019P27	RES DEPC 150R 5% 1/4W			
R05	A700019P28	RES DEPC 180R 5% 1/4W			
	8402003U76A	M905009P1R2 BD PW			
	K805092P1	NON REFERENCED ITEM SUPPORT			

RC969

RECEIVER FRONT END

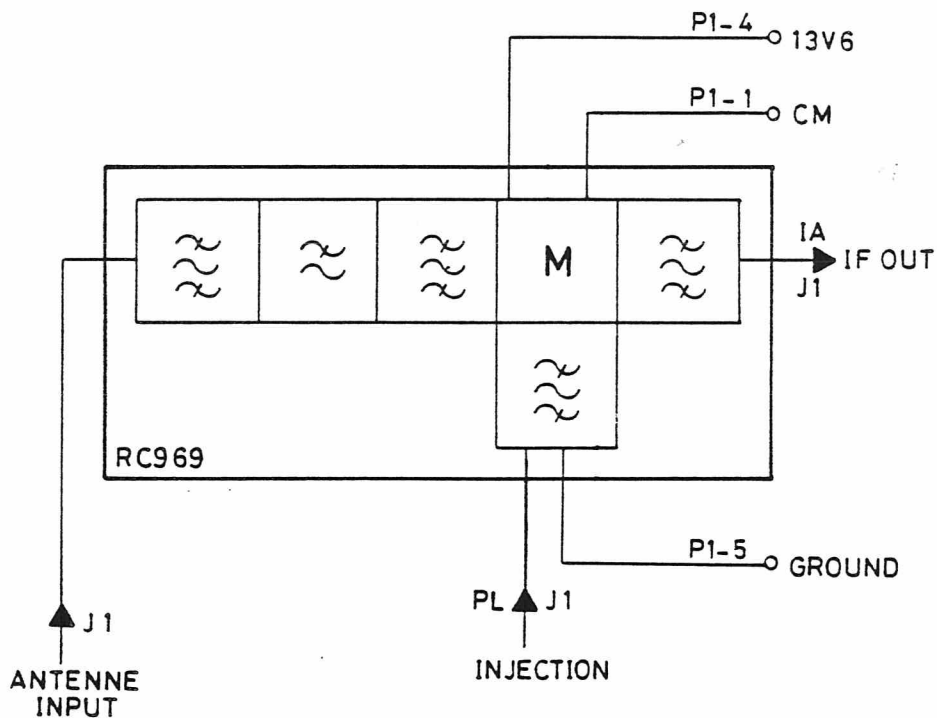
This receiver front-end is the high intermodulation attenuation module with narrow-band front-end. It can be tuned over the 403-470 MHz band. The output from the front-end is the 21.4 MHz IF signal.

This module is used when high intermodulation and blocking attenuation is needed, and in duplex applications.

The receiver front-end consists of a helical bandpass filter with 5 resonators and a J-FET mixer.

Between the 2. and 3. helix resonator is added a 5. order low-pass filter. Between the bandpass filter and the mixer is an LC-circuit for matching the filter to the mixer gate. The injection signal is fed to the FET mixer's source through a to circuit bandpass filter for suppressing spurious signals in the injection signal. The drain of the FET mixer is connected to an IF resonant circuit which adapts the output impedance to the crystal filter in the IA module.

The receiver circuitry has a central metering point for testing the injection signal level.



TECHNICAL SPECIFICATIONS

Antenna impedance

50 ohm

Signal level

less than 2 V

Injection impedance

50 ohm

Output IF impedance

1600 ohm $\pm 10\%$

Supply voltage

13.6 V $\pm 20\%$

Current consumption

less than 5 mA

Antenna frequency (tunable)

403 - 470 MHz

Bandwidth -1 dB

grater than 1.8 MHz

Bandwidth -3 dB
greater than 2.5 MHz

Bandwidth -40 dB
less than 16 MHz

Injection frequency (tunable)
381 - 449 MHz

Bandwidth -3 dB
7 MHz

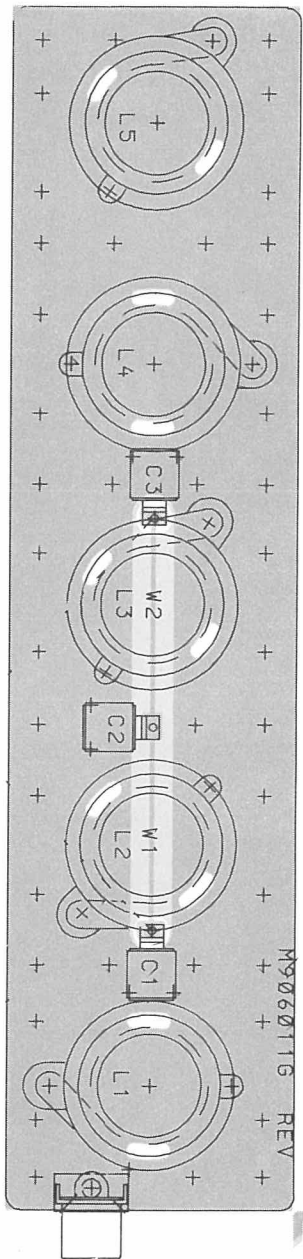
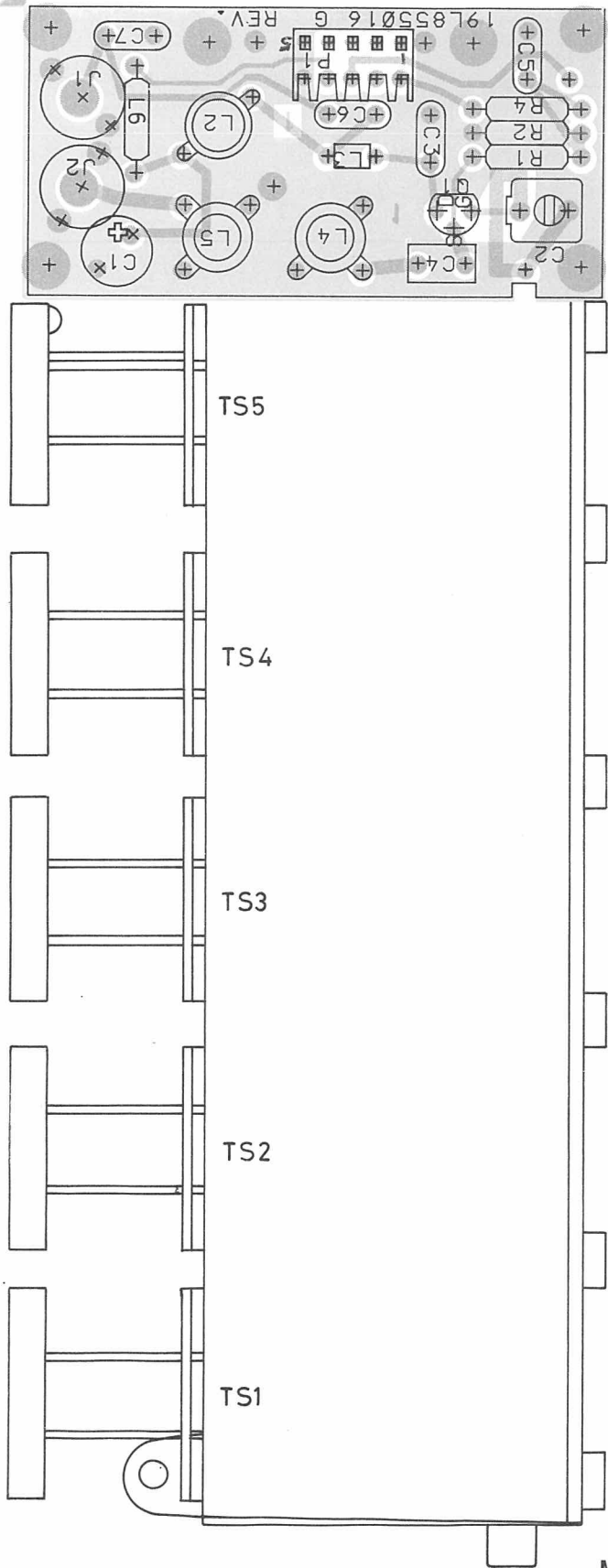
Bandwidth -20 dB
40 MHz

Intermediate frequency
21.4 MHz

Sensitivity 20 dB psoph. EMF
less than 0.75 dB

Intermodulation EIA
greater than 85 dB

Temperature range
-40°C to +85°C



MODULE CODE NO.

L855824G1 - GRE6016A

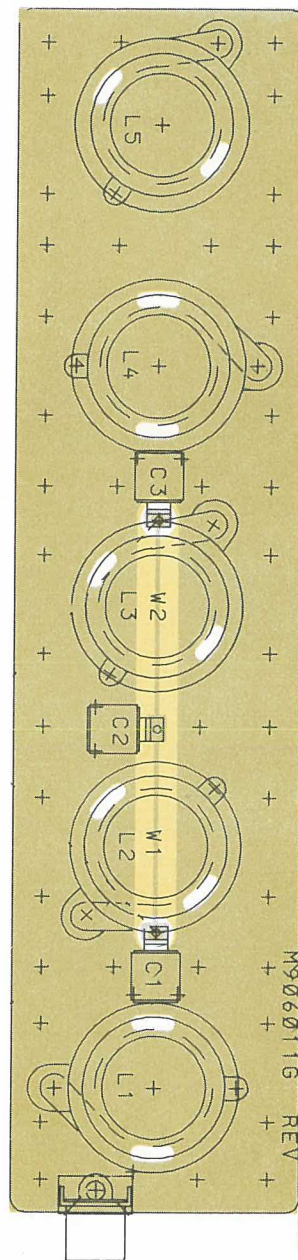
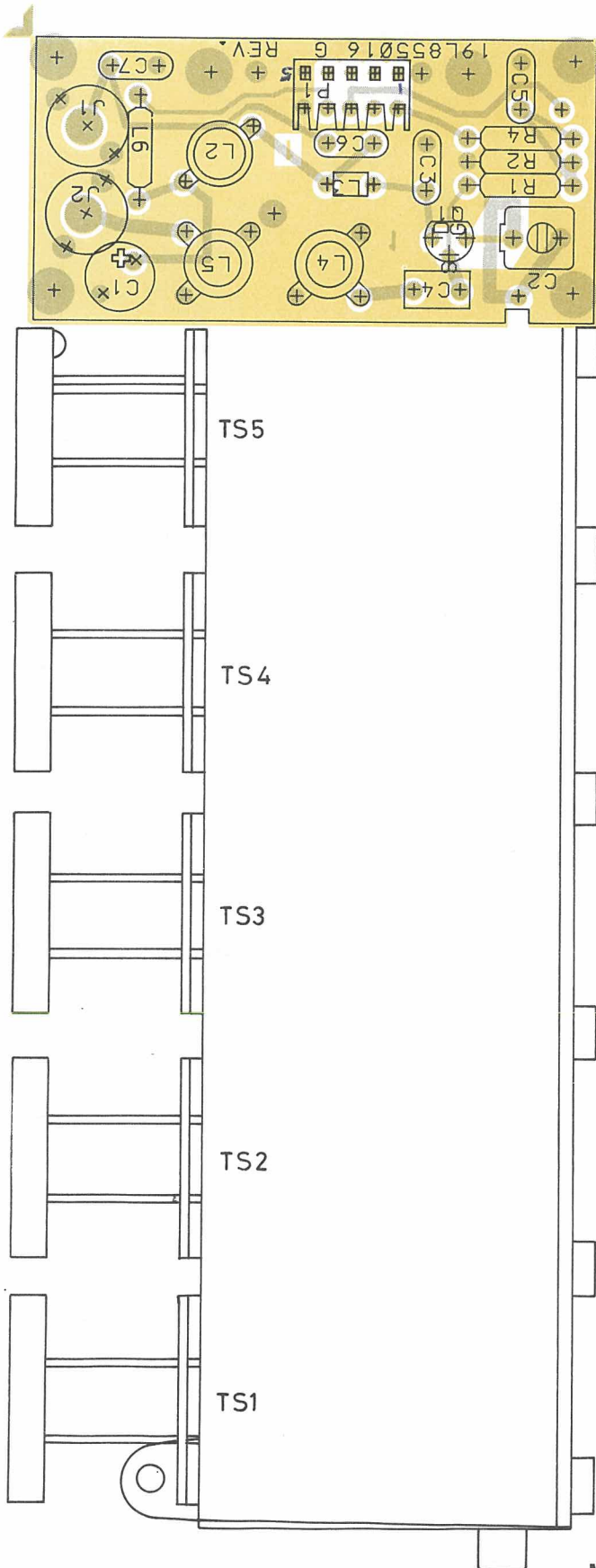
MOUNTED BOARD CODE NO.

A1: L855016G1 - 0102720B72

A2: M906011G1 - 0102720B74

**RECEIVER CONVERTER RC969
COMPONENT LAYOUT**

D404.509/2



MODULE CODE NO.

L855824G1 - GRE6016A

MOUNTED BOARD CODE NO.

A1: L855016G1 - 0102720B72

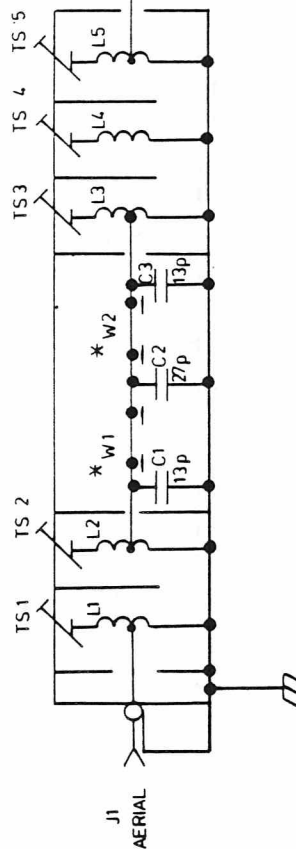
A2: M906011G1 - 0102720B74

**RECEIVER CONVERTER RC969
COMPONENT LAYOUT**

D404.509/2

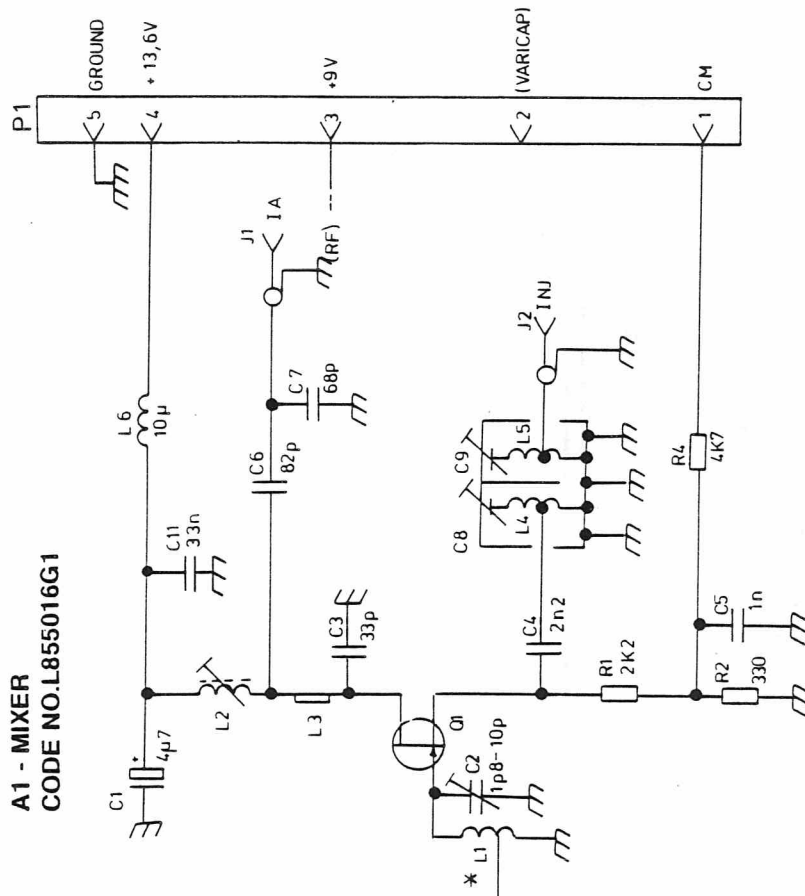
A2 - RF-FILTER
 CODE NO.M906011G1

RF - FILTER A 2



* PART OF PWB

A1 - MIXER
 CODE NO.L855016G1



REV.B MODULE CODE NO. L855824G1 - GRE6016A

RECEIVER CONVERTER RC969

D404.508/3

PARTS LIST FOR RECEIVER CONVERTER RC969

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GRE6016A	L855824G1 RC969			
A01	0102720B72	L855016G1 BD PW, MIXER F. RC96X			
A02	0102720B74	M906011G1 RF AMPL RC96X			
		NON REFERENCED ITEMS:			
	M905016G11	HOUSING RC96X			
	L855144P1	COVER			
	J707755G1	NUT M9 (5 used)			
	J706109P1	SCR TUN (2 used)			
	J706110P1	SPG TUN (2 used)			
	0102720B05	J706108G1ASM TUNING RC96x(5 used)			
	A700031P408	SCREW PAN HD M 3.0X8.0 (17 used)			
A01	0102720B72	L855016G1 BD PW, MIXER RC96X			
C01	2313749D72	CAP TA SOL 4U7 20% 35V			
C02	J706003P1	CAP VAR 1,8/10PF			
C03	A700235P19	CAP CER N150 33P 5% 50V			
C04	A700233P9	CAP CER CL2 2N2 20%			
C05	A700233P7	CAP CER CL2 1N 20%			
C06	A700235P24	CAP CER N150 82P 5% 50V			
C07	A700235P23	CAP CER N150 68P 5% 50V			
C11	2113741C05	CAP CER CL2 33N 5%			
J01	A700171P2	CONN PWB FEM PHONO			
J02	A700171P2	CONN PWB FEM PHONO			
L02	J706538G1	COIL			
L03	J706128G1	COIL			
L04	J706154P1	COIL RF FIX 7-1/2T TAP			
L05	J706154P1	COIL RF FIX 7-1/2T TAP			
L06	A700024P25	COIL FIX 10,0UH 10%			
P01	A700041P4	CONN PWB FEM 05 CKT			
Q01	J706038P1	TSTR JFET SI 2N5245			
R01	A700019P41	RES DEPC 2K2 5% 1/4W			
R02	A700019P31	RES DEPC 330R 5% 1/4W			
R04	A700019P45	RES DEPC 4K7 5% 1/4W			
	8402003U74A	M905172P2R1 BD PW			
A02	0102720B74	M906011G1 RF AMPL RC96X :			
C01	A700006P9	CAP MICA 13P 5% 100V			
C02	A700006P19	CAP MICA 27P 5% 100V			
C03	A700006P9	CAP MICA 13P 5% 100V			
J01	A700171P2	CONN PWB FEM PHONO			
L01	L855133P5	COIL HEL			
L02	L855133P6	COIL HEL			
L03	L855133P5	COIL HEL			
L04	L855133P2	COIL HEL			
L05	L855133P5	COIL HEL			
	8402003U75A	M906012P1R0 BD PW			
		NON REFERENCED ITEM			
	K805092P1	SUPPORT			

VR902

VOLTAGE REGULATOR

VR902 interfaces the 900 mobile to a 24 V supply. VR902 is a switching voltage regulator, which converts 21 V -36 V to 14 Volts. The module can deliver 8 Amperes, can stand a continuous short circuit on the output, and for a shorter period of time. The input has a reverse polarity protection diode.

VR902 includes a step down switch mode regulator, with constant switch frequency (about 32 kHz) and variable duty cycle. The module is contained in a shielded box, and has low-pass filters in the input and output, in order to minimize conducted and radiated switch noise.

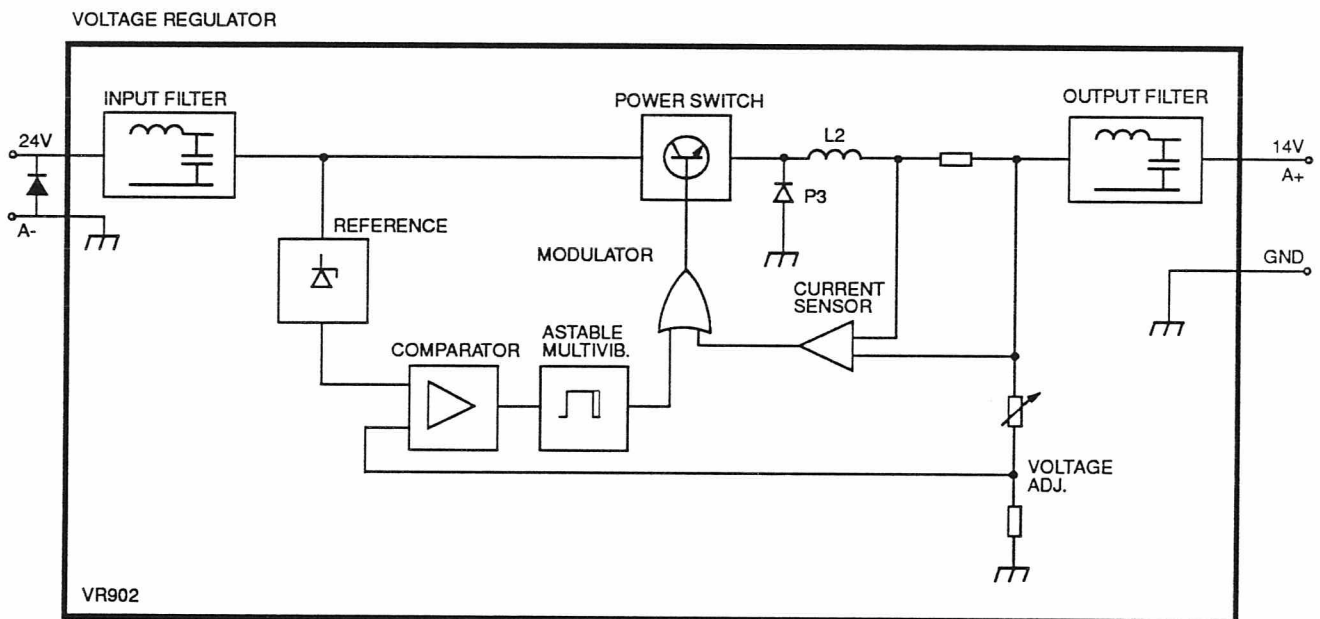
A switch transistor is turned on and off by a square

wave signal with constant frequency and variable duty cycle.

The output from the transistor is fed to a LC filter (L2-C8). When the transistor is on, the input voltage will be across the diode D3, and the coil L2 is energized. When the transistor is off, the voltage across D3 will be near zero, because the energy in the coil L2 will discharge, and thereby make D3 to conduct. The output from the filter will be equal to the mean value of the filter input voltage.

A negative feedback keeps the output voltage constant, independent of load input voltage.

A current sensing circuit sensing circuit provides over-load and short circuit protection.



CIRCUIT DESCRIPTION

Input filter is formed by C1, C2, L1, C3 and C4. Output filter is L2, C8 and L3 - C9 and C10.

Q1, D4, D5 and D2 makes a stable reference for the regulator. This reference is also used for supplying the operational amplifiers.

U1 - 1a is a free running astable multivibrator. It forms the 32 kHz signal used as switching frequency. U1 - 1b is used as buffer for the switching signal.

The necessary variation in duty cycle, is done by gating together the two collectors from the buffer and the error amplifier.

The buffered output from the multivibrator is amplified in Q2 and Q3, before it is led to the switch transistor Q4.

U1 - 1d senses the output current. If the current limit is exceeded, the output of U1 - 1d will pull down the output of the multivibrator, and thereby turn off the switch transistor.

TECHNICAL SPECIFICATIONS

Nominal input voltage

27.2 V

Output voltage with no load

14.0 V \pm 0.1 V (25°C)

Internal impedance

100 mohm

Max. output current

8 A

Ripple (32 kHz)

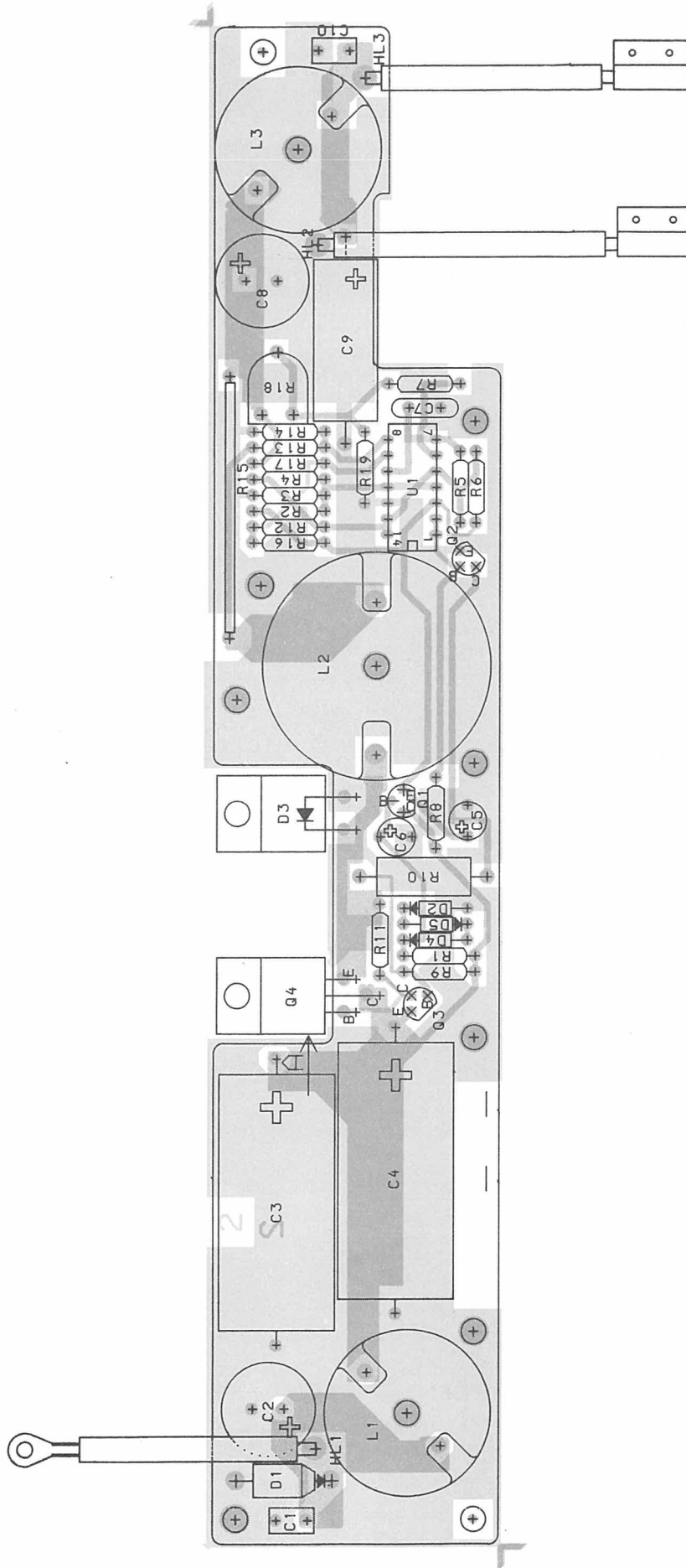
\leq 50 mV pp

Short circuit ability

Continuous without damage

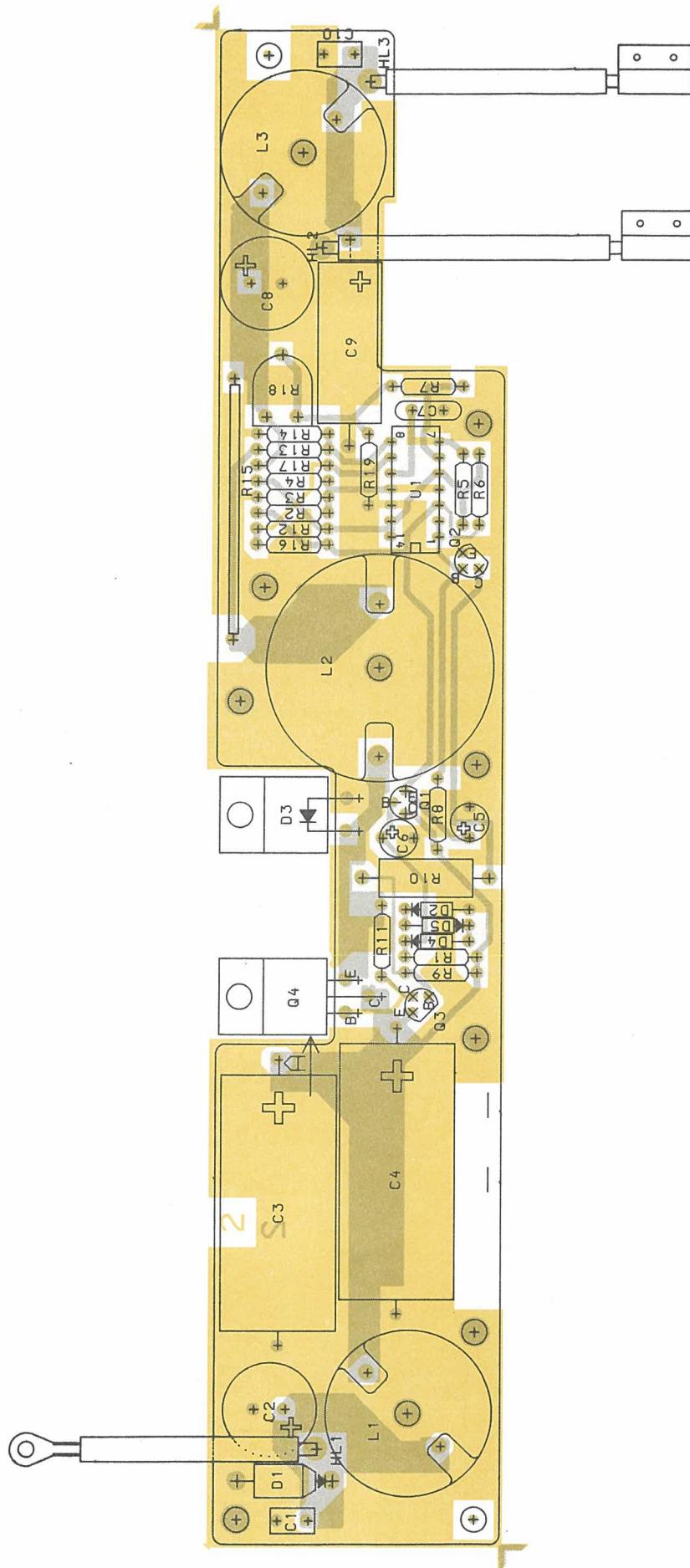
Temperature range

-40°C to 55°C



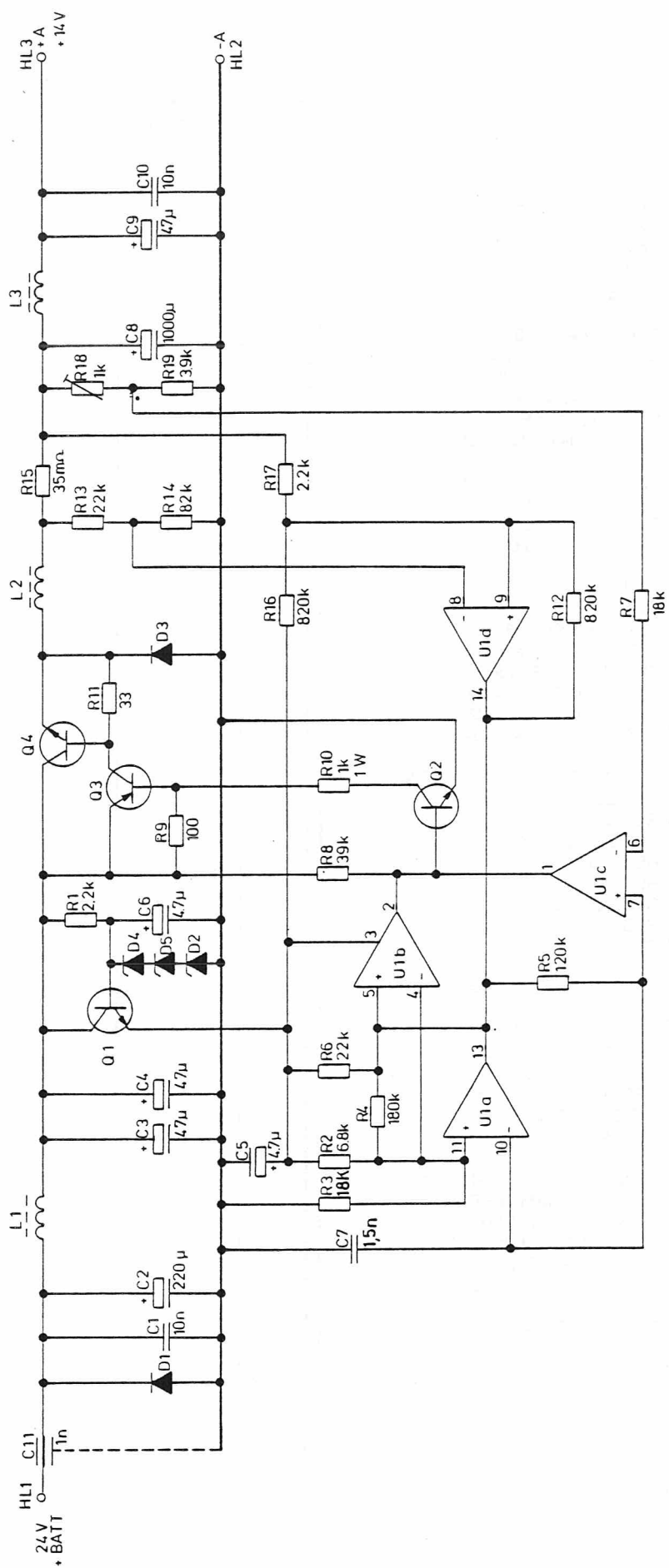
**VOLTAGE REGULATOR VR902
COMPONENT LAYOUT**

D403.165/2 CODE NO. L855018G1 - GRN6130A



**VOLTAGE REGULATOR VR902
COMPONENT LAYOUT**

D403.165/2 CODE NO. L855018G1 - GRN6130A



VOLTAGE REGULATOR 24/12V NEG. GND. VR902

CODE NO. L855018G1 - GPN6130A

D402.966/4

PARTS LIST FOR VOLTAGE REGULATOR VR902

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GPN6130A	L855018G1 VR 902			
A01	0102721B67	M905029G1 ASM : CPNT BD VR902			
C01	A700234P7	CAP POLY 10NF 50V			
C02	J706005P14	CAP EL 220UF 40V			
C03	J706020P1	CAP ELECT 47UF 63V			
C04	J706020P1	CAP ELECT 47UF 63V			
C05	A700003P6	CAP TAN 4,7UF 35V			
C06	A700003P6	CAP TAN 4,7UF 35V			
C07	A700233P8	CAP CER 1.5NF 50V,			
C08	J706005P7	CAP ELECT 1000UF 16V			
C09	J706354P1	CAP ELECT 47UF 16V			
C10	A700234P7	CAP POLY 10NF 50V			
C11	A700124P1	CAP 1NF 0+100% , 500V			
D1	J706026P1	DIO SI 1N5401			
D2	A700025P8	DIO ZENR 6,8V 2% , 0,4W			
D3	J706023P1	DIO BYW29 , 50V			
D4	A700025P7	DIO ZENER SI 5,6V 2% , 0,4W			
D5	A700025P7	DIO ZENER SI 5,6V 2% , 0,4W			
L1	J706067G1	COIL			
L2	J706067G2	COIL			
L3	J706067G1	COIL			
Q1	A700017P1	TSTR NPN BC 548			
Q2	A700017P1	TSTR NPN BC 548			
Q3	J706530P1	TSTR PNP SI BC636			
Q4	J706015P1	TSTR NPN POW. B44H8			
R01	A700019P41	RES DEPOS 2,2K 0,25W			
R02	A700019P47	RES DEPOS 6.8K 0.25W			
R03	A700019P52	RES DEPOS 18K 0.25W,			
R04	A700019P64	RES DEPOS 180K OHM 0.25W			
R05	A700019P62	RES DEPOS 120K OHM 0.25W			
R06	A700019P53	RES DEPOS 22K 0,25W			
R07	A700019P52	RES DEPOS 18K 0.25W			
R08	A700019P56	RES DEPOS 39K OHM 0,25W			
R09	A700019P25	RES DEPOS 100 OHM 0,25W			
R10	A700112P63	RES DEPOS 1K OHM 1W			
R11	A700019P19	RES DEPOS 33 OHM 0,25W			
R12	A700019P72	RES DEPOS 820K OHM 0,25W			
R13	A700019P41	RES DEPOS 2,2K 0,25W			
R14	A700019P60	RES DEPOS 82K OHM 0,25W			
R15	J706068P1	RES WIRE 0.037 OHM			
R16	A700019P72	RES DEPOS 820K OHM 0,25W			
R17	A700019P41	RES DEPOS 2,2K 0,25W			
R18	J706008P1	RES VAR DEPOS 1 KOHM , 0,5W			
R19	A700019P44	RES DEPOS 3,9KOHM			
U1	J706018P1	INT CKT MC3302			
	8402003U99A	BD PW			
		NON REFERENCED ITEMS:			
	0102720B40	J706321G1 ASM WIRE VR 902			
	0102720B41	J706321G2 ASM WIRE VR 902			
	0102720B42	J706321G3 ASM WIRE VR 902			
	J706021P1	CORE CUP , FERRITE (2 used)			
	J706021P2	CORE CUP , FERRITE			
	J706426P425	SCR BRASS (3 used)			
	J706381P1	NUT BRASS SQ 5MM HEX (3 used)			
	J706021P3	CORE CUP , FERRITE (2 used)			

VR903

VOLTAGE REGULATOR

The VR903 voltage regulator is a regulator for generating +9 V with high stability for the receiver or transmitter modules. The regulator has a gate terminal which disables the regulator when pulled to chassis.

The regulator circuit is a integrated voltage regulator U1 with a series transistor Q3. The voltage regulator has an internal voltage reference and the output is adjustable by means of potentiometer R6. The output current passes through resistor R1 and the voltage

drop across this resistor controls the current limiting transistor Q1. If the current exceeds a predetermined value Q1 removes the base drive to the series transistor Q3. The voltage regulator is thus short circuit protected.

Transistor Q2 is normally on and enables the regulator but if the gate terminal is grounded the base voltage to transistor Q2 is removed and the transistor turns off. In this condition the output voltage is disabled.

TECHNICAL SPECIFICATIONS

Input voltage

Nominal: 12.0 V
Minimum: 10.8 V
Maximum: 15.8 V

Output voltage

9 V $\pm 0.5\%$

Output current

0.5 A Continuous at 9 V output

Short circuit current

0.8 A

Internal current drain

On: less than 6 mA
Off: less than 7 mA

Voltage gate threshold

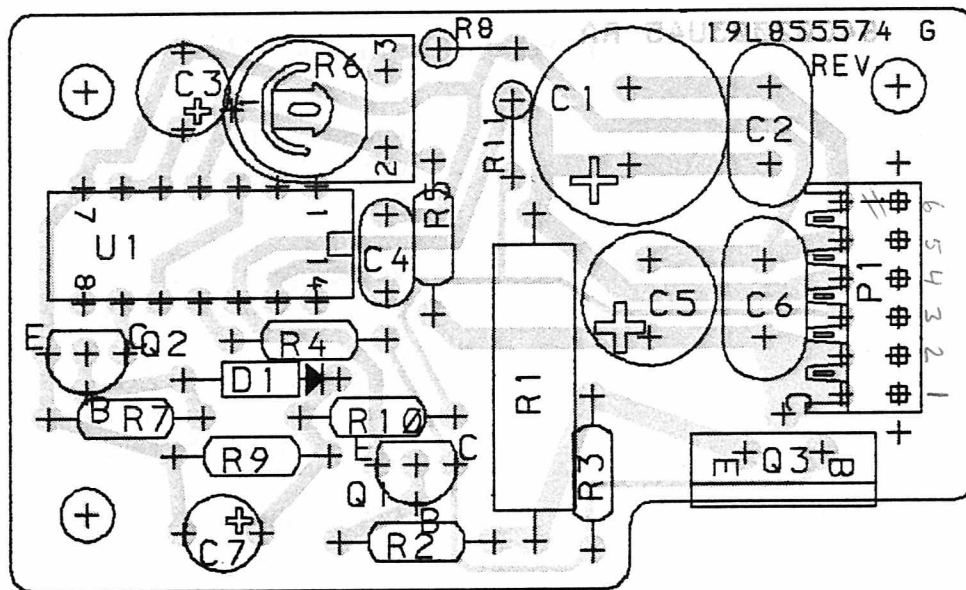
On: 7 V to 15.6 V

Heat loss

Less than 3.3 W, load 0.5 A
less than 12 W, short circuited output

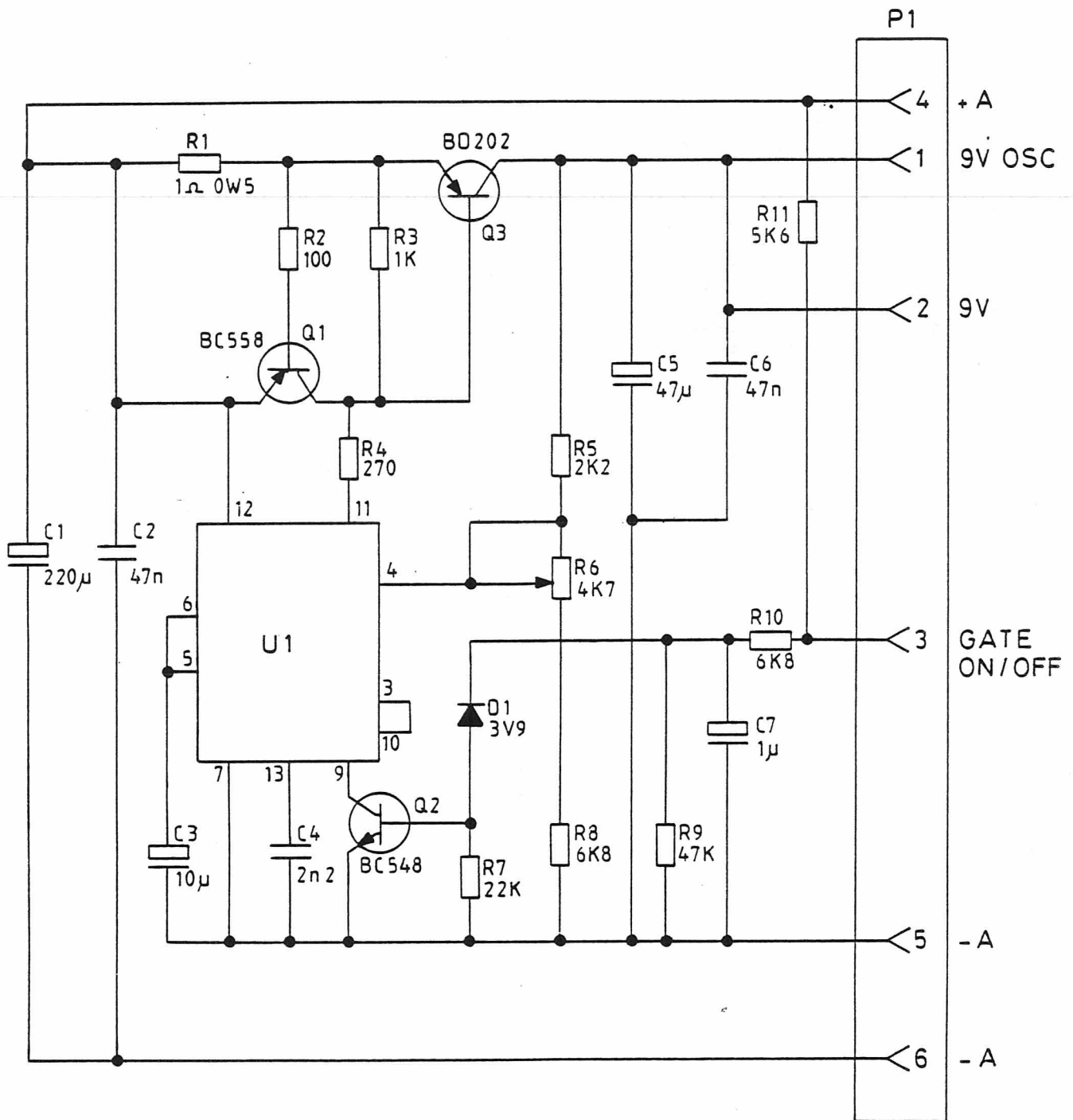
Temperature range

-40°C to +85°C



COMPONENT BOARD FOR VR903

D403.870/3 CODE NO. L855574G1 - GPN6129A



VOLTAGE REGULATOR VR903

CODE NO. L855574G1 - GPN6129A

D403.866/2

PARTS LIST FOR VOLTAGE REGULATOR VR903

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GPN6129A	L855574G1 VR903			
C001	J706005P5	CAP,ELECT 220U , 16V			
C002	A700234P11	CAP,PYES 47N , 10%			
C003	2313749C40	CAP,TA,SOL 10U , 16V			
C004	A700234P3	CAP,PYES 2N2 , 10%			
C005	J706005P3	CAP,ELECT 47U , 16V			
C006	A700234P11	CAP,PYES 47N , 10%			
C007	2313749D52	CAP,TA,SOL 1U , 35V			
D001	A700025P4	DIO,SI,ZENR 3V9,5%,0.4W			
P001	A700041P5	CONN,PWB,FEM 06-CKT			
Q001	J707674P1	TSTR,PNP,SI BC 558A/B			
Q002	J707511P2	TSTR,NPN,SI BC 548C			
Q003	J706016P1	TSTR,PNP,SI BD 202			
R001	J706056P1	RES,DEPC,1/2W 1R0 , 5%			
R002	A700019P25	RES,DEPC,1/4W 100R , 5%			
R003	A700019P37	RES,DEPC,1/4W 1K0 , 5%			
R004	A700019P30	RES,DEPC,1/4W 270R , 5%			
R005	A700019P41	RES,DEPC,1/4W 2K2 , 5%			
R006	J706008P8	RES,VAR,CERM 4K7 , 20%			
R007	A700019P53	RES,DEPC,1/4W 22K , 5%			
R008	A702110P47	RES,DEPC,1/4W 6K8 , 5%			
R009	A700019P57	RES,DEPC,1/4W 47K , 5%			
R010	A700019P47	RES,DEPC,1/4W 6K8 , 5%			
R011	A702110P46	RES,DEPC,1/4W 5K6 , 5%			
U001	J706017P1	IC,LIN,VR,VAR 723			
	8402003U45A	L855575P1R0 BD PW			

XO931

TX CRYSTAL MODE OSCILLATOR

The TX crystal mode oscillator, XO931, contains an oscillator circuit with FM capability, and a buffer stage. The crystal frequency range is 40 - 51 MHz and the

output frequency is 80 - 102 MHz. The oscillator operates similar to the receiver oscillator except for the added modulation input.

TECHNICAL SPECIFICATIONS

RF output impedance

50 ohm

Supply voltage

9 V $\pm 5\%$

Current consumption

Less than 10 mA (keyed)
Less than 1 mA (standby)

Select line

Low to select: less than 1.0 mA
High to unkey: more than 8.0 V

Crystal frequency range

41.0 - 50.4 MHz

Output frequency range

82.0 - 100.8 MHz

Reference temperature

28°C

Output level

+5 dBm ± 3 dB

Audio sensitivity

For ± 5 kHz deviation at output frequency:
 ≤ 1.2 V RMS max.
For maximum audio input:
1.2 V RMS

Audio frequency response

Flat from 300 Hz to 3000 Hz

Audio distortion

7% max. (± 3 KHz deviation at 1000 Hz)

XO932

RX CRYSTAL MODE OSCILLATOR

FUNCTIONAL DESCRIPTION

XO932 is an oscillator module which contains an oscillator circuit, and a buffer to provide a signal output at 103.4 - 122.2 MHz when selected by a resonant circuit. The crystal frequency range is 51.7 - 61.1 Mhz.

CIRCUIT DESCRIPTION

This oscillator is a Colpitts configuration using a bipolar transistor and a quartz crystal for stability. The frequency stability is solely determined by the crystal.

The oscillator circuit is a Colpitts configuration using a transistor as the active element, and the buffer amplifier isolates the oscillator from the load. The buffer stage is followed by a circuit tuned to the 2nd harmonic of the crystal frequency. This circuit also adapts the

output impedance to 50 ohms and to some extent attenuates unwanted harmonics. Frequency adjustment is accomplished with a tuneable series inductor between the crystal and the base terminal of the oscillator transistor.

The oscillator is turned on and off by a transistor which controls the bias voltage to the oscillator and the buffer transistor.

TECHNICAL SPECIFICATIONS

RF output impedance

50 ohm

Crystal frequency range

51.7 - 61.1 MHz

Supply voltage

9 V \pm 5%

Output frequency range

103.4 - 122.2 MHz

Current consumption

Less than 10 mA (keyed)

Less than 1 mA (standby)

Reference temperature

28°C

Select line

Low to select:

less than 1.0 mA

High to unkey:

more than 8.0 V

Output level

+5 dBm \pm 3 dB

XO933

TRANSMIT OSCILLATOR

This module contains an oscillator circuit, a switching stage circuitry and a buffer to provide output at 66 - 88 MHz. The crystal frequency is 16.5 - 22.0 MHz

All oscillators share a common external load. Each oscillator is selected by application of a ground level voltage to pin 2 of that module.

The oscillator is a Colpitts configuration using a bipolar transistor and a crystal for stability and operates in the fundamental mode. A bipolar-transistor buffer is included to isolate circuit from load variations. A tuned circuit at the collector of the buffer selects the 4th harmonic of the crystal frequency.

Frequency adjustment is accomplished with a variable inductor placed in series between the crystal and the base terminal of the oscillator transistor.

The oscillator circuit is designed so that it follows the characteristic of the crystal.

The processed audio is applied to a varactor through pin 4 for true FM modulation.

The oscillator is turned on and off by a third transistor which controls the bias voltage to the oscillator and buffer transistor.

TECHNICAL SPECIFICATIONS

RF output impedance

50 ohm

Power supply

Voltage

9 V \pm 0.5%

Current

<10 mA (keyed)

<1 mA (standby)

Crystal frequency range

16.5 - 22.0 MHz

Output frequency range

66.0 - 88.0 MHz

Operating temperature

-25°C to +70°C

XO934

RECEIVER OSCILLATOR

This module contains an oscillator circuit, a switching stage circuit and a buffer to provide output at 87.4 - 109.4 MHz. The crystal frequency is 43.7 - 54.7 MHz.

All oscillators share a common external load. Each oscillator is selected by application of a ground level voltage to pin 2 of that module.

The oscillator is a Colpitts configuration using a bipolar transistor and a quartz crystal for stability and operates in the third overtone mode. A bipolar-transistor buffer amplifier is included to isolate the oscillator circuit from load variations. A tuned circuit at the collector of the

buffer selected the 2nd harmonic of the crystal frequency.

Frequency adjustment is accomplished with a variable inductor placed in series between the crystal and the base terminal of the oscillator transistor.

The oscillator is turned on and off by a third transistor which controls the bias voltage to the oscillator and buffer transistor.

The oscillator circuit is designed so that it follows the characteristic of the crystal.

TECHNICAL SPECIFICATIONS

RF output impedance

50 ohm

Crystal frequency range

43.7 - 54.7 MHz

Power supply

Voltage

9 V \pm 0.5%

Current

<10 mA (keyed)

<1 mA (standby)

Output frequency range

87.4 - 109.4 MHz

Operating temperature

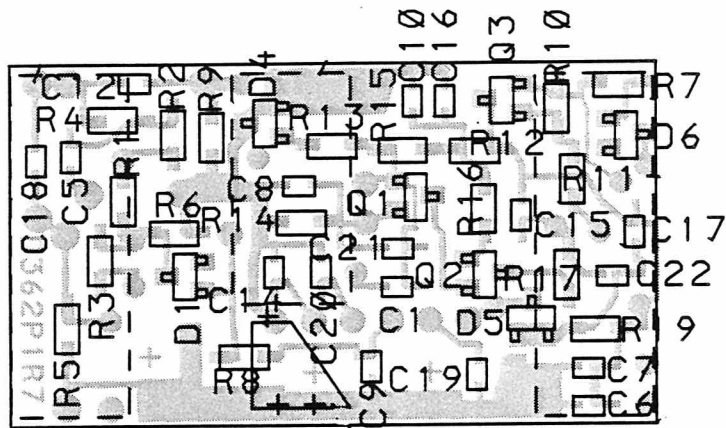
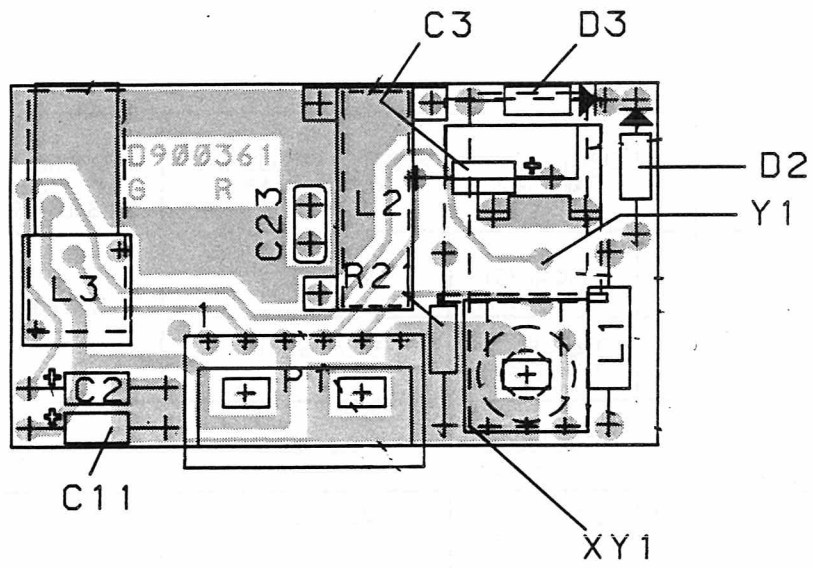
-25°C to +70°C

XO93X

OVERTONE OSCILLATOR SURVEY

OSC. TYPE	RADIO TYPE		OSCILLATOR PART NO.	CRYSTAL FREQUENCY RANGE IN MHz	CRYSTAL PART NO. FOR STABILITY	
					(D)* ± 10 ppm/ -25 to +55°C	(E)* ± 5.3 ppm/ -20 to +55°C
XO931	SIMP./DUP.	TX	D900455G1 - GXC6001A	41.0 - 50.4	J707566P3	J707566P5
XO932		RX	D900455G2 - GXC6002A	51.7 - 61.10		
XO933	ONLY MULT.	TX	D900455G3 - GXC6003A	16.5 - 22.0	J707568P3	J707568P4
XO934		RX	D900455G4 GXC6004A	43.7 - 54.7	J707566P3	J707566P5

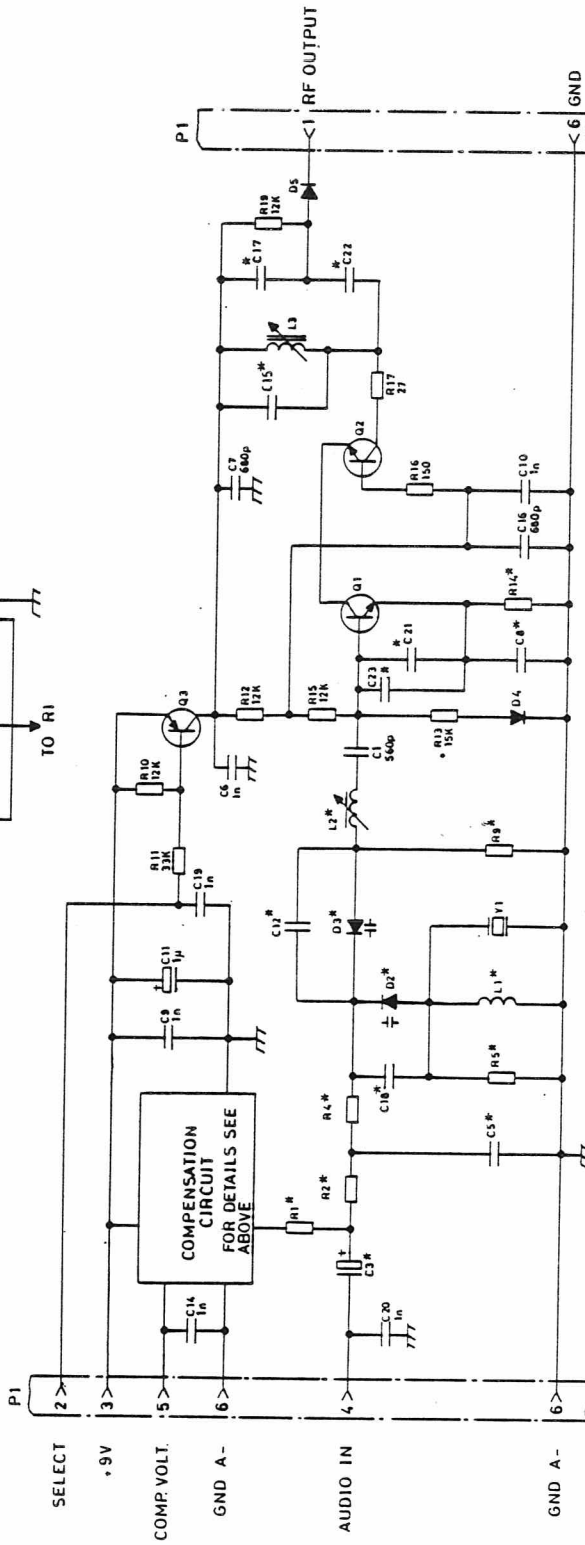
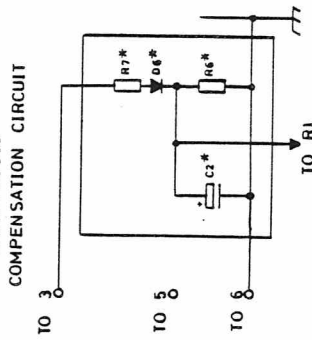
*This letter shall be placed as DIGIT 13 in combination number of radio equipment.



**CRYSTAL OSCILLATORS XO93X
COMPONENT LAYOUT**

D403.789/3

X0931/X0933
COMPENSATION CIRCUIT



M9330 OVERTONE OSCILLATOR SURVEY, SEE OVERLEAF

OSCILLATOR PART No.	MOUNTED BOARD CODE No.	MODULE	C2 *	C3 *	C5 *	C8 *	C12 *	C15 *	C17 *	C18 *	C21 *	C22 *	C23 *	D2 *	D3 *	D6 *	L1 *	L2 *	R1 *	R2 *	R4 *	R5 *	R6 *	R7 *	R9 *	R14 *	R16 *
D900455C1	D900361G1	X0931	1μ	1μ	1n	100p	-	-	82p	-	47p	27p	56p	BB117	BB117	BAV99	1.5μ	B800659P72	68K	12K	68K	680	82K	68K	820	150	
D900455C2	D900361G2	X0932	-	-	-	560p	-	68p	68p	8.2p	39p	18p	82p	-	-	-	1.5μ	B800659P67	-	-	-	560	-	-	680	150	
D900455C3	D900361G93	X0933	1μ	1μ	1n	220p	27p	2.7p	100p	8.2p	39p	39p	-	BB409	BB409	BAV99	-	B800659P84	68K	12K	68K	680	82K	68K	820	27	
D900455C4	D900361G94	X0934	-	-	-	100p	560p	1.2p	39p	8.2p	39p	22p	-	-	-	-	-	B800659P68	-	-	-	560	-	-	680	150	

NOTE:

• NEW CODE NO. : SEE PARTS LIST

CRYSTAL OSCILLATORS
X0931, X0932, X0933, X0934

D403.376/3

PARTS LIST FOR CRYSTAL OSCILLATOR XO931/XO932

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GXC6001A GXC6002A	D900455G1 XO931 D900455G2 XO932			
A001 A001	0102720B98 0102720B99 C850517P8 C850688P1R3 A701680P1	D900361G1 OSC BD 41.0-50.40 MHZ D900361G2 OSC BD 51.7-61.10 MHZ CAN RETAINER INSULATOR			
	0102720B98 0102720B99	D900361G1 OSC BD (A) D900361G2 OSC BD (B)			
C001 C002 C003 C005 C006 C007 C008 C009 C010 C011 C012 C014 C016 C017 C017 C018 C019 C020 C021 C021 C022 C022 C023 C023 D002 D003 D004 D005 D006 L001 L002 L002 L003 P001 Q001 Q002 Q003 R001 R002 R004 R005 R005 R006 R007 R009 R010 R011 R012 R013 R014 R014 R015 R016 R017 R019 XY01	2113740A73 B800650P13 B800650P13 2113741M21 2113741M21 2113741A17 2113740A55 2113741M21 2113741M21 B800650P13 2113740A73 2113741M21 2113741A17 2113740A53 2113740A51 2113740A27 2113741M21 2113741M21 J708702P221 2113740A43 2113740A39 2113740A35 A702291P1 A702291P3 J706262P1 J706262P1 J707389P1 J707391P1 J707389P1 A700024P15 B800669P72 B800669P67 B800668P12 A701486P5 J707418P1 J708418P1 J707387P1 0611077B19 0611077B01 0611077B19 0611077A70 0611077A68 0611077B21 0611077B21 0611077B19 0611077B01 0611077B11 0611077B01 0611077B03 0611077A72 0611077A70 0611077B01 0611077A54 0611077A36 0611077B01 A701486P2	CAP,CER,NP0 560P , 5% CAP,TA,SOL 1U0 , 10V (A) CAP,TA,SOL 1U0 , 10V (A) CAP,CER,CL2 1N0 , 10% (A) CAP,CER,CL2 1N0 , 10% CAP,CER,CL2 680P , 5% CAP,CER,NP0 100P , 5% CAP,CER,CL2 1N0 , 10% CAP,CER,CL2 1N0 , 10% CAP,TA,SOL 1U0 , 10V CAP,CER,NP0 560P , 5% (B) CAP,CER,CL2 1N0 , 10% CAP,CER,CL2 680P , 5% CAP,CER,NP0 82P , 5% (A) CAP,CER,NP0 68P , 5% (B) CAP,CER,NP0 8P2 ,.25P (B) CAP,CER,CL2 1N0 , 10% CAP,CER,CL2 1N0 , 10% CAP,CER,N470 47P , 5% (A) CAP,CER,NP0 39P , 5% (B) CAP,CER,NP0 27P , 5% (A) CAP,CER,NP0 18P , 5% (B) CAP,CER,NP0 56P , 5% (A) CAP,CER,NP0 82P , 5% (B) DIO,SI,CAP BB117/DO35 (A) DIO,SI,CAP BB117/DO35 (A) DIO,SI,SIG BAV 99 DIO,SI,SIG BAT 18 DIO,SI,SIG BAV 99 (A) COIL,RF,FIX 1.5UH , 10% COIL,RF,VAR 18-1/2T (A) COIL,RF,VAR 10-1/2T (B) COIL RF VAR 4-1/2T YE CONN,PWB,FEM06-CKT TSTR,NPN,SI BFS 17 TSTR,NPN,SI BFS 20 TSTR,PNP,SI BCW 30 RES,MFLM,1/8W 68K , 5% (A) RES,MFLM,1/8W 12K , 5% (A) RES,MFLM,1/8W 68K , 5% (A) RES,MFLM,1/8W 680R , 5% (A) RES,MFLM,1/8W 560R , 5% (B) RES,MFLM,1/8W 82K , 5% (A) RES,MFLM,1/8W 82K , 5% (A) RES,MFLM,1/8W 68K , 5% (A) RES,MFLM,1/8W 12K , 5% RES,MFLM,1/8W 33K , 5% RES,MFLM,1/8W 12K , 5% RES,MFLM,1/8W 15K , 5% RES,MFLM,1/8W 820R , 5% (A) RES,MFLM,1/8W 680R , 5% (B) RES,MFLM,1/8W 12K , 5% RES,MFLM,1/8W 150R , 5% RES,MFLM,1/8W 27R , 5% RES,MFLM,1/8W 12K , 5% CONN,PWB,FEM03-CKT D900362P1R7 BD PW			
	A701728P1 C850642P1 J707639P1	NON REFERENCED ITEMS: WASH,NON MET 3.17X 6.35 SPACER SPRING GROUNDING			

X403.612/4

DATE:09/20/90

PARTS LIST FOR CRYSTAL OSCILLATOR XO933/XO934

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GXC6003A GXC6004A	D900455G3 XO933 66-88MHz 10PPM D900455G4 XO934 87.4-109.4MHz 10PPM		A701728P1 C850642P1 J707639P1	NON REFERENCED ITEMS: WASH,NON MET 3.17X 6.35 SPACER SPRING GROUNDING
A001 A001	0102720B70 0102720B75 C850517P8 C850688P1R3 A701680P1	D900361G93 OSC BD 16.5-22.0 MHz D900361G94 OSC BD 43.7-54.7MHZ CAN RETAINER INSULATOR			
	0102720B70 0102720B75	D900361G93 OSC BD (A) D900361G94 OSC BD (B)			
C001 C002 C003 C005 C006 C007 C008 C008 C008 C009 C010 C011 C012 C012 C014 C015 C015 C016 C017 C017 C017 C018 C019 C020 C021 C021 C022 C022 D002 D003 D004 D005 D006 L002 L002 L003 P001 Q001 Q002 Q003 R001 R002 R004 R005 R005 R006 R007 R009 R010 R010 R011 R012 R013 R014 R014 R015 R016 R016 R017 R019 XY01	2113740A73 B800650P13 B800650P13 2113741M21 2113741M21 2113741A17 2113740A63 2113740A55 2113741M21 2113741M21 B800650P13 J708702P18 2113740A73 2113741M21 2113740A13 2113740A05 2113741A17 2113740A55 2113740A43 2113740A27 2113741M21 2113741M21 2113740A53 2113740A43 2113740A43 2113740A37 A700073P1 A700073P1 J707389P1 J707391P1 J707389P1 B800669P84 B800669P68 B800668P12 A701486P5 J707418P1 J708418P1 J707387P1 0611077B19 0611077B01 0611077B19 0611077A70 0611077A68 0611077B21 0611077B21 0611077B19 0611077B01 0611077B01 0611077B11 0611077B01 0611077B03 0611077A72 0611077A70 0611077B01 0611077A36 0611077A54 0611077A36 0611077B01 A701486P2	CAP,CER,NP0 560P , 5% CAP,TA,SOL 1U0 , 10V (A) CAP,TA,SOL 1U0 , 10V (A) CAP,CER,CL2 1N0 , 10% (A) CAP,CER,CL2 1N0 , 10% CAP,CER,CL2 680P , 5% CAP,CER,NP0 220P , 5% (A) CAP,CER,NP0 100P , 5% (B) CAP,CER,CL2 1N0 , 10% CAP,CER,CL2 1N0 , 10% CAP,TA,SOL 1U0 , 10V CAP,CER,N750 27P , 5% (A) CAP,CER,NP0 560P , 5% (B) CAP,CER,CL2 1N0 , 10% CAP,CER,NP0 2P7 ,.25P (A) CAP,CER,NP0 1P2 ,.25P (B) CAP,CER,CL2 680P , 5% CAP,CER,NP0 100P , 5% (A) CAP,CER,NP0 39P , 5% (B) CAP,CER,NP0 8P2 ,.25P (B) CAP,CER,CL2 1N0 , 10% CAP,CER,CL2 1N0 , 10% CAP,CER,NP0 82P , 5% (A) CAP,CER,NP0 39P , 5% (B) CAP,CER,NP0 39P , 5% (A) CAP,CER,NP0 22P , 5% (B) DIO,SI,CAP BB 409 (A) DIO,SI,CAP BB 409 (A) DIO,SI,SIG BAV 99 DIO,SI,SIG BAT 18 DIO,SI,SIG BAV 99 (A) COIL,RF,VAR 29-1/2T (A) COIL,RF,VAR 13-1/2T (B) COIL RF VAR 4-1/2T YE CONN,PWB,FEM06-CKT TSTR,NPN,SI BFS 17 TSTR,NPN,SI BFS 20 TSTR,PNP,SI BCW 30 RES,MFLM,1/8W 68K , 5% (A) RES,MFLM,1/8W 12K , 5% (A) RES,MFLM,1/8W 68K , 5% (A) RES,MFLM,1/8W 680R , 5% (A) RES,MFLM,1/8W 560R , 5% (B) RES,MFLM,1/8W 82K , 5% (A) RES,MFLM,1/8W 82K , 5% (A) RES,MFLM,1/8W 68K , 5% (A) RES,MFLM,1/8W 12K , 5% (A) RES,MFLM,1/8W 12K , 5% (B) RES,MFLM,1/8W 33K , 5% RES,MFLM,1/8W 12K , 5% RES,MFLM,1/8W 15K , 5% RES,MFLM,1/8W 820R , 5% (A) RES,MFLM,1/8W 680R , 5% (B) RES,MFLM,1/8W 12K , 5% RES,MFLM,1/8W 27R , 5% (A) RES,MFLM,1/8W 150R , 5% (B) RES,MFLM,1/8W 27R , 5% RES,MFLM,1/8W 12K , 5% CONN,PWB,FEM03-CKT D900362P1R7 BD PW			

DATE:09/20/90

X403.613/4



XO905/XO906

TX/RXrd MODE MASTER OSCILLATOR

The receiver master oscillator XO905 and the transmitter master oscillator XO906 are plug-in micromodules. Each contains an oscillator circuit, a switching stage circuitry to generate compensation voltage for temperature

compensation and a buffer to provide output at 90 - 186 MHz.

The crystal frequency is 30 - 62 MHz transistor and a buffer stage with tuned output.

CIRCUIT DESCRIPTION

This oscillator is a Colpitts configuration using a bipolar transistor and a quartz crystal for stability and operates in the third overtone mode. A bipolar-transistor buffer amplifier is included to isolate the oscillator circuit from load variations.

Frequency adjustment is accomplished with variable inductor placed in series between the crystal and the base terminal of the oscillator transistor.

Two varactor diodes, series, connected between the crystal and the frequency adjust coil, perform the temperature compensation function.

The compensation voltage applied to the varactor is generated by a thermistor network which is included in the oscillator. This voltage varies in such a manner that the natural frequency variation of the crystal is countered by the changing varactor capacitance.

From about -10°C to 75°C, the compensation voltage is kept constant. The oscillator circuit is so designed that it follows the temperature compensation characteristic of the crystal.

A master module consists of an oscillator plus a compensator network.

TECHNICAL SPECIFICATIONS

RF output impedance
50 ohm

Oscillator compensation
3.6 - 5.5 V DC

Supply voltage
9 V \pm 0.5%

Current consumption
Less than 10 mA

Select line
Low to select: less than 1.0 V
High to unkey: more than 8.0 V

Crystal frequency range
30 - 62 MHz

Output frequency range
90 - 186 MHz

Reference temperature
20°C

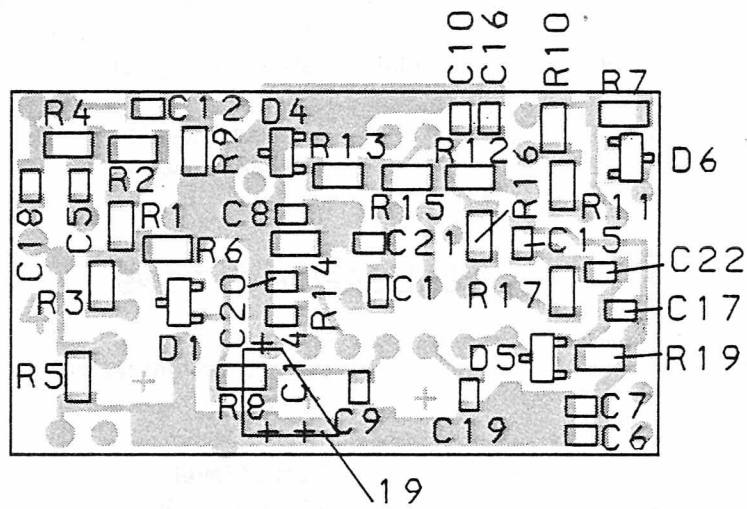
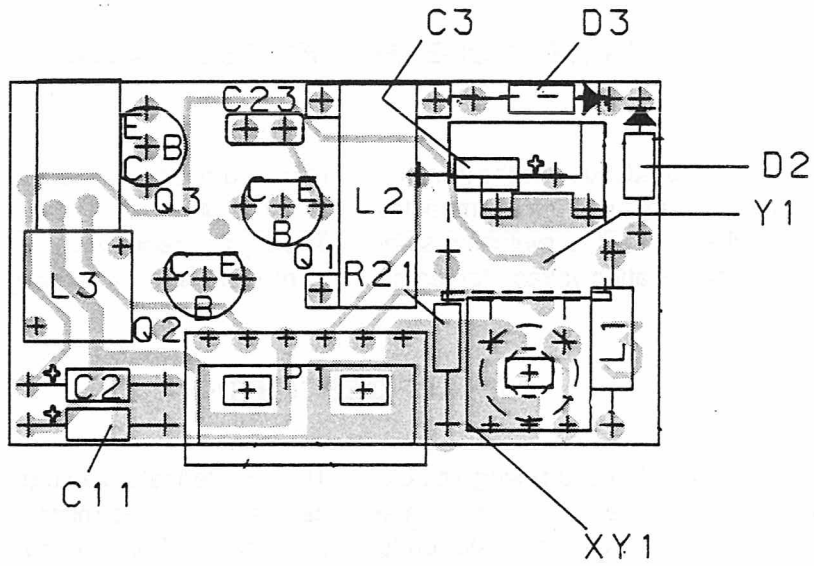
Output level
+3 dBm \pm 3 dB

FOR TX OSCILLATOR ONLY

Audio sensitivity
for \pm 5 kHz at output frequency:
1.2 V RMS max. at 1000 Hz

Audio frequency response
flat from 300 Hz to 3000 Hz

Audio distortion
5% max. for 3 kHz deviation at 1000 Hz



CRYSTAL OSCILLATORS
 XO905/XO906/XO907
 XO908/XO909/XO9010
 COMPONENT LAYOUT

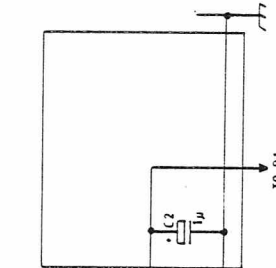
D403.769/3

REV.A

TEMPERATURE COMPENSATION CIRCUITS

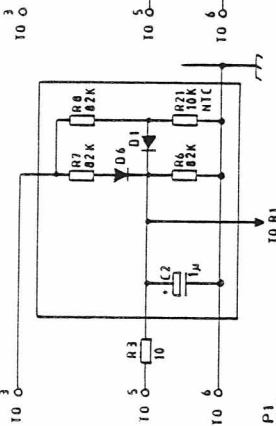
X0907 - X0908

5.3PPM SLAVE RX & TX



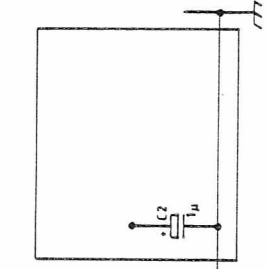
X0905 - X0906

5.3PPM MASTER RX & TX



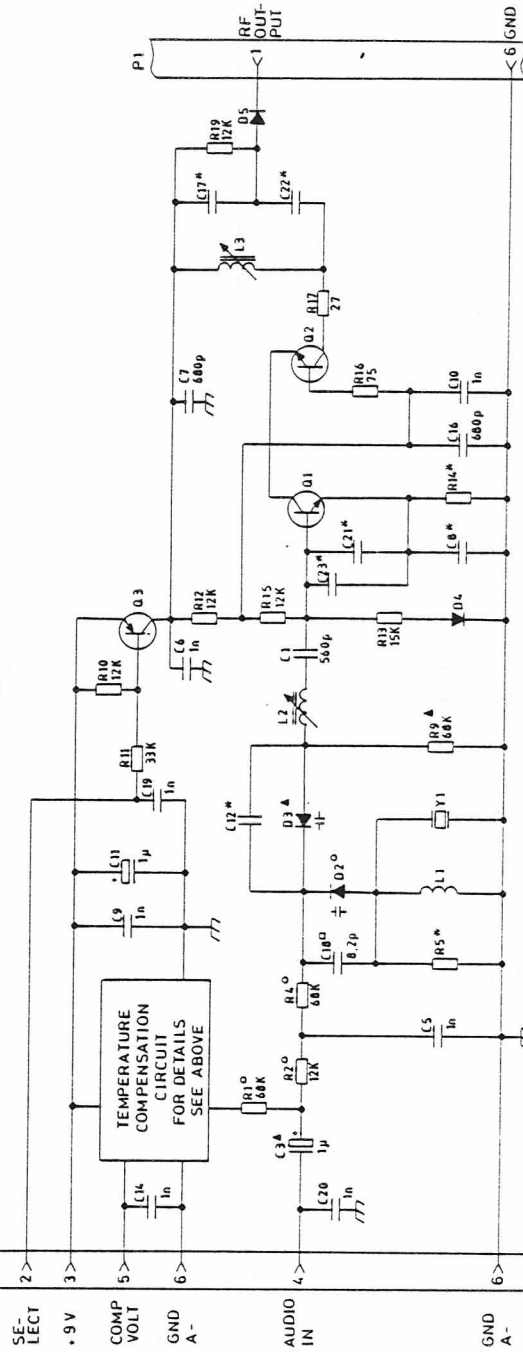
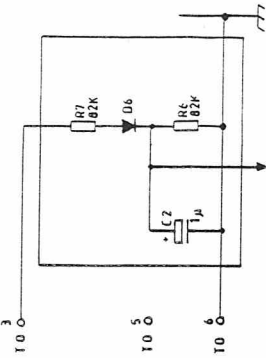
X0909

10PPM MASTER RX



X09010

10PPM MASTER TX



OSCILLATOR PART No.	MOUNTED BOARD CODE No.	C4*	C12*	C17*	C21*	C22*	C23*	R5*	R14*
• A701453C6	D90016IC5	100p	560p	56p	47p	15p	82p	680	820
• A701453C8	D90016IC6	100p	560p	68p	39p	18p	56p	560	680
A701453C18	D90016IC9	100p	560p	56p	47p	15p	82p	680	820
A701453C20	D90016IC10	100p	560p	68p	39p	18p	56p	560	680
• A701453C39	D90016IC13	100p	6.4p	68p	39p	15p	56p	560	680
• A701453C40	D90016IC14	82p		68p	39p	15p	56p	560	470
A701453C41	D90016IC17	82p		68p	39p	15p	56p	560	470
A701453C42	D90016IC18	82p	10p	68p	39p	15p	56p	560	470
A701453C30	D90016IC21	100p	560p	56p	47p	15p	82p	680	820
A701453C32	D90016IC22	100p	560p	68p	39p	15p	56p	560	680
A701453C37	D90015IC25	100p	6.4p	68p	39p	15p	56p	560	470
A701453C38	D90015IC26	82p		68p	39p	18p	56p	560	470

NOTES:
 ▲ : USED IN TX OSCILLATOR ONLY
 □ : USED IN 10 ppm RX OSCILLATOR ONLY
 ○ : NOT USED IN X0909 10 ppm RX
 ● : USED IN C09110 (NEW PART NUMBERS: SEE PARTS LIST)
 OVERTONE OSCILLATOR SURVEY, SEE OVERLEAF (M9110 ONLY).

CRYSTAL OSCILLATORS
 X0905, X0906, X0907,
 X0908, X09010

REV.A D403.768/3

PARTS LIST FOR CRYSTAL OSCILLATOR XO905

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GXD6003A GXD6004A	A701453G6 - XO905 RX LS 5PPM A701453G8 - XO905 RX LS 5PPM			
A001	0102720B76	D900361G5 OSC BD 34.60-45.75MHZ			
A001	0102720B66 C850517P8 C850688P1R3 A701680P1	D900361G6 OSC BD 38.25-50.87MHZ CAN RETAINER INSULATOR			
	0102720B76 0102720B66	D900361G5 OSC BD (A) D900361G6 OSC BD (B)			
C001	2113740A73	CAP,CER,NP0 560P , 5%			
C002	B800650P13	CAP,TA,SOL 1U0 , 10V			
C005	2113741M21	CAP,CER,CL2 1N0 , 10%			
C006	2113741M21	CAP,CER,CL2 1N0 , 10%			
C007	2113741A17	CAP,CER,CL2 680P , 5%			
C008	2113740A55	CAP,CER,NP0 100P , 5%			
C009	2113741M21	CAP,CER,CL2 1N0 , 10%			
C010	2113741M21	CAP,CER,CL2 1N0 , 10%			
C011	B800650P13	CAP,TA,SOL 1U0 , 10V			
C012	2113740A73	CAP,CER,NP0 560P , 5%			
C014	2113741M21	CAP,CER,CL2 1N0 , 10%			
C016	2113741A17	CAP,CER,CL2 680P , 5%			
C017	2113740A49	CAP,CER,NP0 56P , 5% (A)			
C017	2113740A51	CAP,CER,NP0 68P , 5% (B)			
C019	2113741M21	CAP,CER,CL2 1N0 , 10%			
C020	2113741M21	CAP,CER,CL2 1N0 , 10%			
C021	J708702P121	CAP,CER,N220 47P , 5% (A)			
C021	J708702P120	CAP,CER,N220 39P , 5% (B)			
C022	2113740A33	CAP,CER,NP0 15P , 5% (A)			
C022	2113740A35	CAP,CER,NP0 18P , 5% (B)			
C023	A702291P3	CAP,CER,NP0 82P , 5% (A)			
C023	A702291P1	CAP,CER,NP0 56P , 5% (B)			
D001	J707389P1	DIO,SI,SIG BAV 99			
D002	J706262P1	DIO,SI,CAP BB117/DO35			
D004	J707389P1	DIO,SI,SIG BAV 99			
D005	J707391P1	DIO,SI,SIG BAT 18			
D006	J707389P1	DIO,SI,SIG BAV 99			
L001	A700024P17	COIL,RF,FIX 2.2UH , 10%			
L002	B800669P70	COIL,RF,VAR 15-1/2T (A)			
L002	B800669P68	COIL,RF,VAR 13-1/2T (B)			
L003	B800668P12	COIL RF VAR 4-1/2T YE (A)			
L003	B800668P11	COIL RF VAR 3-1/2T OR (B)			
P001	A701486P5	CONN,PWB,FEM06-CKT			
Q001	J707418P1	TSTR,NPN,SI BFS 17			
Q002	J708418P1	TSTR,NPN,SI BFS 20			
Q003	J707387P1	TSTR,PNP,SI BCW 30			
R001	0611077B19	RES,MFLM,1/8W 68K , 5%			
R002	0611077B01	RES,MFLM,1/8W 12K , 5%			
R003	0611077A26	RES,MFLM,1/8W 10R0 , 5%			
R004	0611077B19	RES,MFLM,1/8W 68K , 5%			
R005	0611077A70	RES,MFLM,1/8W 680R , 5% (A)			
R005	0611077A68	RES,MFLM,1/8W 560R , 5% (B)			
R006	0611077B21	RES,MFLM,1/8W 82K , 5%			
R007	0611077B21	RES,MFLM,1/8W 82K , 5%			
R008	0611077B21	RES,MFLM,1/8W 82K , 5%			
R010	0611077B01	RES,MFLM,1/8W 12K , 5%			
R011	0611077B11	RES,MFLM,1/8W 33K , 5%			
R012	0611077B01	RES,MFLM,1/8W 12K , 5%			
R013	0611077B03	RES,MFLM,1/8W 15K , 5%			
R014	0611077A72	RES,MFLM,1/8W 820R , 5% (A)			
R014	0611077A70	RES,MFLM,1/8W 680R , 5% (B)			
R015	0611077B01	RES,MFLM,1/8W 12K , 5%			
R016	0611077A47	RES,MFLM,1/8W 75R , 5%			
R017	0611077A36	RES,MFLM,1/8W 27R , 5%			
R019	0611077B01	RES,MFLM,1/8W 12K , 5%			
R021	A701864P4	RES,THERM,NTC 10K , 10%			
XY01	A701486P2 D900362P1R7	CONN,PWB,FEM03-CKT BD PW			
	A701728P1 C850642P1 J707639P1	NON REFERENCED ITEMS: WASH,NON MET 3.17X 6.35 SPACER SPRING GROUNDING			

X403.924/3

DATE: 09/20/90

PARTS LIST FOR CRYSTAL OSCILLATOR XO906

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GXD6001A GXD6005A	A701453G39 XO906 - TX PLL 5PPM A701453G40 XO906 - TX PLL 5PPM			
A001	0102720B65	D900361G13 OSC BD 41.725-52.89MHz			
A001	0102720B71	D900361G14 OSC BD 46.00-58.00MHz			
	C850517P8	CAN			
	C850688P1R3	RETAINER			
	A701680P1	INSULATOR			
	0102720B65	D900361G13 (A)			
	0102720B71	D900361G14 (B)			
C001	2113740A73	CAP,CER,NP0 560P , 5%			
C002	B800650P13	CAP,TA,SOL 1U0 , 10V			
C003	B800650P13	CAP,TA,SOL 1U0 , 10V			
C005	2113741M21	CAP,CER,CL2 1N0 , 10%			
C006	2113741M21	CAP,CER,CL2 1N0 , 10%			
C007	2113741A17	CAP,CER,CL2 680P , 5%			
C008	2113740A55	CAP,CER,NP0 100P , 5% (A)			
C008	2113740A53	CAP,CER,NP0 82P , 5% (B)			
C009	2113741M21	CAP,CER,CL2 1N0 , 10%			
C010	2113741M21	CAP,CER,CL2 1N0 , 10%			
C011	B800650P13	CAP,TA,SOL 1U0 , 10V			
C012	2113740A24	CAP,CER,NP0 6P8 ,.25P (A)			
C014	2113741M21	CAP,CER,CL2 1N0 , 10%			
C016	2113741A17	CAP,CER,CL2 680P , 5%			
C017	2113740A51	CAP,CER,NP0 68P , 5%			
C019	2113741M21	CAP,CER,CL2 1N0 , 10%			
C020	2113741M21	CAP,CER,CL2 1N0 , 10%			
C021	J708702P120	CAP,CER,N220 39P , 5%			
C022	2113740A33	CAP,CER,NP0 15P , 5% (A)			
C022	2113740A35	CAP,CER,NP0 18P , 5% (B)			
C023	A702291P1	CAP,CER,NP0 56P , 5%			
D001	J707389P1	DIO,SI,SIG BAV 99			
D002	J706262P1	DIO,SI,CAP BB117/DO35			
D003	J706262P1	DIO,SI,CAP BB117/DO35			
D004	J707389P1	DIO,SI,SIG BAV 99			
D005	J707391P1	DIO,SI,SIG BAT 18			
D006	J707389P1	DIO,SI,SIG BAV 99			
L001	A700024P15	COIL,RF,FIX 1.5UH , 10% (A)			
L001	A700024P14	COIL,RF,FIX 1.2UH , 10% (B)			
L002	B800669P70	COIL,RF,VAR 15-1/2T (A)			
L002	B800669P68	COIL,RF,VAR 13-1/2T (B)			
L003	B800668P11	COIL RF VAR 3-1/2T OR (A)			
L003	B800668P15	COIL RF VAR 2-1/2T RED (B)			
P001	A701486P5	CONN,PWB,FEM 06-CKT			
Q001	J707418P1	TSTR,NPN,SI BFS 17			
Q002	J708418P1	TSTR,NPN,SI BFS 20			
Q003	J707387P1	TSTR,PNP,SI BCW 30			
R001	0611077B19	RES,MFLM,1/8W 68K , 5%			
R002	0611077B01	RES,MFLM,1/8W 12K , 5%			
R003	0611077A26	RES,MFLM,1/8W 10R0 , 5%			
R004	0611077B19	RES,MFLM,1/8W 68K , 5%			
R005	0611077A68	RES,MFLM,1/8W 560R , 5%			
R006	0611077B21	RES,MFLM,1/8W 82K , 5%			
R007	0611077B21	RES,MFLM,1/8W 82K , 5%			
R008	0611077B21	RES,MFLM,1/8W 82K , 5%			
R009	0611077B19	RES,MFLM,1/8W 68K , 5%			
R010	0611077B01	RES,MFLM,1/8W 12K , 5%			
R011	0611077B11	RES,MFLM,1/8W 33K , 5%			
R012	0611077B01	RES,MFLM,1/8W 12K , 5%			
R013	0611077B03	RES,MFLM,1/8W 15K , 5%			
R014	0611077A66	RES,MFLM,1/8W 470R , 5%			
R015	0611077B01	RES,MFLM,1/8W 12K , 5%			
R016	0611077A47	RES,MFLM,1/8W 75R , 5%			
R017	0611077A36	RES,MFLM,1/8W 27R , 5%			
R019	0611077B01	RES,MFLM,1/8W 12K , 5%			
R021	A701864P4	RES,THERM,NTC 10K , 10%			
XY01	A701486P2	CONN,PWB,FEM 03-CKT			
	D900362P1R7	BD PW			
0003	A701728P1	NON REFERENCED ITEMS: WASH,NON MET 3.17X 6.35			
0004	C850642P1	SPACER			
0019	J707639P1	SPRING GROUNDING			

DATE:09/20/90

X403.880/4



XO901/XO902

CRYSTAL OSCILLATOR

These oscillators covers the following frequencies:

Group 1, XO902, TX, 129.0 to 157.0 MHz

Group 2, XO901, RX, 122.0 to 150.0 MHz

Group 3, XO902, TX, 112.4 to 132.4 MHz

Group 4, XO901, RX, 105.0 to 125.3 MHz

Each oscillator has its own temperature compensation due to the tight frequency stability requirement. Each oscillator contains an oscillator circuit, a switching transistor and a buffer stage with tuned output.

CIRCUIT DESCRIPTION

This oscillator is a Colpitts configuration using a bipolar transistor (Q2) and a third mode quartz crystal for stability. This circuit will oscillate at a frequency where the crystal impedance is resistive (serie-resonans) At this frequency series resonant circuit is formed between the base of Q2 and ground. The coil L1 in this circuit is used to adjust the output frequency.

A grounded base bipolar transistor buffer amplifier (Q3) isolates the oscillator circuit from load variations.

At the collector of Q3, a selective network (L2, C14, C1) tuned to the third harmonic of the marked crystal frequency, provides attenuation of harmonic spurious and impedance matching to 50 ohm. A switch diode (D5) between the output of the tuned circuit and the load, isolates the unselected oscillator from the keyed module.

The oscillator circuit is tuned on by grounding pin 2, which saturates Q1 and provides the required DC-voltage to Q2 and Q3.

In the TX-versions the processed audio is applied to the varactor diode D1 for true FM-modulation.

The varactor diode D2 performs the temperature compensation function. The compensation voltage applied to the varactor is generated by 3 NTC resistors (R17, R18, R19) and the resistor network U1 (thick-film).

The method is an analog compensation.

The compensation circuit is factory adjusted to be within tolerance and any change in the circuit is not possible.

TECHNICAL SPECIFICATIONS

RF output impedance

50 ohm

Supply voltage

9 V $\pm 0.5\%$

Current consumption

Less than 10 mA (keyed)

Less than 1 mA (standby)

Select line

Low to select: less than 1.0 V

High to unkey: more than 8.0 V

Audio input impedance

More than 20 Kohm

Frequency range

Group	Crystal freq. in MHz	Output freq. in MHz
1	43.00-52.33	129.0-157.0
2	40.67-50.00	122.0-150.0
3	37.47-44.13	112.4-132.4
4	35.00-41.77	105.0-125.3

Frequency satbility

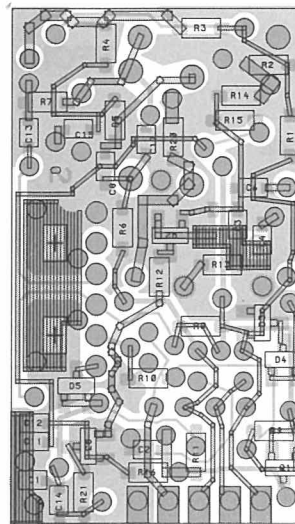
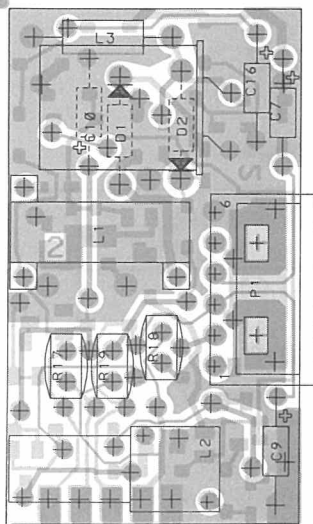
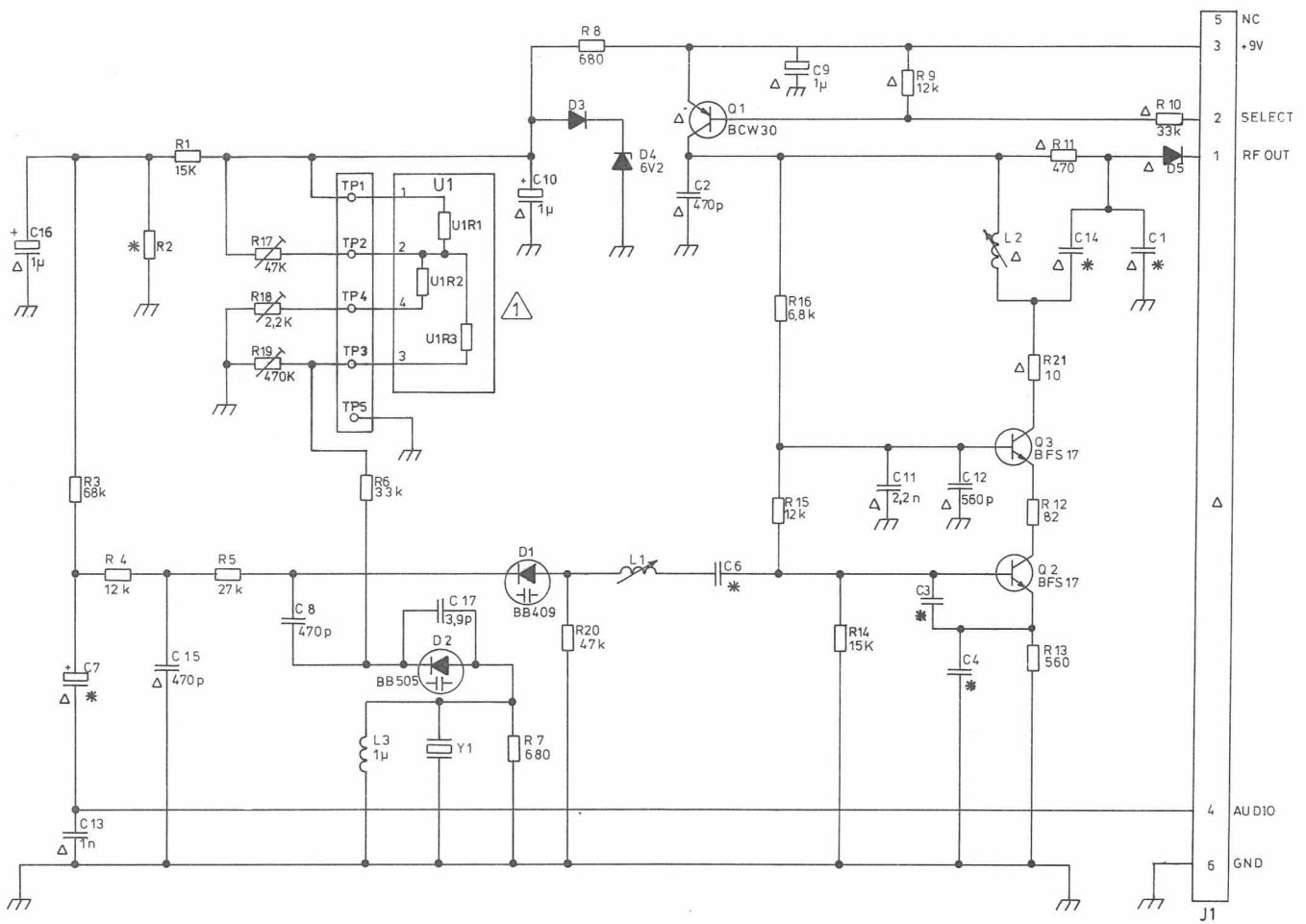
± 2.0 PRM at -30°C to $+75^{\circ}\text{C}$

Reference temperature

$+25^{\circ}\text{C}$

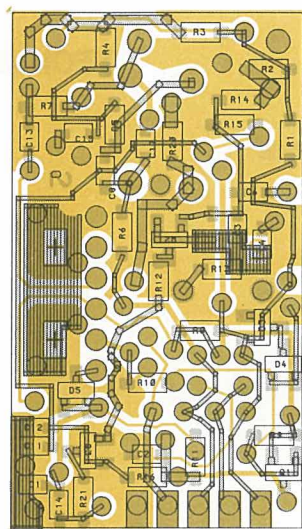
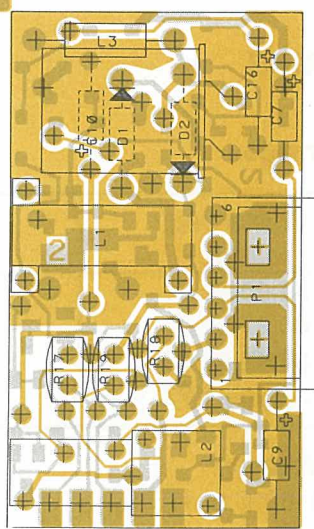
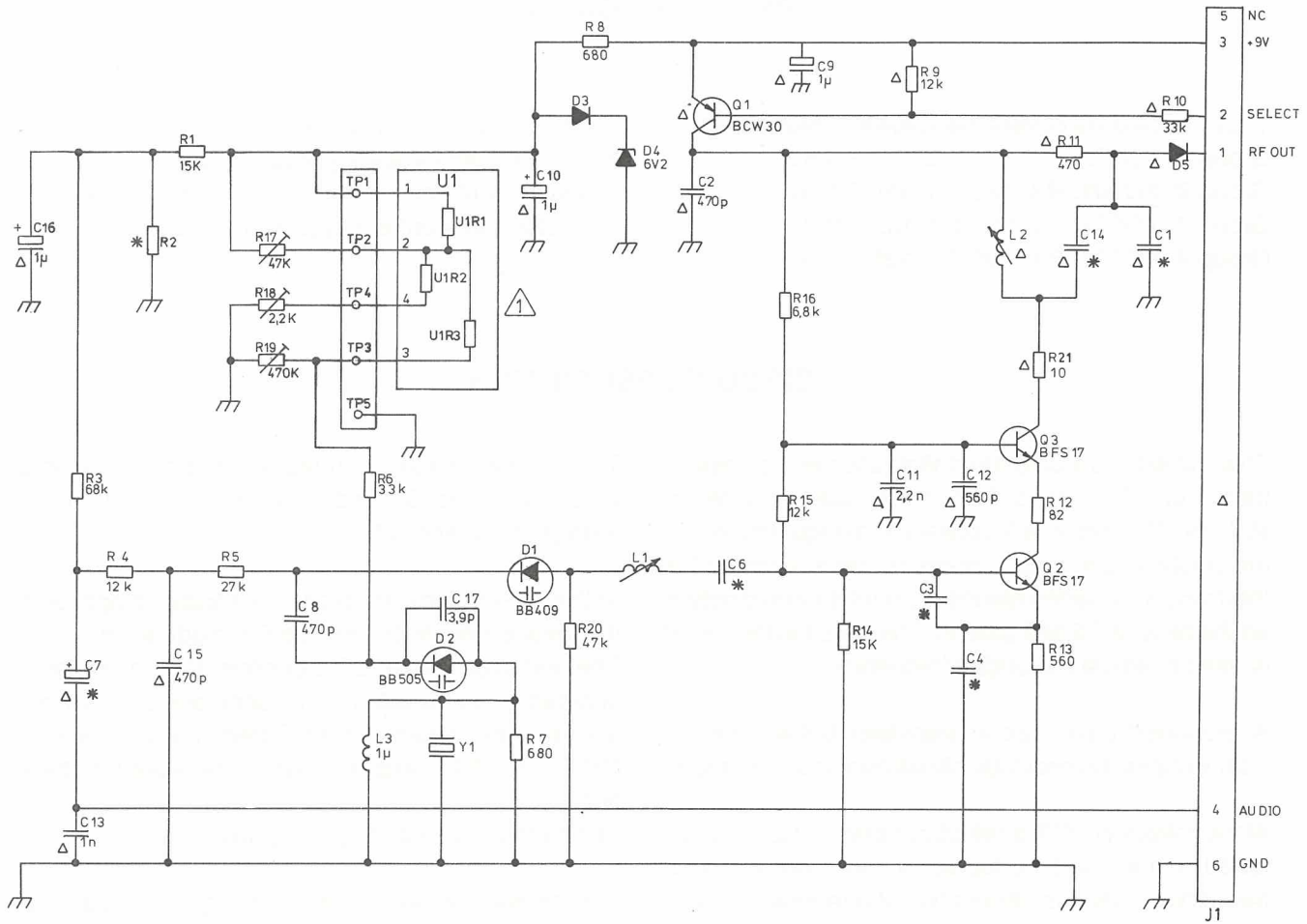
Output level

$+3$ dBm ± 3 dB



NOTES:
 1. U1 IS A RESISTOR NETWORK ON THICKFILM
 2. ALL COMPONENTS MARKED WITH Δ SHOW THE ONLY COMPONENTS THAT CAN BE REPLACED.
 COMPONENTS MARKED * SEE PARTS LIST

CRYSTAL OSCILLATOR X0901/X0902
 REV.A/1 D403.481/3



NOTES:
 1. U1 IS A RESISTOR NETWORK ON THICKFILM
 2. ALL COMPONENTS MARKED WITH Δ SHOW THE ONLY COMPONENTS THAT CAN BE REPLACED.
 COMPONENTS MARKED * SEE PARTS LIST

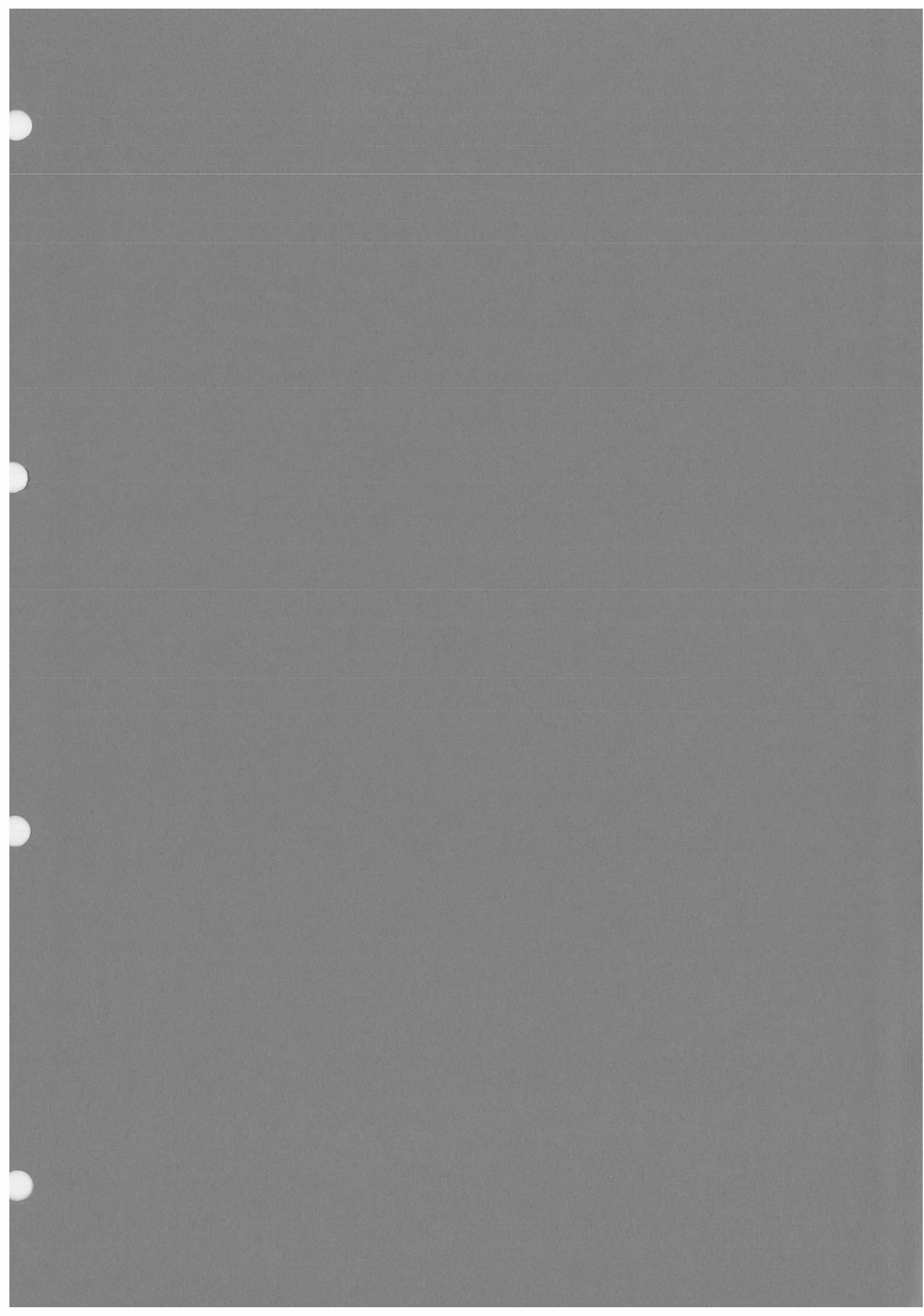
CRYSTAL OSCILLATOR X0901/XO902
 REV.A/1 **D403.481/3**

PARTS LIST FOR CRYSTAL OSCILLATOR XO901/XO902

Pos	Code/Kit No.	Description	Pos	Code/Kit No.	Description
	GXE6002A	J707948G2 XO901 RX : 122.0-150.0MHz	R015	0611077B01	RES,MFLM,1/8W 12K , 5%
	GXE6004A	J707948G4 XO901 RX : 105.0-125.3MHz	R016	0611077A94	RES,MFLM,1/8W 6K8 , 5%
	GXE6001A	J707948G1 XO902 TX : 129.0-157.0MHz	R017	J707406P5	RES,THERM,NTC 47K , 10%
	GXE6003A	J707948G3 XO902 TX : 112.4-132.4MHz	R018	J707406P4	RES,THERM,NTC 2K2 , 10%
	0102720B58	M905613G2 (B) OSC BD RX : 122.0-150.0 MHz	R019	J707406P6	RES,THERM,NTC 470K , 10%
	0102720B67	M905613G4 (D) OSC BD RX : 105.0-125.3 MHz	R020	0611077B15	RES,MFLM,1/8W 47K , 5%
	0102720B61	M905613G1 (A) OSC BD TX : 129.0-157.0 MHz	R021	0611077A26	RES,MFLM,1/8W 10R0 , 5%
	0102720B59	M905613G3 (C) OSC BD TX : 112.4-132.4 MHz		M905614P1R2	BD PW
U01	0102720B60	L855471G1 RES NETWORK		J707831P1	NON REFERENCED ITEMS: SHIELD
Y01	J707566P6	X-TAL 31 - 66 MHz		J707972P1	LBL
		NON REFERENCED ITEM:			
	C850517P3	CAN			
	C850688P1R3	RETAINER			
	A701680P1	INSULATOR			
	J708058P1	LBL PPR			
		OSC BD			
C001	A700007P45	CAP,CER,NP0 47P , 5% (A)			
C001	A700007P57	CAP,CER,NP0 82P , 5% (B)			
C001	A700007P61	CAP,CER,NP0 100P , 5% (C,D)			
C002	A700010P3	CAP,CER,NP0 470P , 5%			
C003	A700007P37	CAP,CER,NP0 33P , 5% (A,B)			
C003	A700088P404	CAP,CER,N750 39P , 5% (C,D)			
C004	A700007P63	CAP,CER,NP0 120P , 5% (A,B)			
C004	A700007P65	CAP,CER,NP0 150P , 5% (C,D)			
C006	A700007P41	CAP,CER,NP0 39P , 5% (A)			
C006	A700007P53	CAP,CER,NP0 68P , 5% (B)			
C006	A700010P3	CAP,CER,NP0 470P , 5% (C,D)			
C007	B800650P13	CAP,TA,SOL 1U0 , 10V (A,C)			
C008	A700010P3	CAP,CER,NP0 470P , 5%			
C009	B800650P13	CAP,TA,SOL 1U0 , 10V			
C010	B800650P13	CAP,TA,SOL 1U0 , 10V			
C011	A700058P7	CAP,CER,CL2 2N2 , 10%			
C012	A700010P5	CAP,CER,NP0 560P , 5%			
C013	A700011P3	CAP,CER,CL2 1N , 20%			
C014	A700007P37	CAP,CER,NP0 33P , 5% (A)			
C014	A700007P33	CAP,CER,NP0 27P , 5% (B)			
C014	A700007P41	CAP,CER,NP0 39P , 5% (C)			
C014	A700007P45	CAP,CER,NP0 47P , 5% (D)			
C015	A700010P3	CAP,CER,NP0 470P , 5%			
C016	B800650P13	CAP,TA,SOL 1U0 , 10V			
C017	A700007P8	CAP,CER,NP0 3P9 , 0.5P			
D001	A700073P1	DIO,SI,CAP BB 409			
D002	J706007P1	DIO,SI,CAP BB 505B			
D003	J706001P1	DIO,SI,SIG BAV 74			
D004	A700083P12	DIO,SI,ZENR 6V2,5%,0.2W			
D005	A700155P1	DIO,SI,SIG BAT 18			
L001	B800669P72	COIL,RF,VAR 18-1/2T			
L002	B800668P15	COIL RF VAR 2-1/2T RED			
L003	A700024P14	COIL,RF,FIX 1.2UH , 10%			
P001	A701486P5	CONN,PWB,FEM 06-CKT			
Q001	J706004P1	TSTR,PNP,SI BCW 30			
Q002	A700236P1	TSTR,NPN,SI BFS 17			
Q003	A700236P1	TSTR,NPN,SI BFS 17			
R001	0611077B03	RES,MFLM,1/8W 15K , 5%			
R002	0611077B11	RES,MFLM,1/8W 33K , 5% (C,D)			
R003	0611077B19	RES,MFLM,1/8W 68K , 5%			
R004	0611077B01	RES,MFLM,1/8W 12K , 5%			
R005	0611077B09	RES,MFLM,1/8W 27K , 5%			
R006	0611077B11	RES,MFLM,1/8W 33K , 5%			
R007	0611077A70	RES,MFLM,1/8W 680R , 5%			
R008	0611077A70	RES,MFLM,1/8W 680R , 5%			
R009	0611077B01	RES,MFLM,1/8W 12K , 5%			
R010	0611077B11	RES,MFLM,1/8W 33K , 5%			
R011	0611077A66	RES,MFLM,1/8W 470R , 5%			
R012	0611077A48	RES,MFLM,1/8W 82R , 5%			
R013	0611077A68	RES,MFLM,1/8W 560R , 5%			
R014	0611077B03	RES,MFLM,1/8W 15K , 5%			










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







GRAPHICAL SYMBOLS USED IN CIRCUIT DIAGRAMS






Resistors (R)

-  Resistor
-  Resistor with fixed tap
-  Variable resistor
-  Resistor with movable tap (Potentiometer).
-  Varistor (voltage-dependent resistor)
-  Temperature-dependent resistor with negative temperature coefficient
-  Light-emitting diode (photosensitive resistor)
-  Temperature dependent resistor with positive temperature-coefficient.
-  Resistor with preset adjustment



Capacitors (C)

-  Capacitor
-  Variable capacitor
-  Trimmer capacitor
-  Feedthrough capacitor
-  Electrolytic capacitor polarized
-  Polarized capacitor general
-  Electrolytic capacitor non-polarized













Coils (L)

-  RF coil, air core
-  Coupled RF coils, air core
-  RF coil with adjustable core
-  Coil with tap.
-  Helical-coil.





Transformers (T)

-  Transformer with iron core
-  Transformer with adjustable RF cores





Diodes (D)

-  Diode
-  Bridge rectifier
-  Series-connected stabilizer diodes within one case
-  Light-emitting diode
-  Zener diode (uni-directional)
-  Zener diode (bidirectional)
-  Tunnel diode
-  Backward diode
-  Varactor diode
-  Controlled rectifier, PNP (N-thyristor)
-  Controlled rectifier, NPN (P-thyristor)
-  Zener diode-programmable.


Transistors (Q)


-  Transistor, PNP
-  Transistor, NPN
-  Light-sensitive transistor PNP
-  Unipolar transistor with N-type base

Junction Field Effect Transistors (JFET)


-  N-channel JFET
-  P-channel JFET
-  N-channel dual gate JFET
-  P-channel dual gate JFET

Insulated Gate Field Effect Transistors (IGFET or MOS)

-  N-channel IGFET (MOS)

-  P-channel IGFET (MOS)

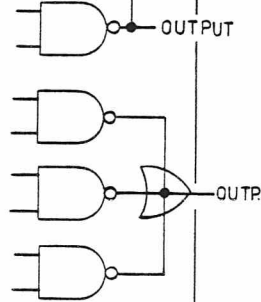
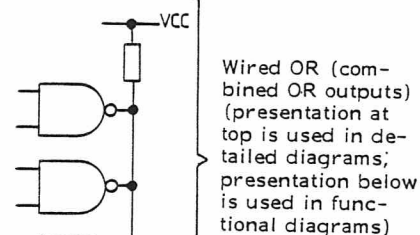
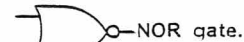
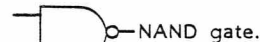
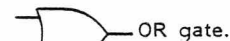
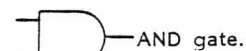
-  N-channel dual gate IGFET (MOS)

-  P-channel dual gate IGFET (MOS)

Integrated Circuits (U)

Several integrated circuits contained within one case are designated by one common number followed by an identifying letter (a, b, c, etc.). Thus, circuits U1A, U1B and U1C are contained within one case.

Gates

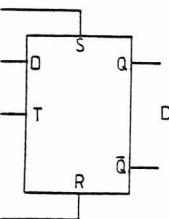
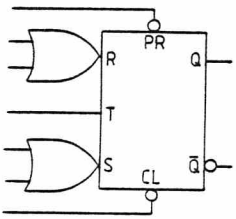
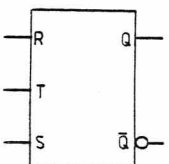
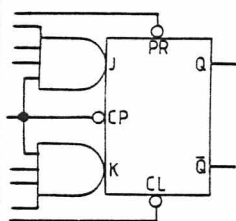
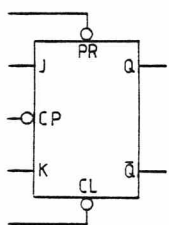
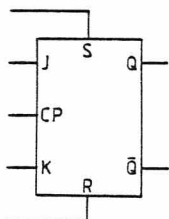


GRAPHICAL SYMBOLS USED IN CIRCUIT DIAGRAMS

Flip-flops

Abbreviations used:

S =Set
R =Reset
CP=Clock pulse
PR=Preset
CL=Clear
T =Toggle

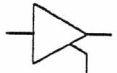


D Flip-Flop

Inverters

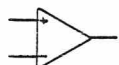


Inverter

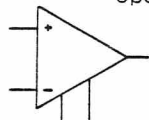


Three-state driver

Operational Amplifiers



Operational amplifiers.



Relays(K)



Single-coil relay



Dual-coil relay



Polarized relay



Slow-acting relay



Slow-release relay



Relay with change-over contacts

Contacts



Open contact (make)



Closed contact (break)



Change-over contact



Change-over contact centre off



Make-before-break

Switches and Keys (S)



On/Off switch



Locking keys or switches:
push on, push off



Non-Locking self-releasing
keys or switches



Make-before-break



Locking mutually releasing
keys or switches (In row
of push-buttons etc.)



Rotary switch.



ON/OFF switch electrically
controlled.
(Not a relay)

Lamps(V)



Indicator Lamp.



Neon Lamp

Fuses and Cut-outs (F)



Fuse



Circuit breaker

Batteries(B)



Battery one cell



Battery multi cell

Feedthrough Filters(Z)



Feedthrough filter

Ferrite Beads(FB)



Ferrite bead

Crystals(Y)



Crystal

Cables and Wires(W)



Usual conductor.



Three conductors



Eight conductors.



Shift from multiple-line to
single-line presentation.








Screened cable.





Coaxial cable.

GRAPHICAL SYMBOLS USED IN CIRCUIT DIAGRAMS




Connectors(J and P)

-  Female (socket) connector.
-  Male (plug) connector
-  Multi-wire connector.
-  Coaxial plug.
-  Coaxial socket.

Loudspeakers(LS)

-  Loudspeaker.
-  Loudspeaker-Microphone.




Telephones(TEL)

-  Telephone.
-  Single headphone.
(Earphone).
-  Double headphone.



Microphones(M)

-  Microphone.



Meters etc.

-  Indicating instrument.
-  Balancing instrument.
(Galvanometer).
-  Basic letters
see DESIGN STANDARD
10.02.3.1 section 12.






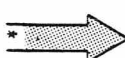




Test Points

-  DC test point.
-  AC test point.

Replaceable Connections(W)

-  Cross-field connection.
(jumper).
-  Strap.

Miscellaneous

-  Antenna
-  Buzzer.
-  Horn.
-  Directional Coupler.
-  Circulator.
-  Multiconductor bus
(used in logic diagrams)
* = Identifying bus label
e.g. DATA, ADDRESS....
-  Chassis or frame
connection
-  Grouping of leads.
-  Crossing of wires.
-  Junction of connected wires

PARTLIST AND DIAGRAM ABBREVIATION

ABBREV.	DESCRIPTION	ABBREV.	DESCRIPTION
A	Ampere	DIO	Diode
AC	Alternating Current	DIPLEX	Diplexer
ADPT	Adaptor	DIS	Display
AF	Audio Frequency	DISCR	Discriminator
ALIGN	Adjust, -able, -ment	DISTR	Distributor, -ion
ALK	Alkaline	DLY	Delay
AM	Ammeter	DPLX	Duplex, -er
AMPL	Amplifier	EARPHO	Earphone
ANALZ	Analyzer	ELEC	Electrolytic
ANT	Antenna	ENCO	Encoder
ARRS	Arrester	EQ	Equalizer
ASM	Assembly	EXC	Exciter
ATTEN	Attenuator, -tion	EYLT	Eyelet
AXFMR	Audio transformer	FD THRU	Feed Through
BAL	Balance, -d, -ing	FERR	Ferrite, -ous
BILAT	Bilateral	FIX	Fixed
BKR	Breaker	FLD EFF	Field Effect
BLO	Blower	FM	Frequency Modulation
BLOK	Block, -ing	FR	Frame
BP	Bandpass	FR END	Front End
BR	Branching	FREQ	Frequency
BRDG	Bridge, -d, ing	FZ	Fuse, -ed
BRDG-T	Bridged-T	FZBOX	Fuse Box
BSTOP	Bandstop	GD	Guard
BTRY	Battery	GE	Germanium
BUFR	Buffer	GEN	Generator
BUTN	Button	GR	Group
BUZ	Buzzer	GRD	Ground, -ing
C	Carbon	GRL	Grill
CA	Cable	HAR	Harmonic
CAB	Cabinet	HB	High Band
CAP	Capacitor, -ive	HDW	Hardware
CER	Ceramic	HEL	Helical
CG	Channel Guard	HGR	Hanger
CHAN	Channel	HLR	Holder
CHAS	Chassis	HN	Horn
CHGR	Charger	HNDSET	Handset
CKT	Circuit	HP	High Pass
CLP	Clamp	HSET	Headset
CND	Conduit	HSG	Housing
COAX	Coaxial	HT SK	Heat Sink
COMP	Compensate	IF	Intermediate-Frequency
COMPTR	Comparator	INP	Input
COND	Conductor, -ire	INSR	Insert
CONN	Connector	INST	Instruction
CONT	Contact	INST	Instrument
CONV	Conversion, -ter	INSTL	Installation
CPLR	Coupler, -ing	INVTR	Inverter
CTG	Cartridge	ISO	Isolator
CTR	Counter	JCTBOX	Junction Box
CURR	Current	JMPR	Jumper
DC	Direct Current	kHz	Kilohertz
DEM	Demodulator	LAM	Laminated
DEPOS	Deposited	LB	Low Band
DET	Detector	LIN	Linear
DEV	Device	LK	Link
DIEL	Dielectric	LMP	Lamp
DIG	Digital	LMTR	Limiter

PARTLIST AND DIAGRAM ABBREVIATION

ABBREV.	DESCRIPTION	ABBREV.	DESCRIPTION
LOG	Logic	SHLD	Shield, -ed, -ing
LS	Loudspeaker	SHT	Shorting
LT	Light	SI	Silicon
LTH	Latch	SM	Small
MEMY	Memory	SMLTR	Simulator
MIKE	Microphone	SOC	Socket
MISC	Miscellaneous	SPC	Spacer
MIX	Mixer	SPG	Spring
MO	Modem	SPKR	Speaker
MOB	Mobile	SPR	Spare
MOD	Modulator	SPT	Bracket
MODF	Modification, -er	SPT	Support
MON	Monitor	SQL	Squelch
MOS	Metal Oxide Semi Conductor	SR	Slow Release
MOT	Motor	STD	Standard
MTCH	Matching	STR	Starter
MTC	Mounting	SUPP	Supply
MTR	Meter	SUPPR	Suppressor
MULTMRT	Multimeter	SYS	System
MUX	Multiplex, -er	TA	Tantalum
MYL	Mylar	TD	Tune Delay
NB	Normal Blow	TEL	Telephone
NET	Network	TEST PT	Test Point
PA	Power Amplifier	TFL	Teflon
PB	Push Button	TGL	Toggle
PLG	Plug	THERMO	Thermostat
PNL	Panel	THERMSTR	Thermistor
POLYC	Polycarbonate	THK FILM	Thick Film
PORT	Portable	TIMR	Timer
PREAMP	Preamplifier	TNSLR	Translator
PREC	Precision	TRIG	Trigger
PROG	Program, -mable	TRM	Trim, -mer
PUL	Pulse	TSTR	Transistor
PW	Printed Wire	TYTR	Thyristor
PWB	Printed Wiring Board	UN	Unit
PYES	Polyester	UNIJCT	Unijunction
PYST	Polystyrene	VAR	Variable
QB	Quick Blow	VAR	Varactor
QTZ	Quarz	VENTLR	Ventilator
RC	Remote Control	VIBR	Vibrator
RCVR	Receiver	VLTC	Voltage
REAC	Reactor	VM	Voltmeter
RECHGR	Rechargeable	VR	Voltage regulator
RECTF	Rectifier	W	Watt
REG	Regulate, -d, or	WASH	Washer
REL	Relay	WB	Wide Band
REP	Repeater	WIND	Winding
RES	Resistor	WM	Wattmeter
RF	Radio Frequency	WW	Wire Wound
RHEO	Rheostat	XFMR	Transformer
ROT	Rotary	XMIT	Transmit
SAF	Safety	XMSN	Transmission
SB	Slow Blow	XMTR	Transmitter
SBSTRT	Substrate	XTAL	Crystal
SEL	Select, -or, -ion	ZENR	Zener
SEPR	Separator	ZN	Zinc
SEQ	Sequential		
SH	Shunt		

**COLOUR CODE/
CODE DES COULEURS/
FARBKODE**

0	BK/BLK	BLACK	NOIR	SCHWARZ
1	BN/BRN	BROWN	MARRON	BRAUN
2	RD/RED	RED	ROUGE	ROT
3	OR/ORG	ORANGE	ORANGE	ORANGE
4	YW/YEL	YELLOW	JAUNE	GELB
5	GN/GRN	GREEN	VERT	GRÜN
6	BL/BLU	BLUE	BLEU	BLAU
7	VT/VIO	VIOLET	VIOLET	VIOLET
8	GY/GRY	GREY	GRIS	GRAU
9	WH/WHT	WHITE	BLANC	WEIß