



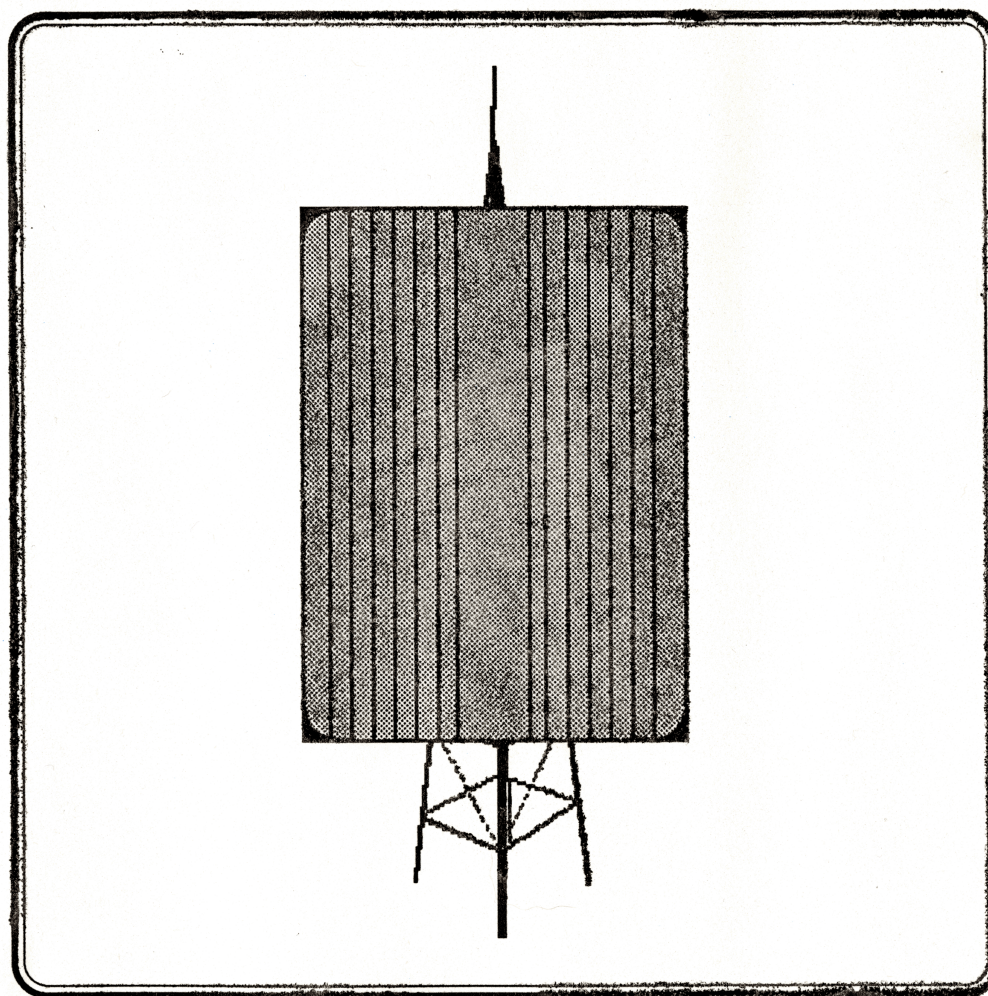
MOTOROLA

Storno

STORNOPHONE 9000

403 - 470 MHz

**FIXED RADIO STATION
MODULE MANUAL**



PUBLICATION SERVICES - COPENHAGEN

Publication no. 68P02046U10

**STORNOPHONE 9000
FIXED RADIO STATION
MODULE MANUAL
403 - 470 MHz**

Publication Services

Date: 9.90

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Old code: 8313:9960

**403 - 470 MHz
MODULE MANUAL**

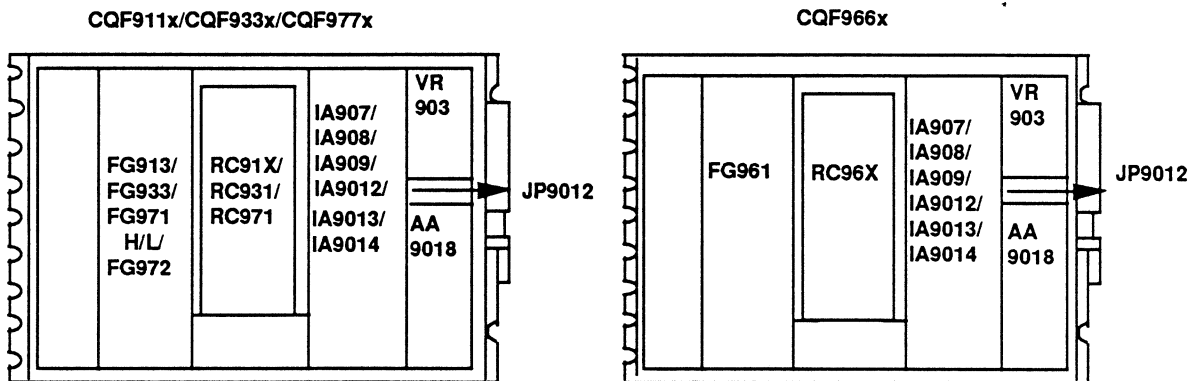
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COLOUR CODE**

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BASIC RADIO MANUAL**

| | |
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RECEIVER

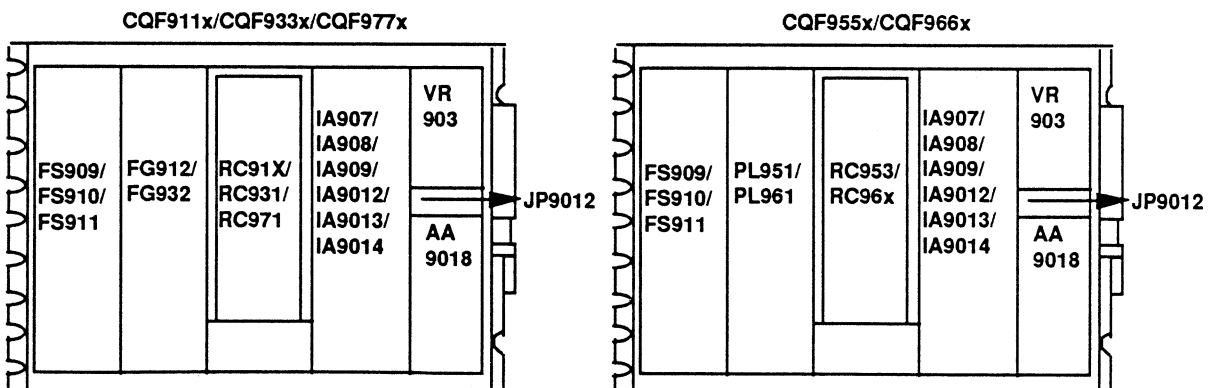
MULTIPLIER VERSION



| 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

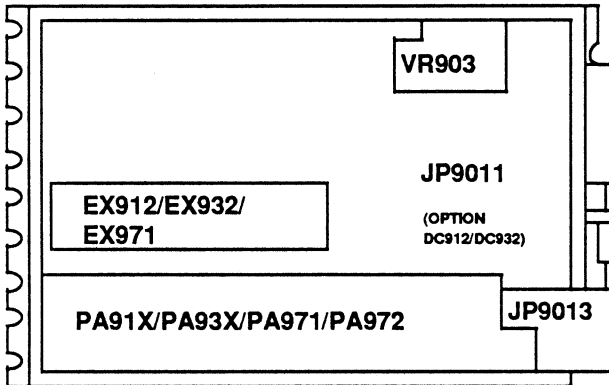


| FREQ. SYNTH. MODULE | CHANNEL SPACING |
|---------------------|-----------------|
| FS909 | 12.5kHz |
| FS9010 | 20.0kHz |
| FS9011 | 25.0 kHz |

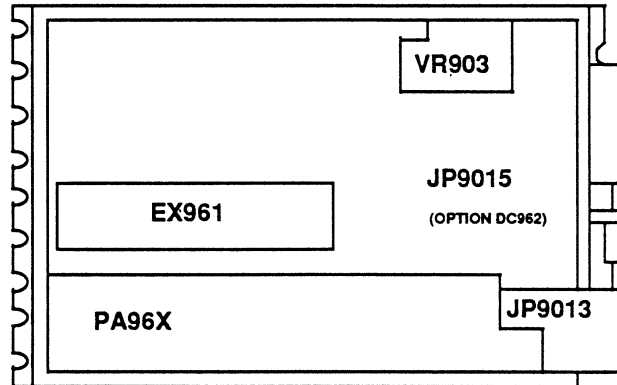
TRANSMITTER

MULTIPLIER VERSION

CQF911x / CQF933x / CQF977x

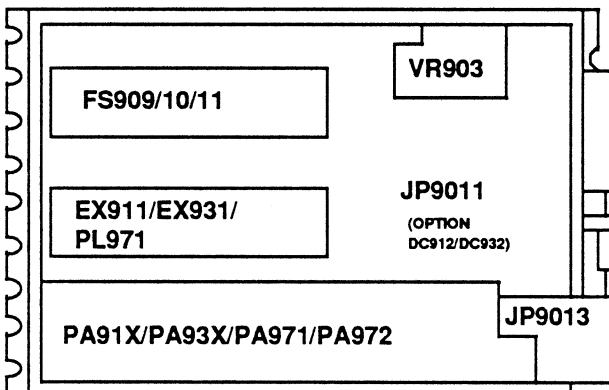


CQF966x

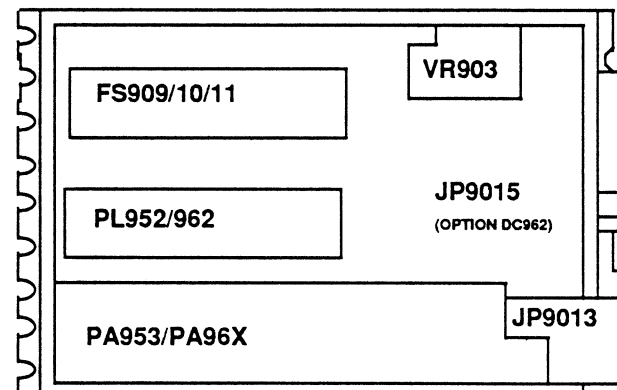


SYNTHESIZER VERSION

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 their 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:

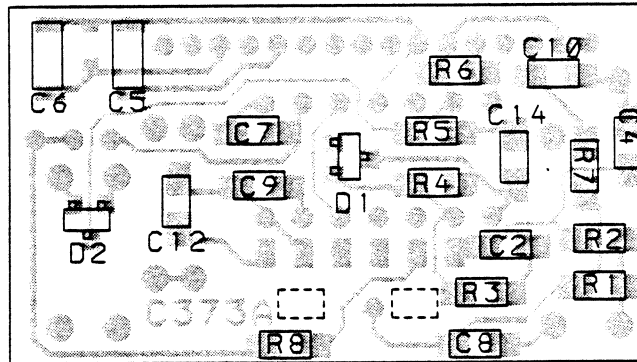
| | | |
|------------|-------------------|-------------|
| Mike input | 300 Hz - 3000 Hz: | +1, -3 dB |
| | 400 Hz - 2700 Hz: | +1, -1.5 dB |

AA902:

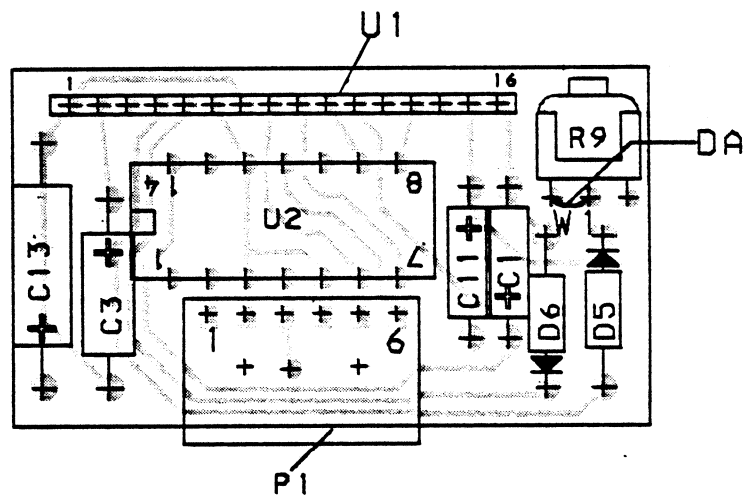
| | | |
|------------|-------------------|-------------|
| Mike input | 300 Hz - 2550 Hz: | +1, -3 dB |
| | 3000 Hz: | +1, -4.5 dB |

Distorsion

Less than 1% for 1000 Hz at threshold



BACKSIDE OF BOARD



FRONTSIDE OF BOARD

**AUDIO PROCESSOR AA901-2
COMPONENT LAYOUT**

D403.786/2



2.3

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 | | | |

X403.599/6

DATE: 09/20/90

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.

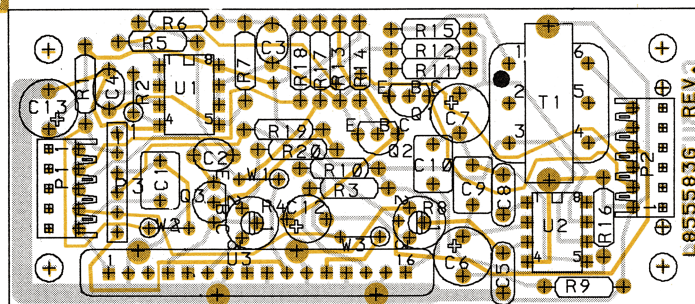
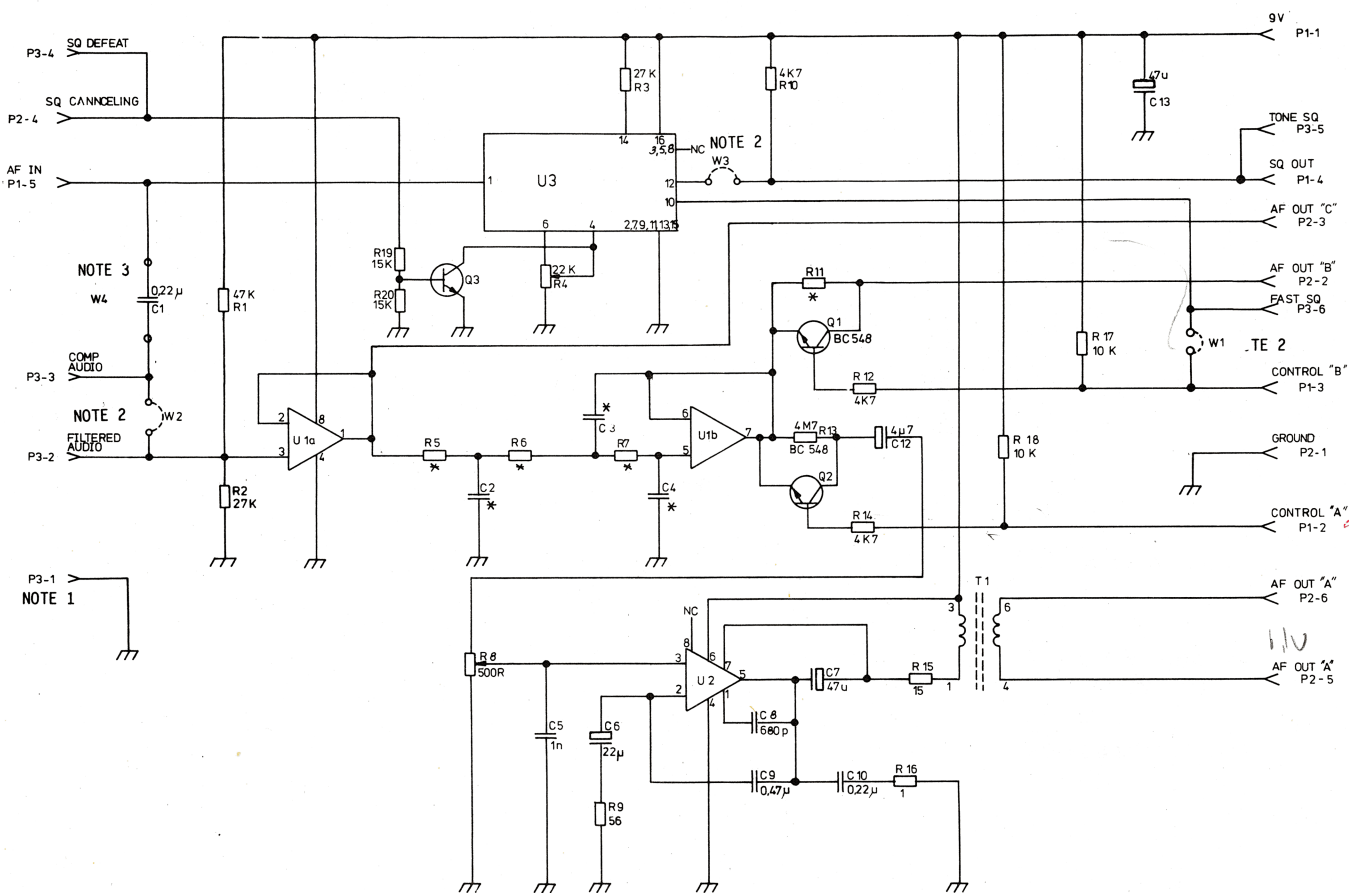
Output impedance
approx. 0 ohm

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.

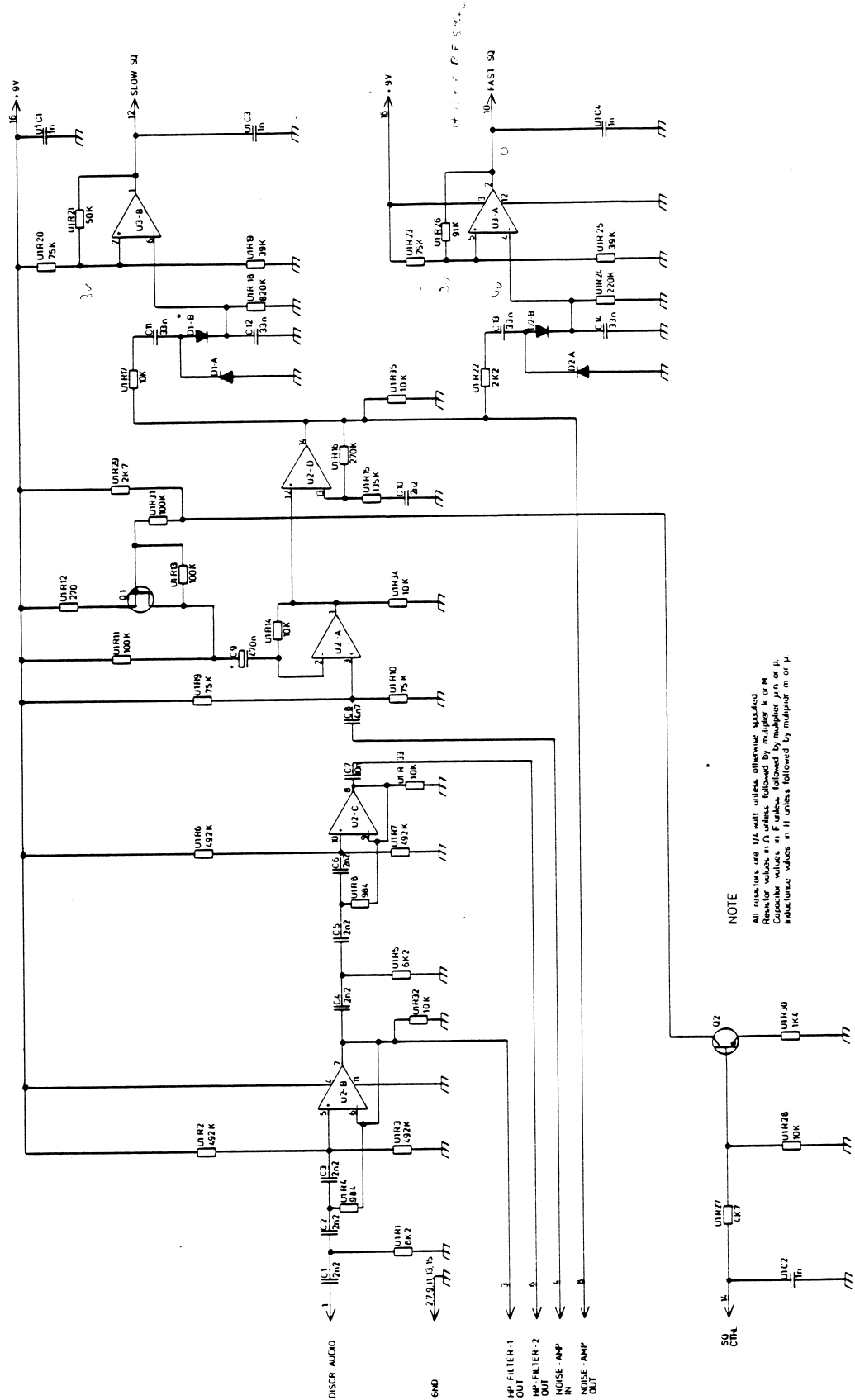
2. W1 IS MOUNTED, WHEN GATING OF NON-DE -EMPHASIZED ("AF OUT -B") IS TO BE CONTROLLED BY THE "FAST SQ" SIGNAL. W2 AND W3 ARE TO BE USED TOGETHER WITH CG9010 (PRIVATE LINE MODULE). IN AA9022 THE COMPONENTS C1, Q1, R12, R17 AND W1 ARE OMITTED AND C1 IS REPLACED BY W4.

* SEE PARTSLIST X403.893.

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

AUDIO AMPLIFIER AA9018/AA9022

D403.859/7



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 | | | |
| 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 | | | |

X403.893/7

DATE: 09/20/90

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.

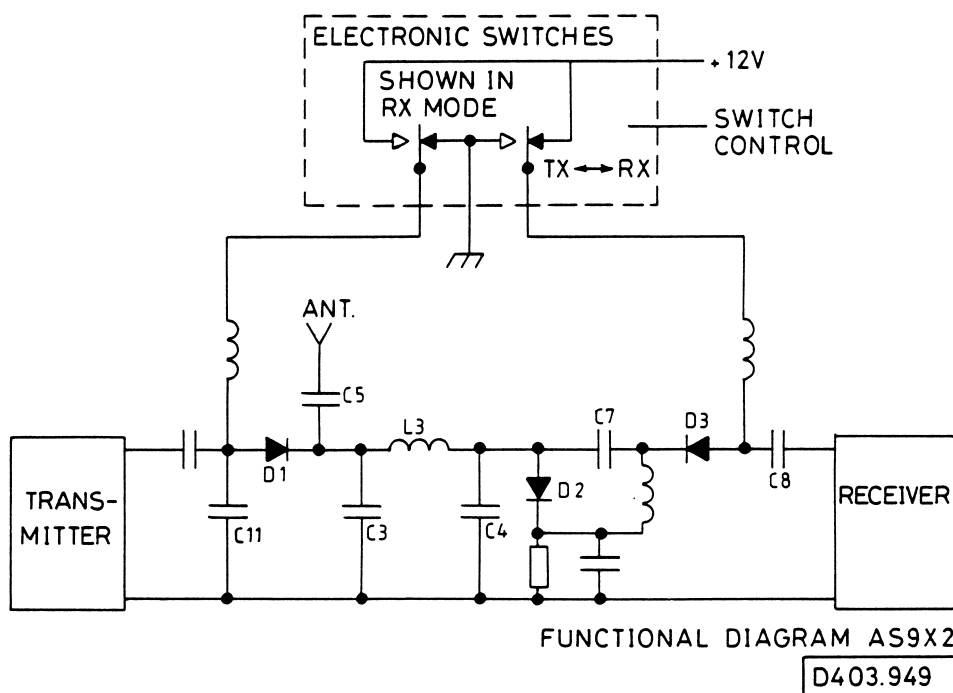
The receiver signal is then able to pass from the

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

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 | | | |
| | | NON REFERENCED ITEMS: | | | |
| | A700133P22 | 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 | | | |

X403.944/3

DATE: 09/20/90

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.

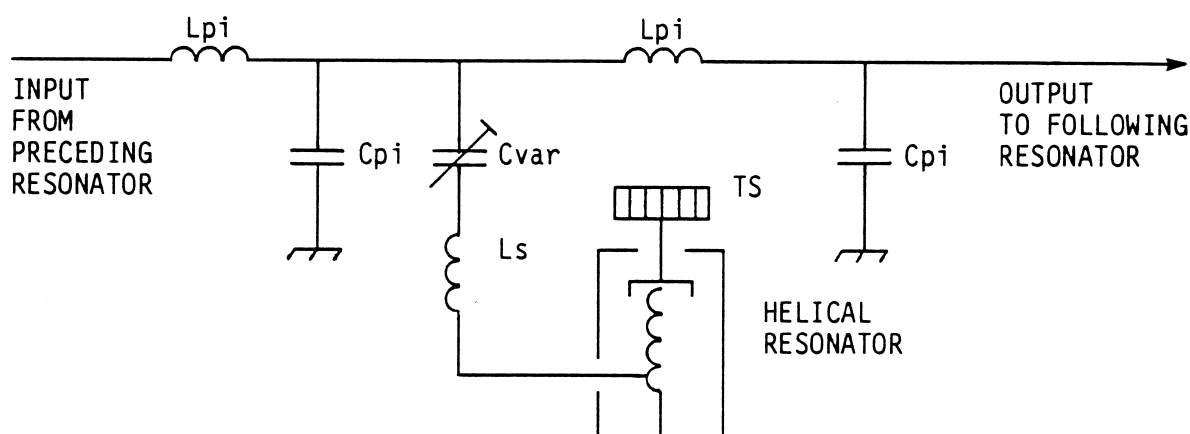
In the TX section there is a notch on the RX frequency to prevent the TX sideband noise from entering the receiver.

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:

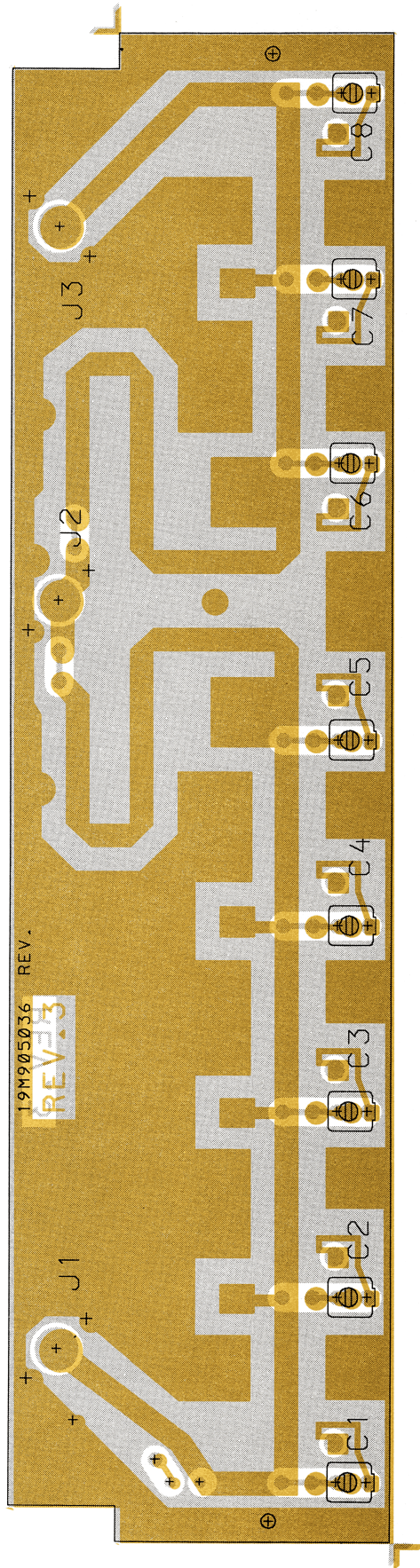
4.5 - 8 MHz 0.8 MHz >30 dB

8 - 15 MHz 2.0 MHz >30 dB

RX in TX branch:

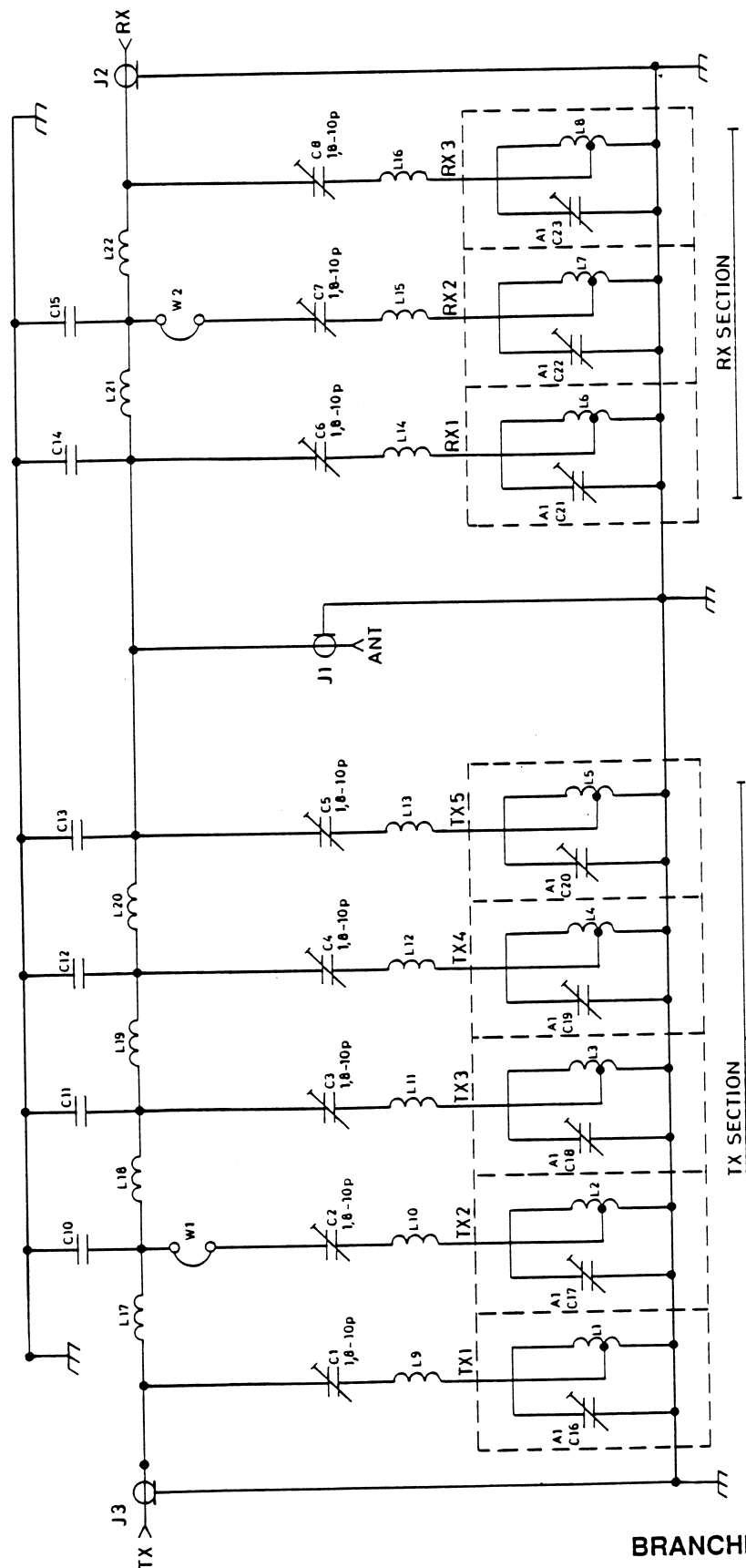
4.5 - 8 MHz 0.8 MHz >70 dB

8 - 15 MHz 2.0 MHz >70 dB



BRANCHING FILTER BF961 COMPONENT LAYOUT

D405.630



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 | | | |

X403.960/5

DATE: 09/20/90

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 | | | | | | | |
|----------------------|--------------------|--------|--------|---|---|---|---|---|---|---|
| 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 0 = Switch closed X = Do not care

Table 1. Frequency programming table

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:

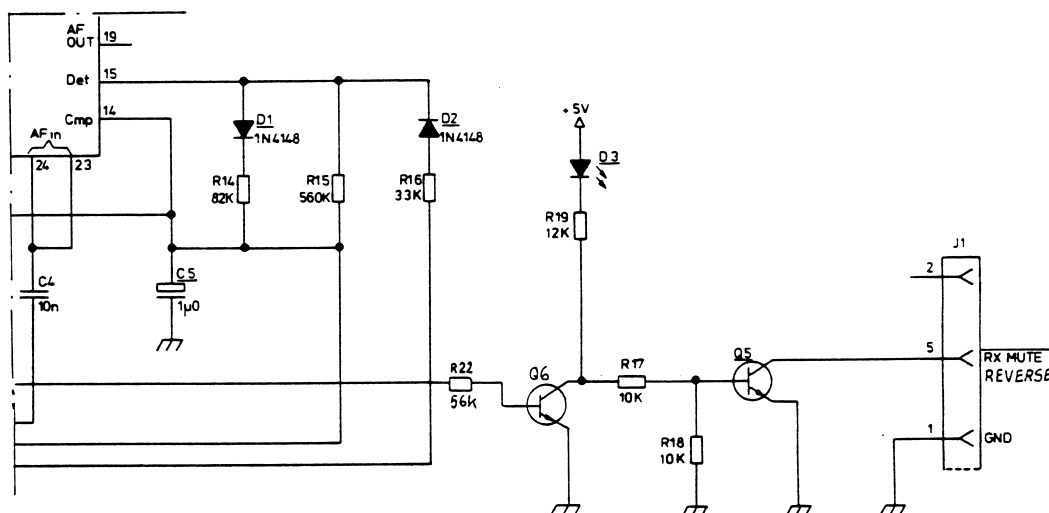
Normally, the strap W2 is removed when CTCSS

(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 ± 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.

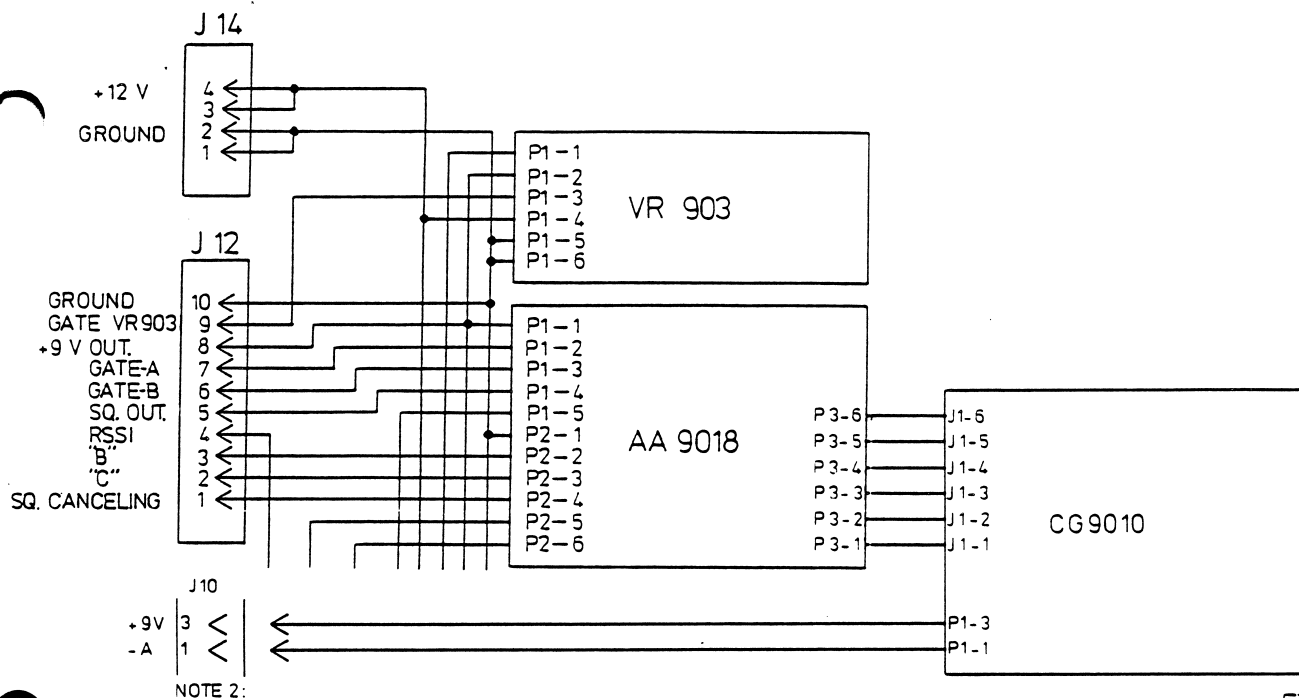


FIGURE 1.

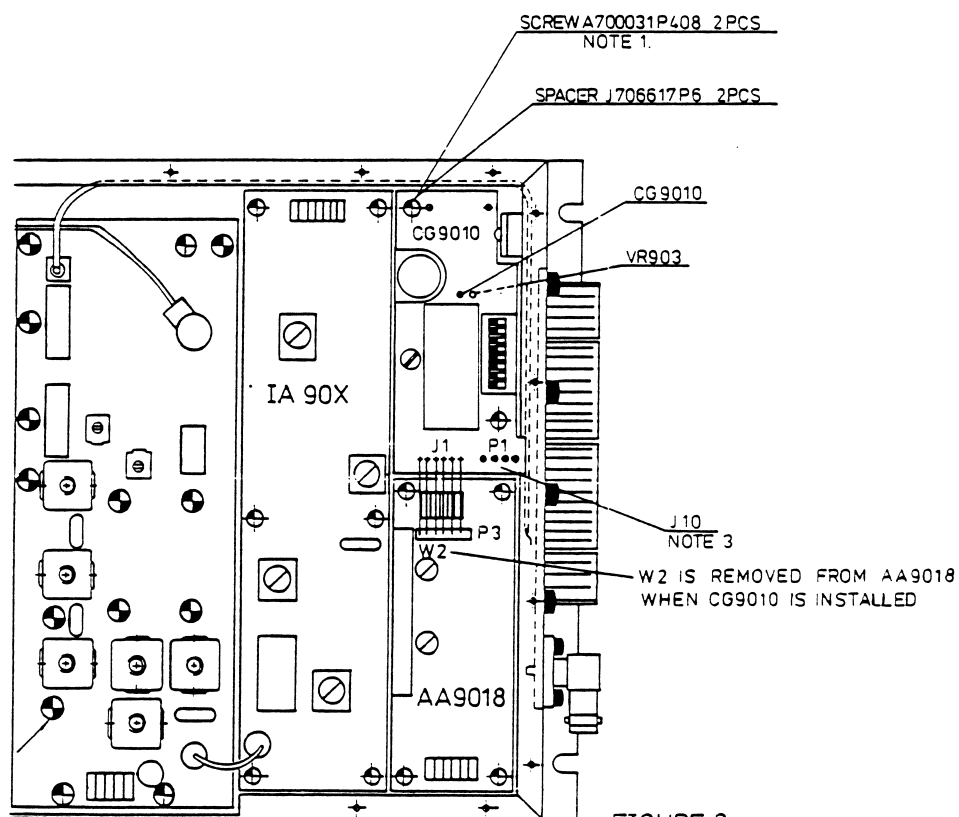


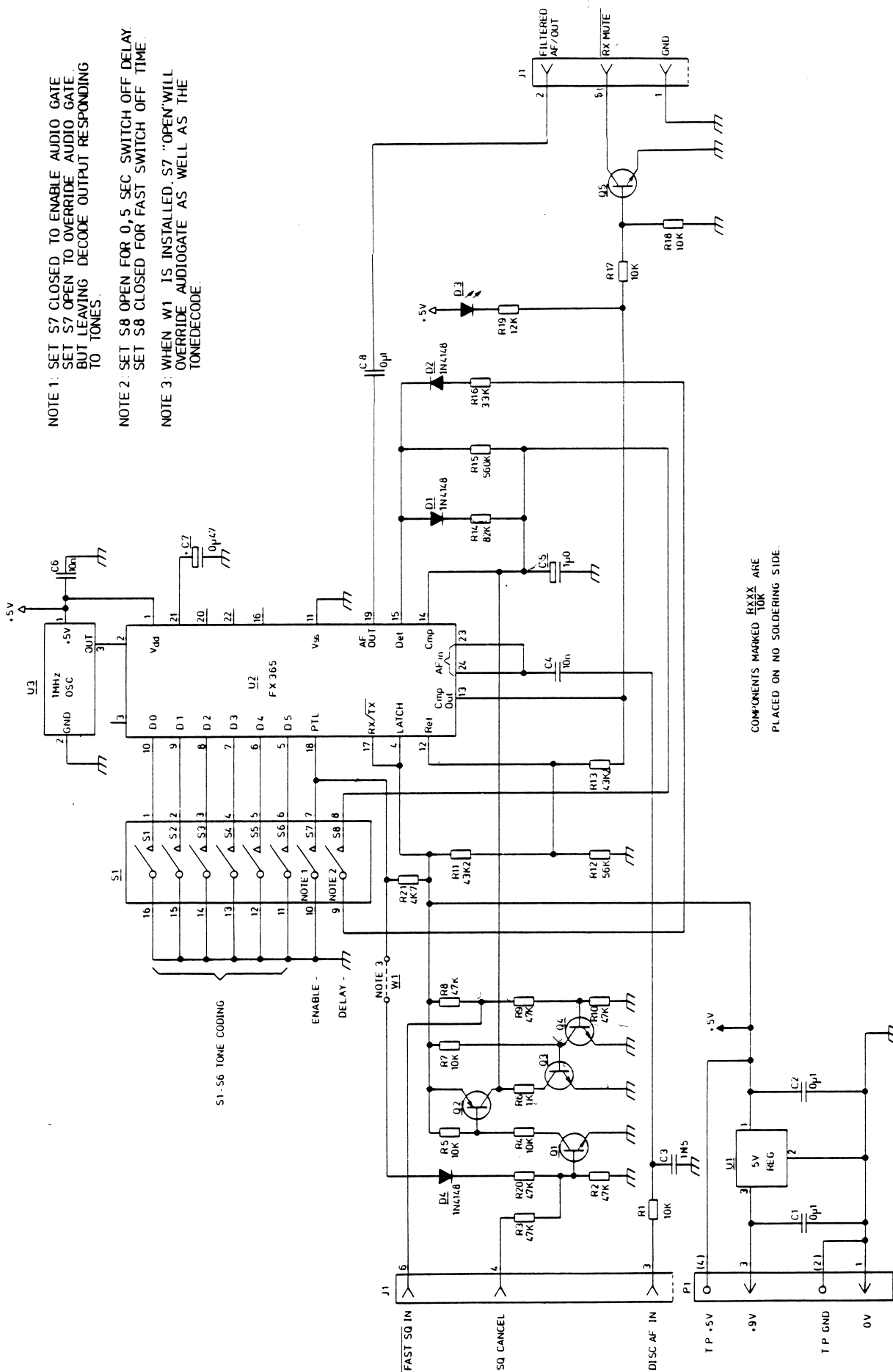
FIGURE 2.

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

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 0R 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) | | | |

X405.081/3

DATE: 09/20/90

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 ± 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 | | | | | | | |
|-------------------|-----------------|--------|--------|---|---|---|---|---|---|---|
| 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 0 = Switch closed X = Do not care

Table 2. Frequency programming table

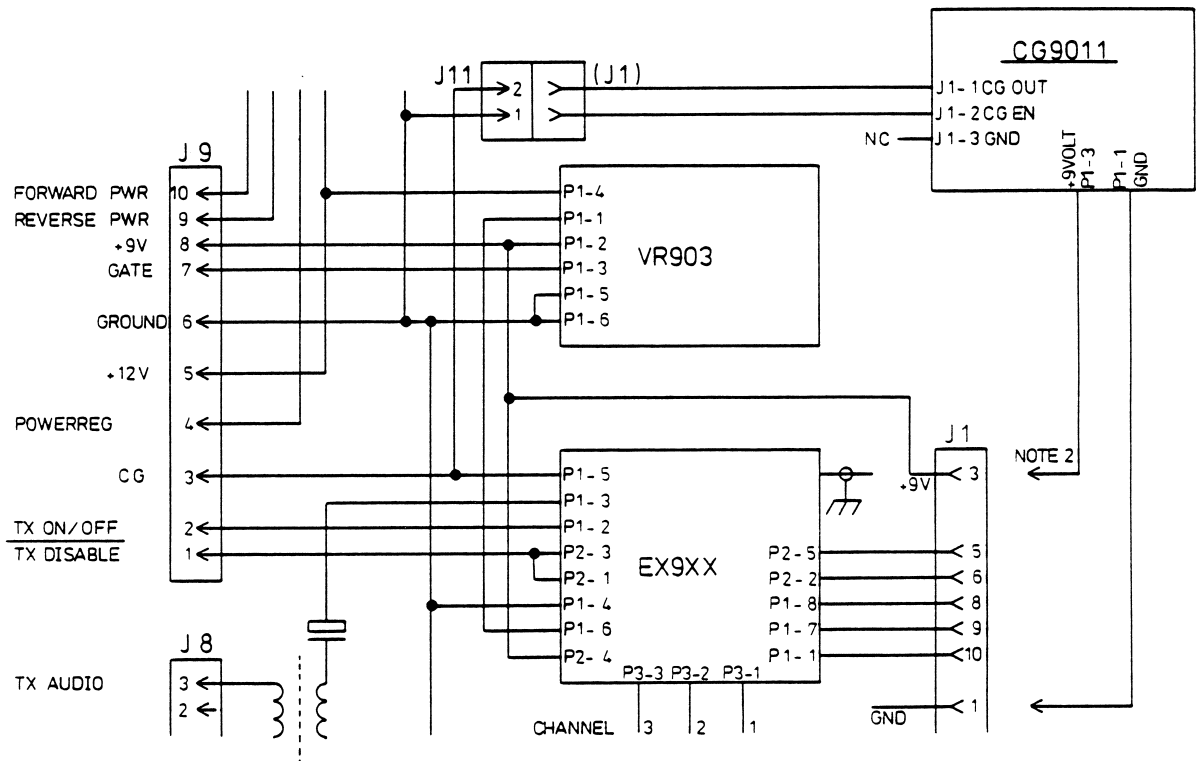


FIGURE 1:

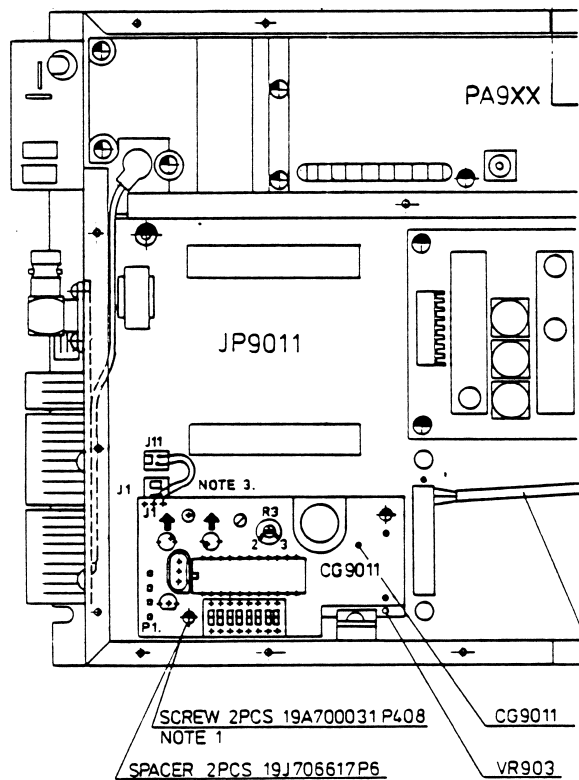


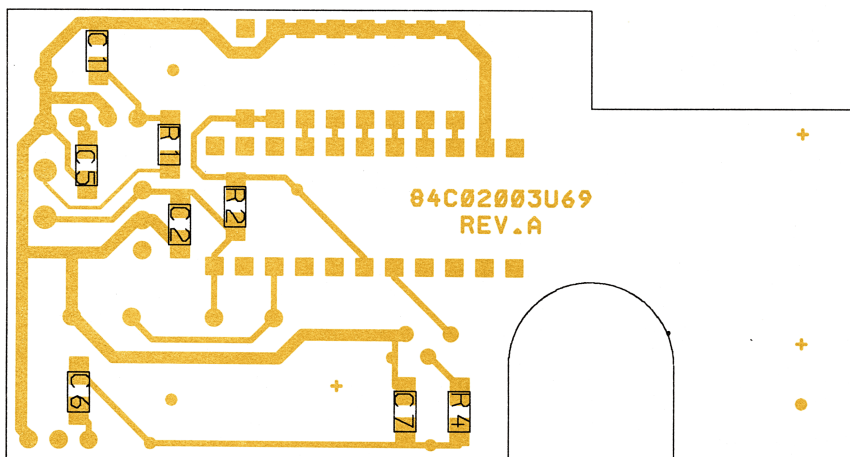
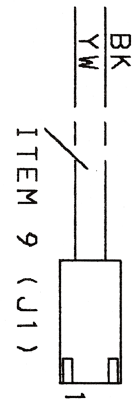
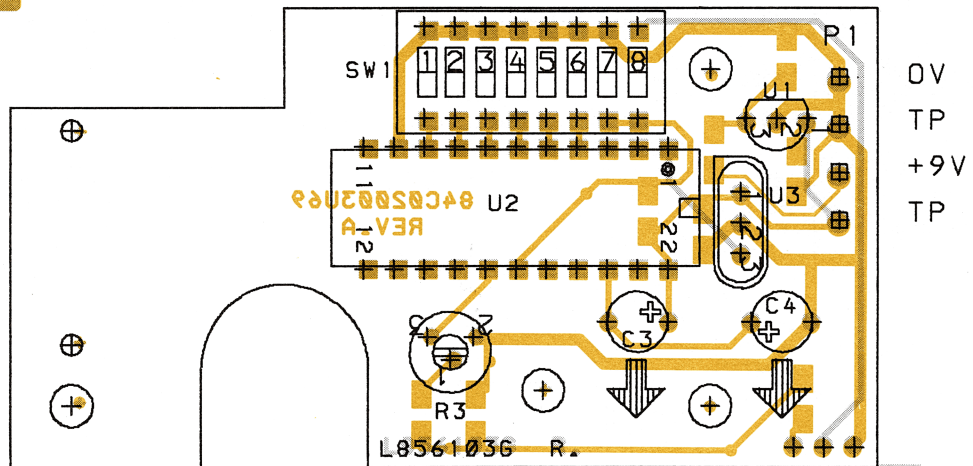
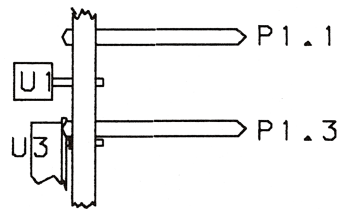
FIGURE 2:

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

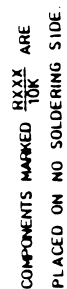
M405.501



CHANNEL GUARD CG9011
COMPONENT LAYOUT

D405.097/2

CODE NO. L856103G1 - GLN7065A



NOTE 1: S8 IS NORMALLY OFF. IF S8 IS CLOSED, AND S7 OPEN, REMOTE ENABLE VIA J1 PIN 2 IS POSSIBLE (REQUIRES MODIFICATION OF JP9011).

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) | | | |

X405.082/3

DATE: 09/20/90

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

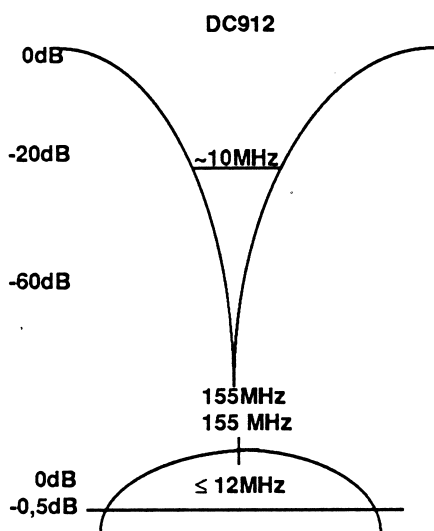
Input impedance
50 ohm

Max. power handling
25 W

Output impedance
50 ohm

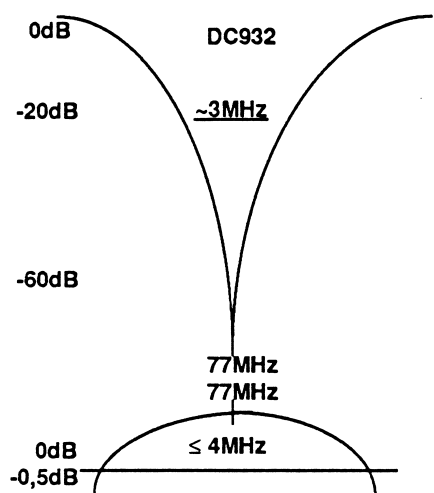
Temperature
from -40°C to +85°C

| | 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 |



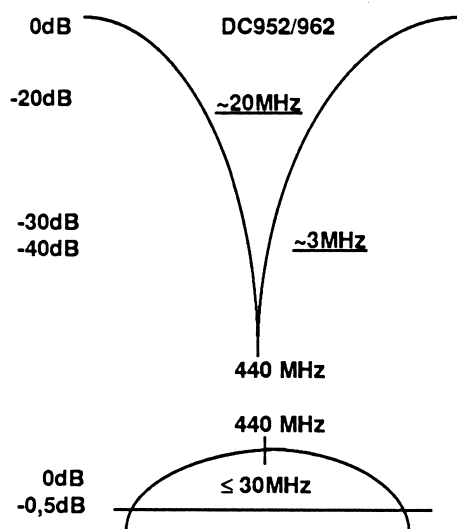
TYPICAL FILTER CURVE FROM ANTENNA TO TRANSMITTER

TYPICAL FILTER CURVE FROM TRANSMITTER TO ANTENNA



TYPICAL FILTER CURVE FROM ANTENNA TO TRANSMITTER

TYPICAL FILTER CURVE FROM TRANSMITTER TO ANTENNA

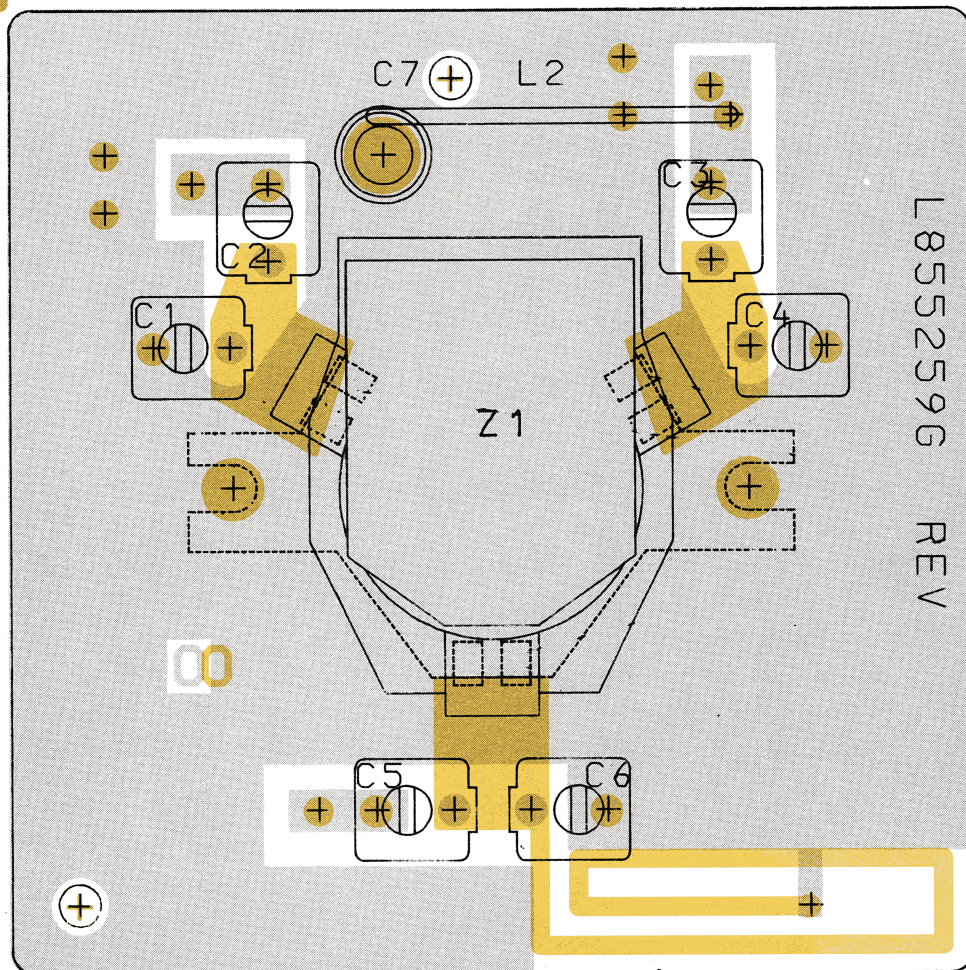


TYPICAL FILTER CURVE FROM ANTENNA TO TRANSMITTER

TYPICAL FILTER CURVE FROM TRANSMITTER TO ANTENNA

FILTER CURVE DC912/932/952/962

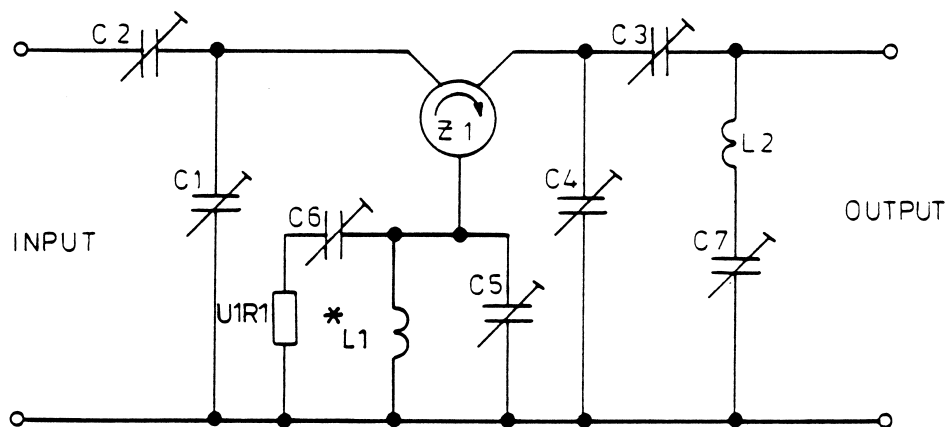
D404.206



| 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) | | | |

X403.961/3

DATE: 09/20/90

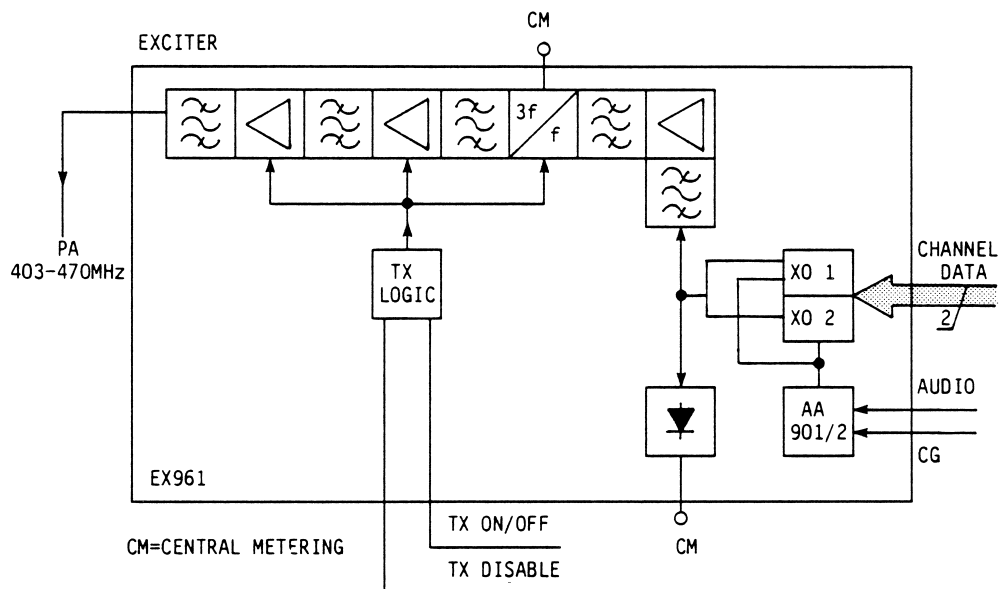
EX961

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

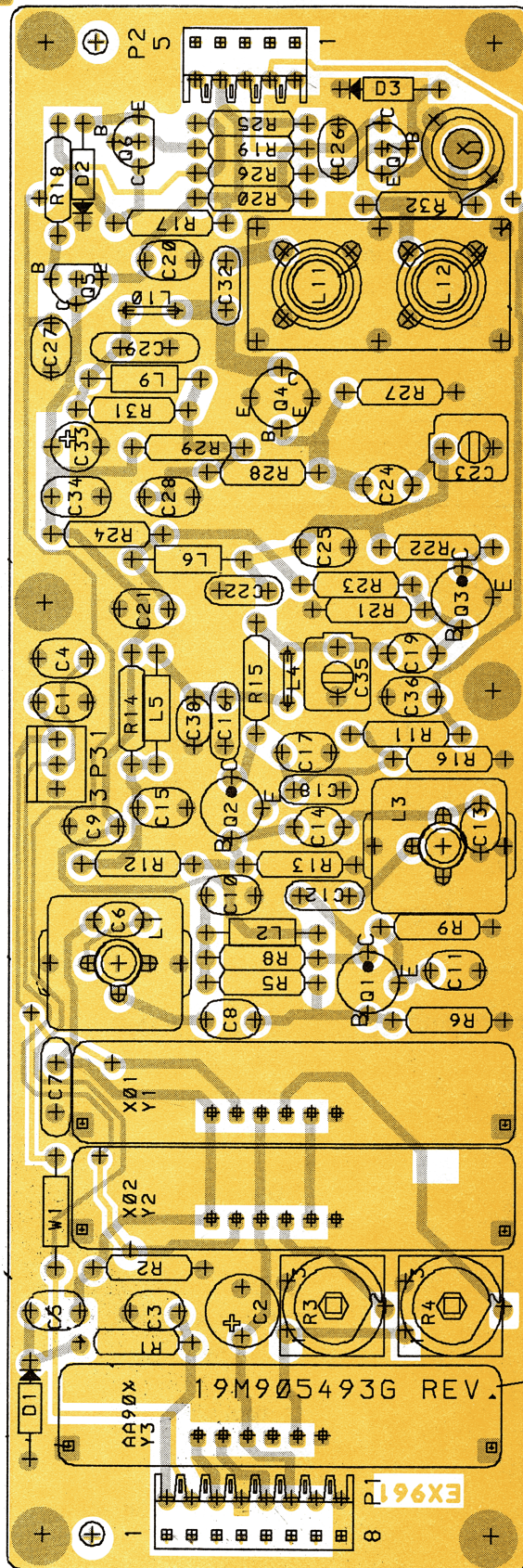
4.5 MHz

AF distortion (EIA)

<2%

Temperature range

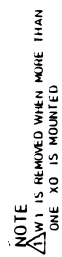
-40°C to +85°C



EXCITER EX961

D403.395/2

CODE NO. 19M905493G1 - GTE6007A



| | |
|-------------|------------|
| MODULE NO | REV LETTER |
| 19M905493G1 | A |

D403.385/3

PARTS LIST FOR EXCITER EX961

| Pos | Code/Kit No. | Description | Pos | Code/Kit No. | Description |
|-----|--------------|--------------------------|-----------|--------------|----------------------------|
| | GTE6007A | M905493G1 EX961 | R19 | A700019P48 | RES DEPC 8K2 5% 1/4W |
| C02 | 2313749C48 | CAP TA SOL 22U 20% 16V | R20 | A700019P49 | RES DEPC 10K 5% 1/4W |
| C03 | A700233P5 | CAP CER CL2 470P 20% 50V | R21 | A700019P28 | RES DEPC 180R 5% 1/4W |
| C04 | A700233P5 | CAP CER CL2 470P 20% 50V | R22 | A700019P15 | RES DEPC 15R 5% 1/4W |
| C05 | A700233P5 | CAP CER CL2 470P 20% 50V | R23 | A700019P42 | RES DEPC 2K7 5% 1/4W |
| C06 | A700235P11 | CAP CER N150 6P8.25P 50V | R24 | A700019P15 | RES DEPC 15R 5% 1/4W |
| C07 | A700235P23 | CAP CER N150 68P 5% 50V | R25 | A700019P49 | RES DEPC 10K 5% 1/4W |
| C08 | A700235P13 | CAP CER N150 10P 5% 50V | R26 | A700019P61 | RES DEPC 100K 5% 1/4W |
| C09 | A700233P5 | CAP CER CL2 470P 20% 50V | R27 | A700019P24 | RES DEPC 82R 5% 1/4W |
| C10 | A700233P5 | CAP CER CL2 470P 20% 50V | R28 | A700019P39 | RES DEPC 1K5 5% 1/4W |
| C11 | A700233P5 | CAP CER CL2 470P 20% 50V | R29 | A700019P7 | RES DEPC 3R3 5% 1/4W |
| C12 | A700235P17 | CAP CER N150 22P 5% 50V | R31 | A700019P27 | RES DEPC 150R 5% 1/4W |
| C13 | A700235P10 | CAP CER N150 5P6.25P 50V | R32 | A700019P9 | RES DEPC 4R7 5% 1/4W |
| C14 | A700235P8 | CAP CER N150 3P9.25P 50V | W0 | A700184P1 | WIRE JUMPER (ZEROHM) |
| C15 | A700233P5 | CAP CER CL2 470P 20% 50V | | 8402003U83A | BD PW |
| C16 | A700235P18 | CAP CER N150 27P 5% 50V | | | NON REFERENCED ITEMS: |
| C17 | A700233P5 | CAP CER CL2 470P 20% 50V | J707745P1 | | SHIELD MODIF. CSTG HELICAL |
| C18 | A700235P16 | CAP CER N150 18P 5% 50V | A700069P1 | | CAN (2 used) |
| C19 | A700235P7 | CAP CER N150 3P3.25P 50V | J706109P1 | | SCR TUN (2 used) |
| C20 | A700233P5 | CAP CER CL2 470P 20% 50V | J706110P1 | | SPG TUN (2 used) |
| C21 | A700233P5 | CAP CER CL2 470P 20% 50V | A701329P2 | | CONT EL PIN (18 used) |
| C22 | A700235P17 | CAP CER N150 22P 5% 50V | A701785P2 | | CONTACT (6 used) |
| C23 | J706003P1 | CAP VAR 1.8/10PF | | | |
| 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 | | | |
| 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

FG961

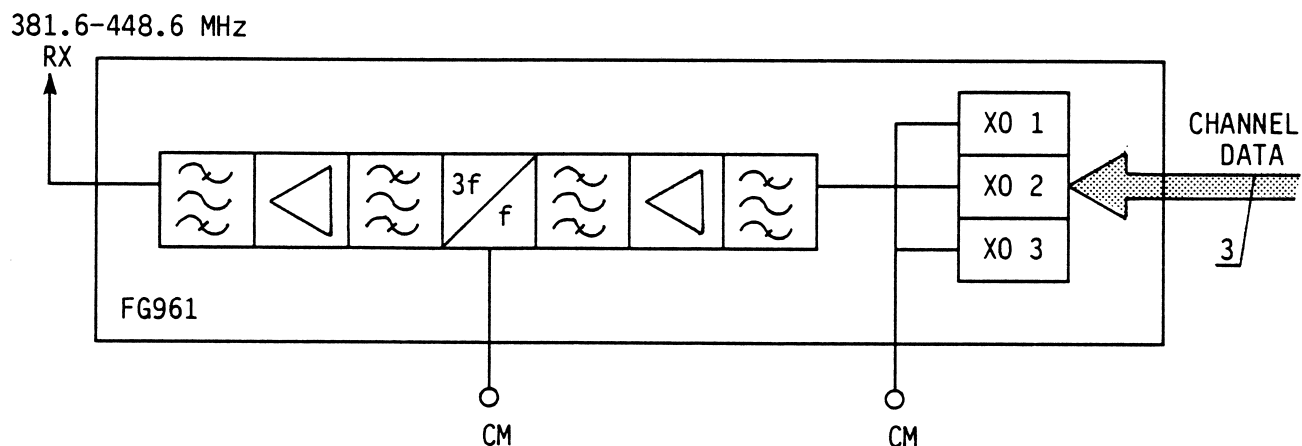
FREQUENCY GENERATOR

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

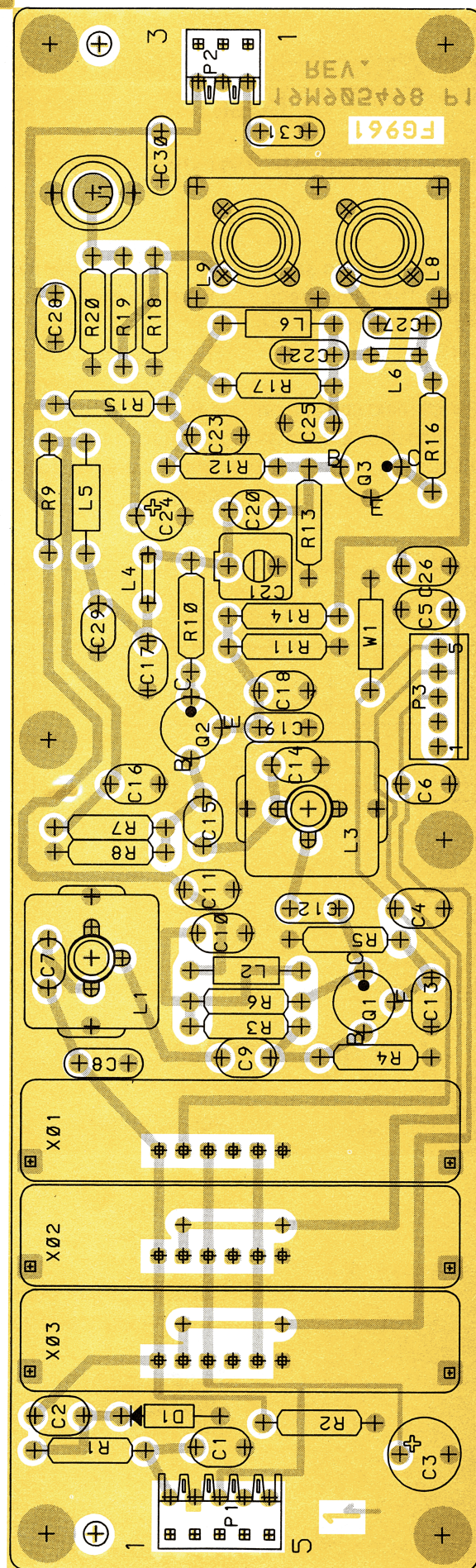
Max. channel spacing
4.5 MHz

Supply voltage
9 V $\pm 5\%$

XO voltage
9 V $\pm 0.5\%$

Current consumption
<100 mA excl oscillators

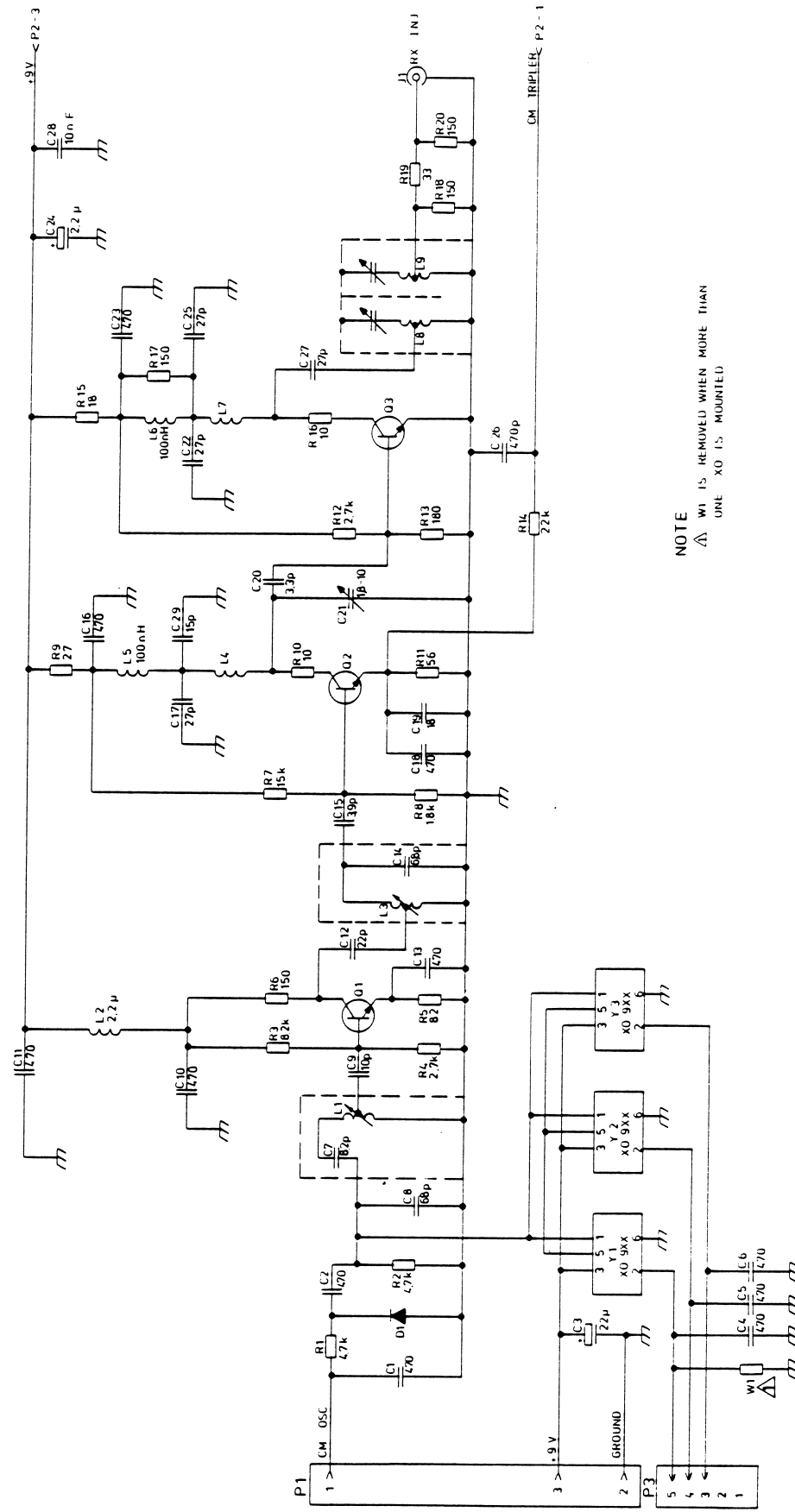
Temperature range
-40°C to +85°C



FREQUENCY GENERATOR FG961

D403.394/2

CODE NO. 19M905497G1 - GRE6020A



NOTE
 Δ 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

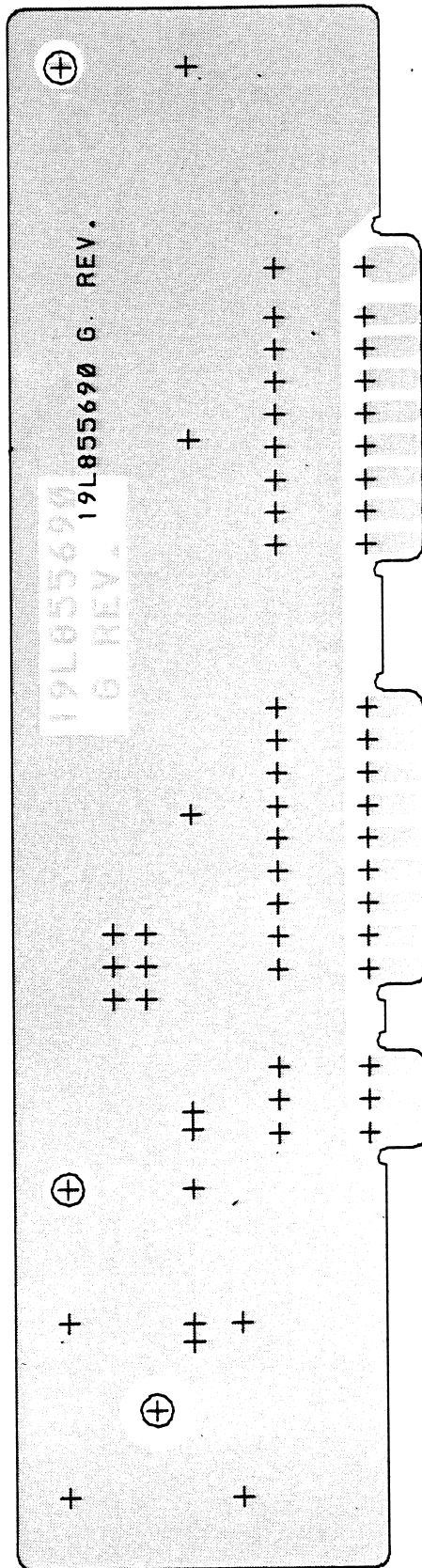
| | |
|--------|-------|
| Width | 29 mm |
| Length | 96 mm |

Temperature range

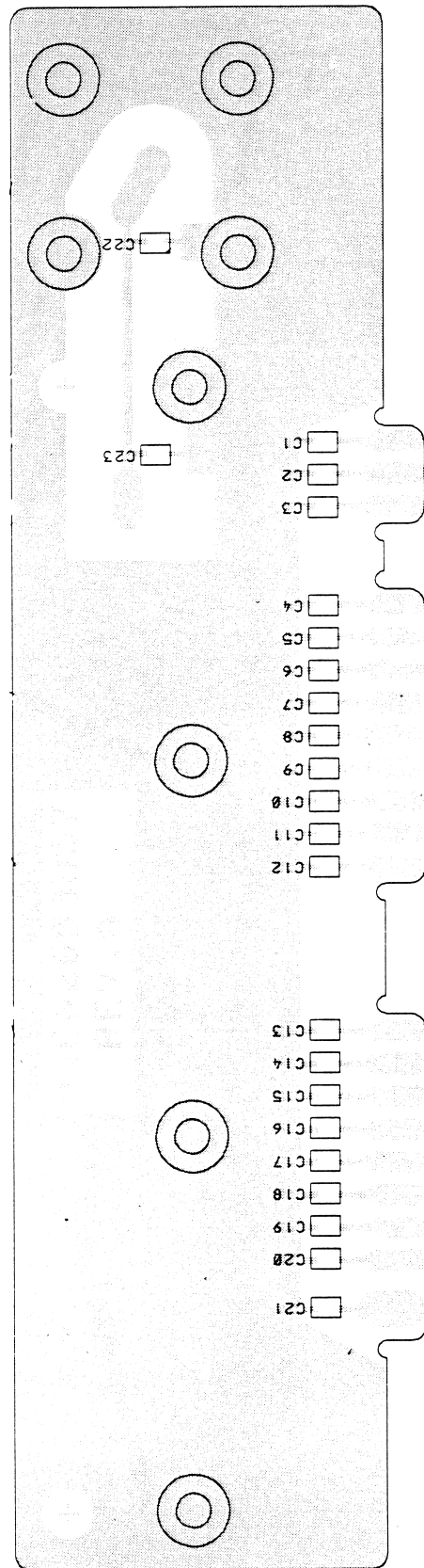
-40°C to +85°C



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 | | | |
| | J708450P2 | NON REFERENCED ITEMS: SPC,SELF-CNCH 5.6X1.5XM3 (8 used) SEE ELECTRICAL DIAGRAM D403.861 | | | |

X404.605/6

DATE: 09/20/90

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

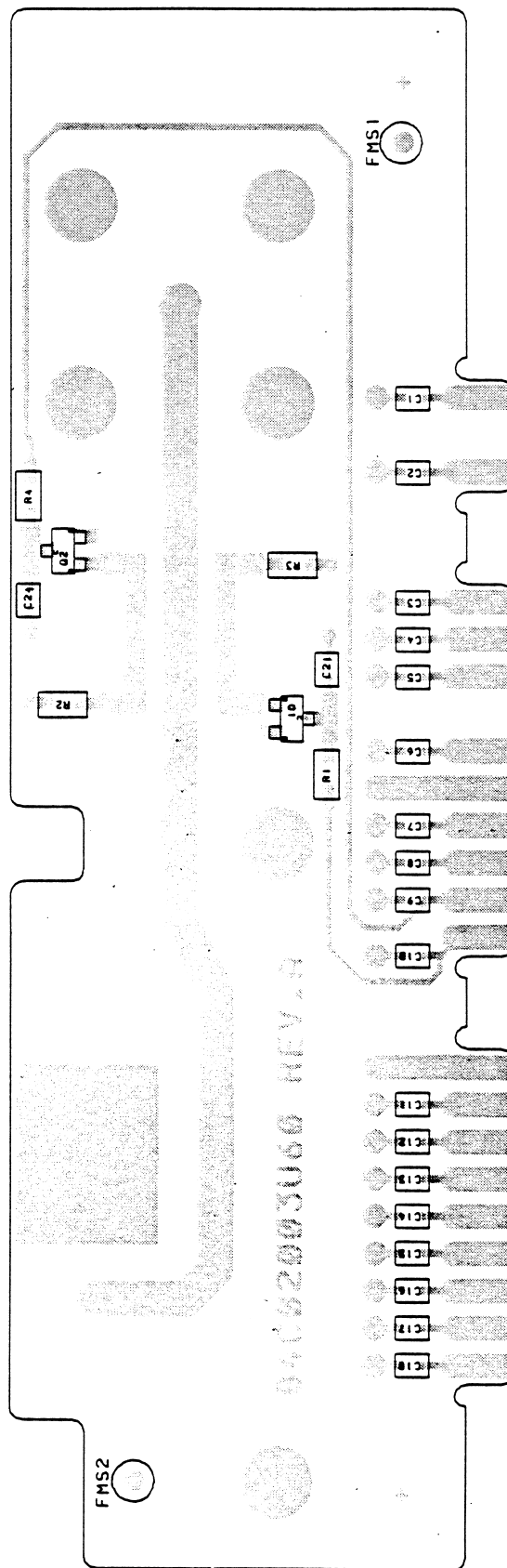
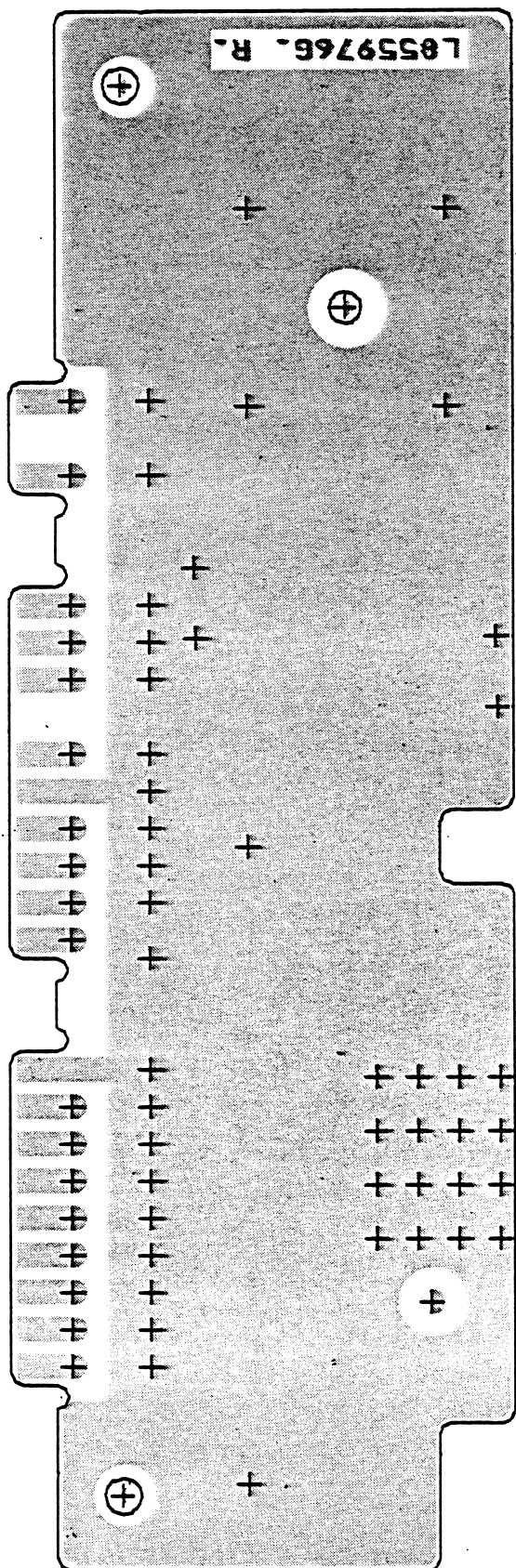
Dimensions

Width: 34 mm

Length: 106 mm

Temperature range

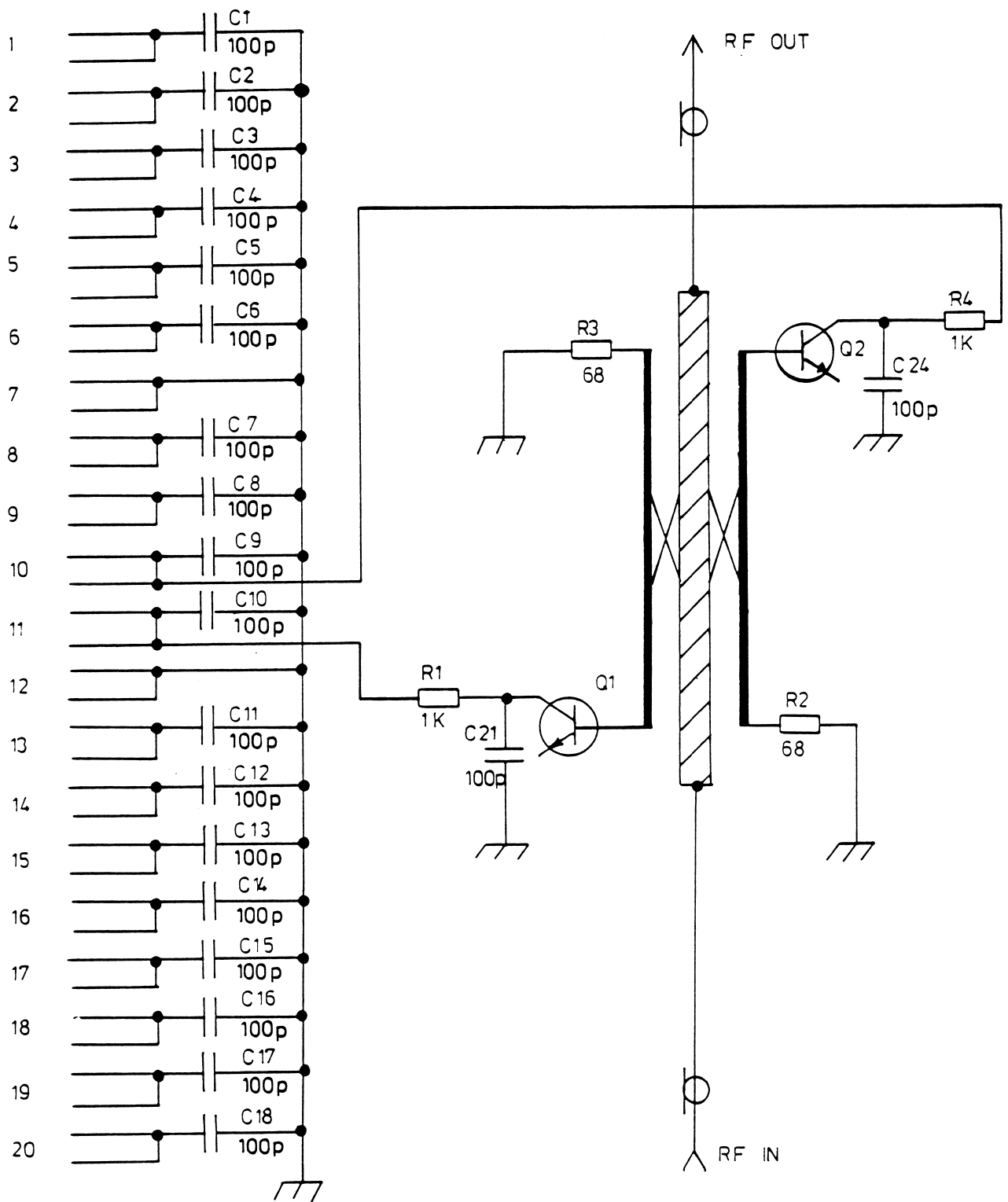
-40°C to +85°C



**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) | | | |

X404.760/4

DATE: 09/20/90

FS90x

FREQUENCY SYNTHESIZER

The frequency synthesizer module is used to generate frequencies for up to 256 channels and 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 | 256 |

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).

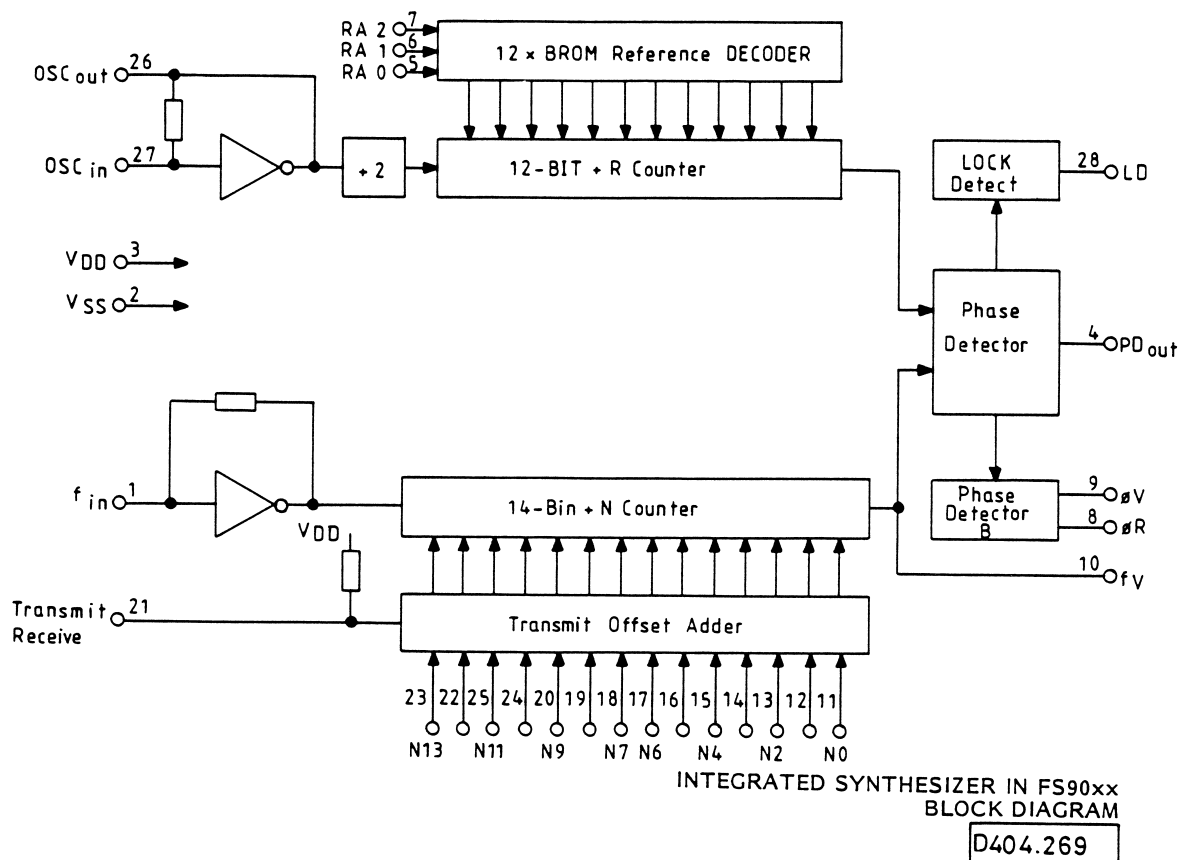
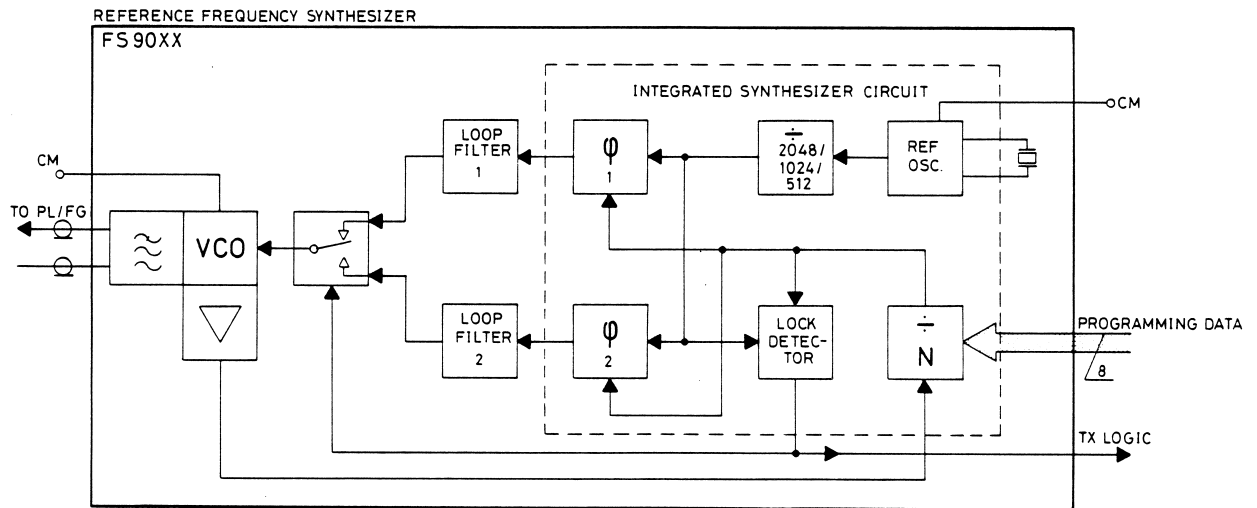
The VCO signal is fed through the programmable divider down to a frequency equal to the reference when the synthesizer's phase loop is locked.

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.



| 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:

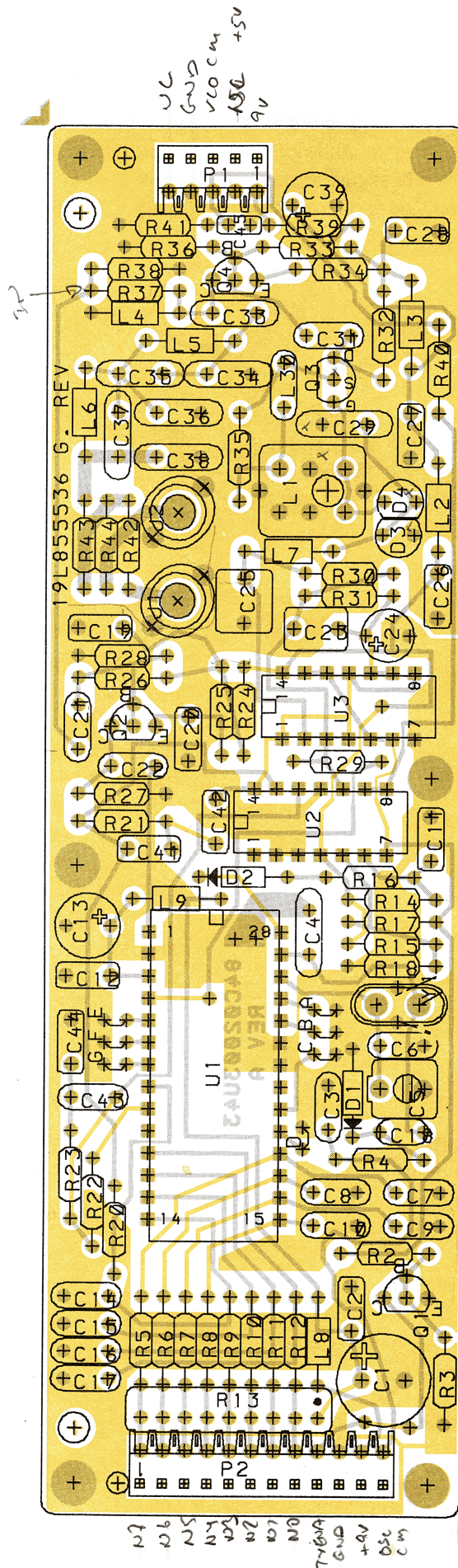
| | |
|------------|--------|
| 1 channel: | ≤ 5 ms |
| random: | ≤ 8 ms |

FS9010/FS9011:

| | |
|-----------|--------|
| 1 channel | ≤ 4 ms |
| random: | ≤ 6 ms |

Temperature Range

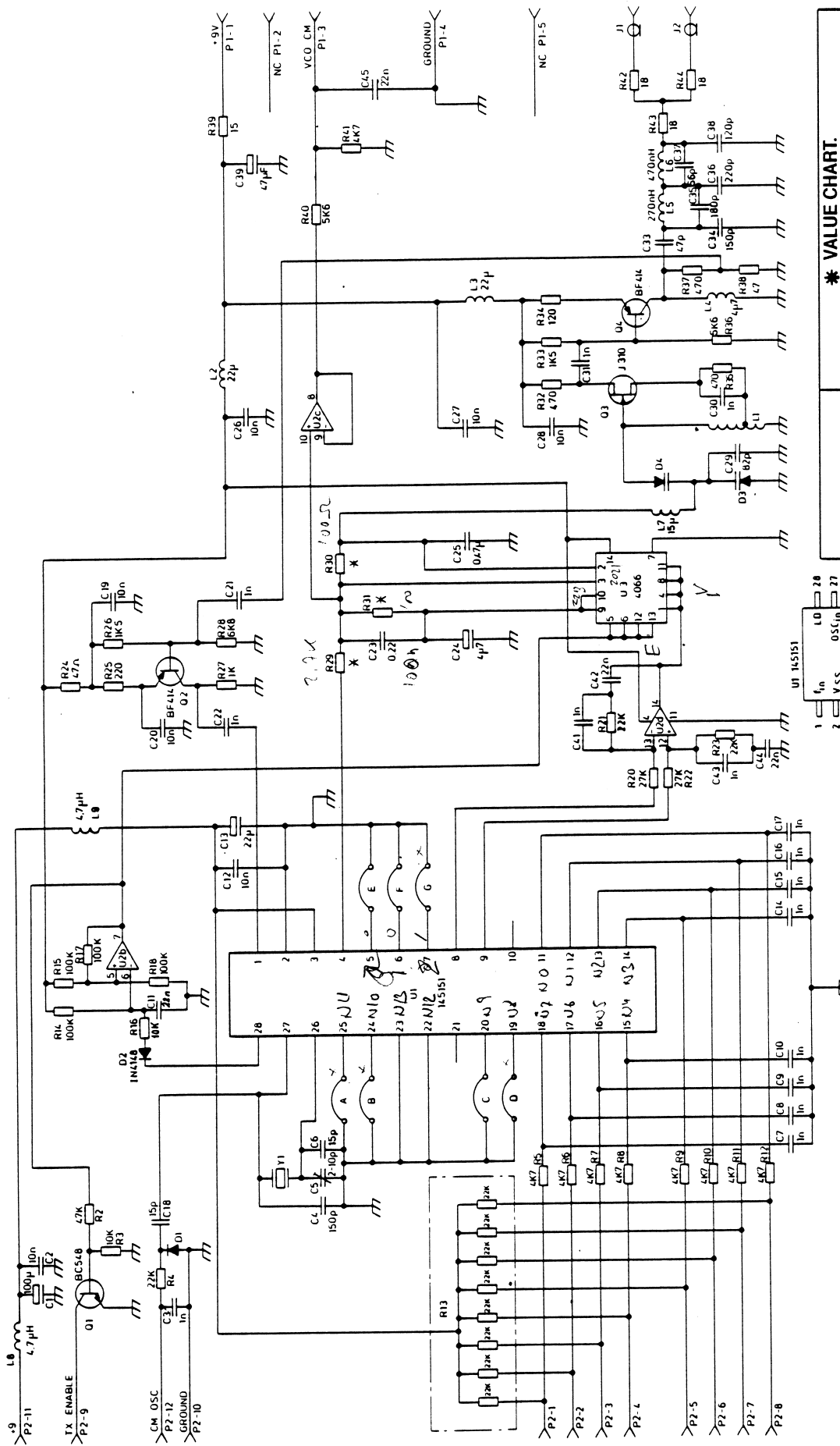
- 40°C to + 85°C



FREQUENCY SYNTHESIZER FS90XX COMPONENT LAYOUT

D403.671/5

REV.1



*** 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 |

U1 145151

| | | | |
|----|-----------------|-------------------|----|
| 1 | f _{in} | L0 | 28 |
| 2 | V _{SS} | 05C _{in} | 27 |
| 3 | V _{DD} | OSC out | 26 |
| 4 | PD out | N11 | 25 |
| 5 | RA0 | N10 | 24 |
| 6 | RA1 | N13 | 23 |
| 7 | RA2 | N12 | 22 |
| 8 | RA | N14 | 21 |
| 9 | RA | N15 | 20 |
| 10 | RA | N16 | 19 |
| 11 | RA | N17 | 18 |
| 12 | RA | N18 | 17 |
| 13 | RA | N19 | 16 |
| 14 | RA | N20 | 15 |

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% |
| | GLN7070A | FS907 : CH. SPAC. 6.25 kHz | R003 | A700019P49 | RES DEPC 1/4W 10K 5% |
| | GLN7044A | L855536G3 (C) | R004 | A700019P53 | RES DEPC 1/4W 22K 5% |
| | GLN7045A | FS908 : CH. SPACING 10 kHz | R005 | A700019P45 | RES DEPC 1/4W 4K7 5% |
| | GLN7046A | L855536G4 (D) | R006 | A700019P45 | RES DEPC 1/4W 4K7 5% |
| | | FS909 : CH. SPACING 12.5 kHz | R007 | A700019P45 | RES DEPC 1/4W 4K7 5% |
| | | L855536G5 (E) | R008 | A700019P45 | RES DEPC 1/4W 4K7 5% |
| | | FS9010: CH. SPACING 20 kHz | R009 | A700019P45 | RES DEPC 1/4W 4K7 5% |
| | | L855536G6 (F) | R010 | A700019P45 | RES DEPC 1/4W 4K7 5% |
| | | FS9011: CH. SPACING 25 kHz | R011 | A700019P45 | RES DEPC 1/4W 4K7 5% |
| C001 | J706005P4 | CAP ELECT 100U 16V | R012 | A700019P45 | RES DEPC 1/4W 4K7 5% |
| C002 | J707412P3 | CAP PYES 10N 10% | R013 | J706216P6 | RES NETW 8X 22K 5% |
| C003 | A700233P7 | CAP CER CL2 1N 20% | R014 | A700019P61 | RES DEPC 1/4W 100K 5% |
| C004 | A700235P27 | CAP CER N750 150P 5% | R015 | A700019P61 | RES DEPC 1/4W 100K 5% |
| C005 | J706003P1 | CAP VAR FILM 1.8/10 PF | R016 | A700019P49 | RES DEPC 1/4W 10K 5% |
| C006 | A700235P15 | CAP CER N150 15P 5% | R017 | A700019P61 | RES DEPC 1/4W 100K 5% |
| C007 | A700233P7 | CAP CER CL2 1N 20% | R018 | A700019P61 | RES DEPC 1/4W 100K 5% |
| C008 | A700233P7 | CAP CER CL2 1N 20% | R020 | A700019P54 | RES DEPC 1/4W 27K 5% |
| C009 | A700233P7 | CAP CER CL2 1N 20% | R021 | A700019P53 | RES DEPC 1/4W 22K 5% |
| C010 | A700233P7 | CAP CER CL2 1N 20% | R022 | A700019P54 | RES DEPC 1/4W 27K 5% |
| C011 | J707412P5 | CAP PYES 22N 10% | R023 | A700019P53 | RES DEPC 1/4W 22K 5% |
| C012 | J707412P3 | CAP PYES 10N 10% | R024 | A700019P21 | RES DEPC 1/4W 47R 5% |
| C013 | 2313749C48 | CAP TA SOL 22U 16V | R025 | A700019P29 | RES DEPC 1/4W 220R 5% |
| C014 | A700233P7 | CAP CER CL2 1N 20% | R026 | A700019P39 | RES DEPC 1/4W 1K5 5% |
| C015 | A700233P7 | CAP CER CL2 1N 20% | R027 | A700019P37 | RES DEPC 1/4W 1K0 5% |
| C016 | A700233P7 | CAP CER CL2 1N 20% | R028 | A700019P47 | RES DEPC 1/4W 6K8 5% |
| C017 | A700233P7 | CAP CER CL2 1N 20% | R029 | A700019P49 | RES DEPC 1/4W 10K 5% (A,B) |
| C018 | A700235P15 | CAP CER N150 15P 5% | R029 | A700019P48 | RES DEPC 1/4W 8K2 5% (C,D) |
| C019 | J707412P3 | CAP PYES 10N 10% | R029 | A700019P46 | RES DEPC 1/4W 5K6 5% (E,F) |
| C020 | J707412P3 | CAP PYES 10N 10% | R030 | A700019P32 | RES DEPC 1/4W 390R 5% (A,B) |
| C021 | A700233P7 | CAP CER CL2 1N 20% | R030 | A700019P30 | RES DEPC 1/4W 270R 5% (C,D) |
| C022 | A700233P7 | CAP CER CL2 1N 20% | R030 | A700019P28 | RES DEPC 1/4W 180R 5% (E,F) |
| C023 | J707412P11 | CAP PYES 220N 10% | R031 | A700019P38 | RES DEPC 1/4W 1K2 5% (A,B) |
| C024 | 2313749D72 | CAP TA SOL 4U7 35V | R031 | A700019P36 | RES DEPC 1/4W 820R 5% (C,D) |
| C025 | J707412P13 | CAP PYES 470N 10% | R031 | A700019P34 | RES DEPC 1/4W 560R 5% (E,F) |
| C026 | J707412P3 | CAP PYES 10N 10% | R032 | A700019P33 | RES DEPC 1/4W 470R 5% |
| C027 | J707412P3 | CAP PYES 10N 10% | R033 | A700019P39 | RES DEPC 1/4W 1K5 5% |
| C028 | J707412P3 | CAP PYES 10N 10% | R034 | A700019P26 | RES DEPC 1/4W 120R 5% |
| C029 | A700235P24 | CAP CER N150 82P 5% | R035 | A700019P33 | RES DEPC 1/4W 470R 5% |
| C030 | A700233P7 | CAP CER CL2 1N 20% | R036 | A700019P46 | RES DEPC 1/4W 5K6 5% |
| C031 | A700233P7 | CAP CER CL2 1N 20% | R037 | A700019P33 | RES DEPC 1/4W 470R 5% |
| C033 | A700235P21 | CAP CER N150 47P 5% | R038 | A700019P21 | RES DEPC 1/4W 47R 5% |
| C034 | A700235P27 | CAP CER N750 150P 5% | R039 | A700019P15 | RES DEPC 1/4W 15R 5% |
| C035 | A700235P28 | CAP CER N750 180P 5% | R040 | A700019P46 | RES DEPC 1/4W 5K6 5% |
| C036 | A700235P29 | CAP CER N750 220P 5% | R041 | A700019P45 | RES DEPC 1/4W 4K7 5% |
| C037 | A700235P22 | CAP CER N150 56P 5% | R042 | A700019P16 | RES DEPC 1/4W 18R 5% |
| C038 | A700235P26 | CAP CER N750 120P 5% | R043 | A700019P16 | RES DEPC 1/4W 18R 5% |
| C039 | J707444P17 | CAP TA SOL 47U 10V | R044 | A700019P16 | RES DEPC 1/4W 18R 5% |
| C041 | A700233P7 | CAP CER CL2 1N 20% | U001 | J708256P1 | IC PLL SYN 145151 |
| C042 | J707412P5 | CAP PYES 22N 10% | U002 | J708164P1 | IC LIN OP-AMP TL074 |
| C043 | A700233P7 | CAP CER CL2 1N 20% | U003 | A700029P44 | IC DIG SW 4066 |
| C044 | J707412P5 | CAP PYES 22N 10% | Y001 | J707567P8 | CRYSTAL UNIT 10.2400MHz |
| C045 | A700121P3 | CAP CER 50V 22N 20% | | | (A,C,E) |
| D001 | A700028P1 | DIO SI SIG 1N4148 | Y001 | J707567P6 | CRYSTAL UNIT 12.8000MHz |
| D002 | A700028P1 | DIO SI SIG 1N4148 | | 8402003U43A | (B,D,F) |
| D003 | A701276P2 | DIO SI CAP MVAM 108 | | | L855537P1R2 BD PW |
| D004 | A701276P2 | DIO SI CAP MVAM 108 | | | NON REFERENCED ITEMS: |
| J001 | A700171P2 | CONN PWB FEM | | J706232P1 | CONN JACK |
| J002 | A700171P2 | CONN PWB FEM | | J706275P1 | SPG XTAL |
| L001 | J708224G1 | COIL ASM | | | |
| 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 | | | |

X404.607/6

DATE: 09/20/90

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 stabilizer the load on the crystal filter.

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

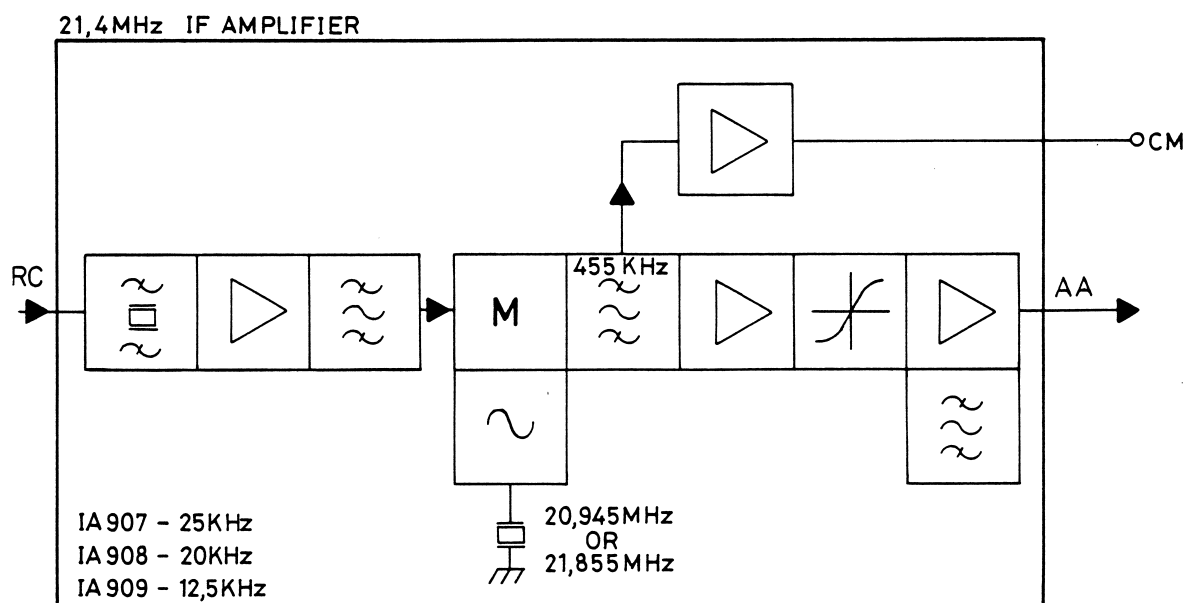
The mixer crystal frequency is either:

$$\begin{aligned} 21.4 \text{ MHz} + 0.455 \text{ MHz} &= 21.855 \text{ MHz} \\ \text{or } 21.4 \text{ MHz} - 0.455 \text{ MHz} &= 20.945 \text{ MHz} \end{aligned}$$

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 strength 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 μ V 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 $f_{\text{mod}} = 1$ 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

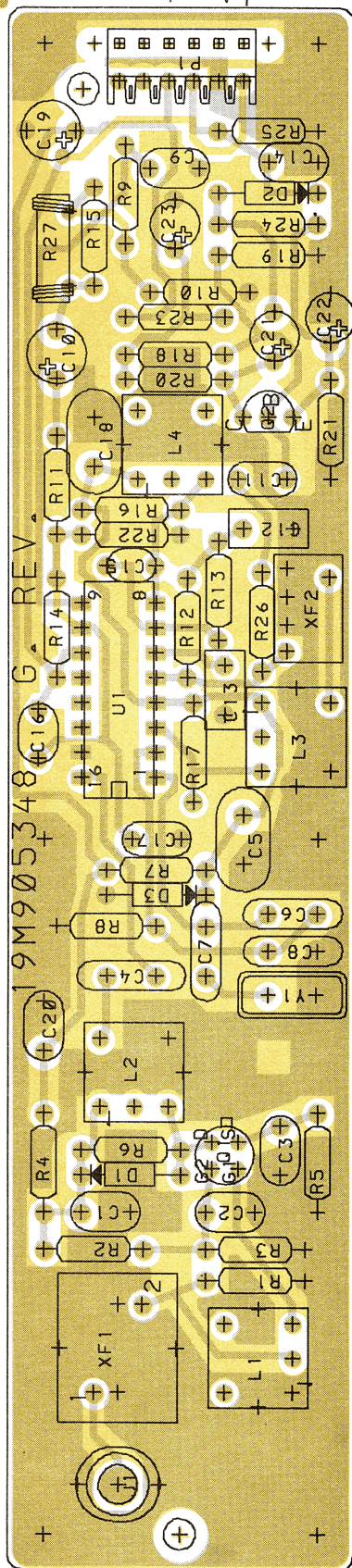
Flat from 300 to 3000 Hz

Temperature range

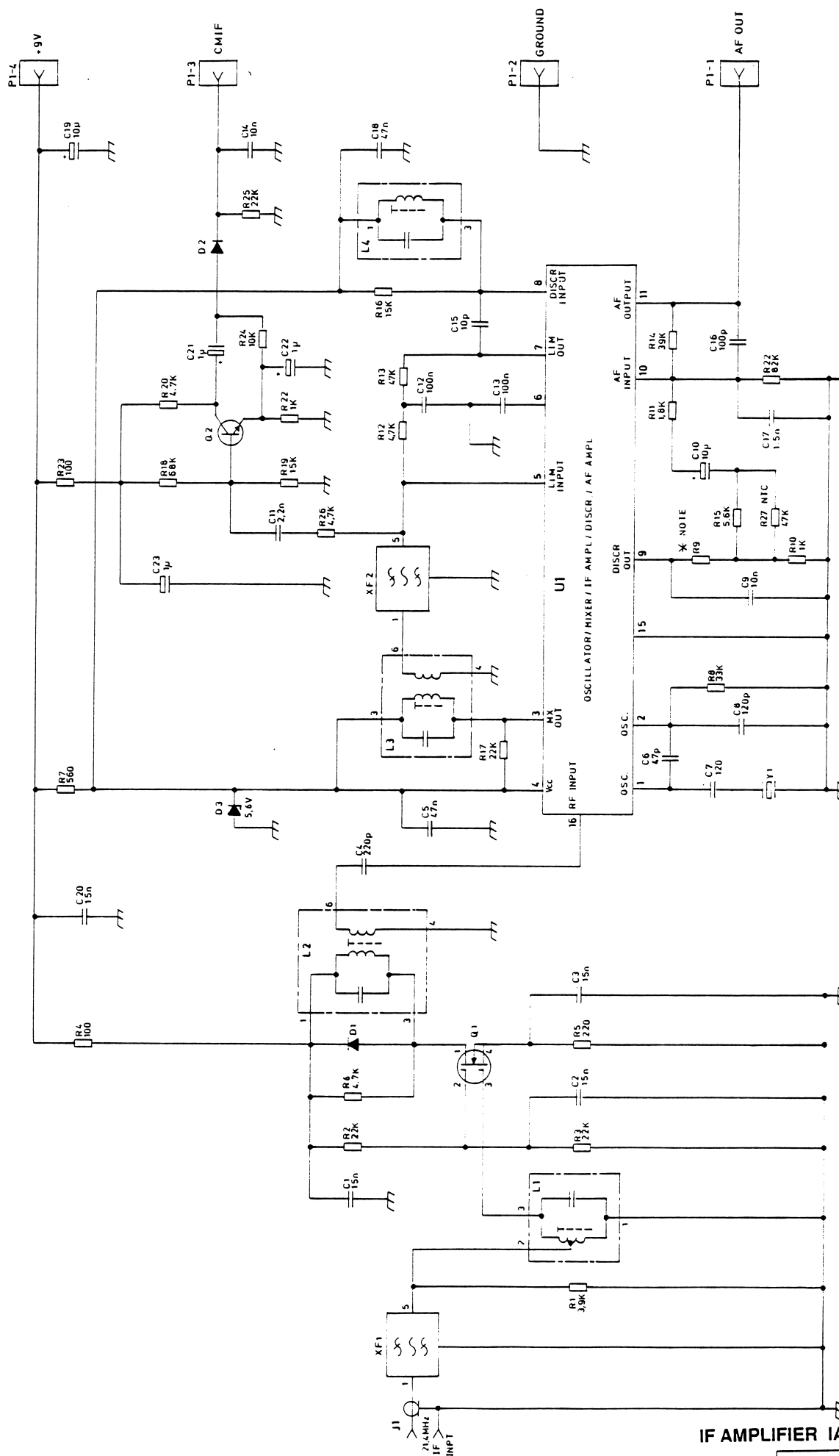
-40°C to +85°C

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 |



| CODE NO. | ΦH9 | CHANNEL SPACING |
|----------|----------------------|-----------------|
| IA907 | M90534BG1 - GRN612BA | 3.3 |
| IA908 | M90534BG2 - GRN6127A | 2.2K |
| IA909 | M90534BG3 - GRN6128A | 1.0K |

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) | | J706804P1 | NON REFERENCED ITEM: WASH. INSUL. |
| 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 | | | |
| L2 | J707342P1 | RF COIL 21.4MHz | | | |
| L3 | J707343P1 | RF COIL 455KHz | | | |
| L4 | J707343P1 | RF COIL 455KHz | | | |
| P1 | A700041P5 | CONN 6 PIN | | | |
| Q1 | A700074P1 | MOS FET 3N205 | | | |
| 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 | | | |
| XF1 | 9102383Y12 | A701196G12 XTAL-FLT. 21.4MHz | | | |
| XF2 | J707308P1 | CER FLT CFW 455D (A) | | | |
| XF2 | J707308P2 | CER FLT CFW 455E (B) | | | |
| XF2 | J707308P3 | CER FLT CFW 455F (C) | | | |
| Y1 | J707309P1 | X-TAL 20,945MHz | | | |
| | 8402003U42A | BD PW | | | |

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.

The channel spacing for the module IA9012 is 25 kHz,

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.

CIRCUIT DESCRIPTION

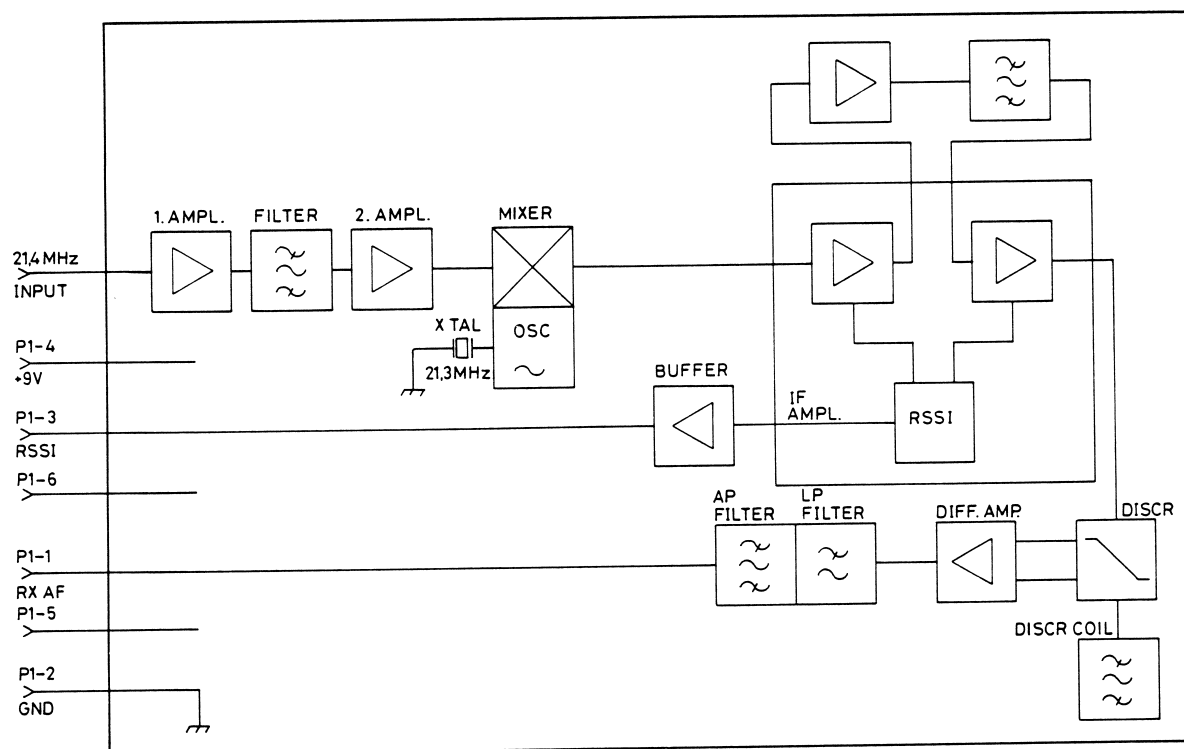
The input signal is amplified and fed to the crystal filter, which is an 8 pole monolithic filter providing the required selectivity. The second amplifier provides gain to overcome the noise figure of the following mixer. The two amplifiers before and after the crystal filter provide a stable matching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



BLOCK DIAGRAM IA 9012/13/14
D404597

SPECIFICATIONS

INTERFACE

Input

Frequency: 21.4 MHz

Source impedance: $\leq 1600 \text{ Ohm}$

RF AF

AF output impedance: $< 100 \text{ Ohm}$

Minimum external load: 2 kOhm

DC level: 4.5 V

RSSI output

DC output impedance: $\leq 560 \text{ Ohm}$

Power supply voltage

$9 \text{ V } (\pm 5\%)$

Consumption

$\leq 40 \text{ mA}$

PERFORMANCE

Sensitivity

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

Static selectivity

| | IA9012 | IA9013 | IA9014 |
|-----------|-------------------------|-----------------------|-------------------------|
| Bandwidth | 25 kHz | 20 kHz | 12.5 kHz |
| 3 dB | $\geq 7.5 \text{ kHz}$ | $\geq 6 \text{ kHz}$ | $\geq 3.75 \text{ kHz}$ |
| 65 dB | $\leq 17.5 \text{ kHz}$ | $\leq 14 \text{ kHz}$ | $\leq 8.75 \text{ kHz}$ |
| 80 dB | $\leq 25.0 \text{ kHz}$ | $\leq 20 \text{ kHz}$ | $\leq 12.5 \text{ kHz}$ |

Group delay distortion

300 - 3000 $< 10 \text{ uS}$

Stability

2600 Hz (level dependence): $< \pm 0.75 \text{ us}$

2600 Hz (temperature dependence): $< \pm 5 \text{ us}$

Discriminator bandwidth

$> \pm 6 \text{ kHz}$

AF output (f mod. 1 kHz)

$300 \text{ mV } \pm 2 \text{ dB}$ at 60% of max. Δf

AF Response

100 - 2000 Hz $\pm 0.5 \text{ dB}$

2000 - 3000 Hz $+0.5 \text{ to } -1.0 \text{ dB}$

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 $\leq -60 \text{ dB}$

RSSI

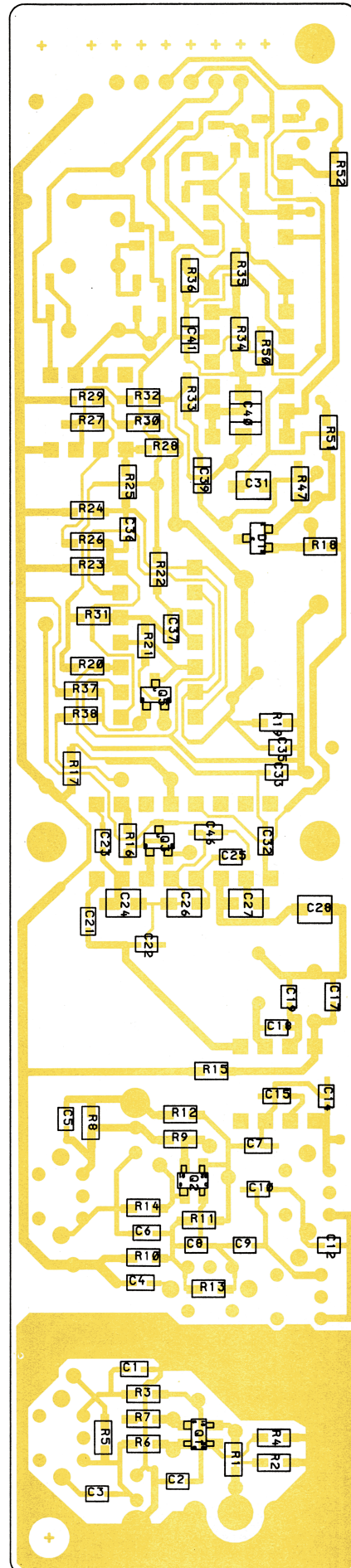
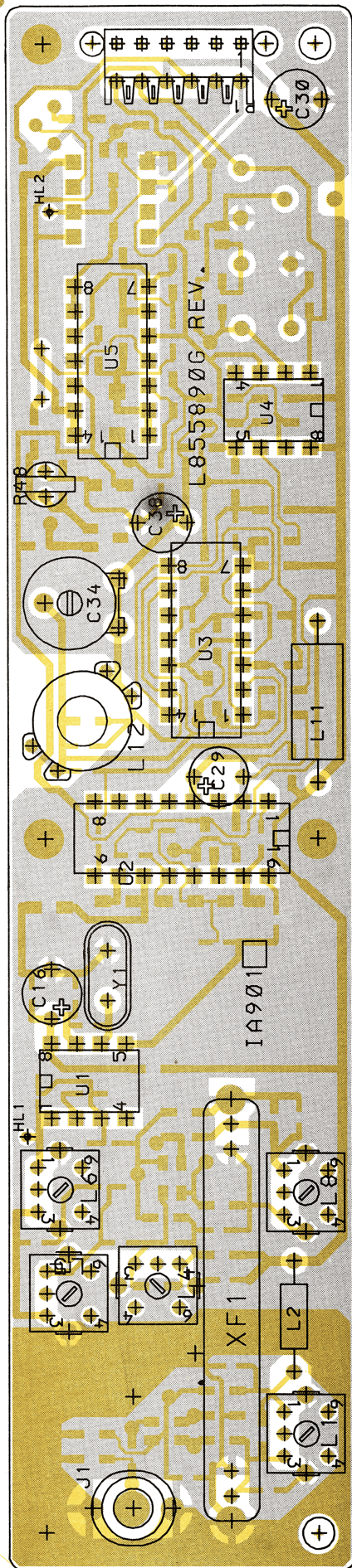
Range (with RC961) 20 dB SINAD: $-2 \pm 45 \text{ dB}$

Temperature stability: $\pm 3 \text{ dB}$

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



NOTE:
COMPONENTS MARKED CXXX ARE
PLACED ON NO SOLDER SIDE

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

D404.601/4

PARTS LIST FOR IF AMPLIFIER IA9012/IA9013/IA9014

| Pos | Code/Kit No. | Description | Pos | Code/Kit No. | Description |
|------|--------------|-------------------------|-----------|--------------|---|
| | GLN7073A | L855890G2 IA9012 | R015 | 0611077A72 | RES,MFLM,1/8W 820R , 5% |
| | GLN7072A | L855890G3 IA9013 | R016 | 0611077A90 | RES,MFLM,1/8W 4K7 , 5% |
| | | Chann.spac.25.0kHz (A) | R017 | 0611077A72 | RES,MFLM,1/8W 820R , 5% |
| | GLN7071A | L855890G4 IA9014 | R018 | 0611077B17 | RES,MFLM,1/8W 56K , 5% |
| | | Chann.spac.12.5kHz (C) | R019 | 0611077B11 | RES,MFLM,1/8W 33K , 5% |
| C001 | 2113741M49 | CAP,CER,CL2 15N , 10% | R020 | 0611077B01 | RES,MFLM,1/8W 12K , 5% |
| C002 | 2113741M21 | CAP,CER,CL2 1N0 , 10% | R021 | 0611077A86 | RES,MFLM,1/8W 3K3 , 5% |
| C003 | 2113740A41 | CAP,CER,NP0 33P , 5% | R022 | 0611077B01 | RES,MFLM,1/8W 12K , 5% |
| C004 | 2113741M49 | CAP,CER,CL2 15N , 10% | R023 | 0611077F45 | RES,MFLM,1/8W 3K32, 1% (A) |
| C005 | 2113740A41 | CAP,CER,NP0 33P , 5% | R023 | 0611077F60 | RES,MFLM,1/8W 4K75, 1% (B) |
| C006 | 2113741M49 | CAP,CER,CL2 15N , 10% | R023 | 0611077F75 | RES,MFLM,1/8W 6K81, 1% (C) |
| C007 | 2113741M49 | CAP,CER,CL2 15N , 10% | R024 | 0611077F45 | RES,MFLM,1/8W 3K32, 1% (A) |
| C008 | 2113740A41 | CAP,CER,NP0 33P , 5% | R024 | 0611077F60 | RES,MFLM,1/8W 4K75, 1% (B) |
| C009 | 2113740A13 | CAP,CER,NP0 2P7 ,.25P | R024 | 0611077F75 | RES,MFLM,1/8W 6K81, 1% (C) |
| C010 | 2113740A41 | CAP,CER,NP0 33P , 5% | R025 | 0611077H22 | RES,MFLM,1/8W 221K |
| C012 | 2113740A71 | CAP,CER,NP0 470P , 5% | R026 | 0611077H22 | RES,MFLM,1/8W 221K , 1% |
| C014 | 2113740A41 | CAP,CER,NP0 33P , 5% | R027 | 0611077H36 | RES,MFLM,1/8W 309K , 1% |
| C015 | 2113741M49 | CAP,CER,CL2 15N , 10% | R028 | 0611077H36 | RES,MFLM,1/8W 309K , 1% |
| C016 | 2313749D52 | CAP,TA,SOL 1U , 35V | R029 | 0611077F16 | RES,MFLM,1/8W 1K65, 1% |
| C017 | 2113741M49 | CAP,CER,CL2 15N , 10% | R030 | 0611077E81 | RES,MFLM,1/8W 732R , 1% |
| C018 | 2113740A43 | CAP,CER,NP0 39P , 5% | R031 | 0611077F07 | RES,MFLM,1/8W 1K33, 1% |
| C019 | 2113740A55 | CAP,CER,NP0 100P , 5% | R032 | 0611077B05 | RES,MFLM,1/8W 18K , 5% |
| C021 | 2113741M49 | CAP,CER,CL2 15N , 10% | R033 | 0611077A96 | RES,MFLM,1/8W 8K2 , 5% |
| C022 | 2113741M37 | CAP,CER,CL2 4N7 , 10% | R034 | 0611077B17 | RES,MFLM,1/8W 56K , 5% |
| C023 | 2113740A55 | CAP,CER,NP0 100P , 5% | R035 | 0611077B17 | RES,MFLM,1/8W 56K , 5% |
| C024 | 2113741C17 | CAP,CER,CL2 100N , 5% | R036 | 0611077B11 | RES,MFLM,1/8W 33K , 5% |
| C025 | 2113740A71 | CAP,CER,NP0 470P , 5% | R037 | 0611077B01 | RES,MFLM,1/8W 12K , 5% |
| C026 | 2113740C25 | CAP,CER,NP0 2N2 , 5% | R038 | 0611077A86 | RES,MFLM,1/8W 3K3 , 5% |
| C027 | 2113741C17 | CAP,CER,CL2 100N , 5% | R047 | 0611077A78 | RES,MFLM,1/8W 1K5 , 5% |
| C028 | 2113741C17 | CAP,CER,CL2 100N , 5% | R048 | J706147P1 | RES,THERM,PTC 50R , 30% |
| C029 | 2313749D52 | CAP,TA,SOL 1U , 35V | R050 | 0611077B09 | RES,MFLM,1/8W 27K , 5% |
| C030 | 2313749D72 | CAP,TA,SOL 4U7 , 35V | R051 | 0611077B11 | RES,MFLM,1/8W 33K , 5% |
| C031 | 2113741C17 | CAP,CER,CL2 100N , 5% | R052 | 0611077A68 | RES,MFLM,1/8W 560R , 5% |
| C032 | 2113741M49 | CAP,CER,CL2 15N , 10% | U001 | J709575P1 | IC,LIN,MIX 602 |
| C033 | 2113740A46 | CAP,CER,NP0 47P , 5% | U002 | J709576P1 | IC,LIN,IF-AMP 604 |
| C034 | J706080P1 | CAP,VAR,FILM 5.0/57 PF | U003 | J709577P1 | IC,ARRAY,TSTR CA 3054 |
| C035 | J707363P7 | CAP,CER,NP0 470P , 2% | U004 | J709530P1 | IC,LIN,OP-AMP 082 |
| C036 | 2113740A71 | CAP,CER,NP0 470P , 5% | U005 | A701789P3 | IC,LIN,OP-AMP 224 |
| C037 | 2113741M49 | CAP,CER,CL2 15N , 10% | XF01 | J709578P1 | FLTR,CRY,21.4 +/-7.50KHZ (A) |
| C038 | 2313749D72 | CAP,TA,SOL 4U7 , 35V | XF01 | J709578P2 | FLTR,CRY,21.4 +/-6.00KHZ (B) |
| C039 | 2113740C21 | CAP,CER,NP0 1N5 , 5% | XF01 | J709578P3 | FLTR,CRY,21.4 +/-3.75KHZ (C) |
| C040 | J707349P9 | CAP,CER,NP0 6N8 , 2% | Y001 | J707567P13 | CRYSTAL UNIT 21.3000MHZ |
| C041 | 2113740C21 | CAP,CER,NP0 1N5 , 5% | | L855891P1R1 | BD PW |
| 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% | | | |
| | | | J706804P1 | | NON REFERENCED ITEM: WASH,INS,CRYS FOR HC-25/U |

X404.608/5

DATE: 09/20/90

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

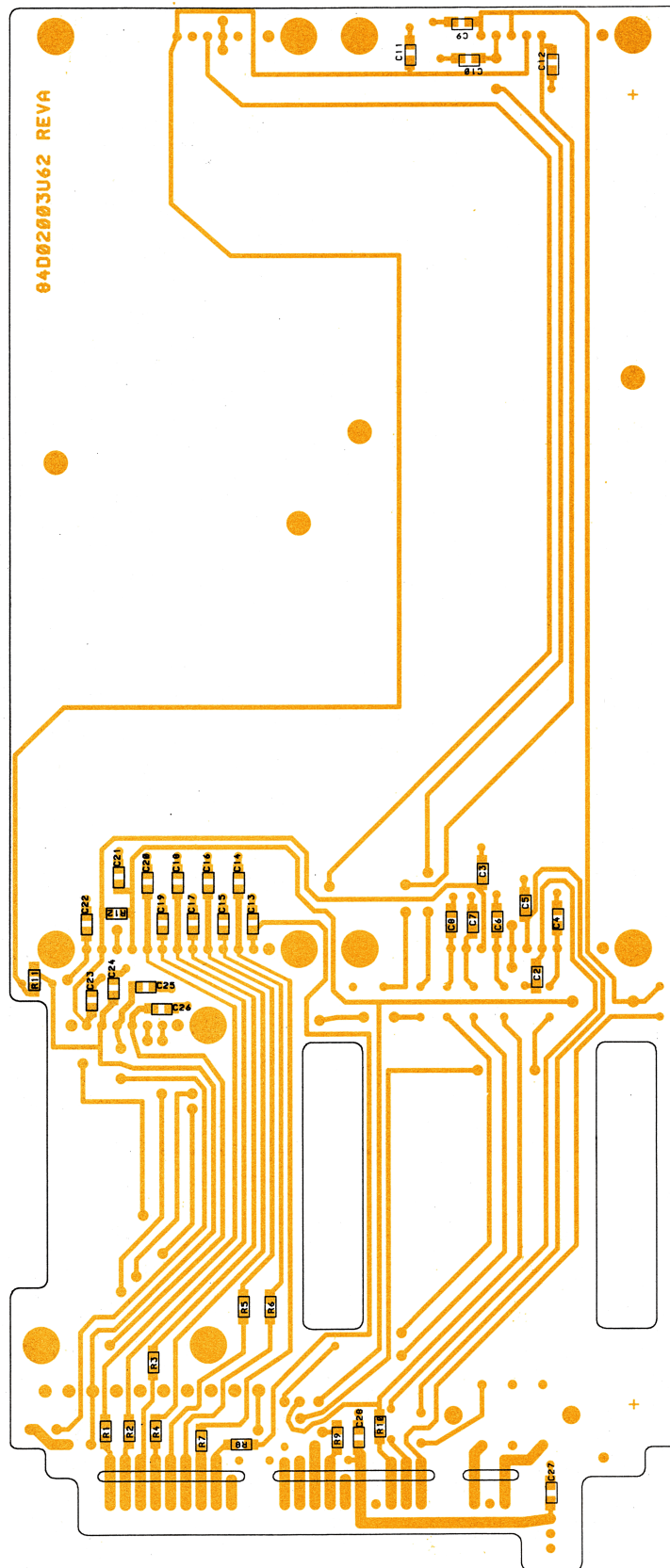
Dimensions

112 x 262 mm

Temperature Range

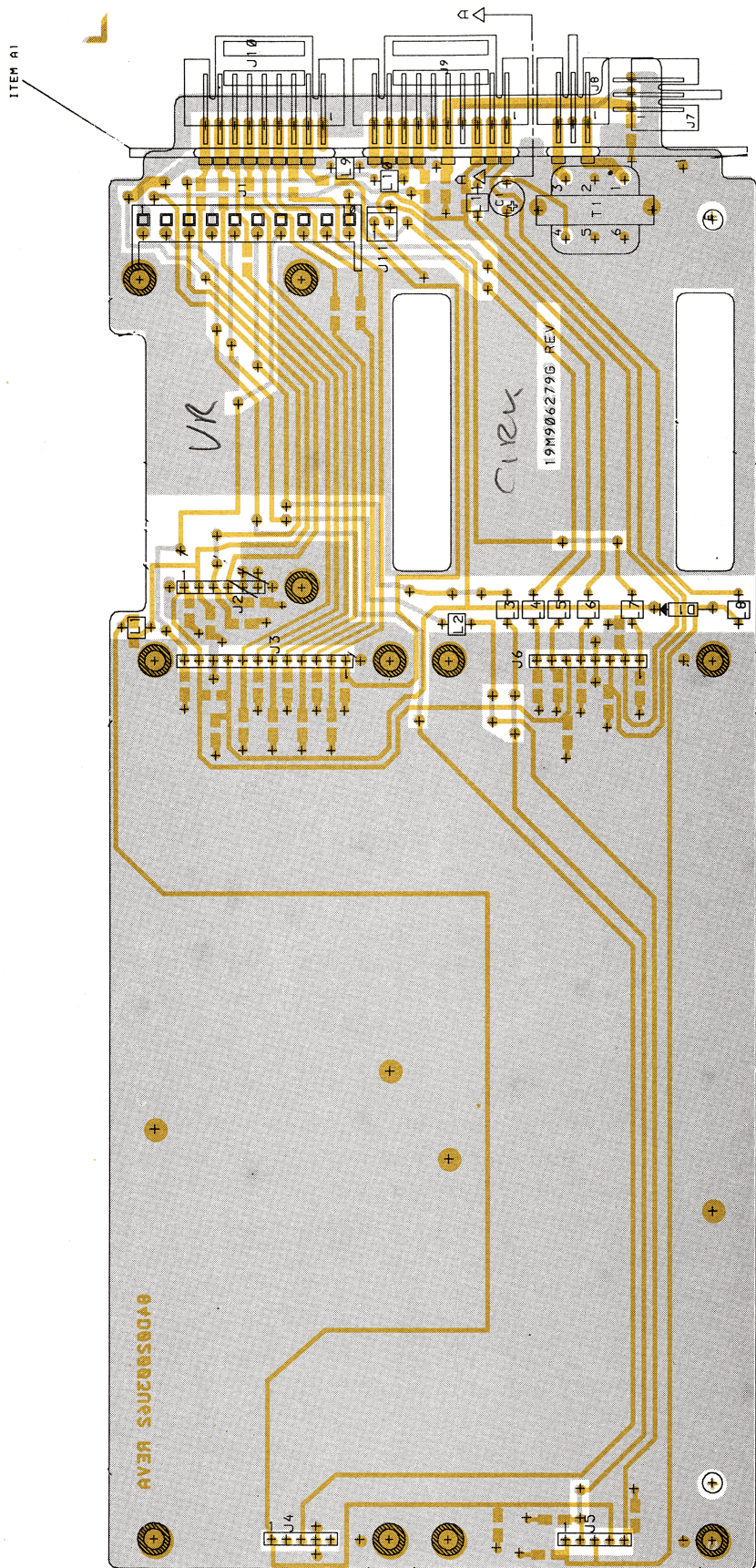
+40°C to +85°C





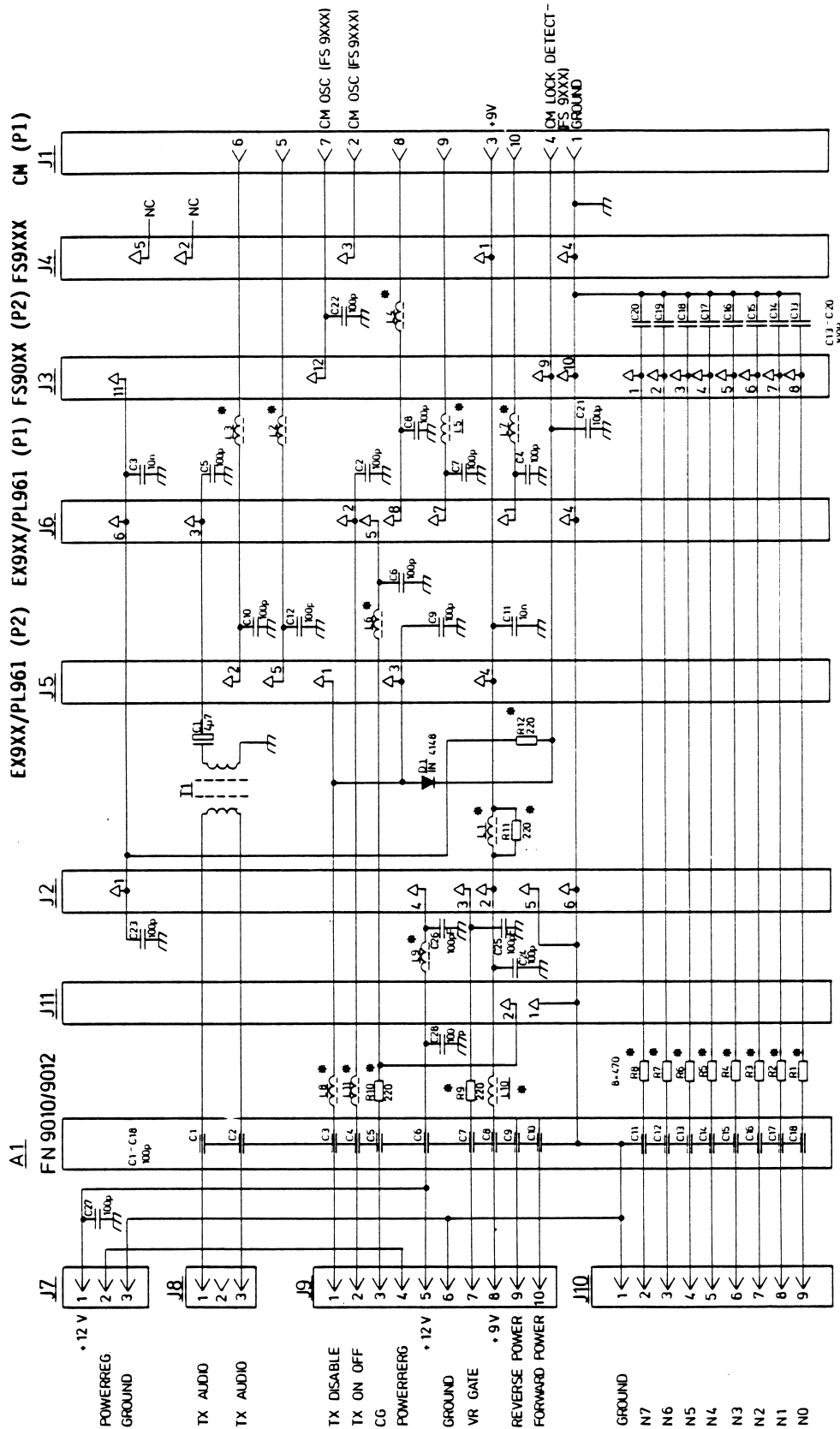
JUNCTION PANEL JP9011/JP9015
COMPONENT LAYOUT CHIP SIDE

D404.755/2



JUNCTION PANEL JP9011/JP9015
COMPONENT LAYOUT COMPONENT SIDE

D404.754/2



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

| 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 |

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

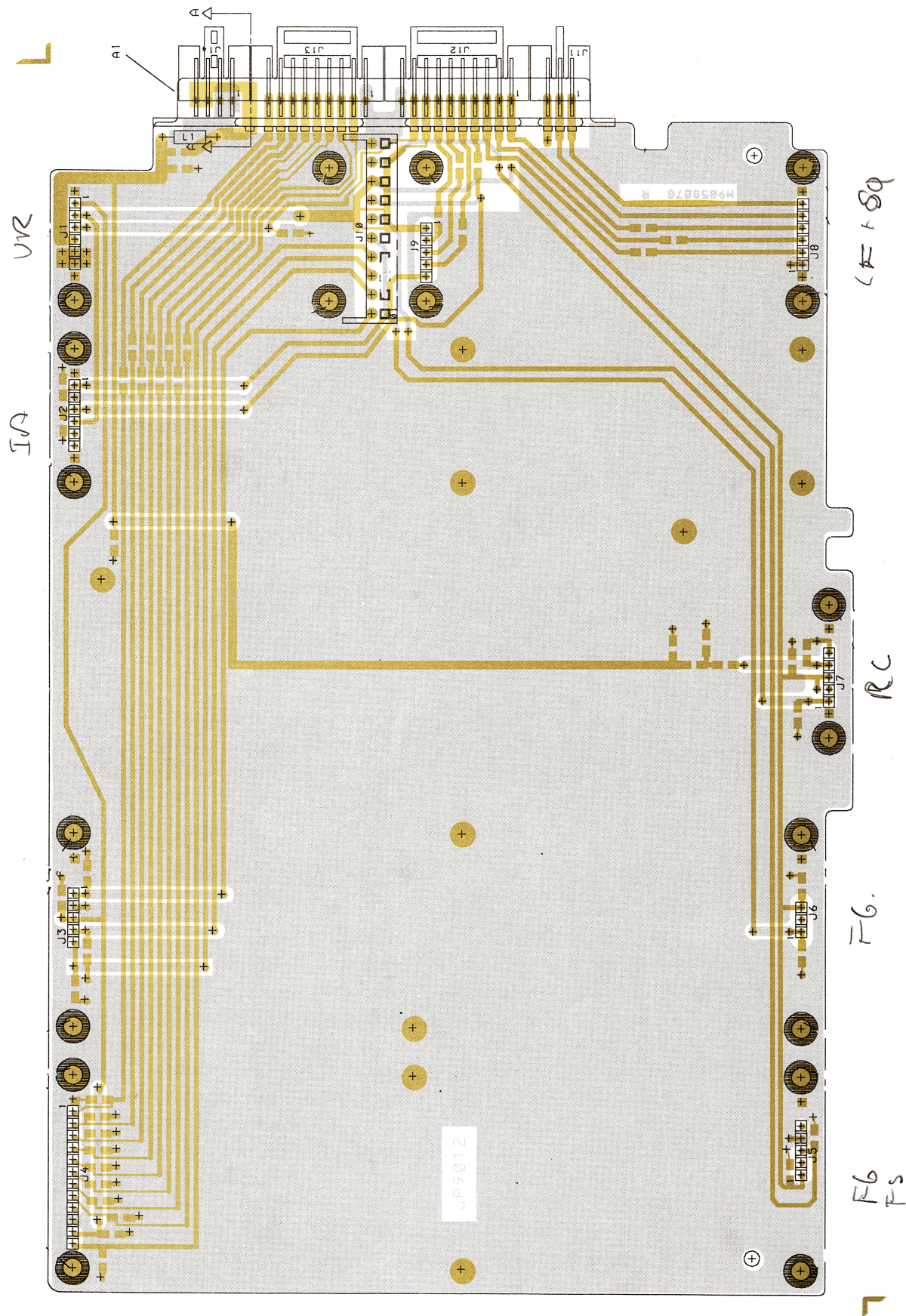
Dimensions

168 x 255 mm

Temperature Range

-40°C to +85°C

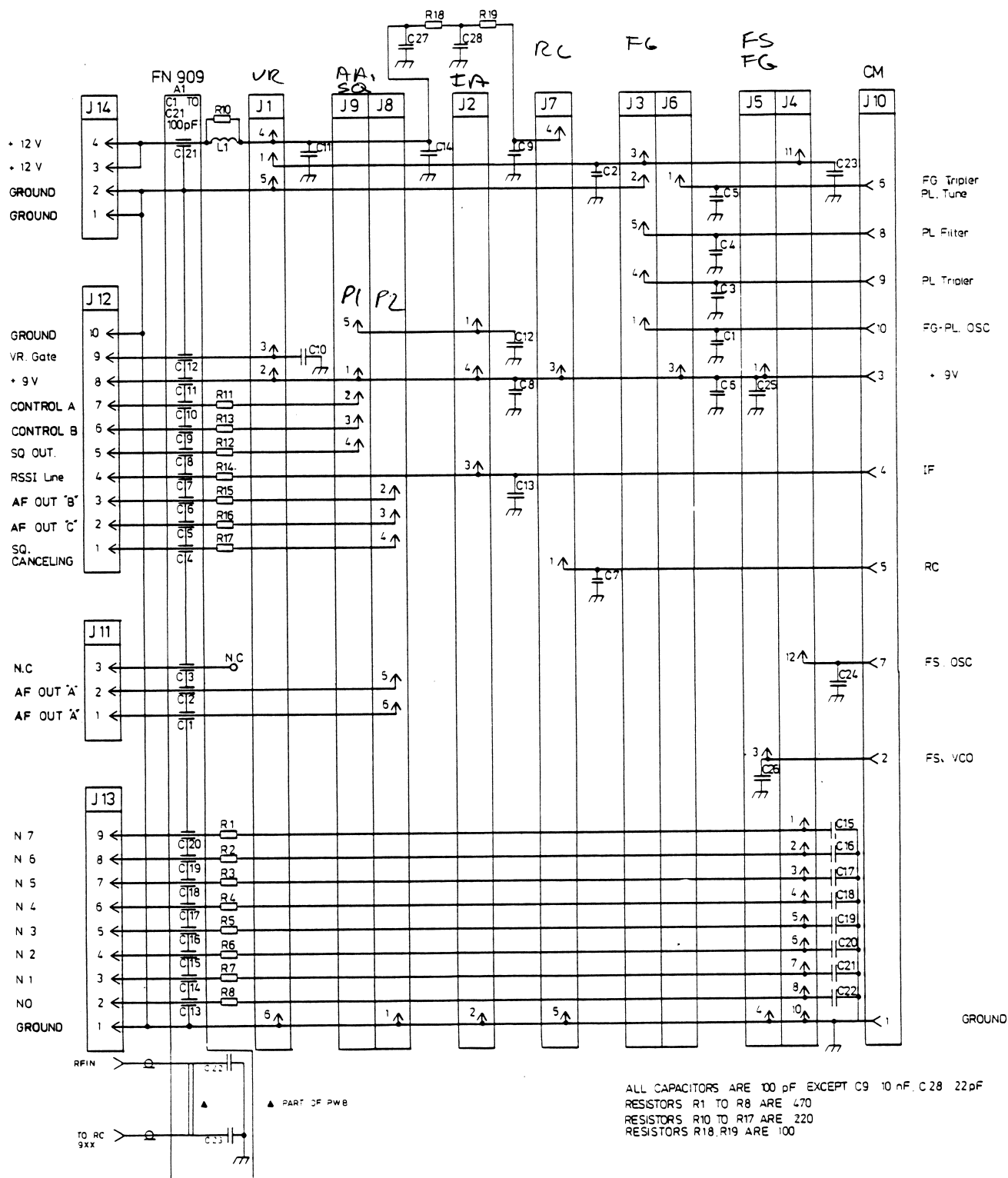




JUNCTION PANEL JP9012
COMPONENT LAYOUT - COMPONENT SIDE

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,NP0 100P , 5% | | | |
| C002 | 2113740B49 | CAP,CER,NP0 100P , 5% | | | |
| C003 | 2113740B49 | CAP,CER,NP0 100P , 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 | 2113741B45 | CAP,CER,CL2 10N , 5% | | | |
| C010 | 2113740B49 | CAP,CER,NP0 100P , 5% | | | |
| C011 | 2113740B49 | CAP,CER,NP0 100P , 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 | 2113740B33 | CAP,CER,NP0 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,FX 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) | | | |

X403.896/7

DATE: 09/20/90

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.

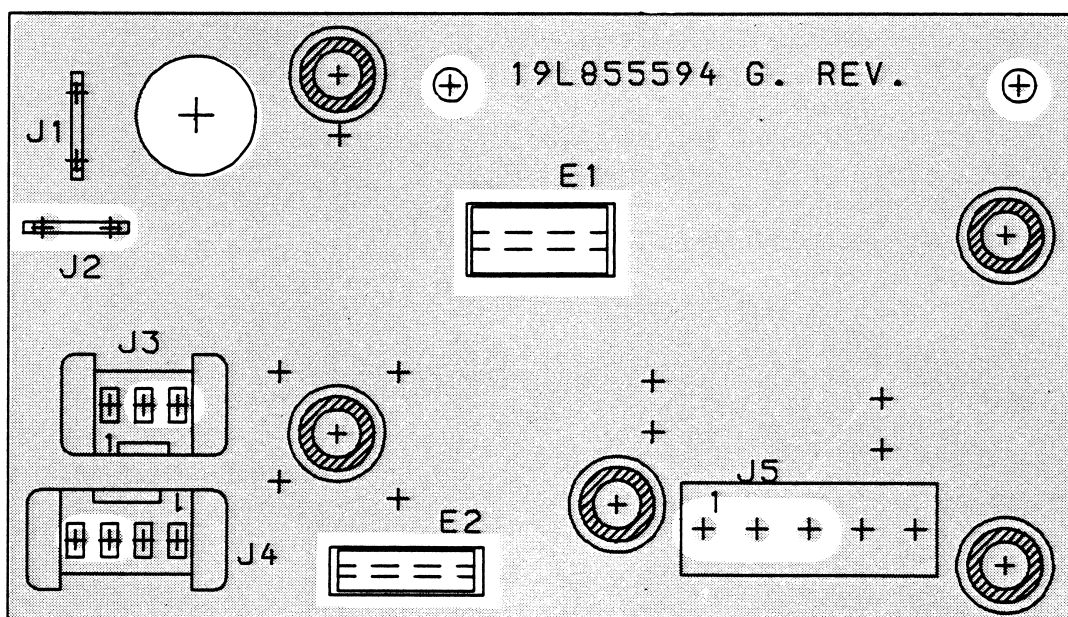
SPECIFICATIONS

Dimensions

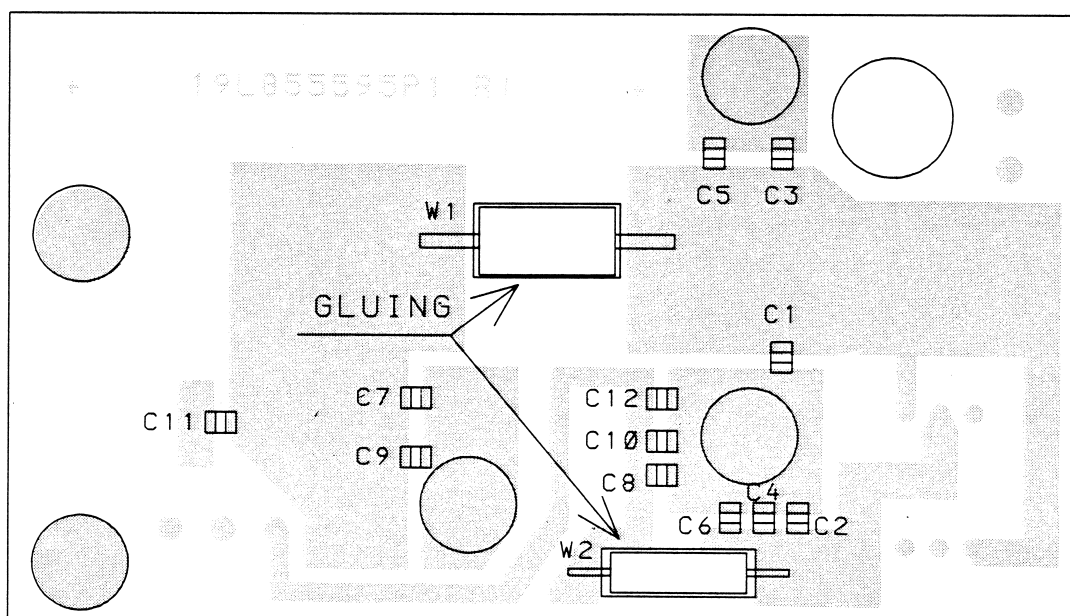
45.8 x 80 mm

Temperature range

-40°C to +85°C



CHIP SIDE

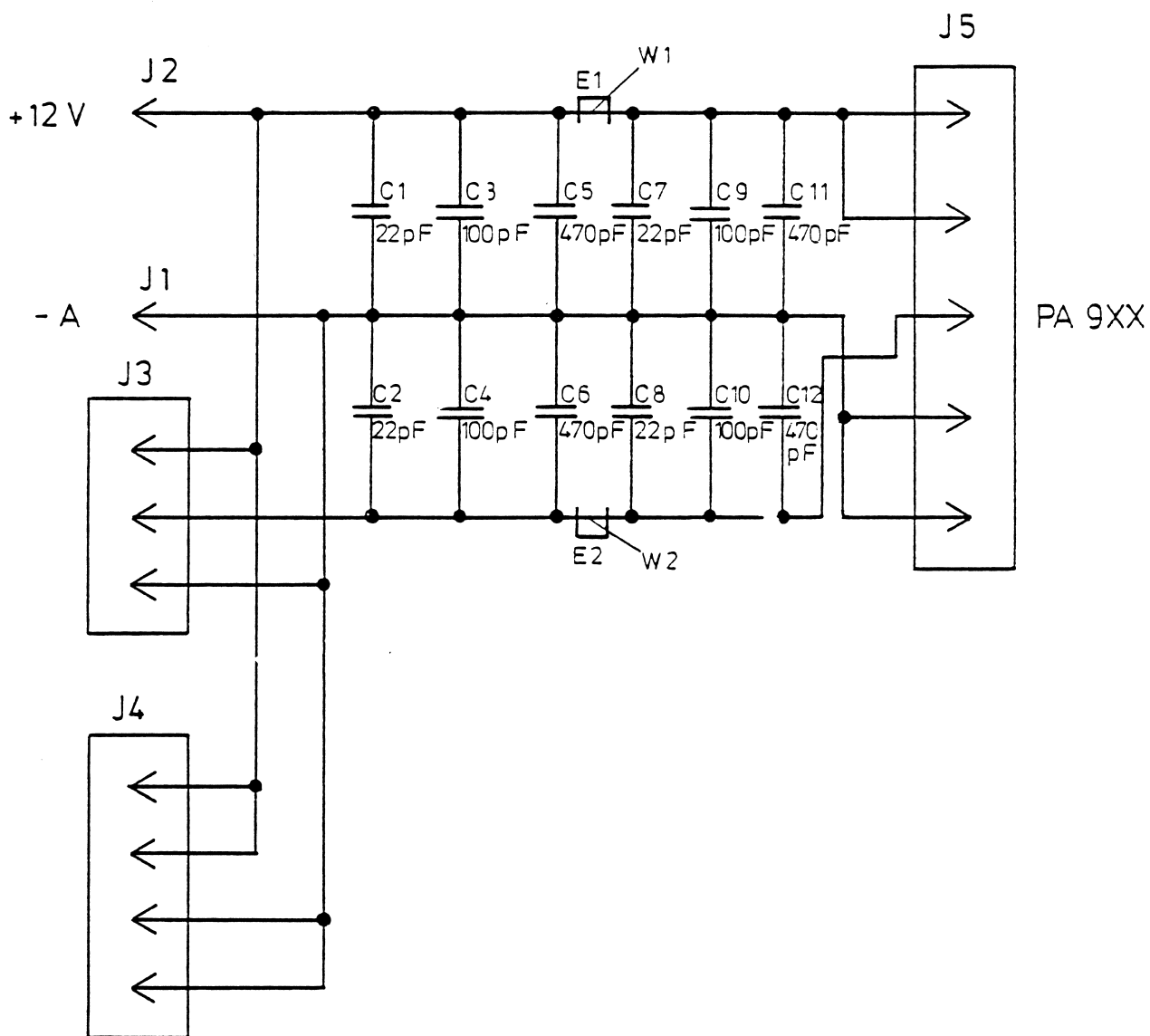


COMPONENT BOARD FOR JP9013

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) | | | |

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.

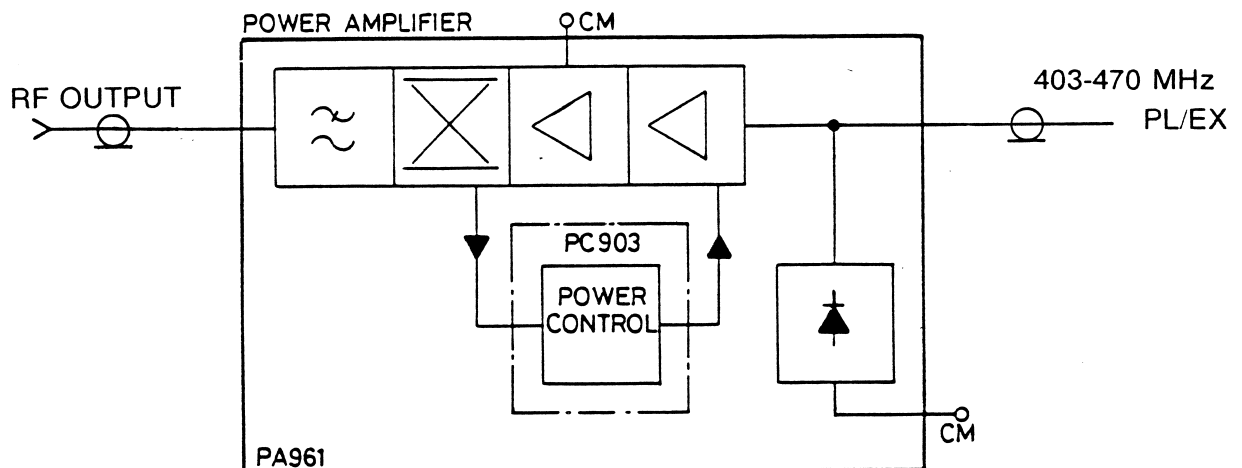
The PC903 regulates the DC voltage supply to the first RF amplifier stage to maintain the required power level. A power set control is used to adjust the control voltage to the PC903 micromodule.

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.

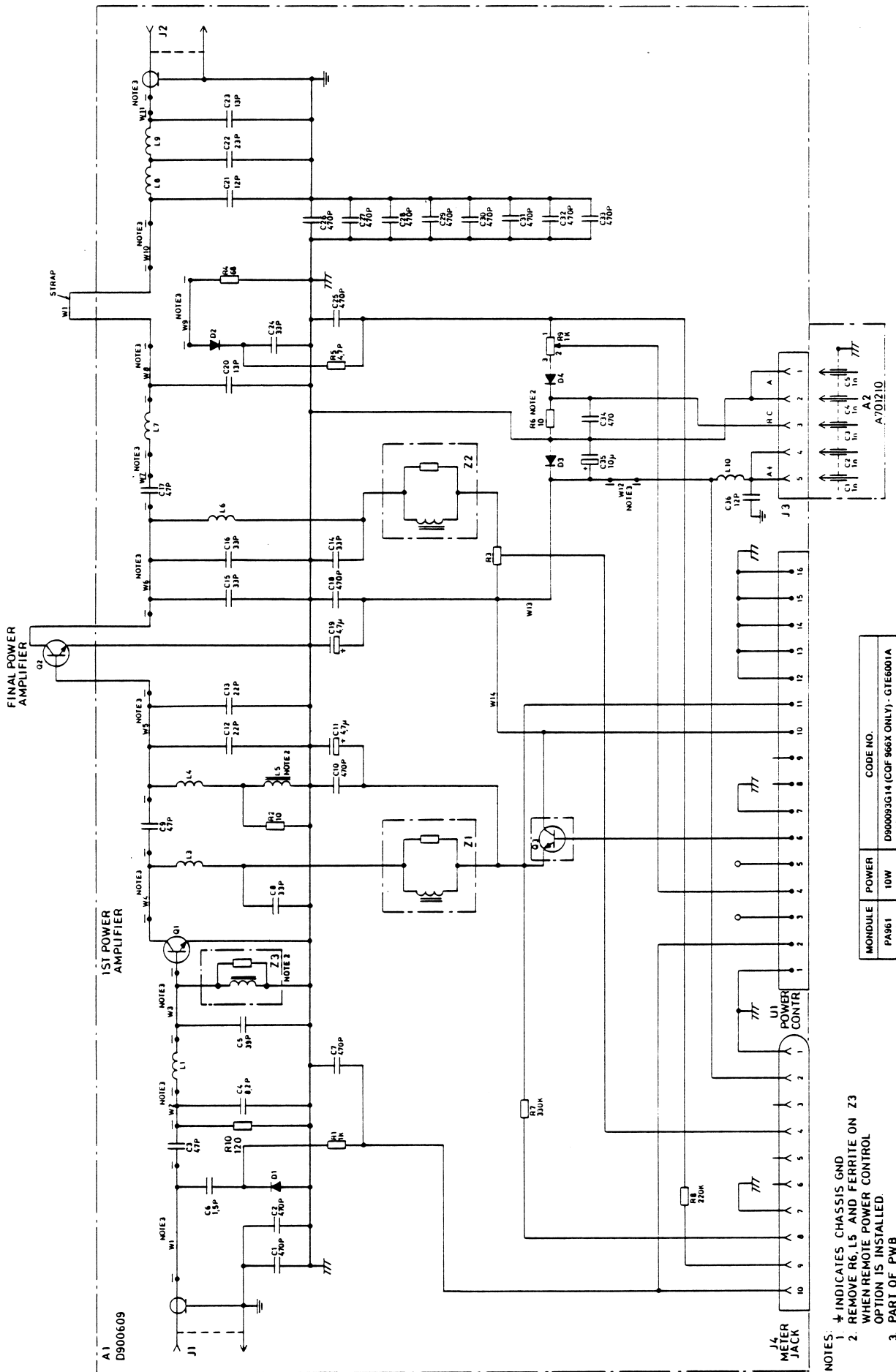
VSWR greater than 3:1 will not damage modules if operated at ≤ rated power with supply voltage less than 15.5 V.

Current with no RF drive

12.0 mA max.

Temperature range

-40°C to 85°C



| MODULE | POWER | CODE NO. |
|--------|-------|---------------------------------------|
| PA961 | 10W | D900093G14 (COF 965X 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.

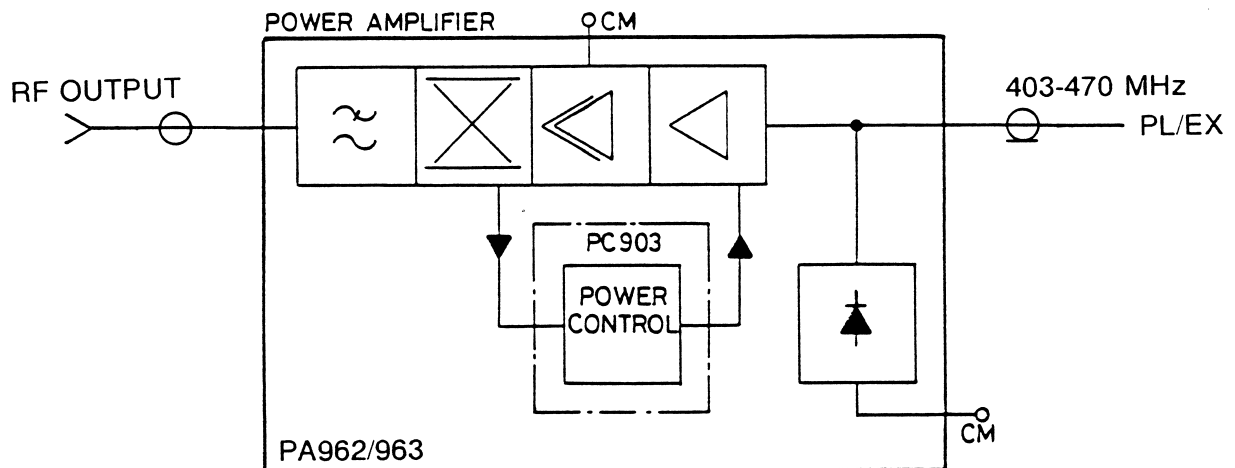
The directional coupler samples the forward power and rectifies the sampled signal. The resulting DC voltage is proportional to the RF output level and is applied to the power control micromodule, PC903.

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.

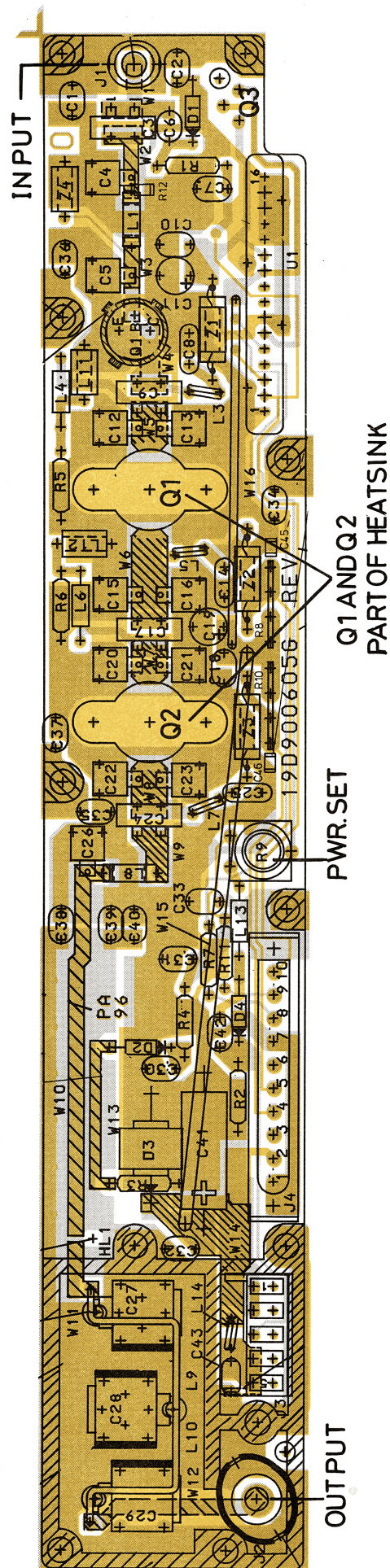
Current with no RF drive
22.0 mA max.

Temperature range
-40°C to +85°C

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 |





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| MODULE | POWER | CODE NO. |
|--------|-------|-----------------------------|
| PA962 | 25W | D900093 G7 |
| PA962 | 25W | D900168 G7 |
| PA962 | 25W | D900093 G15 (CQF 566X ONLY) |
| PA963 | 40W | D900168 G9 |
| PA963 | 40W | D900093 G16 (CQF 566X ONLY) |
| PA963 | 40W | D900093 G9 |

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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% | | | NON REFERENCED ITEMS: |
| C017 | A700015P8 | CAP PTFE 15P 5% | | A700114P1 | TERM STUD INSULATED (3 used) |
| C018 | A700233P5 | CAP CER CL2 470P 20% | | B800554P1 | COIL |
| C019 | 2313749D72 | CAP TA SOL 4U7 35V | | J706513P1 | 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

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PARTS LIST FOR POWER AMPLIFIER PA963

| Pos | Code/Kit No. | Description | Pos | Code/Kit No. | Description |
|------|--------------|---------------------------|------|--------------|-------------------------|
| | GTE6003A | D900093G16 PA963 | L007 | A701237P1 | COIL |
| A001 | 0102720B94 | D900605G3 BD PW SEE BELOW | L008 | A701006P5 | 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% |
| | | | R005 | A700019P13 | RES DEPC 1/4W 10R 5% |
| A001 | 0102720B94 | D900605G3 BD PW | R006 | A700019P13 | RES DEPC 1/4W 10R 5% |
| | | | 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

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 | | | |
| | A701611G1 | NON REFERENCED ITEMS | | | |
| | M905917P1 | CAN COATED RETAINER | | | |

X404.659/3

DATE: 09/20/90

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.

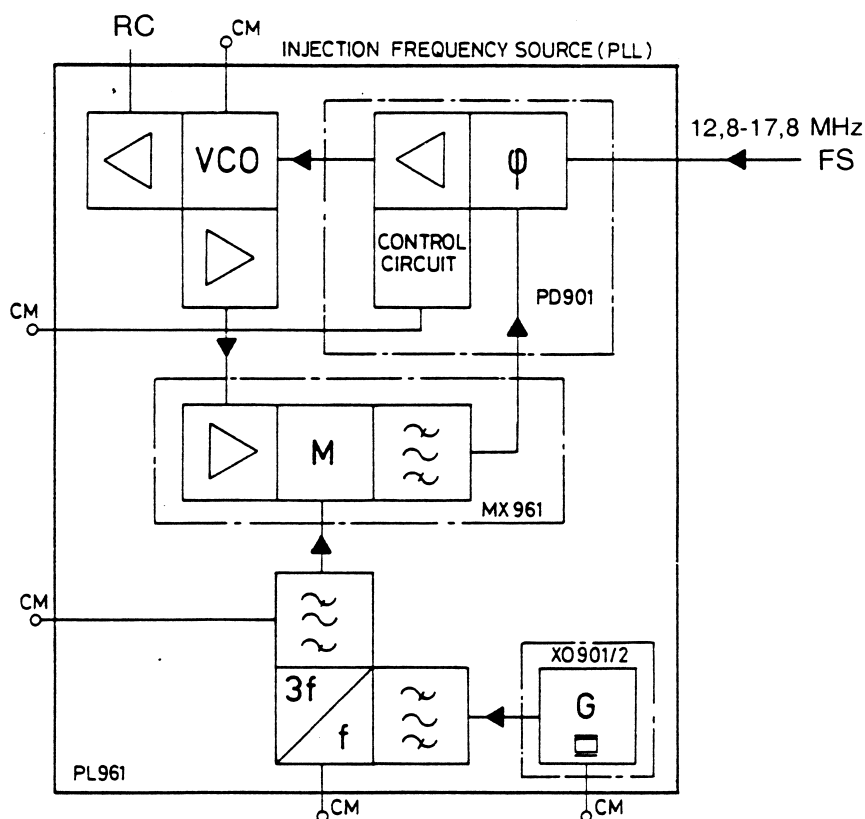
The VCO is followed by a broadband buffer stage for achieving adequate output level, and it isolates the

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

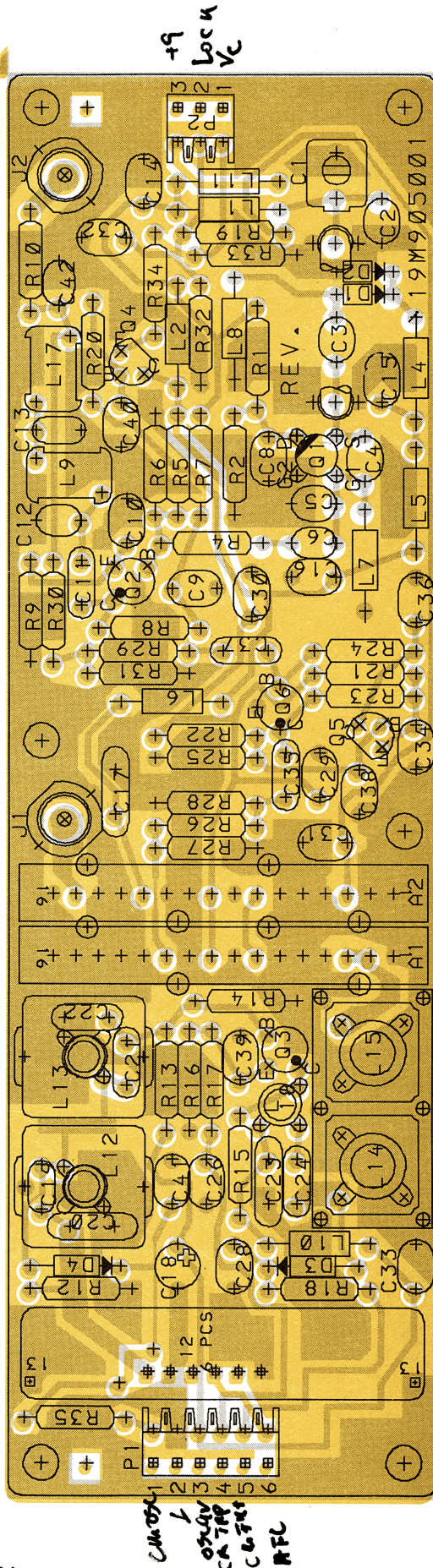
Output level
+10 to +13 dBm

Power supply voltage
9 V ±5%

Power supply voltage for XO only
9 V ±0.5%

Current consumption
less than 150 mA

Temperature range
-40°C to +85°C



+9
Loc 4
Vc

CA 100V
0.01uF
CA 100V
0.01uF
CA 100V
0.01uF
RFL

RX PHASE LOCKED LOOP PL961 COMPONENT LAYOUT

D402.975/6

REV.7 CODE NO.M905002G1 - GRE6018A

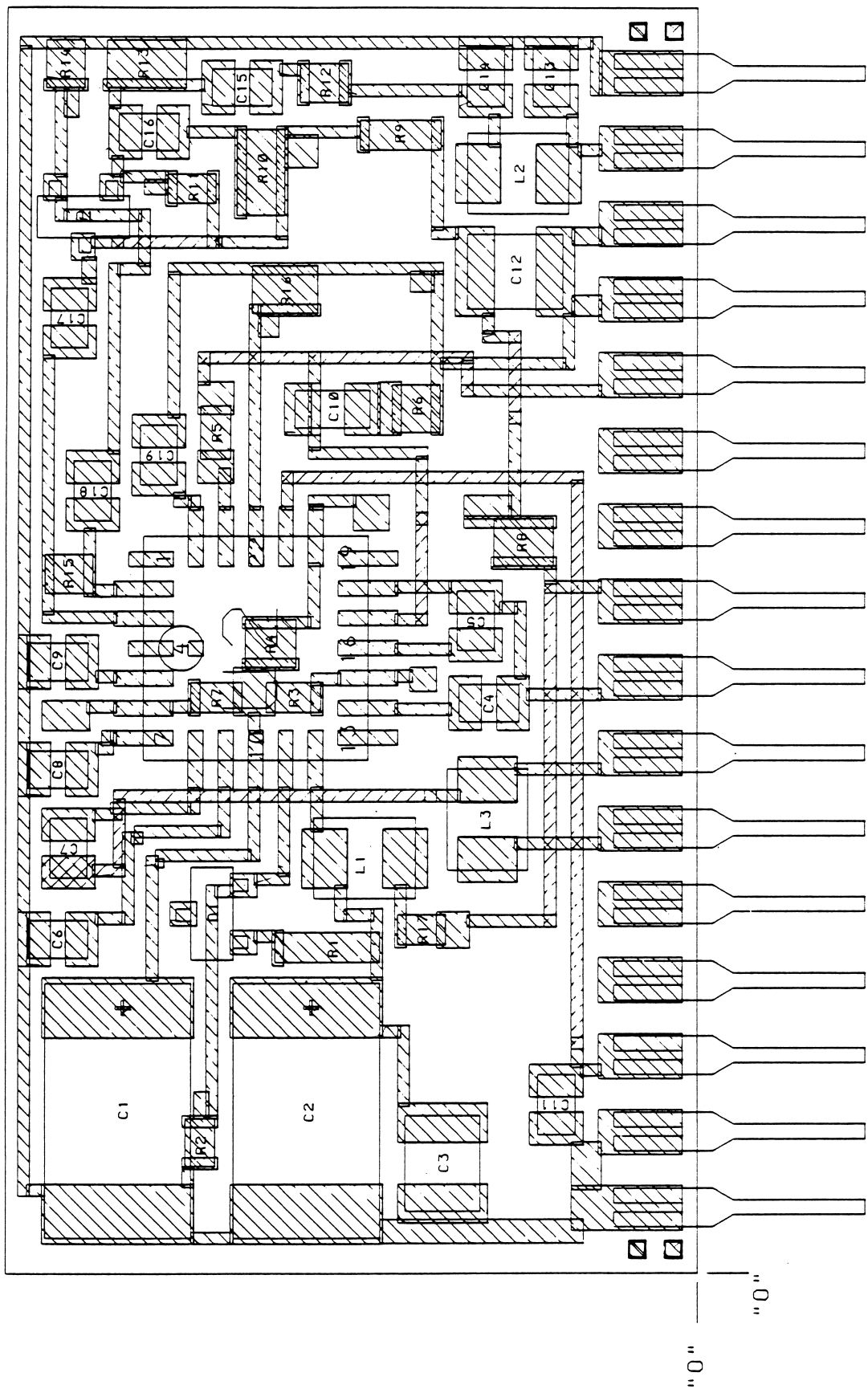


D402.942/7

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 33R 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 4K7 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 4K7 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% | | | |

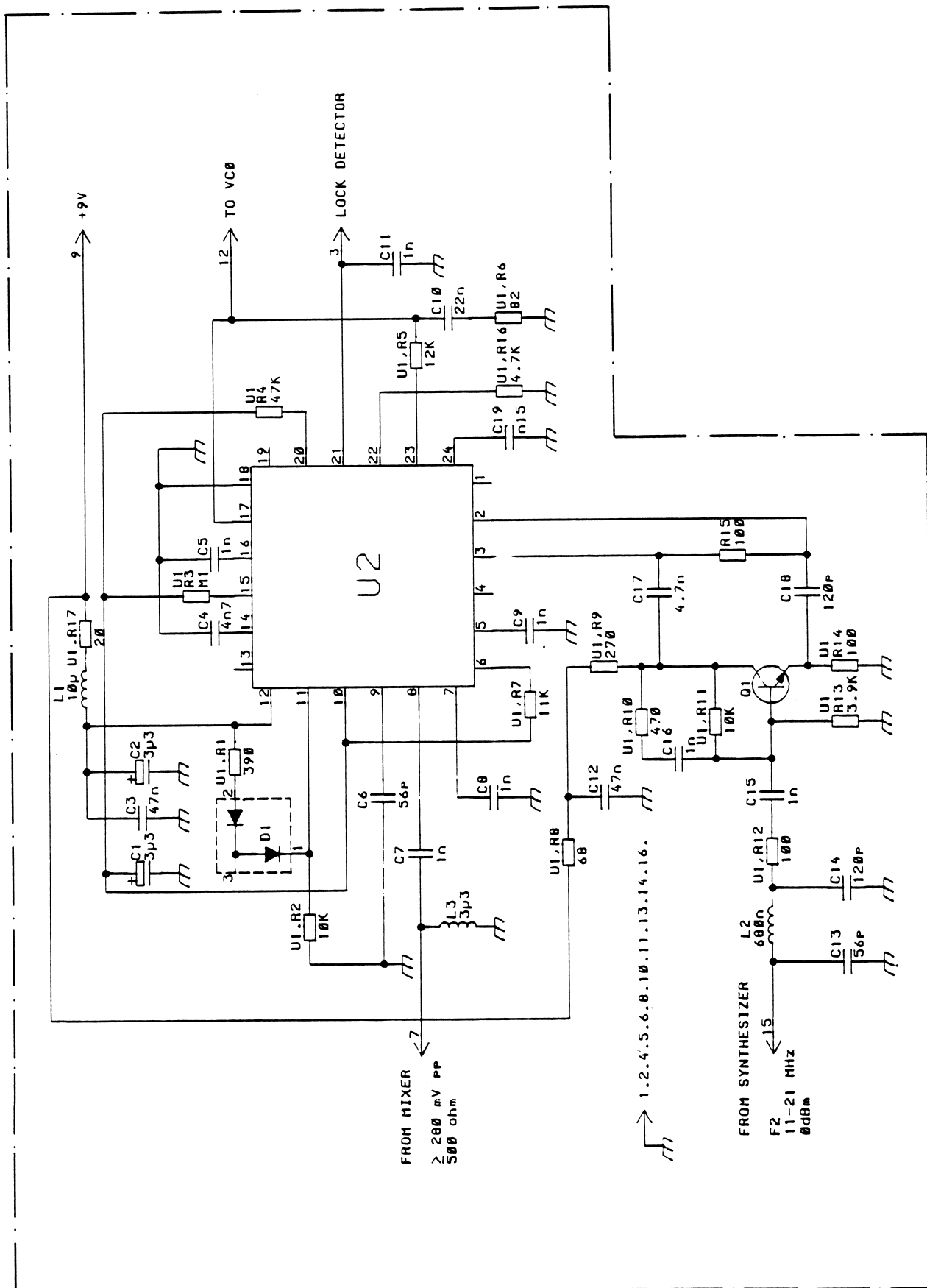
DATE: 09/20/90



PHASE DISCRIMINATOR PD901
INTERGRAED CIRCUIT

CODE NO. M905011G1 - 0102720B81

D405.106/2



PHASE DISCRIMINATOR PD901

D402.921/5

REV A

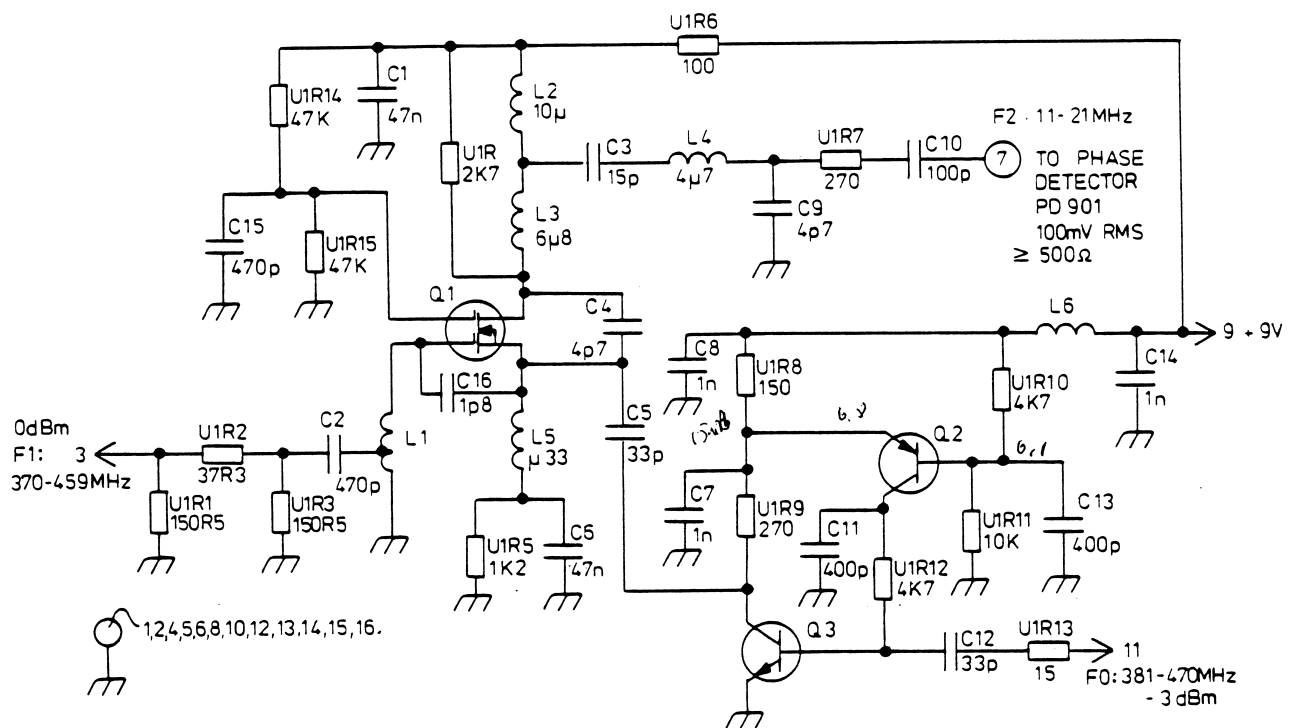
CODE NO. M905011G1 - 0102720B81

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



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

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

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

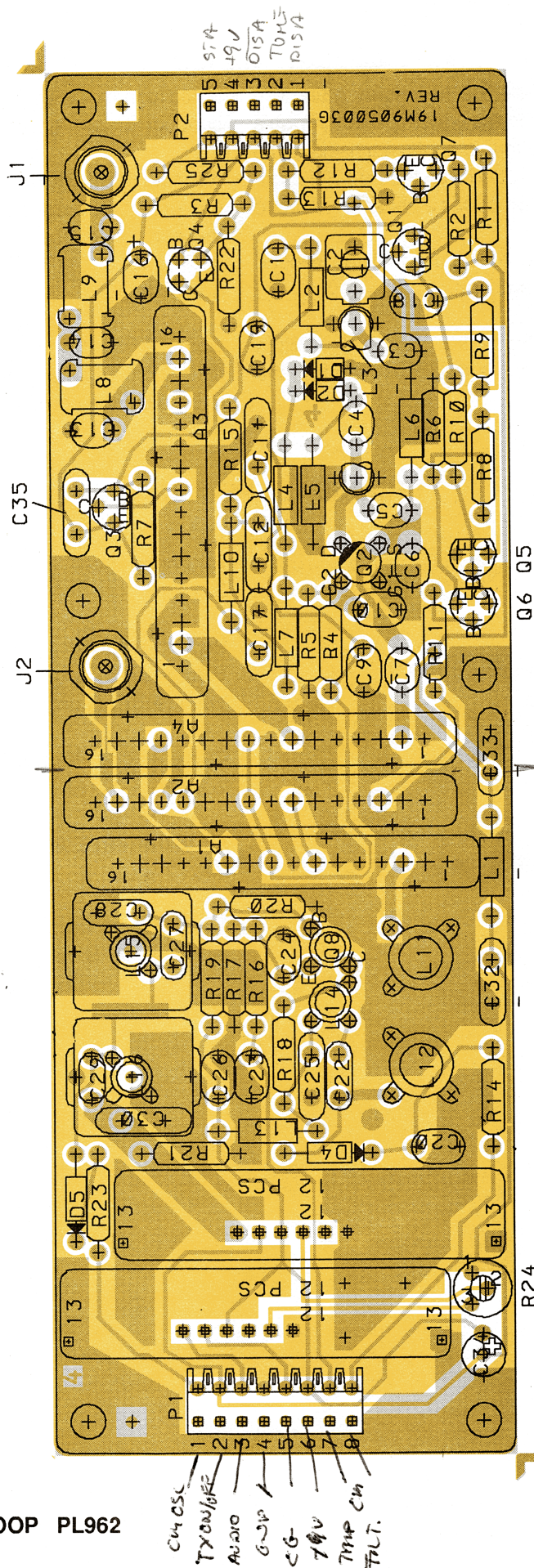
-40°C to +85°C

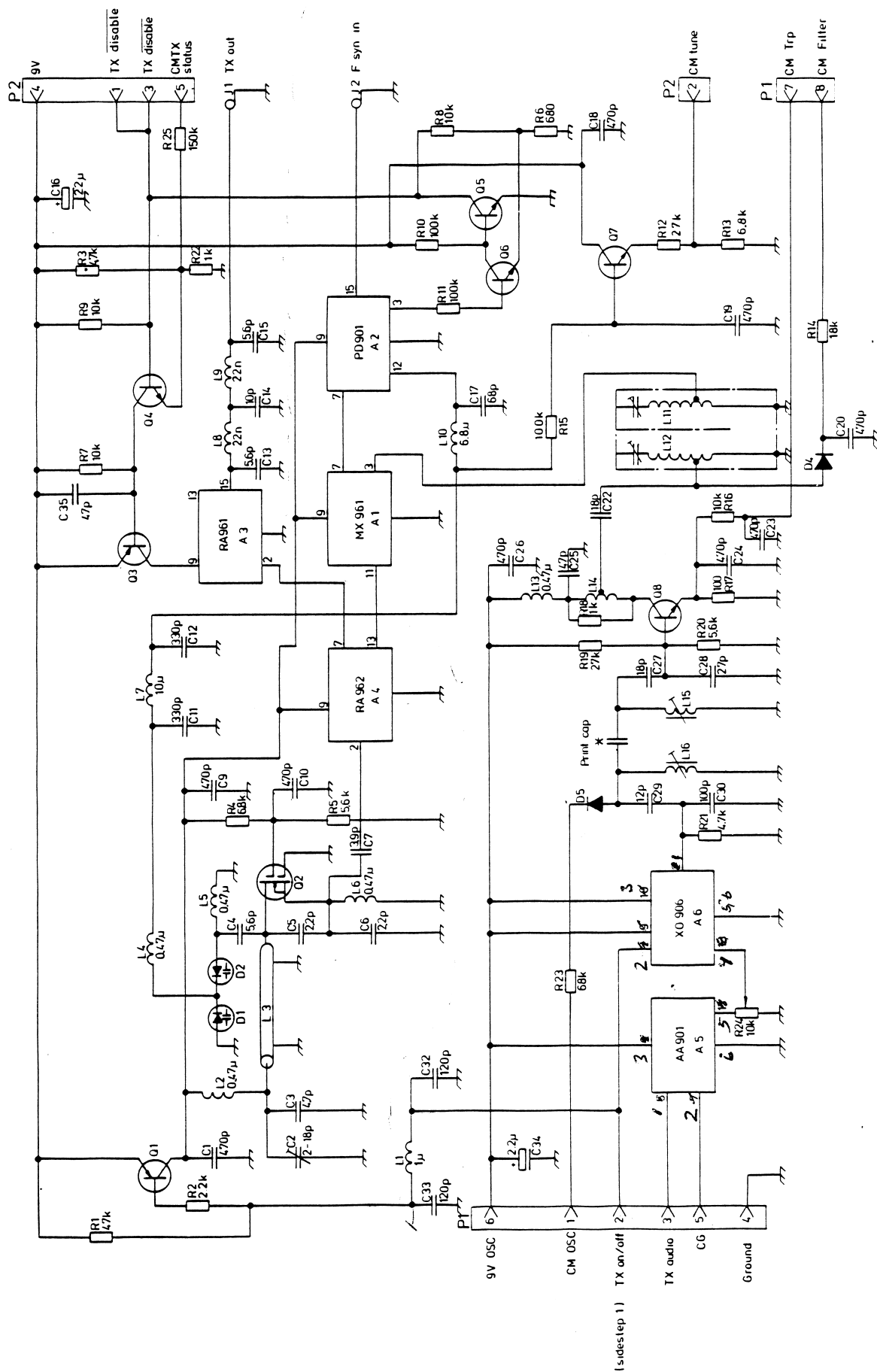
TX PHASE LOCKED LOOP PL962
COMPONENT LAYOUT

D402.976/4

REV.4 COMPONENT LAYOUT

574
49V
015A
T04E
015A





TX PHASE LOCKED LOOP PL962

REV B CODE NO. M905003G1 - GTE6005A

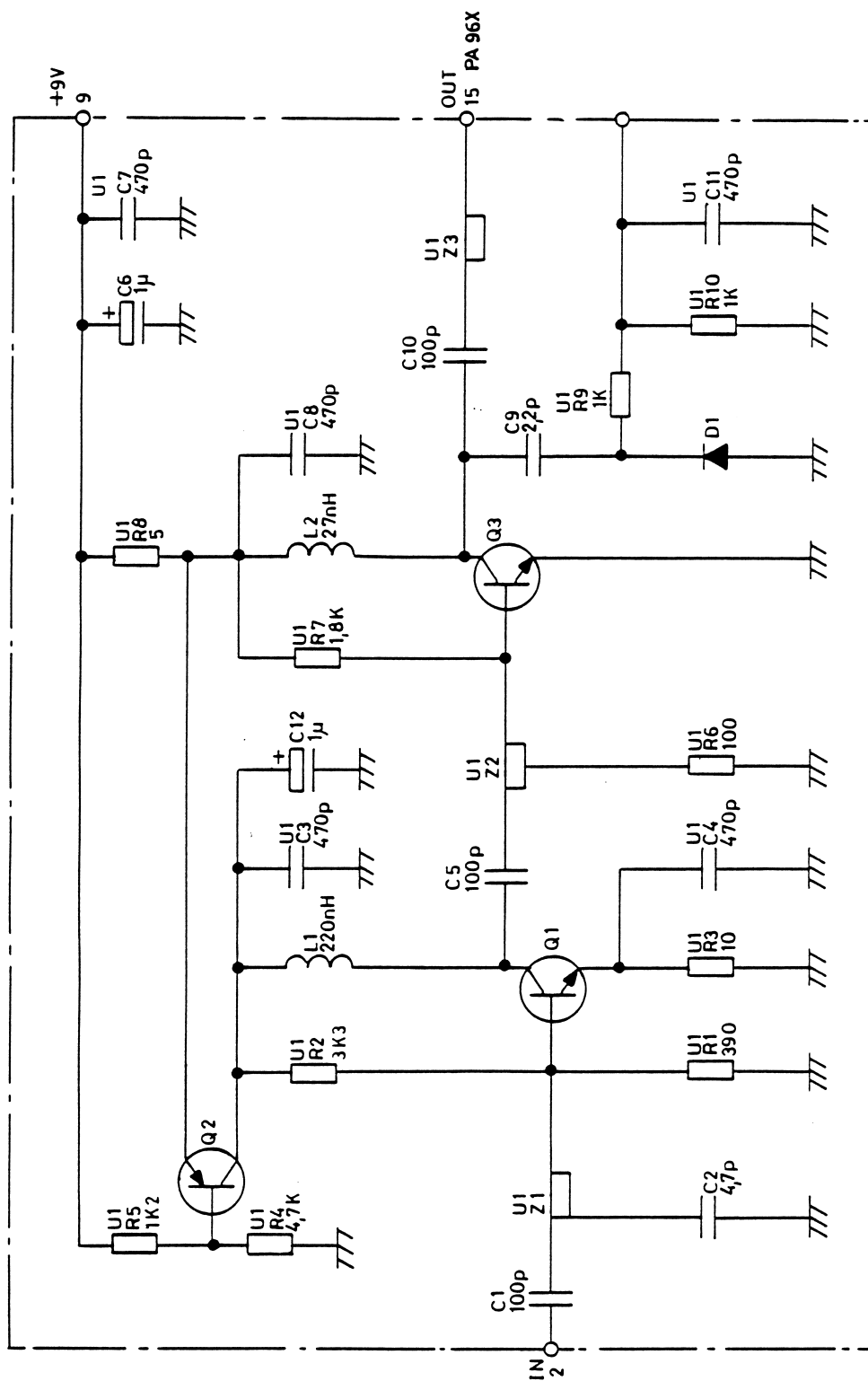
D402.974/6

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



1-3-4-5-6-7-10-11-12-14-16

RF AMPLIFIER RA961

CODE NO. M905057G1 - 0102721B50

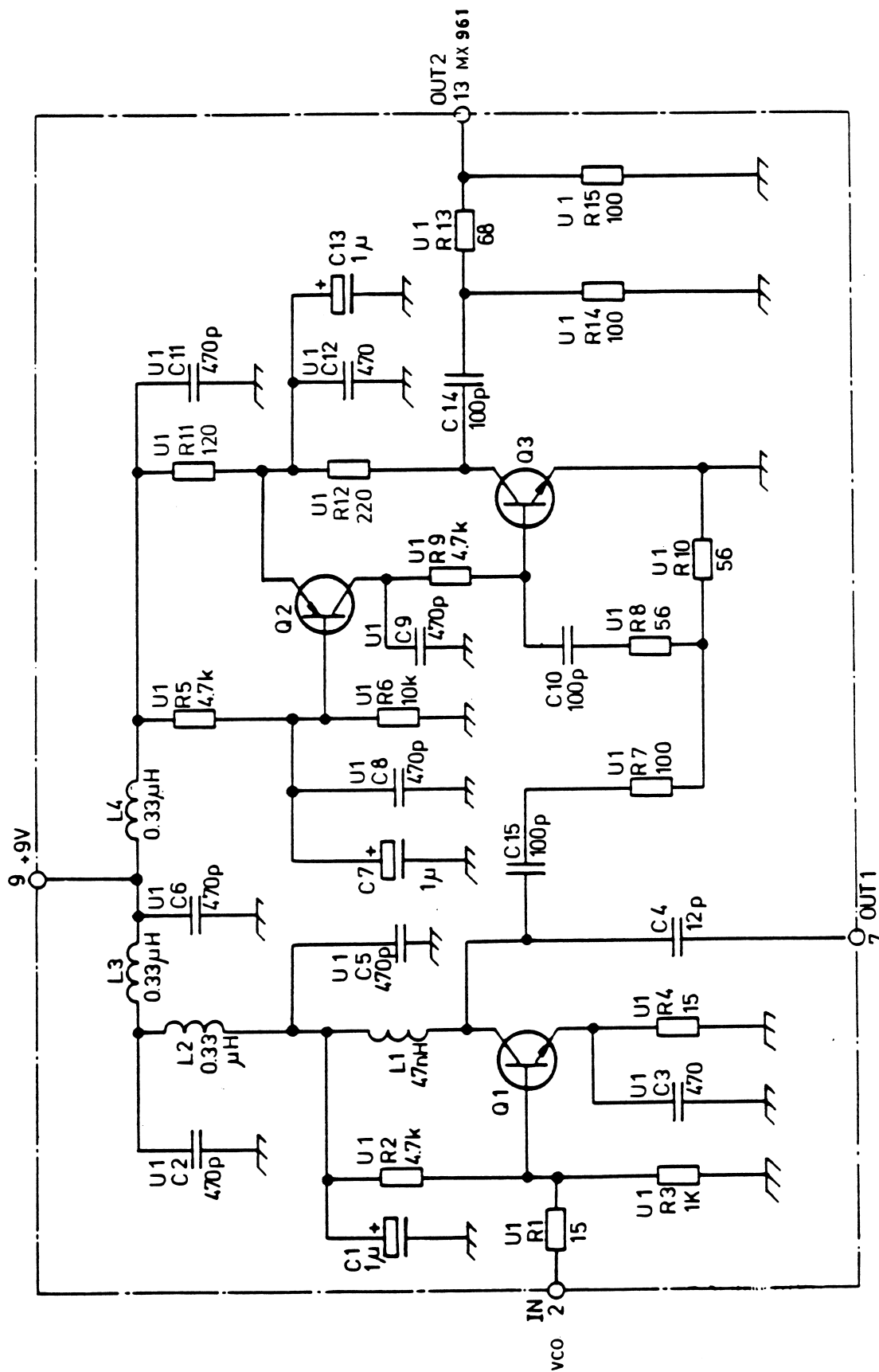
D402.920/4

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 | | | |

X405.104/3

DATE: 09/20/90



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

RA 961

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 | | | |

X405.105/4

DATE: 09/20/90

PS907

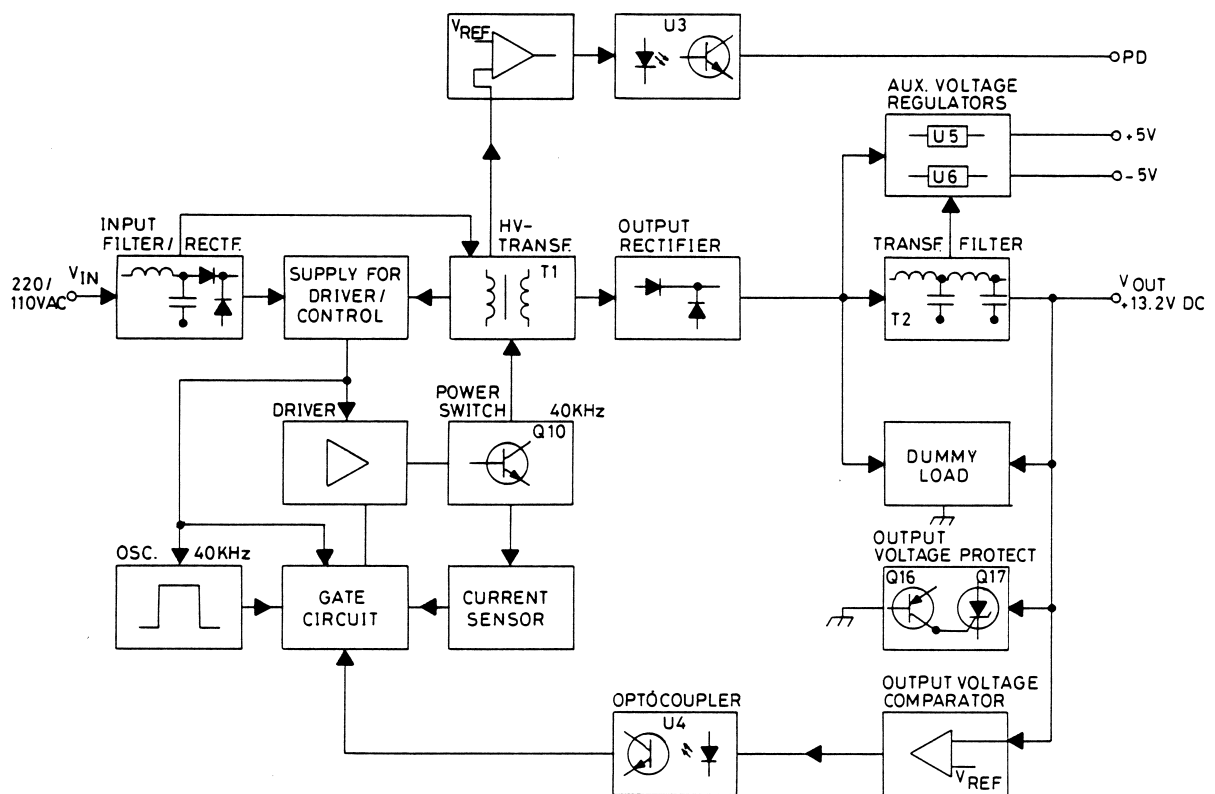
POWER SUPPLY

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 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 A, 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 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

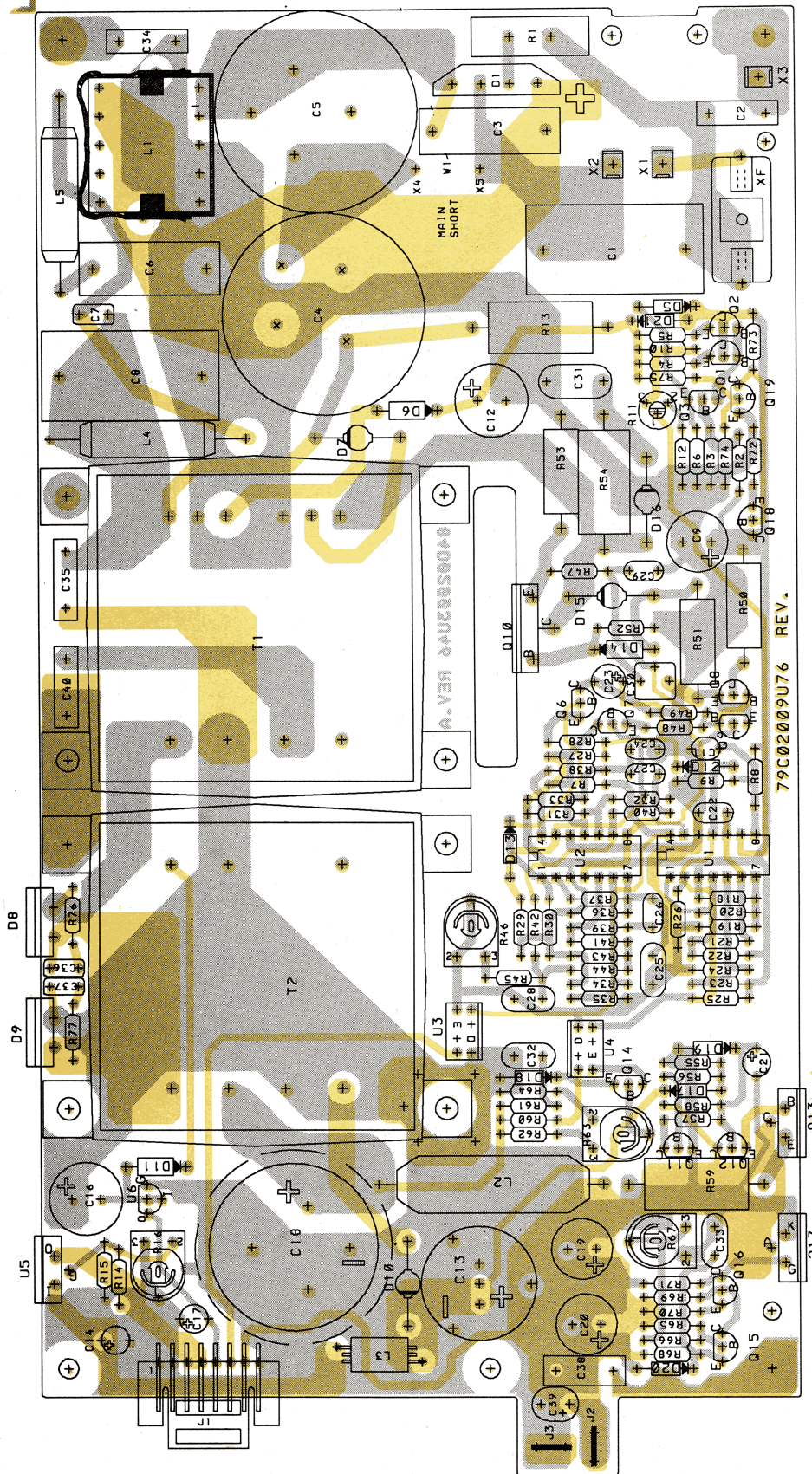
-25°C to +70°C

Mechanical dimensions

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

Weight:

app. 2.1 kg

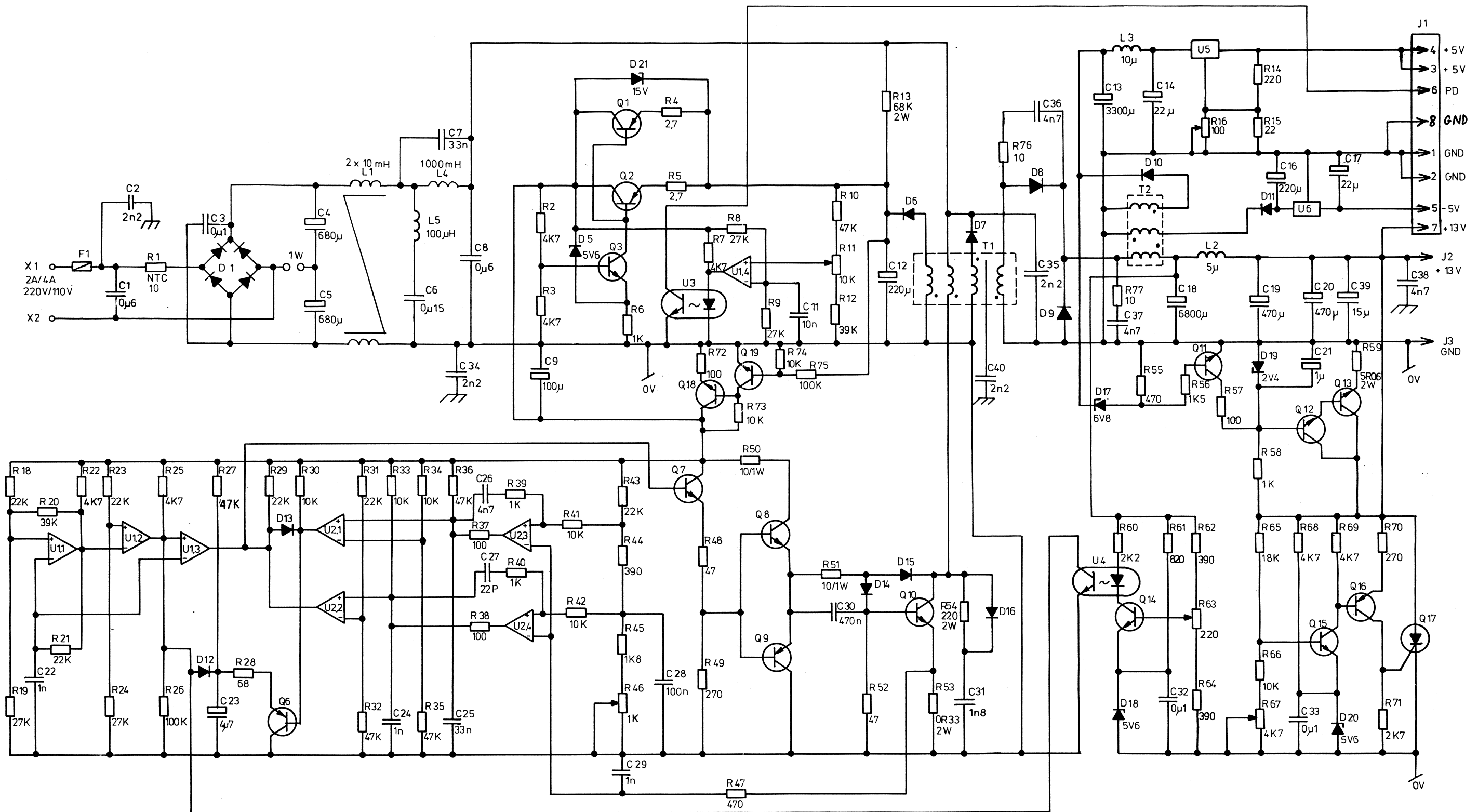


POWER SUPPLY PS907
COMPONENT LAYOUT

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 |
|------|--------------|---------------------------------|------|--------------|---------------------------|
| F001 | GPN6128A | L855742G2 PS 907 | D017 | A700025P8 | DIO SI ZENR 6V8 5% 0.4W |
| | 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 | L855728G1 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 |
| | | | Q009 | J707435P1 | TSTR PNP SI BC 369 |
| | 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 |
| 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 | 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% |
| 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 | 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 BYW 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% | | | |
| R054 | J708692P1 | RES MFLM 2W 220R 5% | | | |
| 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 | | | |
| 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 0R JUMPER | | | |
| | 8402003U46A | M905860P1R2 BD PW | | | |

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PS9011/PS9012

POWER SUPPLY MODULES

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

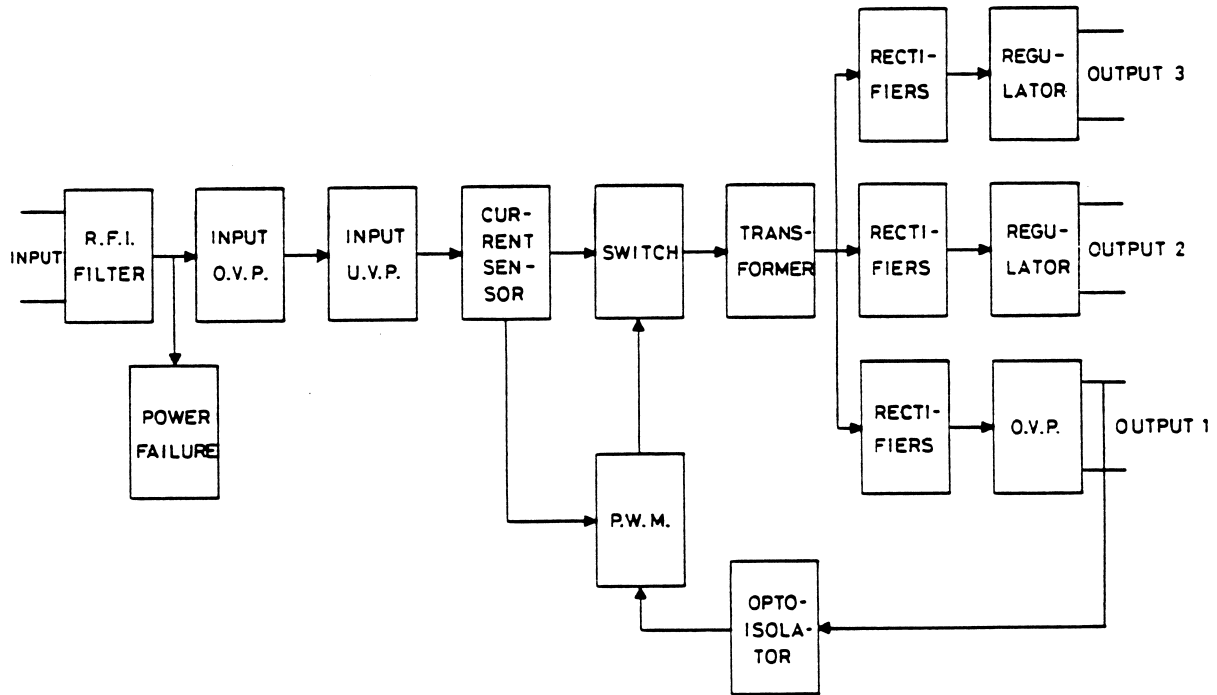
PS9011 is used for 24 V input voltage.

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.

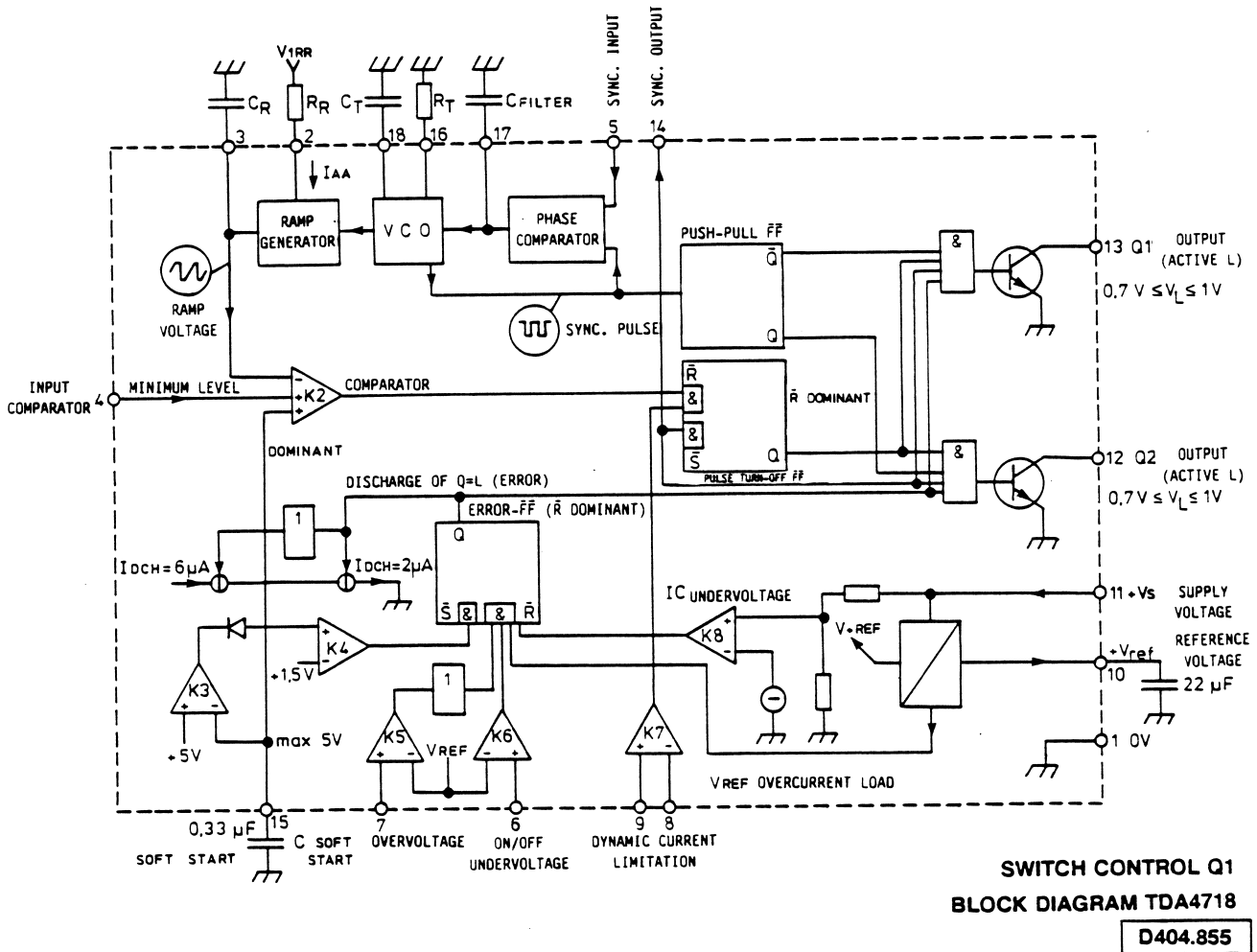


PS9011/PS9012 BLOCK DIAGRAM

D404.852

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.



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

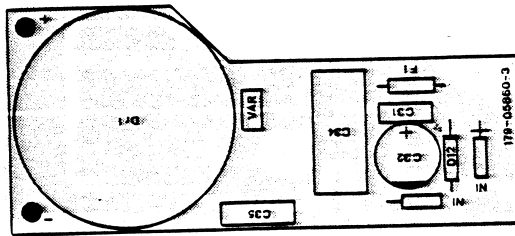
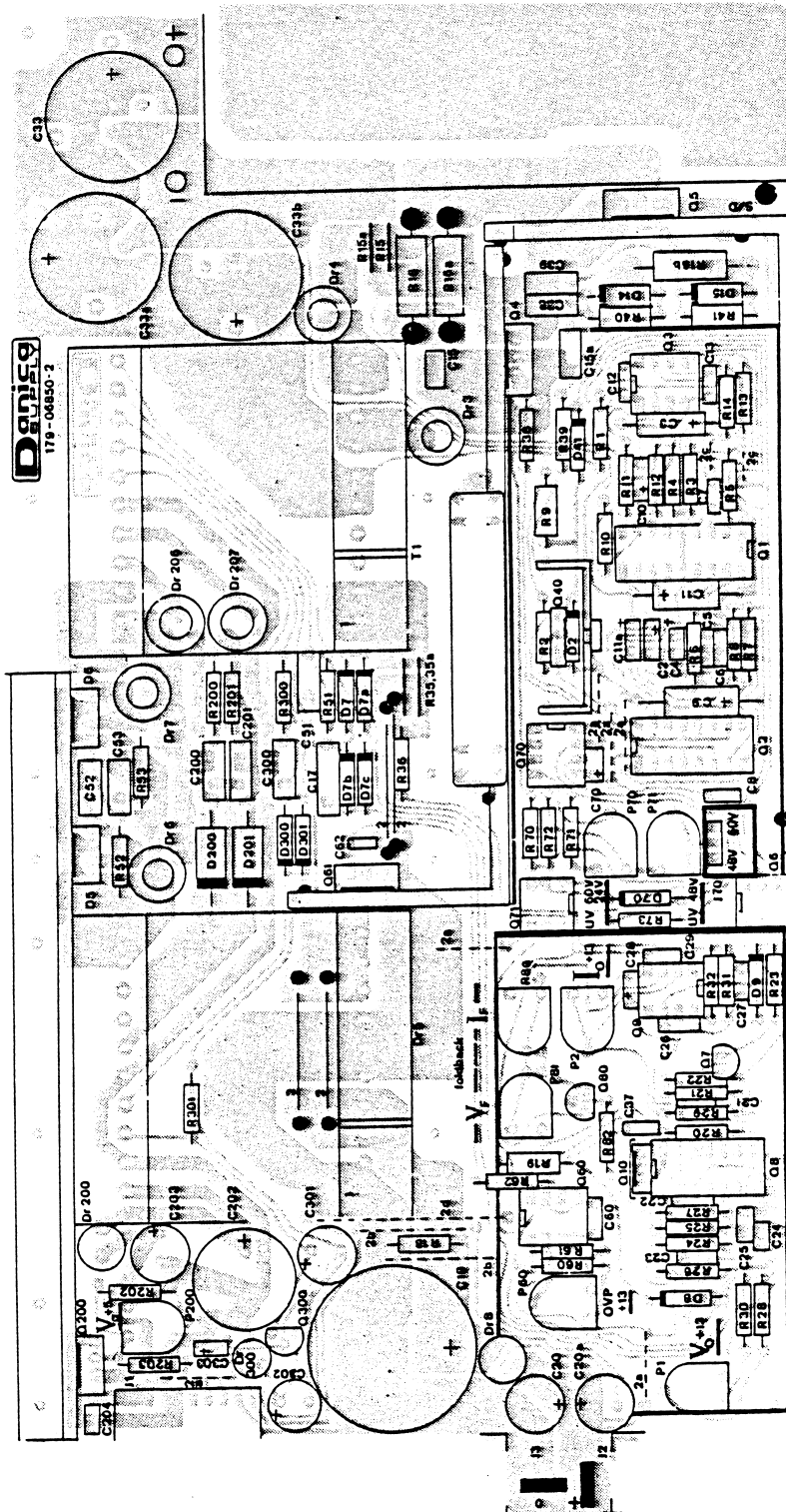
17 V

Under voltage protection, input

16 - 18 V

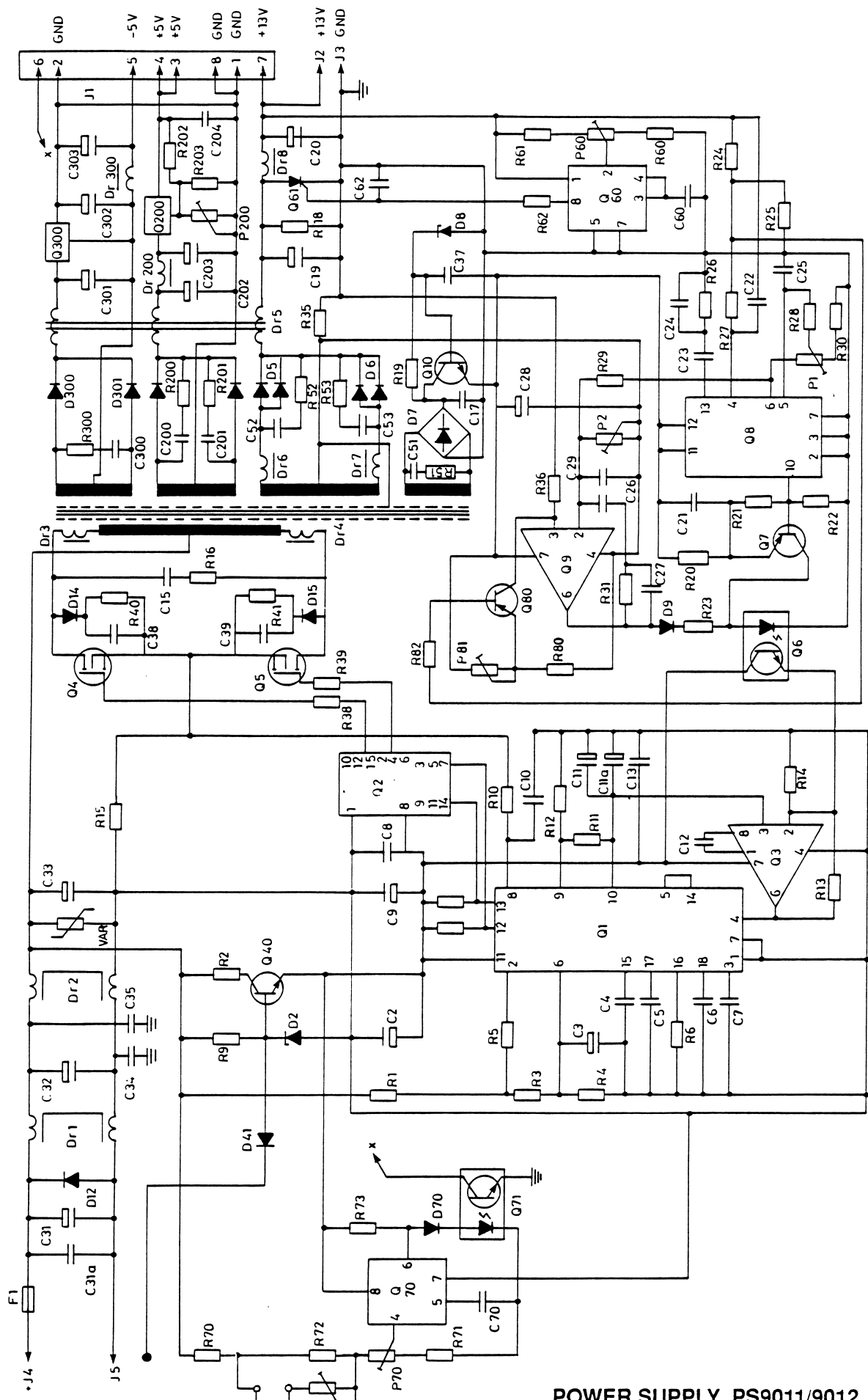
Temperature range

-25°C to +60°C



POWER AMPLIFIER PS9011/9012 COMPONENT LAYOUT

D404.678/2



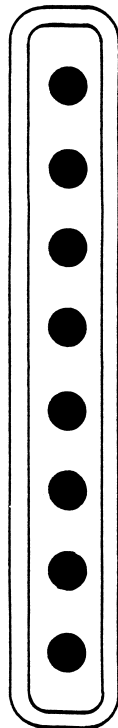
POWER SUPPLY PS9011/9012

PS9011: CODE NO. J709793P1 - GPN6132A

PS9012: CODE NO. J709793P2 - GPN6131A

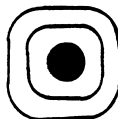
D404.677/2

CONNECTOR J1



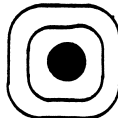
- | | |
|---|----------------------|
| 1 | OUTPUT 2 GND |
| 2 | OUTPUT 3 GND |
| 3 | OUTPUT 2 + 5V |
| 4 | OUTPUT 2 + 5V |
| 5 | OUTPUT 3 - 5V |
| 6 | POWER FAILURE SIGNAL |
| 7 | OUTPUT 1 + 13,2V |
| 8 | OUTPUT 2 GND |

J2



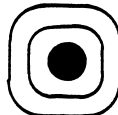
- | | |
|---|------------------|
| 1 | OUTPUT 1 + 13,2V |
|---|------------------|

J3



- | | |
|---|--------------|
| 1 | OUTPUT 1 GND |
|---|--------------|

J4



- | | |
|---|-----------------|
| 1 | INPUT + VOLTAGE |
|---|-----------------|

J5



- | | |
|---|-----------------|
| 1 | INPUT - VOLTAGE |
|---|-----------------|

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 VAR 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 S10V | | | |
| | | 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 | | | |

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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 |

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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 | 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 | 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 S10V | | | |
| | | 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 | | | |

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RC962

RECEIVER FRONT END

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

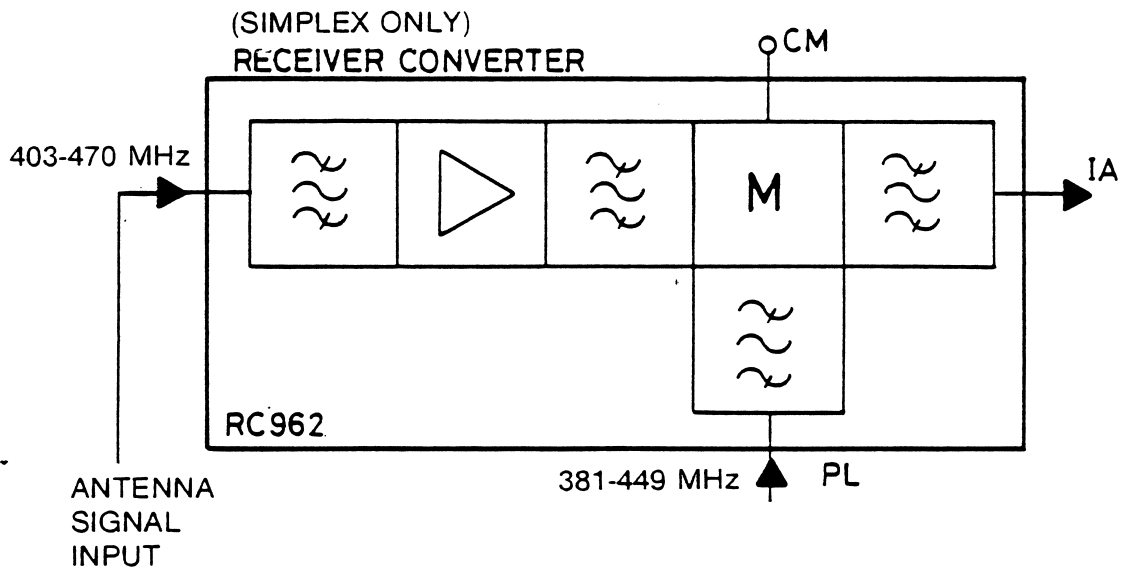
The RC962 is a broad-band front-end which can be tuned over the 403 - 470 MHz band.

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

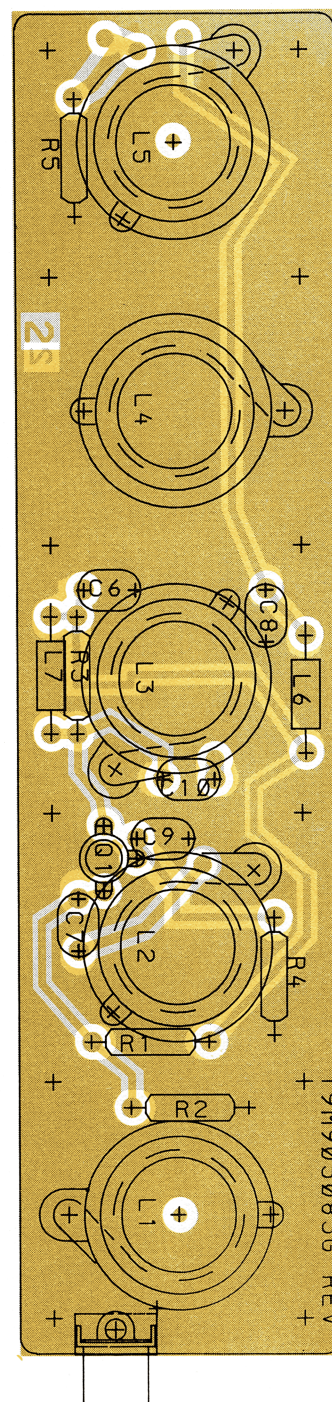
Injection frequency
381 - 449 MHz

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 $+85^{\circ}\text{C}$



D402.963/3 **CODE NO. M905020G1 - GRE6021A**

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 | | | |

X403.888/3

DATE: 09/20/90

RC969

RECEIVER FRONT END

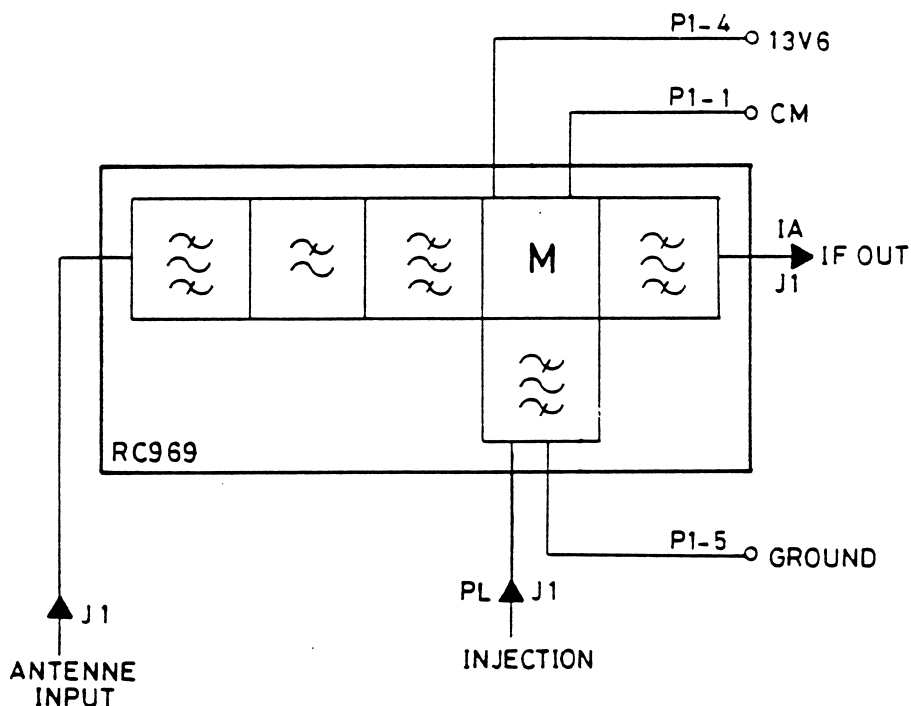
This receiver front-end is the high intermodulation attenuation module with narrow-band front-end. It can be tuned over the 403-470 MHz band. The output from the front-end is the 21.4 MHz IF signal.

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
grater than 2.5 MHz

Bandwidth -40 dB
less than 16 MHz

Injection frequency (tunable)
381 - 449 MHz

Bandwidth -3 dB
7 MHz

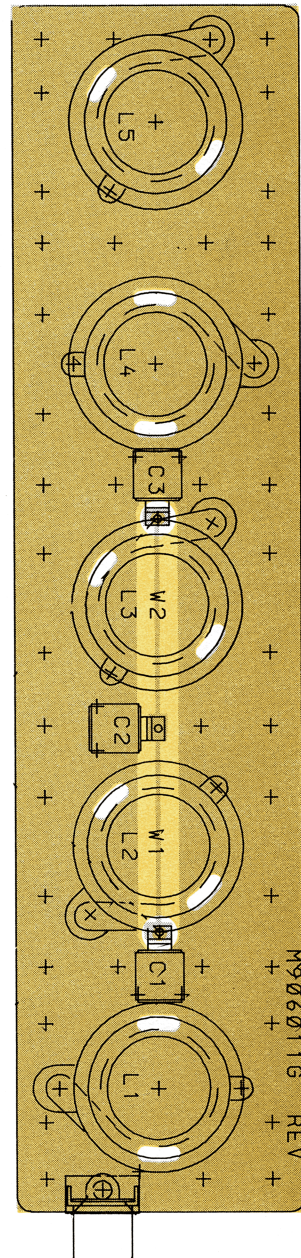
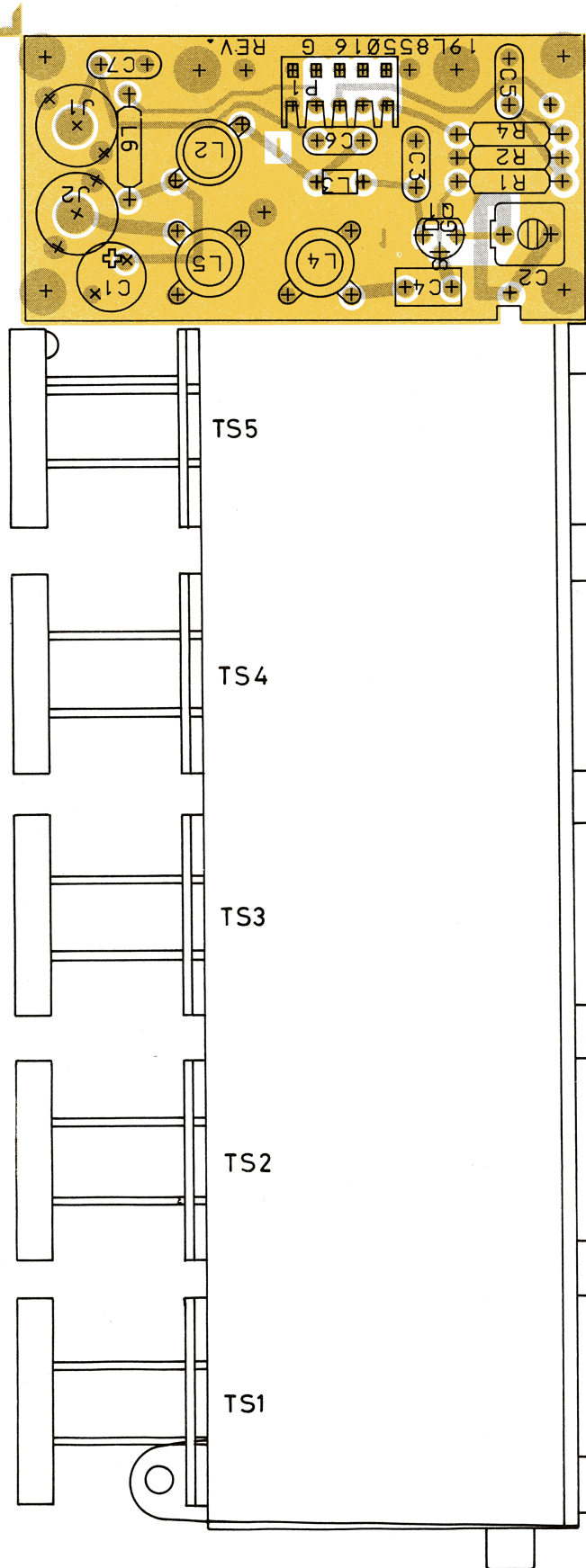
Bandwidth -20 dB
40 MHz

Intermediate frequency
21.4 MHz

Sensitivity 20 dB psoph. EMF
less than 0.75 dB

Intermodulation EIA
grater than 85 dB

Temperature range
-40°C to +85°C



MODULE CODE NO.

L855824G1 - GRE6016A

MOUNTED BOARD CODE NO.

A1: L855016G1 - 0102720B72

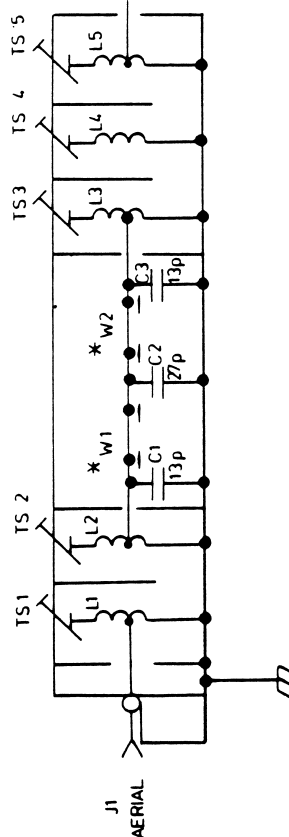
A2: M906011G1 - 0102720B74

RECEIVER CONVERTER RC969 COMPONENT LAYOUT

D404.509/2

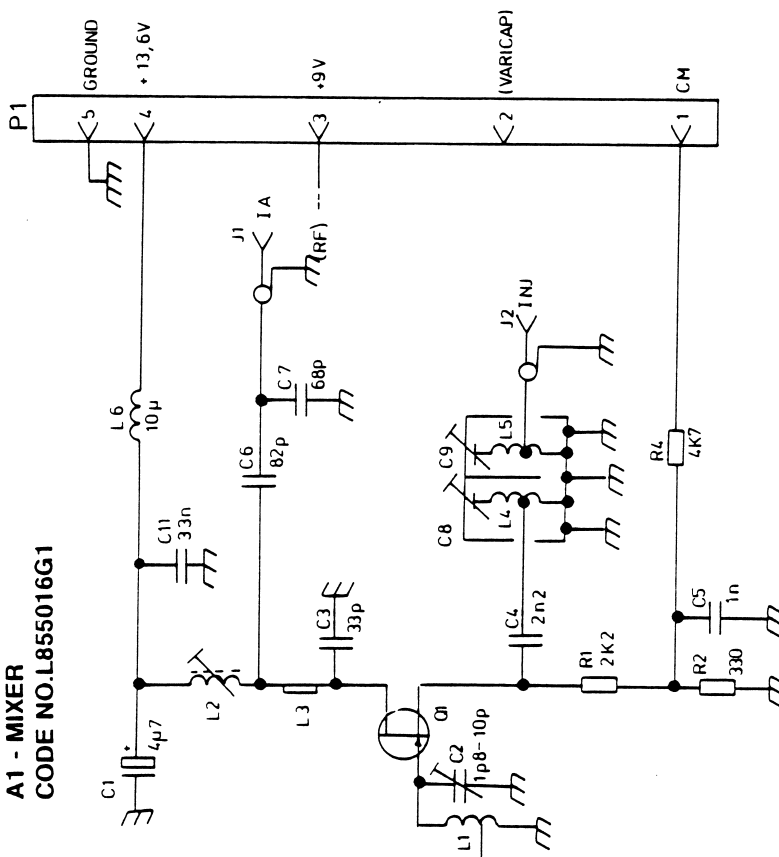
A2 - RF-FILTER
CODE NO.M906011G1

RF-FILTER A2



* PART OF PWB

A1 - MIXER
CODE NO.L855016G1



RECEIVER CONVERTER RC969

D404.508/3

REV.B MODULE CODE NO. L855824G1 - GRE6016A

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 | | | |
| | K805092P1 | NON REFERENCED ITEM SUPPORT | | | |

X404.510/3

DATE: 09/20/90

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.

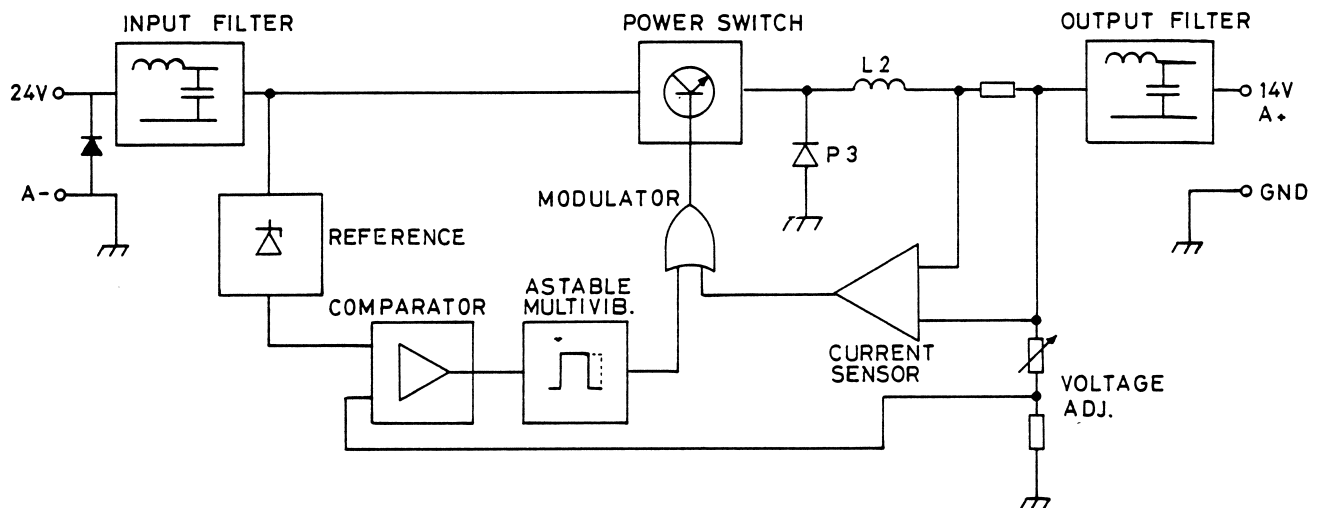
A switch transistor is turned on and off by a square

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

Max. output current

8 A

Output voltage with no load

14.0 V \pm 0.1 V (25°C)

Ripple (32 kHz)

\leq 50 mV pp

Internal impedance

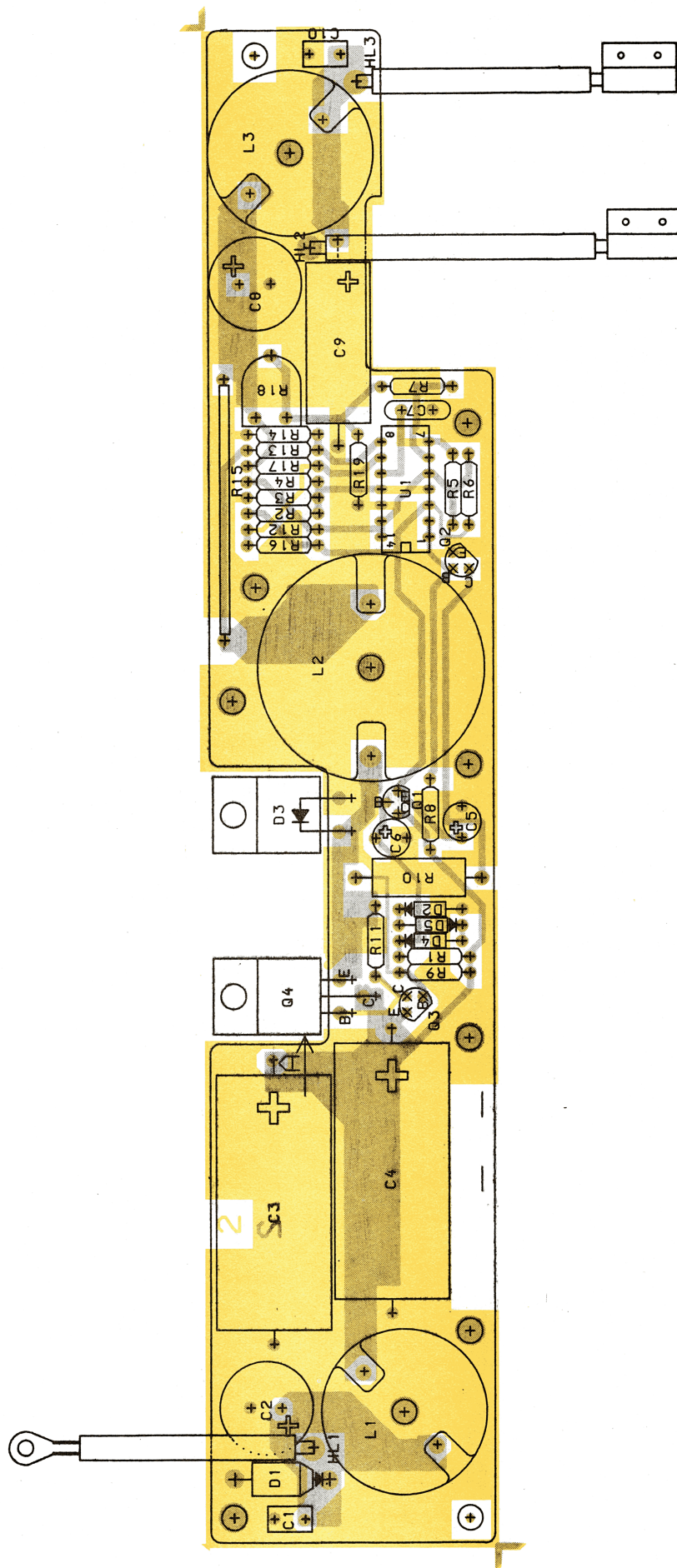
100 mohm

Short circuit ability

Continuous without damage

Temperature range

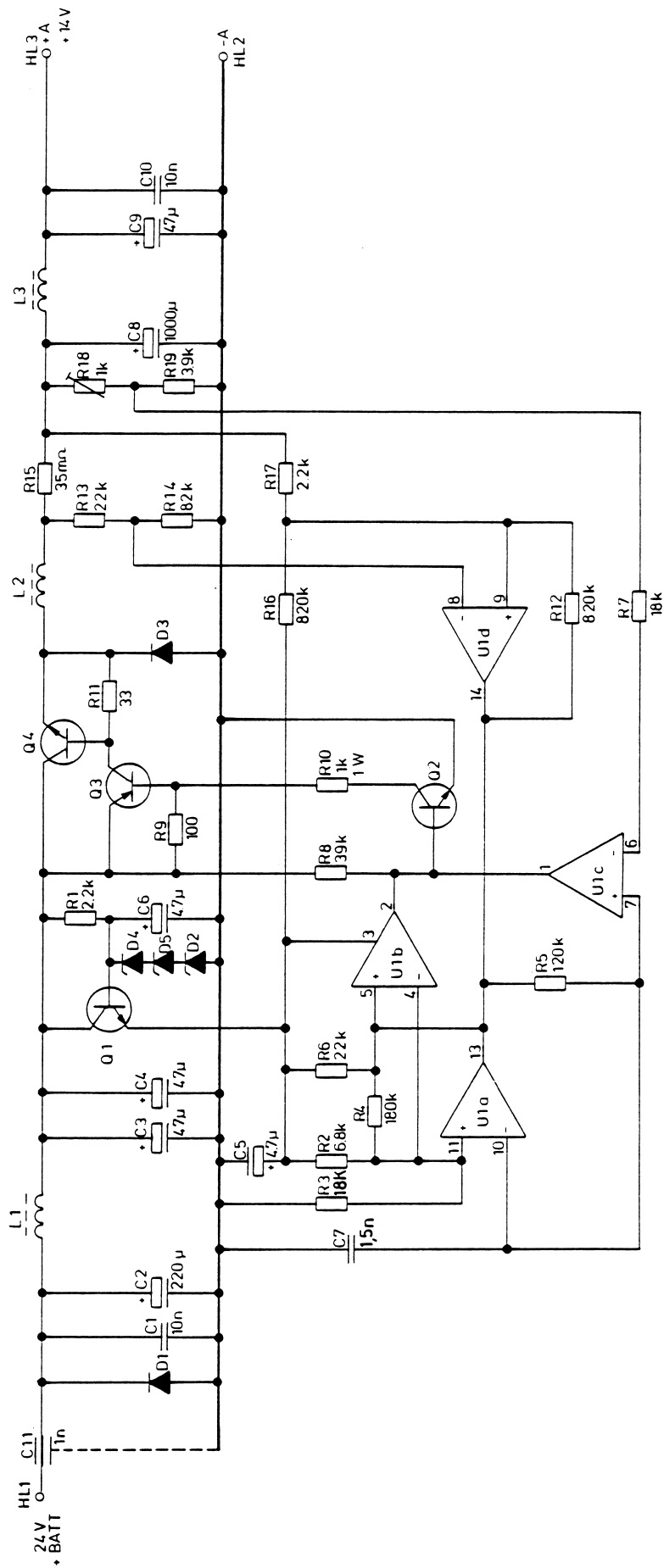
-40°C to 55°C



VOLTAGE REGULATOR VR902 COMPONENT LAYOUT

D403.165/2

CODE NO. L855018G1 - GRN6130A



VOLTAGE REGULATOR 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) | | | |

X403.355/5

DATE: 09/20/90

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

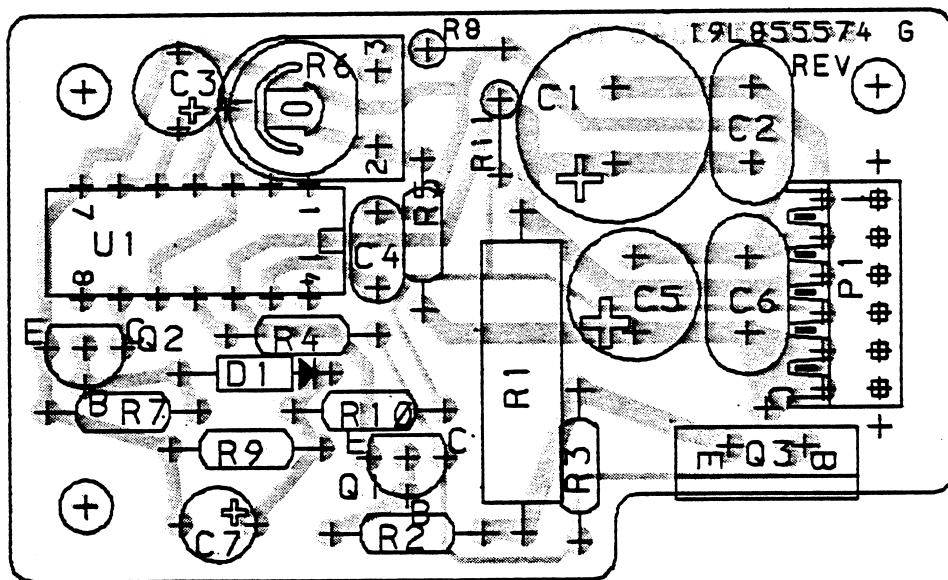
On: 7 V to 15.6 V

Heat loss

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

Temperature range

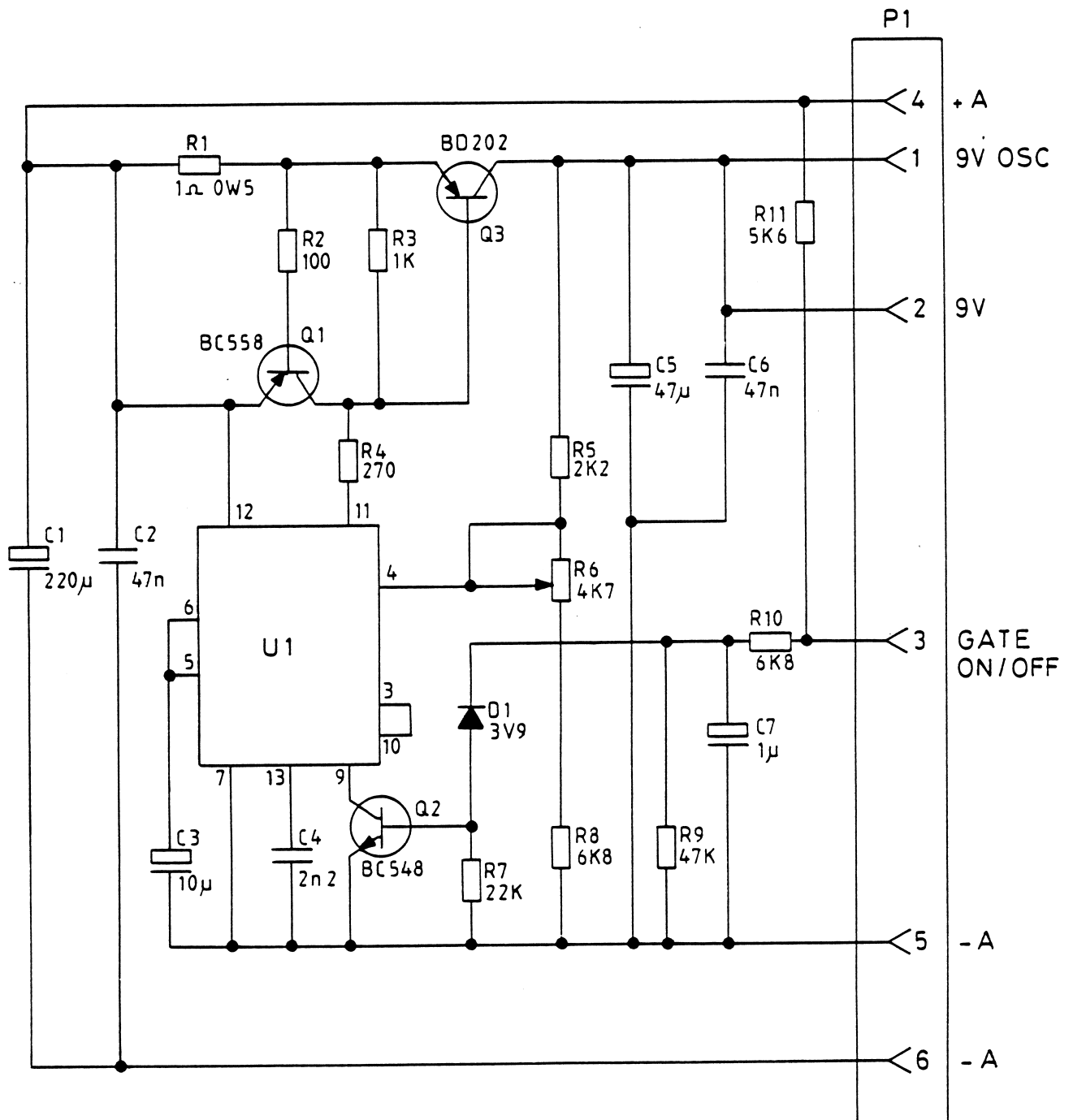
-40°C to +85°C



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 | | | |

X403.898/3

DATE: 09/20/90

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

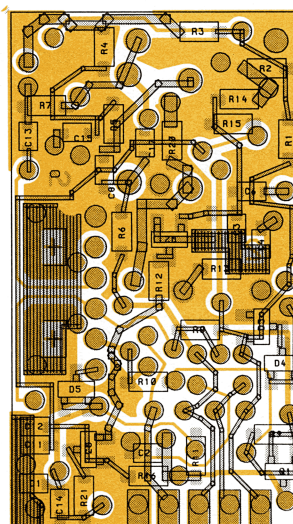
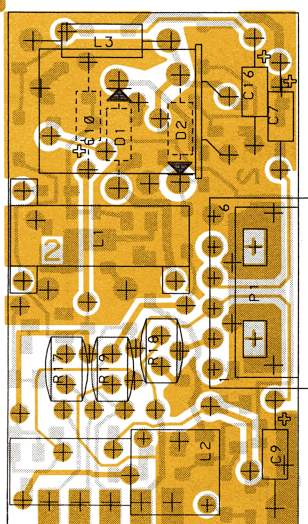
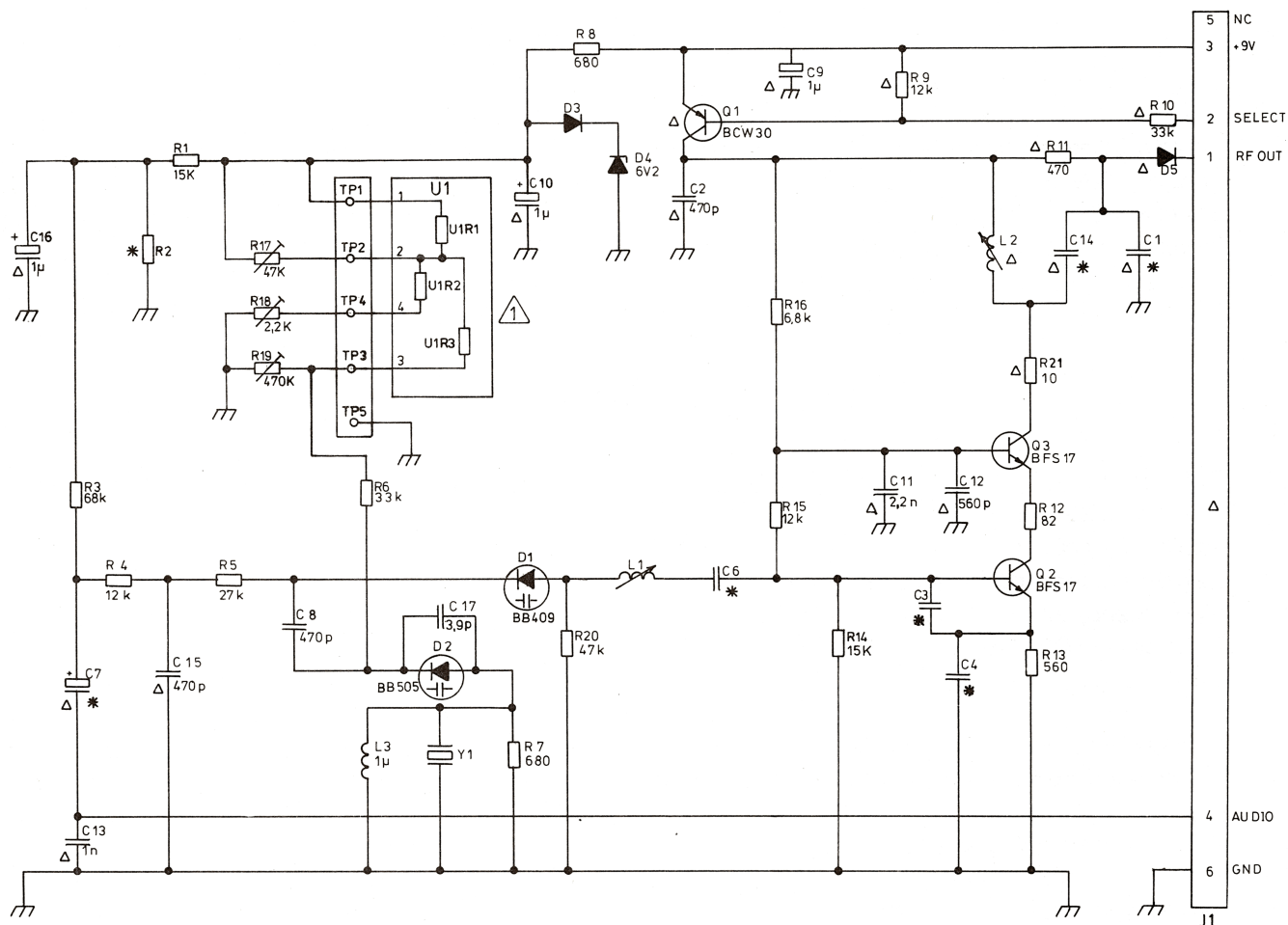
± 2.0 PRM at -30°C to +75°C

Reference temperature

+25°C

Output level

+3 dBm ± 3 dB



- NOTES:
- U1 IS A RESISTOR NETWORK ON THICKFILM
 - 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

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 | | | BD PW |
| U01 | 0102720B60 | L855471G1 RES NETWORK | | J707831P1 | NON REFERENCED ITEMS: |
| Y01 | J707566P6 | X-TAL 31 - 66 MHz | | J707972P1 | SHIELD |
| | | NON REFERENCED ITEM: | | | LBL |
| | 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% | | | |

DATE: 09/20/90








X405.355/2

GRAPHICAL SYMBOLS USED IN CIRCUIT DIAGRAMS






Resistors(R)

-  Resistor
-  Resistor with fixed tap
-  Variable resistor
-  Resistor with movable tap (Potentiometer).
-  VDR
-  NTC
-  Light-emitting diode (photosensitive resistor)
-  PTC
-  Resistor with preset adjustment


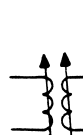
Capacitors(C)

-  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

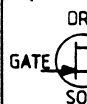



Diodes(D)

-  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)

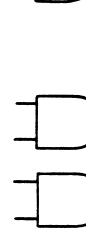
-  P-channel dual gate IGFET (MOS)

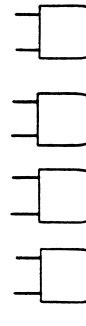
Integrated Circuits (U)

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

-  AND gate.
-  OR gate.
-  NAND gate.
-  NOR gate.
-  Exclusive OR gate.

-  Wired OR (combined OR outputs) (presentation at top is used in detailed diagrams; presentation below is used in functional diagrams)

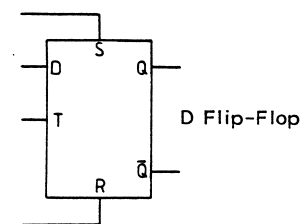
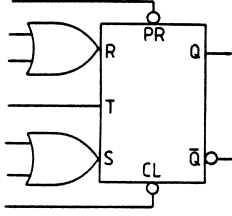
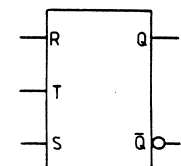
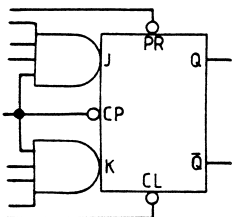
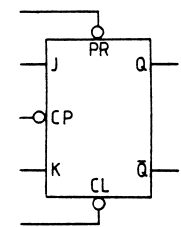
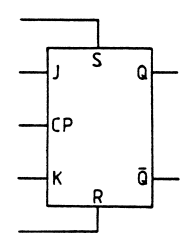
-  OUTPUT

GRAPHICAL SYMBOLS USED IN CIRCUIT DIAGRAMS

Flip-flops

Abbreviations used:

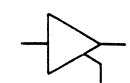
S =Set
R =Reset
CP=Clock pulse
PR=Preset
CL=Clear
T =Toggle



Inverters

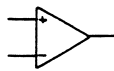


Inverter

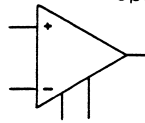


Three-state driver

Operational Amplifiers



Operational amplifiers.



Relays(K)



Single-coil relay



Dual-coil relay



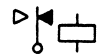
Polarized relay



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

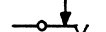
Switches and Keys (S)



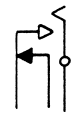
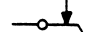
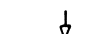
On/Off switch



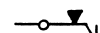
Locking keys or switches: push on, push off



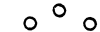
Non-Locking self-releasing keys or switches



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.



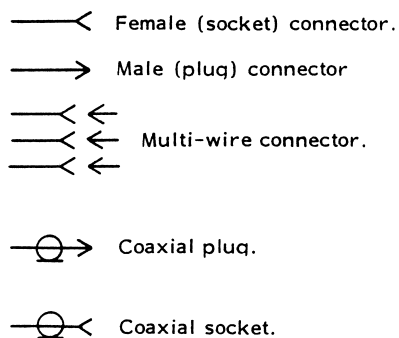
Screened cable.



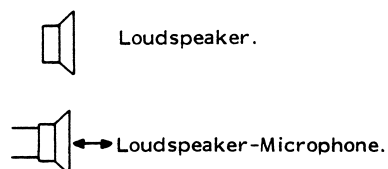
Coaxial cable.

GRAPHICAL SYMBOLS USED IN CIRCUIT DIAGRAMS

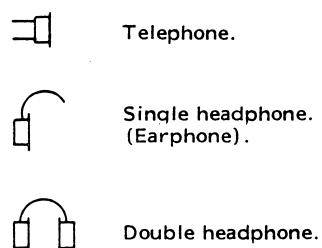
Connectors(J and P)



Loudspeakers (LS)



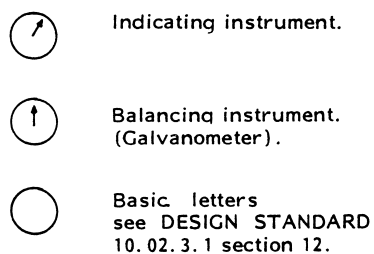
Telephones (TEL)



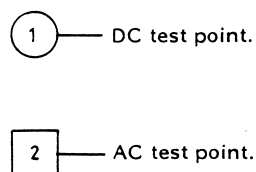
Microphones (M)



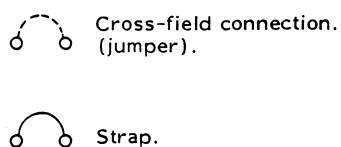
Meters etc.



Test Points



Replaceable Connections (W)



Miscellaneous

