

FARNELL

Part No. 9HPSG1000B

**INSTRUCTION/SERVICE MANUAL
FOR
PSG1000B
PORTABLE SIGNAL GENERATOR**

Farnell Electronics plc. 1992

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1. S A F E T Y

GENERAL

This equipment has been designed to meet the requirements of IEC publication 348, "Safety Requirements for Electronic Measuring Apparatus", and has left the factory in safe condition.

The remainder of this section on safety provides information and warning which must be followed by the user to ensure safe operation and to maintain the equipment in a safe condition.

AC POWER SUPPLY

If it is necessary to fit a suitable a.c. power plug to the power cable, the user must observe the following colour code:-

LIVE terminal to BROWN lead
NEUTRAL terminal to BLUE lead
EARTH terminal to GREEN/YELLOW lead.

The user must also ensure that the protective earth lead would be the last to break should the cable be subject to excessive strain.

If the power cable electrical connection to the a.c. power plug is through screw terminals then, to ensure reliable connections, any solder tinning of the cable wires must be removed before fitting the plug.

WARNING! Any interruption of the protective earth conductor inside or outside the equipment or disconnection of the protective earth terminal is likely to make the equipment dangerous. Intentional interruption is prohibited.

Before switching on the equipment, ensure that it is set to the voltage of the local a.c. power supply.

ADJUSTMENT, REPLACEMENT OF PARTS, MAINTENANCE AND REPAIR

When the equipment is connected to the local a.c. power supply, internal terminals may be live and the opening of covers or removal of parts (except those to which access can be gained by hand) is likely to expose live parts.

The equipment must be disconnected from all voltage sources before it is opened for any adjustment, replacement, maintenance or repair.

Capacitors inside the equipment may still be charged even if the equipment has been disconnected from all voltage sources.

Any adjustment, maintenance and repair of the opened equipment under voltage must be carried out only by a skilled person who is aware of the hazards involved.

Ensure that only fuses with the required rated current and of the specified type are used for replacement. The use of make shift fuses and the short-circuiting of fuse holders is prohibited.

HANDLING HAZARDS

Cathode ray tubes can implode if subject to excessive mechanical shock. Wear safety goggles if removing or replacing a CRT.

Any battery which is no longer serviceable should be disposed of intact and never incinerated. Replacement of lithium based batteries requires particular caution. Do not allow a new or used lithium battery to be short circuited, subject to any charging current or temperatures in excess of +70°C. Insulate terminals before disposal.

Beryllium oxide washers must be treated as toxic waste and be disposed of intact and never incinerated.

EPROMs could lose data if exposed to direct sunlight for 1 week or room level fluorescent lighting for 3 years.

Many components contain polymers which will give rise to toxic fumes if incinerated.

STATIC ELECTRICITY

Assume all integrated circuits are 'static sensitive'. Before handling these components or printed circuit board assemblies containing these components, personnel should observe the following precautions:

- 1) The work surface should be a conductive grounded mat.
- 2) Soldering irons must be grounded and tools must be in contact with a conductive surface to ground when not in use.
- 3) Any person handling static-sensitive parts must wear a wrist strap which provides a leaky path to ground, impedance not less than 1 megohm, and not greater than 100 megohm.
- 4) Components and printed circuit board assemblies must be stored in or on conductive foam or mat while work is in progress.
- 5) New components should be kept in the supplier's packaging until required for use.

2. SCHEDULE OF EQUIPMENT

The instrument has been carefully packed to prevent damage in transit. When removing the unit from the packing box, ensure that all parts and accessories are removed from the packing material. Retain the packing box and material.

The complete equipment comprises:	Farnell part number
1 off Farnell PSG1000B Signal Generator	1ERPSG1000B
1 off detachable a.c. power lead	HC22V2
1 off type N to BNC adaptor	TR201A
1 off BNC to BNC coaxial cable	HC0010
1 off Instruction/Service manual	9HPSG1000B
1 off three pin d.c. input plug	TG212
1 off six way auxiliary connection plug and loom:	
standard unit	LB553
pulse modulation option	LB554
1 off extractor for power selector card	HW3114003

Any factory fitted options will be marked on the unit back panel.

Note: In the event of damage in transit or shortage in delivery separate notices in writing should be given to both carriers and Farnell Instruments Limited, or local agent if outside the U.K., within three days of receipt of the goods, followed by a complete claim within five days. All goods which are the subject of any claim for damage in transit or missing items should be preserved intact as delivered, for a period of seven days after making the claim, pending inspection or instructions from Farnell Limited, or an agent of this company.

3. INTRODUCTION

The Farnell PSG1000B is a field portable synthesized signal generator covering the frequency range 10kHz to 1GHz with a full +13dBm to -133dBm output level range. This range covers most radio services in the MF, HF, VHF and UHF bands.

Designed to operate from any standard a.c. supply or from 12V d.c. (24V option) the compact lightweight unit is ideal for field, bench or system use.

An internal 1kHz distortion analyzer is a standard feature allowing SINAD sensitivity test to be performed on mobile radios, thus enabling rapid and consistent alignment checks to be made. The SINAD signal to noise ratio is displayed on the front panel analogue meter, which can also be used to monitor the external modulation input level or the battery state when d.c. power is applied.

Front panel control is by a tactile membrane switch assembly completely sealed against the ingress of moisture and dust, with a RFI shield laminated in. High visibility LED displays are used to indicate carrier frequency or modulation rate with carrier level or modulation level. The addition of a rotary control, which is not normally incorporated in signal generators in this price range, enables displayed data to be conveniently adjusted.

The entire parameters of the last front panel settings and 100 user defined set ups are retained in non-volatile RAM following a power break. Individual memories are available for recall, store and protect, with an additional memory step function. Automatic conversion calculations are performed by the microprocessor enabling carrier level to be entered and displayed in the units of dB, dB μ V, mV and μ V pd.

A built-in fast locking modulation tone generator provides greater versatility than the usual spot frequencies, and enables precise continuous tones to be set up for CTCSS systems, sequential tones to be programmed for SELCALL systems and modulation bandwidths to be accurately checked. In addition to the usual 5 tone SELCALL systems, the user may also define unique tone bursts with up to 16 consecutive tones. The last used SELCALL tones are also stored in non-volatile RAM.

Also included is a low distortion 1kHz spot frequency designed to be used for accurate modulation settings, SINAD measurements or mixed with the tone generator enabling two tone tests to be performed. External modulation sources may also be used independently or mixed with the internal tone generator.

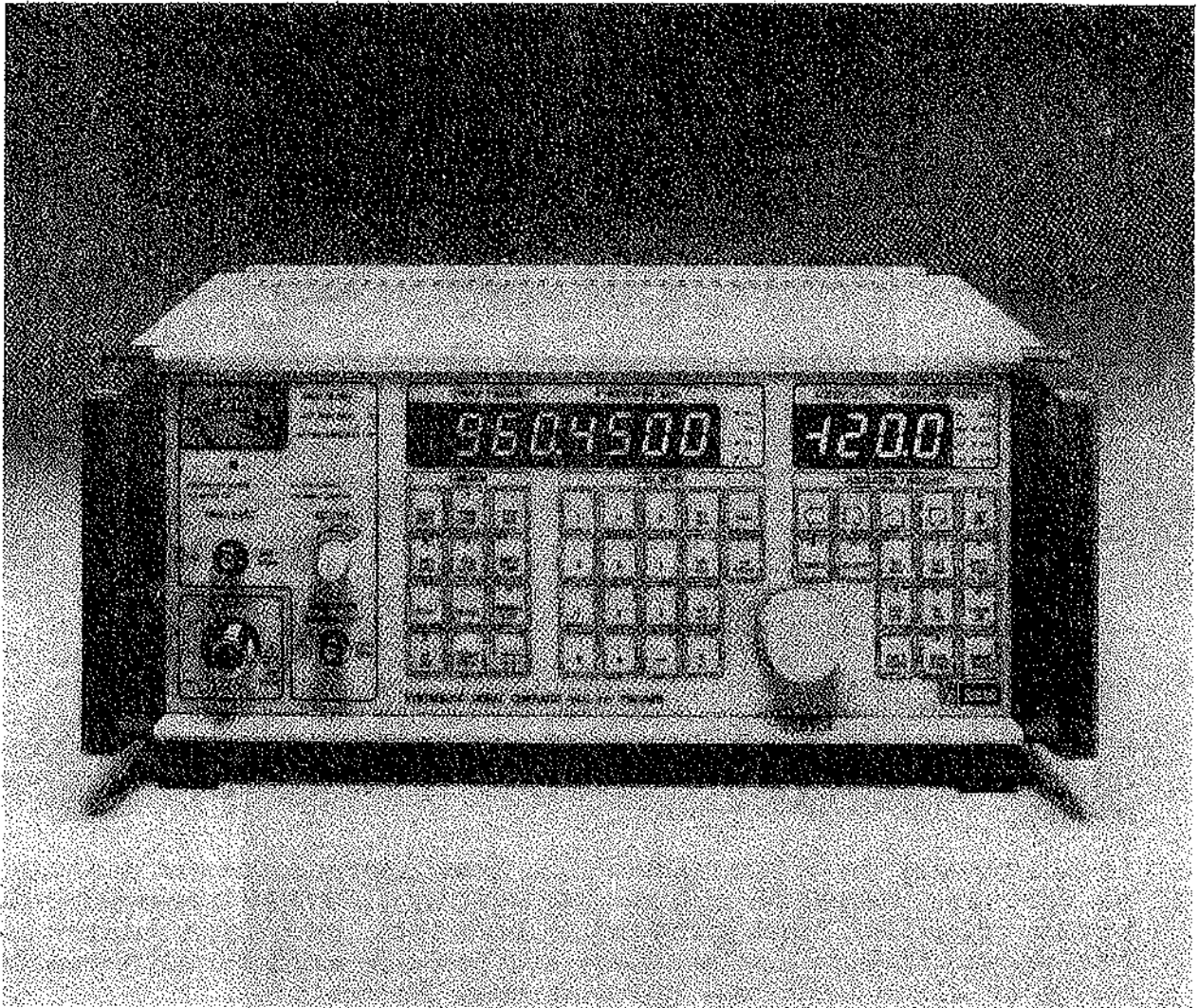
The wide external modulation bandwidth extends down to d.c. to cater for low rate data streams. A front panel potentiometer is also provided for adjustment of the external level.

In addition to amplitude and frequency modulation, phase modulation is available as standard.

Extra features include a secondary function key for access to special facilities, and digital sweep of displayed data with the ability to set start, stop points and the total sweep time. Other standard features include IEEE 488 programming and reverse power protection.

The instrument's low power consumption allows field operation from an optional 12V re-chargeable external battery pack.

Other options include a high stability crystal reference and pulse modulation.



4. SPECIFICATION

FREQUENCY

Range	10kHz to 1000MHz Extended range 1kHz to 1.024GHz (with error limits removed)
Resolution	10Hz (carrier < 128MHz) 100Hz (carrier ≥ 128MHz)
Lock Speed (to 100Hz)	< 500ms
Stability (standard)	$\pm 1E^{-6}$ (0 to + 55°C)
(option O)	$\pm 2E^{-7}$ per month $\pm 2E^{-7}$ (0 to + 40°C) $\pm 8E^{-8}$ per month during first year $\pm 4E^{-8}$ per month after first year

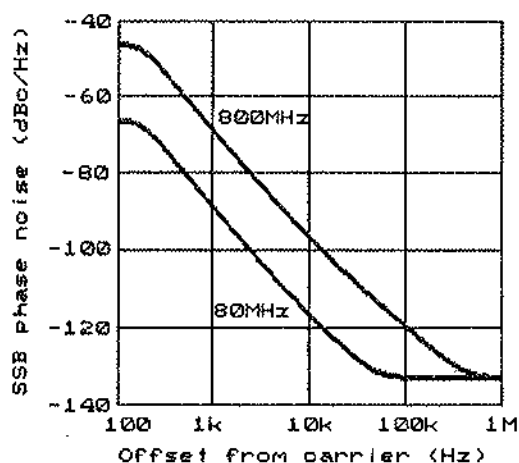
RF OUTPUT

Range	-133.0dBm to +13dBm (0.05 μ V to 1V rms pd)
Resolution	0.1dB
Units	dBm, dB μ V, mV, μ V pd
Absolute level accuracy	± 1 dB for carrier levels of 0dBm to +13dBm For carrier levels of -127 to 0dBm: ± 1.5 dB (carrier < 500MHz) ± 2.5 dB (carrier ≥ 500MHz) For carrier levels < -127dBm: ± 3 dB, typical
Source Impedance	50 Ω
VSWR	< 1.5:1 (carrier < -3dBm)
Reverse Power Protection	50W maximum (from 50 Ω source) d.c. to 1GHz, user reset
Trip Level	100mW typical

SPECTRAL PURITY

Harmonics	< -25dBc (carrier < +7dBm)
Sub Harmonics and Non-Harmonic spurious	< -60dBc at carrier offsets ≥ 3kHz

Residual FM	< 48Hz rms at 1GHz (CCITT P53A weighting), improving 6dB/octave to <1.5Hz rms at 16MHz
	<6Hz rms below 16MHz
Residual AM	<0.1% rms (50Hz to 15kHz bandwidth)
SSB Noise	Typical characteristics shown for carrier frequencies of 80 and 800 MHz



Noise Floor	<-130dBc/Hz
AM on 20kHz FM	<0.5% at 1kHz rate, 50Hz to 15kHz bandwidth
FM on 30% AM	<200Hz at 1kHz rate, 50Hz to 15kHz bandwidth
Carrier Leakage	<0.5 μ V (2 turn 25mm loop, 25mm away)

AMPLITUDE MODULATION

Depth	0 to 99.9% (carrier < +7dBm) AM depth reduces in a linear fashion from 99.9% at < +7dBm to 10.0% at +12.0dBm.
Resolution	0.1%

Accuracy	$\pm 5\%$ of reading at 1kHz rate, up to 90% depth (carrier <500MHz, <+7dBm)
External modulation response	Relative to 1kHz rate ± 1 dB, d.c./10Hz to 25kHz
Distortion (THD)	Carrier < +7dBm, 1kHz rate and 50Hz to 15kHz bandwidth. <2% up to 50% depth <3% up to 80% depth, (carrier < 500MHz)

FREQUENCY MODULATION

Maximum peak deviation	10kHz to <16MHz, 200kHz 16MHz to <32MHz, 50kHz 32MHz to <64MHz, 100kHz 64MHz to <128MHz, 200kHz 128MHz to <256MHz, 400kHz 256MHz to <512MHz, 800kHz 512MHz to 1000MHz, 1.6MHz
Resolution	10Hz (<10kHz peak) 100Hz (<100kHz peak) 1kHz (<1.0MHz peak) 10kHz (≥ 1.0 MHz peak)
Accuracy	$\pm 5\%$ of reading at 1kHz rate, excluding residual FM
External modulation response	Relative to 1kHz rate ± 1 dB, d.c./50Hz to 25kHz ± 3 dB up to 100kHz rate, typical
Distortion (THD)	All at 1kHz rate, 50Hz to 15kHz bandwidth <1% up to 10kHz peak deviation <3% up to 100kHz peak deviation <5% up to maximum peak deviation, typical
DCFM frequency drift	After 30 minutes warm up and under constant ambient temperature conditions < ± 500 Hz/10mins at 150MHz, typical.
DCFM frequency offset	< ± 50 Hz at 150MHz, typical

PHASE MODULATION

Deviation	0 to 4.99 rads
Resolution	0.01 rad
Accuracy	$\pm 10\%$ of reading at 1kHz rate excluding residual PM

External modulation response	Relative to 1kHz rate ±2dB, 100Hz to 10kHz
Distortion (THD)	< 2% at 1kHz rate, 300Hz to 3kHz bandwidth

INTERNAL MODULATION SOURCES

Spot Frequency	1kHz
Accuracy	±2E ⁻⁵
Distortion (THD)	<0.2% (50Hz to 15kHz bandwidth)
Tone Generator	10.0Hz to 9.999kHz
Resolution	0.1Hz (frequency < 1kHz) 1Hz (frequency ≥ 1kHz)
Accuracy	±2E ⁻⁵
Lock Speed	<5ms
Distortion (THD)	<2% up to 5kHz (50Hz to 15kHz bandwidth)
Internal modulation response (using the tone generator)	Relative to 1kHz rate ± 2dB, 10Hz to 9.999kHz
Simultaneous Tones	The internal 1kHz spot frequency may be mixed with the tone generator, with a fixed amplitude ratio of 5:1

MODULATION OUTPUT	All with load impedance ≥10kΩ (usable down to 50Ω)
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1kHz Spot frequency	1V rms
Tone generator	0 to 1V rms in 1mV steps
Accuracy	±5% of reading for levels ≥ 100mV rms at 1kHz rate
Distortion	As internal modulation source
Source impedance	50Ω nominal (d.c. coupled)

SEQUENTIAL TONES

Systems covered	CCIR, EEA, ZVEI, DZVEI, EIA NATEL plus user defined tone frequencies and durations with up to 16 consecutive tones.
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EXTERNAL MODULATION

Impedance	≥ 50kΩ
Level	1V peak for calibration (front panel potentiometer for adjustment of higher levels)
Indication	Analogue meter (Scaled 0 to 1 with "CAL" marker)
Simultaneous tones	The external input may be mixed with the internal tone generator, with a fixed amplitude ratio of 5:1

SINAD

Input frequency	1kHz
Input level	30mV to 3V rms
Indication	Analogue meter, scale range 30dB to 6dB (true rms detection)
Impedance	≥ 10kΩ
Bandwidth	Within ±3dB of CCITT P53A weighting from 300Hz to 3kHz, typical

SWEEP

Functions	Carrier frequency, carrier level, modulation rate, modulation level
Range (start, stop)	Any within setting range
Total sweep time	2 to 200 seconds
Sweep sync output	Available on back panel. Analogue ramp proportional to sweep position with a range of 0 to +10V nominal corresponding to sweep start, stop respectively.

GENERAL

Programmability	GPIB (IEEE 488.2) Functions supported: SH1, AH1, T6, TE0, L4, LE0, SR1, DC1, RL1, PP0, DT0, C0, E2.
Memory (non-volatile)	100 complete front panel set-ups. Last front panel set up. Last sequential tone sequence, and IEEE 488.2 address.

Internal crystal reference	TCXO, 10MHz
Internal reference output	3V pk-pk (load impedance >10k Ω)
External reference frequency	10MHz
External reference level	1V rms

POWER REQUIREMENT

A.C. input	100, 120, 220, 240V a.c. \pm 10% 45 to 440Hz
D.C. input (standard) (option A)	11.5 to 15V d.c. 23 to 30V d.c.
Consumption	30VA maximum

ENVIRONMENT

Temperature (operating) (storage)	0 to +55°C -40 to +70°C
Relative Humidity	95% to +40°C non-condensing
Vibration	5 to 150Hz at 2G sinusoidal, 15 minutes in each of 3 orthogonal planes.
Shock	10 off 25mm drops on each of 6 faces
Safety	Designed to meet the requirements of IEC publication 348 (BS4743)
EMC	Designed to meet European Standards EN 50 081-1 (generic emission) and EN 50 082-1 (generic immunity)

MECHANICAL

(Approximate information)

Height (including feet)	145mm
Width	330mm
Depth	405mm
Weight	8.6 kg

PULSE MODULATION OPTION

Frequency range	25MHz to 1000MHz
Carrier on/off ratio	≥60dB at 70MHz ≥45dB at 500MHz ≥40dB at 800MHz
Pulse rise time	2μs nominal
Pulse fall time	1μs nominal
Minimum pulse width	4μs
Modulator insertion loss	<4.5dB
TTL logic drive (maximum 5V peak)	TTL High = Carrier on TTL Low = Carrier off
Carrier leakage	<0.5μV (2 turn 25mm loop, 25mm away) carrier level < -3dBm

**ORDER CODES, OPTIONS
AND ACCESSORIES**

PSG1000B standard unit	1ERPSG1000B
Option A*. 23 to 30V d.c. input	1ERPSG1000B/A
Option F*. RF output changed to rear panel	1ERPSG1000B/F
Option M*. Pulse Modulation	1ERPSG1000B/M
Option O*. High stability frequency reference	1ERPSG1000B/O

*factory fitted.

Accessories:

Rechargeable 12V 4Ah add-on battery pack For use with standard 11.5 to 15V d.c. input only	15S10100
Rack mounting kit	15A20100
Protective padded carrying case	15A20110

Farnell Instruments Limited reserves the right to amend specifications without notification.

5. I N S T A L L A T I O N

5.1 INITIAL SETTING UP - A.C. SOURCE

Check that the power input setting is correct for the local supply by looking through the clear window adjacent to the power input socket on the rear panel. One of four alternative settings will be visible. Should it be necessary to change the setting, slide the window across, remove the fuse and then pull out the small selector card using the extractor provided. Re-insert the card in the appropriate alternative position so that the required voltage setting is visible when the card is fully replaced. Replace the fuse ensuring that the rating is correct for the voltage to be used, and slide the window across. The fuse rating for 230V operations is 250mA T type and for 115V operation is 500mA T type.

Read the precautions listed in the SAFETY section at the start of this manual. Connect a suitable plug to the power cable observing the following colour codes:-

Live - BROWN
Neutral - BLUE
Earth - GREEN/YELLOW

Plug power cable into socket on rear of instrument. Switch on using the power switch on the rear of the instrument.

5.2 INITIAL SETTING UP - D.C. SOURCE

Apply a d.c. input via the three pin connector on the rear panel by correctly wiring the three pin plug supplied as part of the accessory package. The connections are as follows:-

Pin 1 - Instrument chassis earth
Pin 2 - D.C. Negative
Pin 3 - D.C. Positive

The d.c. supply must be within the range 11.5 to 15V (or 23 to 30V for the 24V d.c. option) with a current capability of 3 amps. Switch on using the power switch on the rear of the instrument. The instrument is fully protected against accidental d.c. polarity reversal. An internal relay is used to isolate the a.c. power input when a d.c. supply is present.

The front panel analogue indication meter may be used to monitor the d.c. input level by selecting only SYNTH RATE for the possible modulation sources. The red/black scale point corresponds to a d.c. input of 12V \pm 1V for the standard unit, and 24V \pm 1V for the 23 to 30V d.c. option. For reliable operation, ensure that the indication on the meter is in the black part of the scale.

5.3 RACK MOUNTING

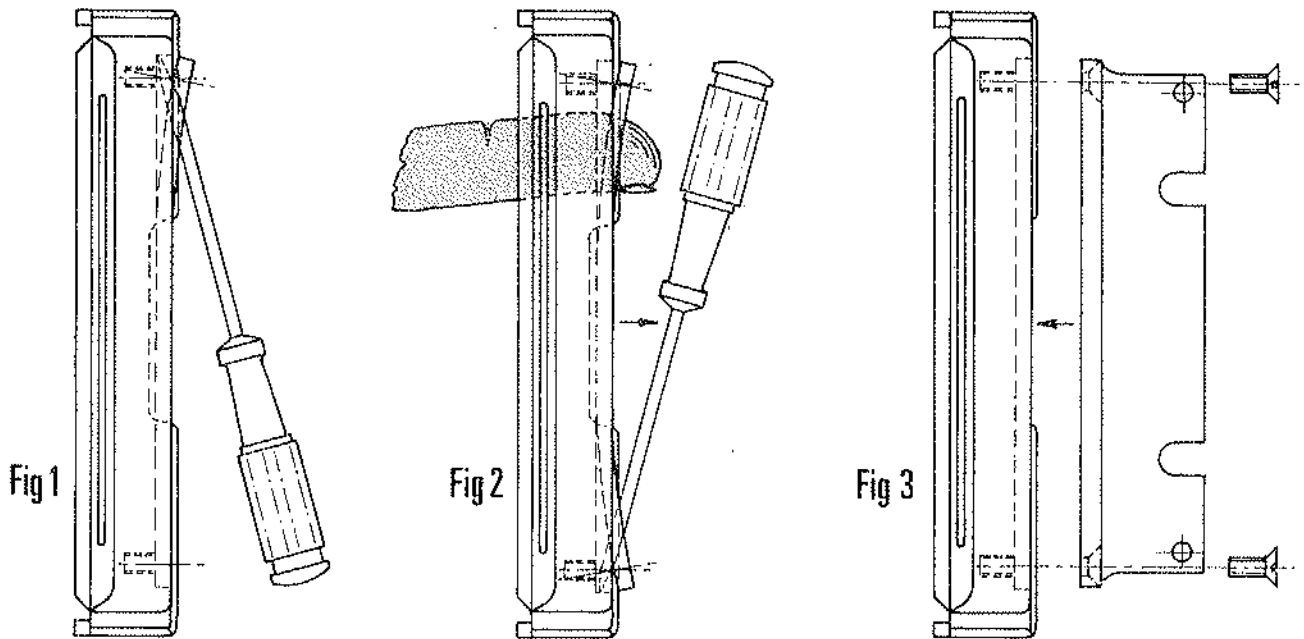
The instrument may be mounted in a standard nineteen inch rack using the kit available as an optional accessory (order code 15A20100).

For rack mounting applications the unit's support feet (located on the lower cover) must be removed as follows:-

Place the instrument with the lower cover facing upwards and hinge forward the front tilt feet. Remove the eight screws (four each side) securing the feet support bars to the lower cover and remove the support bars complete with feet. Retain the screws and support bars for future use.

To fit the rack mounting "ears", carefully prise out the insert in the outer face of both front handles (retain for future use). Fit each ear into the exposed recess, securing with the M4 x 10 CSK screws provided.

It is important to ensure that some provision be made to support the rear of the unit when using the rack mounting ears.



PROCEDURE FOR ATTACHMENT OF RACK MOUNTING BRACKET

REF. FIG 1

Insert small screwdriver into thin gap between insert and handle body. Prise away one end slightly and hold in position with finger.
Note orientation of insert with styling cut-out opposite cut-out in handle.

REF. FIG 2.

Insert screwdriver into other end and repeat procedure. This will relieve the small tapered pins of the insert from the threaded holes in the handle. Remove insert in direction of arrow.

REF. FIG 3

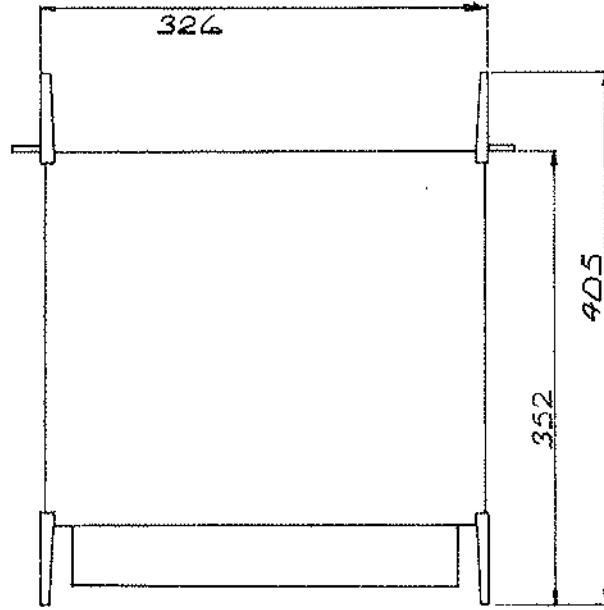
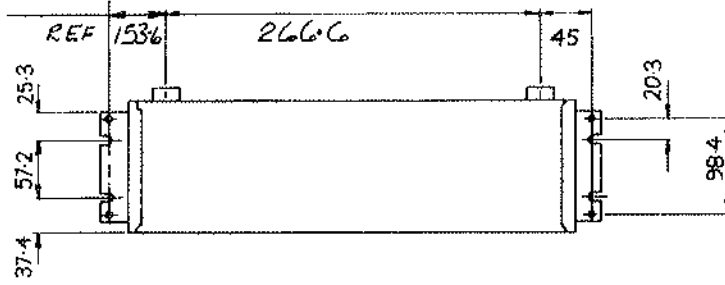
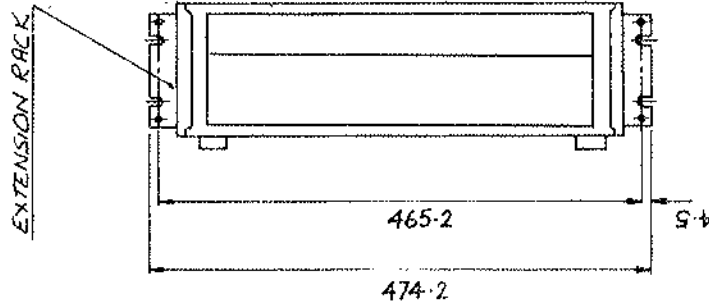
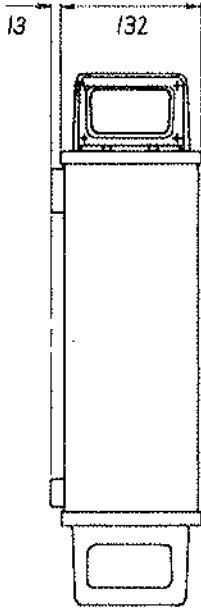
Insert rack mounting bracket into recess in handle in attitude shown and secure firmly with 4 M4 x 10LG C'SK HD screws supplied.

ALL ERRORS TO BE REPORTED TO DRAWING OFFICE
DRAWN IN ACCORDANCE WITH BS 308



DO NOT SCALE

DRAWING No.
35ZU0083



DRAWN: A.C.		USED ON:		GENERAL TOLERANCES UNLESS OTHERWISE STATED		HOLE SIZES		PROTECTIVE FINISH:		FARNELL INSTRUMENTS LTD. WETHERBY, YORKS.	
TRACED		NOTE: REMOVE ALL BURRS AND SHARP EDGES.		UP TO 200 ± 0.1		UP TO 70 ± 0.2		MATERIAL		DRAWING NO.	
ISS. DATE: 12.6.88		SCALE: N.T.S.		200 TO 500 ± 0.1		NO STAMP PART NO WHERE SHOWN		MOUNT DETAIL MASTER		35ZU0083	
MOD. No.		CHECKED		500 → ± 0.2		DIMENSIONS IN mm.		BASED ON:		SHEET OF SHEETS	
								X		3	

UNITS: mm

5.4 PSG1000B BATTERY PACK

a) INSTALLATION

The 12V battery pack (option order code 15S10100) is supplied with 2 off rack mounting ears to fix the pack to the PSG1000B. Secure the mounting ears, one at each end, to the battery pack using the M4 x 10 pan head screws supplied.

The battery pack complete with mounting ears is then fixed to the right-hand side of the PSG1000B utilising the rack mounting fixings in the front and rear PSG1000B handles.

Carefully prise out the handle inserts (see section 5.3) and retain for future use. Align the battery pack (mains input connector facing the rear of the unit) with the exposed recesses and secure with the M4 x 10 screws supplied.

c) OPERATION

Check that the mains tap slider switch (top edge of the battery pack) is set to the correct setting for the local supply.

To charge the battery, connect the battery d.c. power plug to the charger output socket and connect mains power to the charger mains input socket. For a completely flat battery the charge time is approximately 10 hours.

To operate the PSG1000B from the battery, connect the battery d.c. power plug to the PSG1000B d.c. input socket. A fully charged battery will give approximately 2 hours of continuous use. The battery level may be monitored on the PSG1000B analogue indication meter with the red/black scale point corresponding to a d.c. input of $12V \pm 1V$.

The use of nickel-cadmium batteries ensures a relatively flat discharge voltage versus time characteristic, with the nominal battery voltage of 12.5V decaying rapidly when charging is required.

c) SPECIFICATION

Charger a.c. input	115 or 230V a.c. +15% -25% 45 to 440Hz 20VA maximum
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Operating temperature	0 to +40°C
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Mechanical information (approximate)

Height	135mm
Width	55mm
Depth	400mm
Weight	2.8kg

6. O P E R A T I N G I N S T R U C T I O N S
A N D A P P L I C A T I O N S

- 6.1 First Time Operation
- 6.2 Front Panel Facilities
- 6.3 Reference Tables
- 6.4 Remote Operation Using GPIB (IEEE 488)
- 6.5 Back Panel Facilities
- 6.6 Applications
- 6.7 Quick reference guide

6.1 FIRST TIME OPERATION

a) DISPLAY AND DATA ENTRY

The PSG1000B can display carrier frequency or modulation rate simultaneously with carrier level or modulation level. LED's above the main displays indicate which parameters are being viewed and LED's in the switches indicate the functions selected. Units for the displayed data are also clearly visible at the side of the main display windows.

Data is displayed on entry, with a prompt line, in the appropriate window. The entered data may be edited by utilising the cursor position keys to remove data or provide a space. On selecting a valid units termination key, the data entry is accepted.

If an invalid key selection is chosen the input is ignored. Additionally the data entry mode can be terminated at any point, by selecting the CLEAR/LOCAL key.

Entered data which exceeds the instrument's specification limits is ignored, with a momentary error code displayed.

b) CARRIER FREQUENCY

On selecting the CARR FREQ key, the last setting will be displayed. Enter the data for the new carrier frequency, followed by a valid termination key (GHz, MHz or kHz). On completion of data entry the carrier frequency units LED will light.

For example, to set up a carrier frequency of 460.4250MHz press:

CARR FREQ 460.4250 MHz

The normal carrier frequency limits are 10kHz to 1000MHz with an extended range of 1kHz to 1024MHz available using the relax error limits secondary function, #22.

For frequencies below 128MHz the resolution is 10Hz, and 100Hz above.

NB

The CARR FREQ key is a toggle function with the MOD RATE key.

c) CARRIER LEVEL

To set up a carrier level select the CARR LEVEL key, followed by the new data which is displayed on entry in the carrier level window. Now select a valid termination key (dBm, dB μ V, mV or μ V) to complete data entry.

For example, to set up a carrier level of -47.5dBm press:

CARR LEVEL -47.5 dBm

The carrier level limits are -133.0dBm to +13.0dBm with a resolution of 0.1dB. Full carrier level units conversion is provided so that outside of the data entry mode, selecting alternative units will update the carrier level display.

NB

The CARR LEVEL key is a toggle function with the MOD LEVEL key. For glitch free level changes when checking squelch thresholds see section 6.6 Applications, part b).

d) MODULATION SOURCE

The available internal modulation sources are the 1kHz spot frequency and the synthesized tone generator, with the added facility of using an external source. Selecting the MOD RATE key shows the modulation sources previously set, in the eight digit modulation rate window. The left hand half of the window indicates "Int" or "Etn" when INT 1kHz or EXT MOD are selected, with the last four digits displaying the tone generator rate when SYNTH RATE is selected.

Any of the three sources may be independently selected and the internal tone generator can be mixed with either the 1kHz spot frequency or an external signal, but not both together. This allows complex dual tone modulation signals to be generated.

When the internal tone generator is mixed with another source, its amplitude is reduced to a nominal 20% of the main tone.

The analogue indication meter is automatically switched to read SINAD when INT 1kHz is selected. Similarly the meter indicates external level when EXT MOD is selected and battery level when SYNTH RATE is selected, with both INT 1kHz and EXT MOD de-selected.

For example to set up a tone rate of 220.8Hz press:

MOD RATE 220.8 Hz

The tone generator limits are 10.0Hz to 9.999kHz with a resolution of 0.1Hz below 1kHz and 1Hz above.

e) MODULATION LEVEL

For modulation level the four possible termination keys are MHz or kHz for frequency modulation, %AM, and rad for phase modulation. The resulting level is displayed in the four digit modulation window.

For example to set up a modulation depth of 50.0% press:

MOD LEVEL 50.0 %AM

The modulation circuits may be d.c. coupled by selecting the DCFM key. In the %AM mode the isolating capacitor in the external modulation input path is shorted out so that all the circuits are d.c. coupled. When selected with frequency or phase modulation the synthesizer FM loop integrator is also held at the last tuning voltage, thus disabling the correction loop. The unlocked carrier frequency can now be controlled with a d.c. voltage at the external modulation input. See section 6.6 Applications, part d).

In the DCFM mode the unlocked carrier frequency will be subject to drift dependent upon the carrier frequency range and ambient temperature fluctuations. To reduce errors it is recommended that DCFM should only be selected for the duration of the d.c. coupled test.

Additionally the modulation signal can be isolated from the carrier by selecting the MOD OFF key. This key also de-selects DCFM (if selected) permitting re-locking of the carrier.

f) CURSOR AND ROTARY CONTROL

Any of the displayed carrier and modulation data may be incremented or decremented in consecutive steps by utilizing the UP/DOWN key or the rotary control. On selecting the CURSOR key one of the displayed digits will start flashing, indicting the cursor position. Now select either CARR FREQ/MOD RATE or CARR LEVEL/MOD LEVEL to assign the cursor to the desired display window. After positioning the cursor with the LEFT/RIGHT key over the desired digit, use the UP/DOWN key to alter the data as required.

NB

When MOD RATE is selected the flashing cursor will only appear if SYNTH RATE is also selected, as it is not possible to alter the INT 1kHz or EXT MOD source.

A more convenient method of adjusting the data is provided with the rotary control. Simply select the ROTARY key and turn the rotary control to alter the indicated data.

By utilizing the secondary function #77, the instrument may be set in the auto-cursor mode. When the desired digit is then altered by holding down the UP/DOWN key for a period of > 2 seconds, the stepping will continue automatically after the key is released. The stepping will cease after any other key depression or if an error boundary is reached.

To stop the auto-cursor mode, select #78.

Additionally the displayed data may be altered in fixed steps by using the STEP SIZE key.

For example to set up a carrier frequency step of 12.5kHz press:

CARR FREQ	STEP SIZE	12.5	kHz
-----------	-----------	------	-----

On de-selecting CURSOR (if selected) the display window will momentarily output the message "dlt" indicating the delta or fixed step size mode. Now use the UP/DOWN key or the rotary control to alter the carrier frequency in steps of 12.5kHz.

When the CURSOR key is again selected the incrementing reverts to the consecutive step mode.

g) STORE AND RECALL

The instrument will store up to 100 complete front panel settings in non-volatile memory. These are designated store 00 through to store 99, with store 00 reserved for the current front panel setting.

To store a setting, select the STORE key followed by the required two digit store number between 01 and 99. Conversely to recall a setting select RECALL followed by the store number.

Store and recall are displayed as "StO" and "rCL" with two prompt lines, in the carrier frequency window.

If an invalid setting is found during recall of any of the stores it is replaced with fixed default values of 100MHz, 0dBm, INT 1kHz modulation rate and 0.0 rads PM.

By utilizing the secondary function #90, selective stored settings may be write protected. The store number followed by #91 removes the write protection.

Additionally the MEMORY STEP key allows the contents of the stores to be viewed using the UP/DOWN key or the rotary control.

h) SWEEP

A useful feature of the PSG1000B is the ability to digitally sweep displayed settings of carrier frequency, carrier level, modulation rate or modulation level.

Sweep start values are entered in store location 01 and the final value in store 02.

Total sweep time is entered using the SWEEP TIME key, with a valid range of 2 to 200 seconds.

The parameter to be swept is then identified by placing the flashing cursor in the required display window.

Selecting the SWEEP ON key will now initiate the sweep. The sweep mode may be terminated at any point by deselecting SWEEP ON, and conversely press the SWEEP ON key to re-enter the sweep mode.

For example to sweep the carrier frequency from 1MHz to 1000MHz in 25 seconds press:

CARR FREQ 1 MHz STORE 01

```

CARR FREQ      1000MHz   STORE 02
SWEEP TIME     25 SEC    CURSOR    SWEEP ON

```

For carrier frequency the sweep steps are executed at the rate of 6.5 steps/second and 10 steps /second for other functions.

To use the sweep function to greatest advantage, the user should be aware that by proper choice of sweep range, frequency error transients can be minimised. First choose a sweep range which is an exact multiple of the step size in the table below. If the range covers more than one entry in this table, use the smaller of the two step sizes:

SWEEP RANGE REQUIRED	CHOOSE STEP SIZE INTEGER MULTIPLE OF:
10kHz to <16MHz	12.5kHz
16MHz to <32MHz	3.125kHz
32MHz to <64MHz	6.25kHz
64MHz to <128MHz	12.5kHz
128MHz to <256MHz	25kHz
256MHz to <512MHz	50kHz
512MHz to <1000MHz	100kHz

Example:

Required sweep range 200 to 300MHz

Sweep time 2 secs

Knowing that the sweep rate is 6.5 steps per second gives the required increment:

$$F = \frac{100\text{MHz}}{6.5 \times 2} = 7.6923076 \text{ MHz}$$

Referring to the sweep range chart, select the step size to be an exact integer multiple of 25kHz. This adjusts F to be $308 \times 25\text{kHz} = 7.7\text{MHz}$.

Set the start frequency to 200MHz and store in 01.

Now calculate stop frequency = $200\text{MHz} + 13 \times 7.7\text{MHz} = 300.10000\text{MHz}$ and store in 02.

The PSG1000B will now executive a sweep in exact 7.7MHz steps. An unavoidable glitch will occur at any range change point, in this example at 256MHz.

A sweep sync ramp signal is available on the back panel auxiliary connector. See section 6.6 Applications, part f).

1) SELECTIVE CALLING TONE GENERATOR

The instrument's internal synthesized tone generator is specially designed for rapid frequency hopping with minimum settling time, which is essential for the generation of SELCALL tone burst sequences.

Either standard 5 tone systems or user defined tone bursts may be set up, with the last used settings stored in non volatile memory.

The software is designed to recognise the standard 5 tone systems currently in use of CCIR, EEA, ZVEI, DZVEI, EIA and NATEL. A table of tone numbers, frequencies and durations is provided in Section 6.3 Reference Tables, part e).

To set up a 5 tone burst, first select the required modulation rate, modulation level and ensure MOD OFF is not selected. Select the SET 5 TONES key and enter the tone numbers required, following the prompt lines in the carrier frequency display window. Entry is then completed by defining the required sequential system, as indicated by the last prompt line.

Enter: 0 for CCIR, 1 for EEA, 2 for ZVEI, 3 for DZVEI,
4 for EIA, 5 for NATEL

On completion of 5 tone entry the display will revert to normal.

When the SEND TONES key is selected the message "5 tones" is displayed as the tones are sent.

For continuous repetition of the tone send, use the secondary function #88, pressing the CLEAR/LOCAL key to exit this mode.

To avoid false triggering of the radio tone decoder, the modulation signal is inhibited for a 500ms period preceding the start of the SELCALL tone burst.

Unique user defined tone sequences are entered with the DEFINE TONES key, with provision for up to 16 consecutive tones. Tone lengths in the range 1ms to 999ms are catered for, and blank periods can be programmed into the sequence by assigning a tone frequency as zero.

Tone sequences are programmed by entering consecutive tone frequencies and lengths, following the prompts displayed in the carrier frequency window. The sequence can be terminated after a tone length entry by selecting the SEND TONES key.

The first tone prompt is displayed as "0 tF" for frequency and "0 tL" for length.

For example, to set up tones of 1kHz, 2kHz, 3kHz with equal tone lengths of 33ms press:

```

DEFINE TONES      1 kHz      33 (m)SEC      2 kHz      33 (m)SEC
                  3 kHz      33 (m)SEC      SEND TONES

```

To set up tones of 1kHz, 2kHz with equal tone lengths of 100ms preceded by a blank period of 500ms press:

```

DEFINE TONES      0 kHz      500 (m)SEC      1kHz      100 (m)SEC
                  2 kHz      100 (m)SEC      SEND TONES

```

On sending user defined tones the message "U tones" is displayed as the tones are sent. For continuous repetition of a tone sequence, use the secondary function #88.

The SEND TONES key may be assigned to the last used settings by selecting the secondary function #86 for the 5 tone system, and #87 for user defined tones.

NB:

For the standard 5 tone systems, if INT 1kHz modulation is selected this signal is also inhibited in the 500ms blank period preceding the SELCALL tone burst, and reinstated afterwards. However, for the user defined tone system this blank period is omitted as it is possible for the user to programme blank periods in the range 1 to 999ms.

If desired, an external modulation signal may be mixed simultaneously with the sequential tones, by selecting the EXT MOD key.

To avoid false triggering of the radio tone decoder, this external signal frequency must not lie within the bands of allowable sequential tone frequencies. See section 6.3 Reference Tables, part e).

j) PULSE MODULATION OPTION

When this option is fitted it may be used in conjunction with any combination of front panel modulation settings. The pulse modulator is controlled via the auxiliary connector on the instrument back panel, with an auxiliary loom and connector supplied as part of the accessories package. See section 6.6 Applications, part g).

6.2 FRONT PANEL FACILITIES

All paragraph numbers below refer to the annotated drawing adjacent to this page.

a) RF output connector

This output is protected against accidental overload, up to a maximum level of 50W/50V d.c. **CAUTION!** Exceeding this level may result in permanent damage to the instruments RF output section. If the accidental overload exceeds the threshold level of 100mW, the reverse power protection circuit disconnects the RF output, selects RF OFF and sounds a continuous bleep. Once the overload has been removed the protection circuit can be reset by pressing the RF OFF key. In normal use selecting RF OFF disconnects the RF output.

b) Modulation in/out connector

Allows access to the internal 1kHz spot frequency and the tone generator to view the modulation signal applied to the carrier. This output may also be used as an A.F. source, see section 6.6 Applications, part c).

With EXT MOD selected an external source may be used to modulate the carrier. See section 6.6 Applications, part d).

c) External level control

Provides attenuation for external signals of greater than 1V pk-pk, with the level displayed on the analogue indication meter.

d) SINAD input connector

This input permits SINAD sensitivity checks to be performed on mobile radio receivers, by monitoring the speaker output. See section 6.6 Applications, part a).

e) Analogue indication meter

Provides visual information of the SINAD ratio in dB (red scale), external modulation input level in Vpeak (black scale) and battery level (red/black marker).

f) Carrier frequency / modulation rate display window

Large eight digit LED indication with data displayed as entered. The various units of GHz, MHz, kHz or Hz are displayed separately.

g) Carrier level / modulation level display window

Large four digit LED indication with data displayed as entered. The various carrier/modulation units are also displayed separately.

h) Carrier function keys

Select either the CARR FREQ or CARR LEVEL key followed by numeric data which is displayed on entry, with a prompt line, in the appropriate display window. Data entry is completed by selecting the desired units termination key.

i) Modulation function keys

Choose either the MOD RATE or MOD LEVEL key followed by numeric data which is displayed on entry, with a prompt line, in the correct display window. Data entry is completed by pressing the desired units termination key. With MOD RATE selected the internal 1kHz spot frequency is displayed as INT, external modulation as ETN, and the last four digits used to display the synthesized tone rate.

j) Data entry keys

Allows entry of data, with the CURSOR LEFT key used to delete erroneous entries.

k) Units termination keys

Dual purpose keys for carrier and modulation function units termination.

l) Clear / local key

Clears the keyboard buffer when in local mode (i.e. no activity on GPIB). Returns the unit to local mode after GPIB operation unless GPIB local lockout command is active.

m) Cursor / rotary control

Used for incrementing data with the desired digit located by a flashing cursor. Selecting carrier or modulation functions assigns the cursor to the desired display window. When enabled, the rotary control provides a convenient interface for the adjustment of displayed data. With the cursor deselected displayed data may be incremented in fixed step sizes, entered by utilizing the STEP SIZE key.

n) Step size key

Allows displayed data to be incremented in any resolvable step size.

o) Modulation source keys

Selects either internal 1kHz, external modulation or the synthesized tone generator which may be used separately or mixed together.

p) Modulation off key

Disables any selected modulation from reaching the carrier.

q) DC coupled modulation key

Allows the external modulation input isolating capacitor to be shorted out for zero phase shift amplitude modulation, and low rate digital frequency modulation.

r) SELCALL tone keys

The user may select standard 5 tone system codes or assemble unique tone sequences by utilizing the DEFINE TONES key. See section 6.1 First Time Operation, part i).

s) Secondary function key

Allows access to special facilities. See section 6.3 Reference Tables, part c).

t) Memory function keys

These keys allow front panel data to be stored and recalled from non volatile memory. There are 100 available stores, with store location 00 reserved for the current instrument setting, which is always saved on power off. The MEMORY STEP key allows the store locations to be scanned using the incrementing up/down keys or the rotary control.

u) Sweep setting keys

Digital sweep of displayed data is possible by setting start and stop points in memory locations 01, 02 respectively. On entering the desired total sweep time, the sweep may be started or terminated using the SWEEP ON key. See section 6.1 First Time Operation, part h).

v) External reference key

This key allows the RF synthesizer to be phased locked to an external 10MHz high stability time base, via the external reference input/output connector located on the rear panel of the instrument. **WARNING!** When EXT REF is selected and the external signal is of low level or not present, the instrument RF output will not be valid. On power up EXT REF is always deselected, unless it is recalled from a preferential power on store. See section 6.6 Applications, part h).

6.3 REFERENCE TABLES

a) ERROR CODES

Abbreviations used:

CF = Carrier frequency, CL = Carrier level
 MR = Modulation rate, ML = Modulation level
 TF = Tone frequency, TL = Tone length

ERROR CODE	PROBLEM
08	GPiB address out of range (0 - 30 valid)
10	CF out of range
11	CF step out of range
12	Store is write protected
13	Trying to store a relaxed limits setting
14	Store number out of range
20	CL out of range
21	CL step out of range
22	Trying to enter a linear CL step
30	MR out of range
31	MR step out of range
35	TF out of range
36	TL out of range
40	ML out of range
41	ML step out of range
45	Trying to increment CF with DCFM selected
60	Gate function not implemented
61	Swept limit in store 01 invalid
62	Swept limit in store 02 invalid
63	Sweep time out of range
64	Cursor not on swept parameter
65	Swept limits too close together or sweep time too long
80	Attempt to generate SELCALL tones with MOD OFF selected. Deselect MOD OFF before attempting to send tones.
81	SELCALL tone sequence incorrect
82	No previous 5 tone SELCALL sequence
83	No previous user defined tone sequence
99	Function not implemented

b) NOTE CODES

52 FM deviation reduced to maximum available for set CF
 53 Non valid data when in store wake up mode
 54 AM depth reduced to maximum available for set CL

c) SECONDARY FUNCTIONS

#00	Software revision number
#01	Display test (next key exits the routine)
#02	Beeper off (2)
#03	Beeper on (1)
#04	Last error code
#05	Display GPIB address
NN#05	Enter GPIB address (0-30 valid)
#11	Display status (see section 6.4.e)
#22	Relax error limits (2)
#23	Set normal error limits (1)
#77	Select auto increment mode (2)
#78	Deselects auto increment mode (1)
#80	CCIR tone sequence (100 mS)
#81	EEA tone sequence (40 mS)
#82	ZVEI tone sequence (70mS)
#83	DZVEI tone sequence (70mS)
#84	EIA tone sequence (30mS)
#85	NATEL tone sequence (70mS)
#86	Selects 5 tone sequence for tone send
#87	Selects user defined tone sequence for tone send
#88	Continuous send tones (2)
NN#90	Write protect store NN
NN#91	Remove write protection of store NN
NN#94	Power up in store location NN
#95	Power up with last settings
#99	Memory clear out with return to default settings

NB

- (1) Selected on power up
- (2) Not stored

d) DEFAULT STATES

If the instrument memory is cleared using the secondary function #99, then the default state is set as below:

Carrier frequency 100MHz, carrier level 0dBm, internal 1kHz modulation source and modulation level 0.0rad PM.

e) SELCALL TONE FREQUENCIES

SEQUENTIAL SYSTEMS						
TONE	CCIR	EEA	ZVEI	DZVEI	EIA	NATL
0	1981		2400	2200	600	1633
1	1124		1060	970	741	631
2	1197		1160	1060	882	697
3	1275		1270	1160	1023	770
4	1358		1400	1270	1164	852
5	1446		1530	1400	1305	941
6	1540		1670	1530	1446	1040
7	1640		1830	1670	1587	1209
8	1747		2000	1830	1728	1336
9	1860		2200	2000	1869	1477
Repeat	2110		2600	2400	459	1805
Group	2400	1055	2800	885	2010	1995
Alarm	-	2400	-	-	-	-
Tone length	100ms	40ms	70ms	70ms	33ms	70ms

NB:

The group and alarm tones are not incorporated in the standard five tone sequence software, but may be generated using the user defined tone sequence capability.

6.4 REMOTE OPERATION USING GPIB (IEEE 488.2)

The IEEE 488.1 bus standard and the IEEE 488.2 code standard are fully supported. The use of IBM-PC or compatible computers with IEEE 488.2 interface cards and software drivers supplied by National Instruments Corporation (also available from Farnell) is recommended. A Labwindows driver is available for this instrument.

IEEE 488.1 functions supported:

SH1	Source handshake
AH1	Acceptor handshake
T6	Basic talker, serial poll, on talk only, untalk on MLA
TEO	No talker with secondary addressing
L4	Basic listener, no listen only, unlisten on MTA
LEO	No listener with secondary addressing
SR1	Full service request
DC1	Full device clear
RL1	Full remote/local
PPO	No parallel poll
DT1	Full device trigger
CO	No controller
E2	Tri state driver

a) String Formats and Protocol

When addressed to listen, a new line character and/or the EOI line asserted will be recognised by the instrument as a terminator. When addressed to talk, the instrument response message is terminated with the assertion of the EOI line coincident with the New Line character on the data bus.

The instrument command interpreter is case insensitive. There must be at least one space character between any command header and the following data, and any following terminator.

If multiple commands are sent all together, they must be separated by a semi-colon as shown on the example below:

```
CF 1.6789543E+8 HZ ; ML 35.8 %AM ; INT1KHZ ; CSR-ON
```

The total message length must not exceed the instrument input buffer size which is 80 bytes.

The user can only change the GPIB address from the front panel. Pressing the keys #05 displays the current address and NN#05 changes the address into NN. The GPIB address is non-volatile.

b) Listen Functions

Commands requiring no data:

CSR-ON	Set cursor on
CSR-OFF	Set cursor off

CSR-UP	Cursor up
CSR-DN	Cursor down
CSR->	Cursor right
CSR<-	Cursor left
ROTY-ON	Set rotary on
ROTY-OFF	Set rotary off
INT-REF	Select internal 10MHz reference
EXT-REF	Select external reference
RF-ON	Set RF on
RF-OFF	Set RF off
SYNRT-ON	Set synthesizer rate on
SYNRT-OFF	Set synthesizer rate off
DCFM-ON	Set DC FM on
DCFM-OFF	Set DC FM off
MOD-ON	Set modulation on
MOD-OFF	Set modulation off
SWP-ON	Set sweep on
SWP-OFF	Set sweep off
MEMSTEP-ON	Set memory step on
MEMSTEP-OFF	Set memory step off
SD5T	Send the standard 5 tones
SDUT	Send the user defined tones
LOCAL	Go to local state
CLEAR	Instrument is returned to last valid setting
INT1KHZ	Select internal 1kHz modulation source (this is a toggle function: check previous state, using STATUS? if necessary).
EXTMOD	Select external modulation source (this is a toggle function: check state, using STATUS? if necessary).

 Commands requiring data:

Note the syntax used below: [] means the enclosed entry is optional, < > means the enclosed data must be provided and ... means repeat as required.

CF <n...>	[GHz] [MHz] [kHz] [Hz]	To change the carrier frequency as required. Floating point data is acceptable. Valid range is 10kHz to 1GHz.
MR <n...>	[kHz]	To change the modulation rate as required. Floating point data is acceptable. Valid range is 10Hz to 9.999kHz.
CL <n...>	[dBm] [dBuv] [mv] [uv]	To change the carrier level as required. Floating point data is acceptable. Valid range is -133.0dBm to +13.0dBm.
ML <n...>	[MHzFM] [kHzFM] [%AM] [radPM]	To change the modulation level as required. Floating point data is acceptable. Valid range is 0kHz to 1.6MHz FM, 0 to 99.9 %AM and 0 to 4.99 rad PM.

Note: The four commands CF, CL, MR, ML can be followed by no data. This changes the display and the cursor position only.

CF-SS <n...>	[GHz] [MHz] [kHz] [Hz]	To change the carrier frequency step size as required. Floating point data is acceptable. Valid range is 10Hz to 500MHz.
MR-SS <n...>	[kHz]	To change the modulation rate step size as required. Floating point data is acceptable. Valid range is 0.1Hz to 5kHz.
CL-SS <n...>	[dBm] [dBuv]	To change the carrier level step size as required. Floating point data is acceptable. Valid range is +/-0.1dB to +/-10dB.
ML-SS <n...>	[MHzFM] [kHzFM] [%AM] [radPM]	To change the modulation level step size as required. Floating point data is acceptable. Valid range is 10Hz to 500kHz FM, 0.1 to 50 %AM and 0.01 to 2.99 rad PM.

SWPT <n...> [s]
 [ms] Set sweep time as required.
 Floating point data is acceptable.
 Valid range is 2 to 200 seconds.

*STO <nn> Store a front panel setting 01 to
 99.

*RCL <nn> Recall a front panel setting 01 to
 99.

<nn> or GATE <nn> Execute the same functions as in the
 user control gate code listing.

CSR <nn> Move the cursor to the required
 position. This may require CF, CL,
 MR or ML commands to select relevant
 display windows first.

Note: CSR 1 will position the cursor on the left most digit on
the front panel display, CSR 12 will position the cursor on the
right most digit.

WP <nn> Write protect a selected store
 location, 01 to 99.

UNWP <nn> Remove write protection of store
 location, 01 to 99.

Commands for defining standard 5 tone sequences:

CCIR <nnnnn> Define CCIR tone sequence (100ms).

EEA <nnnnn> Define EEA tone sequence (40ms).

ZVEI <nnnnn> Define ZVEI tone sequence (70ms).

DZVEI <nnnnn> Define DZVEI tone sequence (70ms).

EIA <nnnnn> Define EIA tone sequence (30ms).

NATEL <nnnnn> Define NATEL tone sequence (70ms).

Commands for user defined tones:

TFO <n...> [kHz]
TF1 [Hz] To change the tone frequency
TF2 sequences as required. Floating
 point data is acceptable. Valid
 range 10Hz to 9.999kHz.
 NB 0Hz is used to select a blank
 period.
 .
 .
 .
TF14
TF15

TLO <n...> [s] To change the tone length sequences
 TL1 [ms] as required. Floating point data is
 TL2 acceptable. Valid range 10ms to
 . 999.9ms.
 .
 .
 TL14
 TL15

When entered data is not followed by a units termination, the default settings are:

CF	[HZ]	CF-SS	[Hz]
MR	[Hz]	MR-SS	[Hz]
CL	[dBm]	CL-SS	[dBm]
ML	[%AM]	ML-SS	[%AM]
SWPT	[s]		
TFO---TF15	[Hz]	TLO---T15	[s]

c) Talk Functions

The commands listed below will cause the instrument to transmit data:

CF? Returns carrier frequency to a resolution of 10Hz in Hz as floating point data e.g. 6.7800000E8 = 678MHz

MR? Returns modulation rate to a resolution of 0.1Hz in Hz as floating point data e.g. 2.540E2 = 254Hz

CL? Returns carrier level to a resolution of 0.1 dB in 0.1 dBm as fixed point data e.g. -1070 = -107.0dBm

ML? Returns AM to a resolution of 0.1% when in the AM mode, the deviation in kHz to a resolution of 0.01kHz when in the FM mode, and the deviation in rads to a resolution of 0.01 when in the PM mode as fixed point data e.g. 560 can equal 56.0%AM

CF-SS? Returns carrier frequency step size to a resolution of 10Hz in Hz as floating point data e.g. 1.2000000E7 = 12MHz

MR-SS?	Returns modulation rate step size to resolution of 0.1Hz in Hz as floating point data e.g. 2.000E2 = 200Hz
CL-SS?	Returns carrier level step size to a resolution of 0.1 dB in 0.1 dBm as fixed point data e.g. 50 = 5dBm
ML-SS?	Returns AM step size to a resolution of 0.1% when in the AM mode, the deviation step size in kHz to a resolution of 0.01kHz when in the FM mode, and the deviation step size in rads to a resolution of 0.01 rad when in the PM mode, as fixed point data e.g. 200 can equal 20.0%AM
STATUS?	Returns the status to PSG1000B the same as #11 function. See section 6.4 e).
5TONES?	Returns the current 5 tones setting in the format of "x nnnnn" where x=0 to 5 corresponding to CCIR, EEA, ZVEI, DZVEI, EIA, and NATEL.
TF-DUMP?	Returns the current frequency setting of user defined tones as a 64 byte block formatted as IEEE definite length arbitrary block.
TL-DUMP?	Returns the current length setting of user defined tones as a 64 byte formatted as IEEE 488.2 definite length arbitrary block.
<p>Note: The frequencies and the lengths of user defined tones are stored in the memory as 32 bit binary fixed point numbers. Each number occupies 4 bytes.</p>	
*TST?	Performs self test and returns integer 1 for pass and integer 0 for fail.
*IDN?	Returns the message "Farnell PSG1000B Ver" where Ver is replaced by the software version number.

d) The Status Byte Register

The status byte register has the format specified in IEEE 488.2. Bit 5 is the Event Status bit. Bit 4 is the message available bit, set whenever the PSG1000B wants to talk. Bit 6 is the Master Summary bit, set whenever the PSG1000B needs to request service, although it is not sent when the controller performs a serial poll.

The Service Request Enable register is an 8 bit register set with the *SRE command. This register is used to mask the Status Register such that whenever anything changes in the Status Register, if the corresponding bit is set in the *SRE register, then a service request is issued.

The Event Status register is implemented except for the user request and request control bits. The command error bit is set whenever an illegal command, or out of range data value is detected. The execution error bit is set when a command cannot be executed (e.g. setting FM step size when in AM mode) or syntactically incorrect data is detected.

The Event Status Enable register is supported. This is a mask register written using the *ESE command which functions as follows. Whenever a bit goes high in the Event register, if the corresponding bit is set in the ESE register, then the Event Status bit in the status register will be set.

The following IEEE 488.2 status commands are implemented:

*CLS	Clear status register and associated status data structures.
*ESE <n...>	Set the standard Event Status Enable register bits, with n ranging from 0 to 255.
*SRE	This command sets the Service Request Enable register. This register determines which bits in the status byte will cause a Service Request from the device.
*ESE?	Returns the current contents of the Standard Event Status Enable register as an integer in the range 0 to 255.
*ESR?	Returns the current contents of the Standard Event Status register as an integer in the range 0 to 255. Reading this register clears same.
*SRE?	Returns the current contents of the Service Request Enable register as an integer in the range 0 to 63 and 128 to 191.
*STB?	Returns the current contents of the status byte with the Master Summary bits as an integer in the range 0 to 255. Bit 6 represents Master Summary Status rather than Request Service.

e) The Status Function

The status of the PSG1000B can be found either by using the #11 function, which displays the status on the front panel seven-segment displays, or when using the GPIB interface, by using the STATUS command, which will return the status on the bus. The status information is presented in the form of 8 hexadecimal digits, the significance of the bits in these digits is shown below.

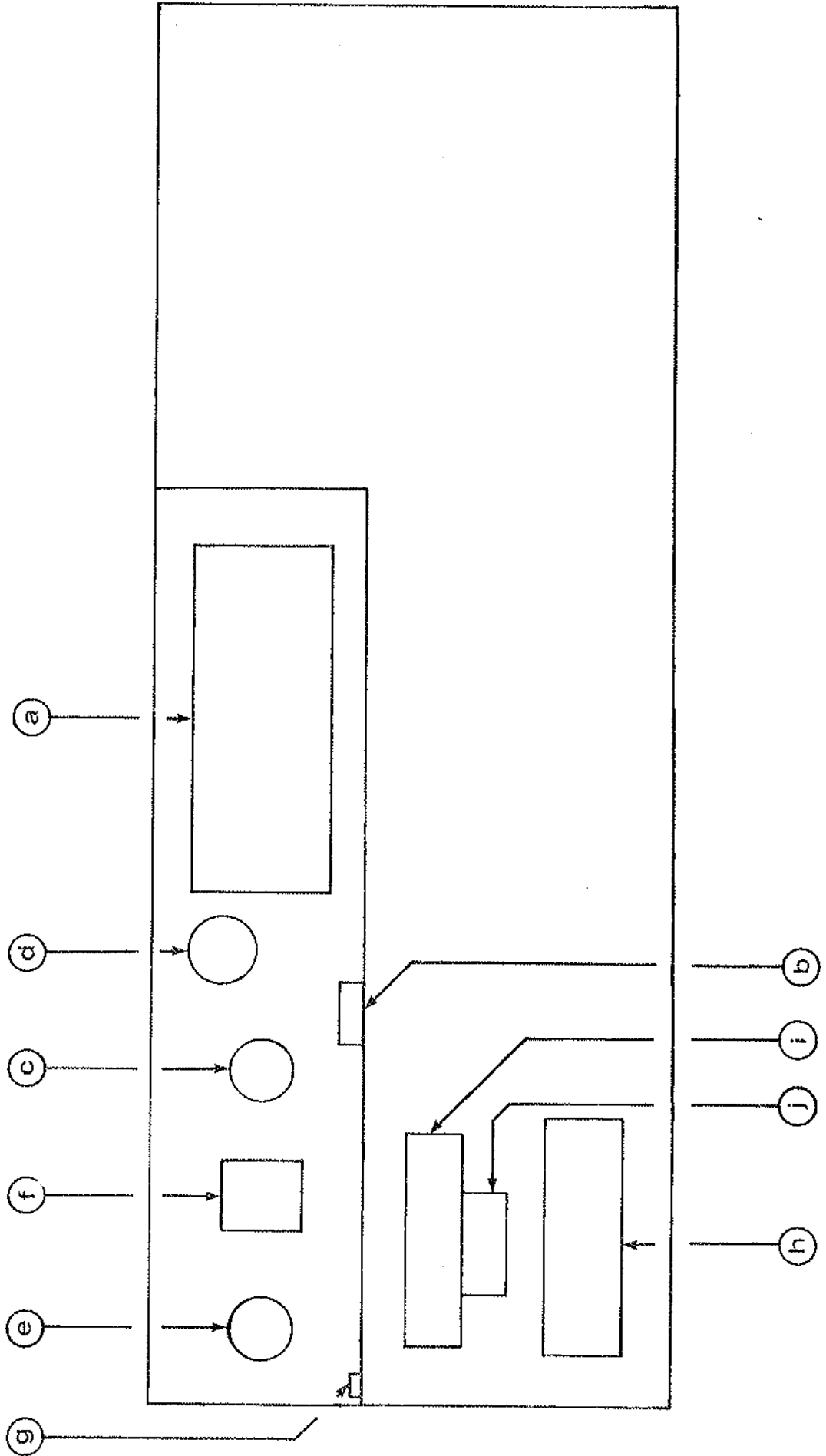
	msb			lsb
digit 1	12dB SINAD	dpend	prefixends	postfix
digit 2	prefix	demo	delta	x
digit 3	am0	am50	relax spec	xtal
digit 4	blp	wp	serv	err
digit 5	test	-agc	fm-hi	fm/pm
digit 6	am	dcfm	modoff	intmod
digit 7	extmod	afsynth	rfoff	mr<1kHz
digit 8	CL/ML	CF/MR	sweep	curs-on

Notes:

1. x = don't care.
2. When using the #11 command to display the status it must be remembered that the PSG blanks out any leading zeros in the display.
3. The #11 function itself causes the 'prefix' and the 'demo' bit to be set.

REAR PANEL CONTROLS

4ZU10050222 ISS - A



6.5 BACK PANEL FACILITIES

Lower case letters below refer to the annotated drawing adjacent to this page.

- a) Combined a.c. power inlet connector, RFI filter, voltage selector and fuse.
- b) Combined a.c. and d.c. power input on / off switch.
- c) Three pin d.c. input socket.
- d) DC input fuse.
- e) Internal 10MHz crystal reference output / external reference input BNC socket. See section 6.6 Applications, part h).
- f) Rear panel RF output option (if fitted).
- g) Internal 10MHz crystal reference fine adjustment. See section 9.5 Frequency calibration.
- h) GPIB (IEEE 488) connector.
- j) Six way auxiliary connector for access to the sweep sync ramp output on the standard unit. An auxiliary six way plug and loom is supplied with the unit in the accessories package.

When the pulse modulation option is fitted the modulator is controlled via this connector. See section 6.6 Applications, part g).

6.6 APPLICATIONS

a) SINAD MEASUREMENT

The maximum usable sensitivity of a receiver is the minimum level of signal at the receiver input, at the nominal frequency of the receiver and with normal test modulation, which will produce an audio frequency output signal having a:

$$\frac{\text{Signal} + \text{Noise} + \text{Distortion}}{\text{Noise} + \text{Distortion}} \text{ ratio of 12dB. (The SINAD ratio)}$$

Normal test modulation is 30%AM or 60% of maximum permissible FM.

This test is simply performed using the PSG1000B. The receiver under test is first supplied with a high level RF signal of 1mV (-47dBm) and normal test modulation using the internal 1kHz fixed tone. Selecting the internal 1kHz tone using the INT 1kHz key automatically switches the analogue meter into SINAD mode. The receiver volume control is then adjusted to give 50% of rated output across the loudspeaker or equivalent dummy load. When this output is connected to the PSG1000B SINAD input socket, the analogue meter will give a direct indication of the SINAD reading for this high RF input level, which will be typically 30dB or greater.

Now reduce the RF level from the PSG1000B and watch the SINAD reading reduce until it reaches the 12dB mark.

The indicated RF level on the PSG1000B is the maximum usable sensitivity of the receiver under test.

For improved repeatability in conditions of high noise, true rms detection is employed.

NB

The wide dynamic range of the SINAD input AGC circuits (30mV to 3V rms) is tolerant of varying receiver audio outputs. A low SINAD input level will result in unstable readings.

The SINAD measurement bandwidth approximates to CCITT P53A weighting, which is similar to most radio receiver audio bandwidths. See page 6-30.

b) ATTENUATOR LEVEL GLITCHES

The instrument's RF level setting is obtained by a combination of 10dB fixed step attenuators switched in by relays and 0.1dB steps obtained from the output AGC loop.

At the attenuator change points of -3.0dBm, -13dBm ---- -113.0dBm the RF output is momentarily undefined for a period of approximately 3ms as the relays change over.

To eliminate this level glitch it is possible to extend the normal range of the AGC loop as follows.

Place the cursor over the 0.1dBm carrier level digit and commence decrementing the display. At the next attenuator change point, "Fine AGC" will be displayed in the carrier frequency window and the RF level will continue reducing with no level glitch. When the limit of the extended AGC range is reached the message "Fine AGC" will be removed and the instrument reverts to normal attenuator settings. For optimum AM performance at modulation depths of > 50%, the normal attenuator settings are recommended.

The CLEAR/LOCAL key will exit the "Fine AGC" mode as will any attempt to change the level other than in 0.1dBm steps.

c) MODULATION OUTPUT

This output is d.c. coupled with a nominal source impedance of 100Ω, and is capable of driving load impedances down to 50Ω.

NB

The application of reverse signals in excess of ±5V may result in damage to the A.F. driver stage.

When the INT 1kHz modulation source is selected a fixed level signal of 1V rms is available at the front panel modulation output connector. This output may also be used as an AF source by utilising the synthesized tone generator. Select the SYNTH RATE key only, and use the MOD RATE key to enter the desired frequency (valid range 10.0Hz to 9.999kHz). The AF level can also be set in 1mV steps up to 999mV by selecting the required level as %AM (999mV = 99.9%), using the MOD LEVEL key.

d) EXTERNAL MODULATION.

When EXT MOD is selected the carrier may be modulated by an external signal applied to the front panel modulation input/output connector. The front panel analogue indication meter displays the external level (black scale), with the CAL marker corresponding to an input level of 1V peak (external level control fully CW). The external level detector is true rms sensing and is calibrated for sine wave inputs.

Input levels of greater than 1V peak (0.707V rms) may be attenuated by utilising the front panel external level potentiometer. When the calibrated external source is mixed with the internal tone generator the ratio is set internally as 5:1. This ratio may be adjusted using the external level control by applying the formula:

True modulation level =

(Front panel setting) x (external level scale reading)

The external modulation input is normally a.c. coupled but may be d.c. coupled by selecting the DCFM key. This is essential for zero phase shift AM and low rate digital FM applications.

NOTE:

For d.c. coupled AM the external signal must not contain a d.c. offset as this would alter the RF level setting. In the DCFM mode the unlocked carrier frequency will be subject to drift dependent upon the carrier frequency range and ambient temperature fluctuations. To reduce errors it is recommended that DCFM should only be selected for the duration of the d.c. coupled test.

With FM selected a d.c. input of +1.0V will give the indicated peak positive frequency deviation and correspondingly -1.0V will give a peak negative frequency deviation.

e) HIGHER LEVEL RF OUTPUT

RF output levels up to +25dBm (300mW) are available by using the external FARNELL LA1000 amplifier in conjunction with the PSG1000B. This amplifier is highly linear and is unconditionally stable.

f) SWEEP SYNC OUTPUT

This signal is available on the back panel auxiliary socket and is accessed via the connector and loom supplied with the instrument. In the sweep mode an analogue ramp output is produced with 0V corresponding to the start of the sweep and +10V to the end of the sweep.

This output is not designed to drive load impedances of $<5k\Omega$.

g) PULSE MODULATION

When this option is fitted it is supplied with an auxiliary loom and connector for connection to the instruments back panel auxiliary socket. To enable the pulse modulator link together the +5V and pulse mod enable lines. The modulator is then controlled by a TTL pulse applied to the pulse input line, with a TTL low corresponding to carrier off and TTL high to carrier on.

h) CRYSTAL REFERENCE INPUT/OUTPUT

The internal 10MHz crystal reference signal is available on the back panel BNC connector, for synchronising two sources. This output has a nominal level of 3V pk-pk and is not designed to drive large capacitive loads or load impedances of $<500\Omega$. It is thus recommended that connecting cables should be as short as possible.

When EXT REF is selected the instrument may be referenced from an external 10MHz frequency standard, with a level of $>2V$ pk-pk required for reliable operation.

WARNING!

If the external reference signal is of low amplitude or not present the instrument RF output will not be valid.

i) AMPLITUDE MODULATION

In the normal mode of operation full AM depth is available for carrier levels of $< +7\text{dBm}$. For carrier levels of $\geq +7\text{dBm}$ a limited AM depth is allowed (with unspecified accuracy and distortion) according to the table below.

CARRIER LEVEL dBm	AM DEPTH %
+7.0	90.0
+8.0	70.0
+9.0	60.0
+10.0	40.0
+11.0	30.0
+12.0	10.0

When incrementing either carrier level or modulation level above $+7.0\text{dBm}$, the note code 54 is displayed momentarily when an error boundary is reached and the AM depth reduced to the maximum permissible.

j) RELAXED ERROR LIMITS

The normal carrier frequency limits of 10kHz and 1000MHz may be extended to 1kHz and 1024MHz respectively by using the secondary function #22. In this mode the specification is not guaranteed, but the RF level response is typically -3dB at 1kHz .

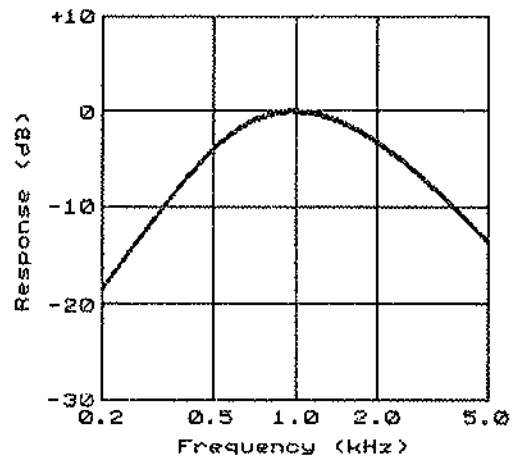
k) ILS TONES

Selecting DCFM with amplitude modulation d.c. couples the external modulation input, thus removing any phase shift errors between the external modulation signal and the modulated carrier. The flat modulation bandwidth extends to 25kHz rate, resulting in minimum modulation depth variation between the ILS tones of 90Hz and 150Hz .

For carrier frequencies between 108MHz and 118MHz the typical modulation depth variation is $< 0.04\% \text{AM}$ between ILS tones of 90Hz to 150Hz , with a modulation depth of 40% .

1) SINAD BANDWIDTH

Typical characteristics shown for the SINAD noise bandwidth.



CARRIER SETUP

Carrier frequency

Press **CARR FREQ** if led is not lit. Enter frequency

followed by GHz, MHz or kHz as terminator:

CARR FREQ 4 6 . 4 2 MHz

Any invalid data entry will return an error code. To

backspace during data entry, press **←**. To abort during

data entry, press **CLEAR**.

Carrier level

Press **CARR LEVEL** if led is not lit. Enter level followed by

dBm, dBuV, mV or uV as terminator:

CARR LEVEL - 9 7 . 5 dBm

To change level units press the desired level units key for automatic conversion. **RF OFF** toggles RF output on/off.

Reverse power protection

If reverse power is detected at RF output, bleep sounds and RF OFF led lights. Remove source of RF power before pressing RF OFF key to restore RF output level.

Glitch free squelch test

Place cursor (see CURSOR AND ROTARY CONTROL) over 0.1dB carrier level digit. Increment/decrement as desired and AGC level range will be extended beyond normal

attenuator switch boundary. Press **CLEAR** to exit.

MODULATION SETUP

Modulation source

Any of the three sources **INT 1kHz**, **EXT MOD**, **SYNTH RATE**

may be independently selected, and the SYNTH RATE (variable frequency source) can be mixed with either the INT 1kHz (spot frequency) or EXT MOD (external source) for CTCSS, when the SYNTH RATE amplitude is reduced to 20% of the main source

Modulation rate

Select **SYNTH RATE** and deselect any other source not required. Press **MOD RATE** if led is not lit. Enter modulation rate followed by kHz or Hz as terminator:

MOD RATE 2 5 1 Hz

Modulation level

Press **MOD LEVEL** if led is not lit. Enter modulation level followed by %AM, kHz, Hz or rad as terminator:

MOD LEVEL 2 . 5 kHz

DCFM and DCFM

Press **DC FM** if led is not lit to provide DC coupling of AM and FM external signals. Toggle DCFM or MOD OFF to periodically relock carrier when in FM mode.

STORE AND RECALL

Press **STORE** followed by any number between 01 and 99. Stores all current parameter settings including cursor position. To recall a setting press **RECALL** followed by appropriate number between 01 and 99.

To write protect a store, enter store number followed by #90:

0 3 # 9 0

To remove write protection, enter store number followed by #91.

Press **MEMORY STEP** if led is not lit to allow recall of stores sequentially using UP/DOWN keys or rotary control.

To power up using user stored parameters, enter store number followed by #94. To power up using last setting enter #95. To clear memory and return to default setting enter #99.

CURSOR AND ROTARY CONTROL

Cursor

Any adjustable parameter may be incremented/decremented. Press **CURSOR** if led is not lit to view flashing cursor position.

Select **CARR FREQ**, **CARR LEVEL**, **MOD RATE** (if SYNTH RATE is on) or **MOD LEVEL** as desired to assign cursor to appropriate window.

Press **←** or **→** to choose desired digit and

then use **↑** or **↓** to increment or decrement

respectively. To increment/decrement using rotary control, press **ROTARY** if led is not lit.

Autocursor
Pressing #77 will cause unit to continue stepping after a subsequent key is pressed for >2 seconds. Stepping ceases on error boundary or any other key press. To deselect autocursor mode, press #78.

User defined step size
Displayed data may be altered in a specified step size. Press display parameter key, step size key and step value followed by terminator:

CARR FREQ **STEP SIZE** 1 2 . 5 kHz

Deselect **CURSOR** if led is lit to enable specified step size ("delta") mode. UP/DOWN keys and rotary control will now alter parameter in chosen step size.

SWEEP

Press **CARR FREQ**, **CARR LEVEL**, **MOD RATE** or **MOD LEVEL** as appropriate to display parameter to be swept.

Press **CURSOR** if led is not lit and position over specific parameter to be swept. Enter sweep start value in store 01:

1 MHz **STORE** 0 1

Enter sweep stop value in store 02:

1 0 0 MHz **STORE** 0 2

Enter total sweep time between 2 and 200 seconds using sweep time key followed by data and terminator:

SWEEP TIME 2 5 (m)sec

Use **SWEEP ON** key to toggle sweep on/off.

SELECTIVE CALLING

Five tone systems

Deselect **MOD OFF** if led is lit. Press **SYNTH RATE** if led is not lit. Enter required nominal modulation level and rate:

MOD RATE 1 0 0 Hz

MOD LEVEL 2 . 5 kHz

Press **SET 5 TONES** followed by required 5 tone numbers and

terminate with number which selects the system required from following list: 0=CCIR, 1=EA, 2=ZVEI, 3=DZVEI, 4=EA, 5=NATEL eg.

SET 5 TONES 1 2 3 4 5 0

Press **SEND TONES** as required to send this sequence once.

Press #88 for a continuous output of tone sequences, hold down **CLEAR/LOCAL** key to exit this mode.

User defined systems

Deselect **MOD OFF** if led is lit. Press **SYNTH RATE** if led is not lit. Consecutive tone frequencies of differing lengths up to

16 can be entered using **DEFINE TONES** key and terminating with

SEND TONES key.

For example, to set up tones of 1kHz and 2kHz with durations of 33ms and 66ms preceded by a blank period of 50 ms:

DEFINE TONES 0 kHz 5 0 (m)sec

1 kHz 3 3 (m)sec

2 kHz 6 6 (m)sec **SEND TONES**

The **SEND TONES** key may be assigned to the last used 5 tone sequence by pressing #86, and to the last used user defined sequence by pressing #87.

SINAD MEASUREMENT

Press **INT 1kHz** if led is not lit to select SINAD measurement on front panel analogue meter.

FREQUENCY REFERENCE

EXT REF toggles between internal frequency reference and external frequency reference. On power up **EXT REF** is always deselected, unless recalled from user defined store (see **STORE AND RECALL**).

MISCELLANEOUS FUNCTIONS

- #00 Display software revision number
- #01 Display test. Any key press exits test
- #02 Bleeper off. Cleared on power on.
- #03 Bleeper on. Set on power on.
- #04 Display last error code
- #05 Display GPIB address
- NN#05 Enter GPIB address range 00 to 30
- #11 Display status
- #22 Relax error limits. Cleared on power on
- #23 Normal error limits. Set on power on

ERROR CODES

- 08 GPIB address out of range
- 10 Carrier frequency out of range
- 11 Carrier frequency step size out of range
- 12 Store write protected
- 13 Cannot store with relaxed limits
- 14 Store number out of range
- 20 Carrier level out of range
- 21 Carrier level step size out of range
- 22 Cannot use carrier level linear step size
- 30 Modulation rate out of range
- 31 Modulation rate step size out of range
- 35 Tone frequency out of range
- 36 Tone level out of range
- 40 Modulation level out of range
- 41 Modulation level step size out of range
- 45 No carrier frequency increment with DCFM
- 52 FM deviation reduced to fit carrier frequency
- 53 Invalid data found in store power up mode
- 54 AM depth reduced to suit carrier frequency
- # function not implemented
- 60 Store 01 sweep limit out of range
- 62 Store 02 sweep limit out of range
- 63 Sweep time out of range
- 64 Cursor not on sweep parameter
- 65 Sweep time or limits out of range
- 80 Cannot SELCALL with MOD OFF
- 81 SELCALL sequence incorrect
- 82 No previous SELCALL sequence
- 83 No previous user defined sequence
- 99 Function not implemented

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7. OVERALL BLOCK DIAGRAM AND THEORY OF OPERATION

7.1 INTRODUCTION

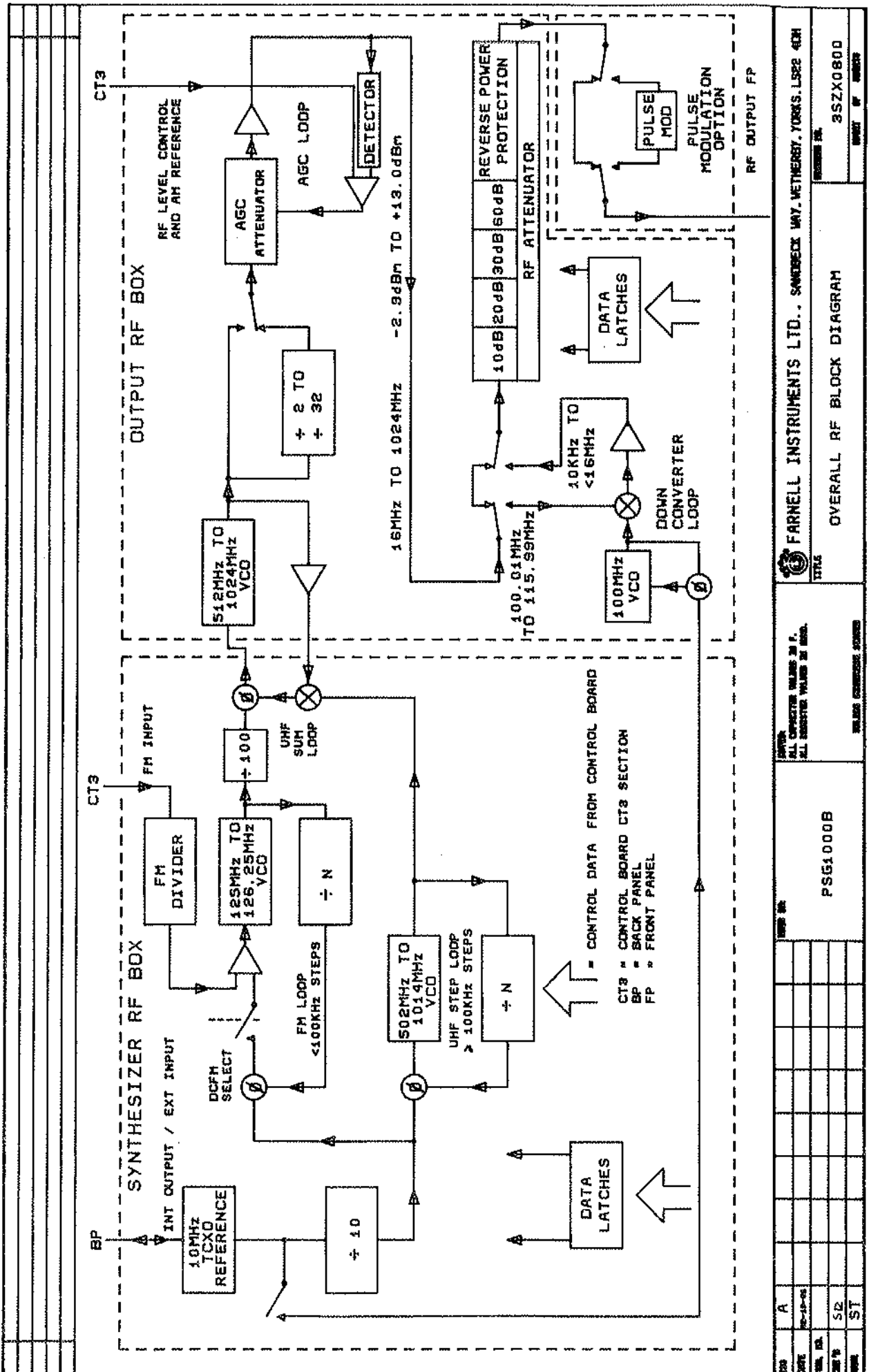
For a signal generator to cover the wide frequency range of 10kHz to 1GHz multiple ranges of switched oscillators could be used, but this design would suffer from excessive component count and result in a physically large unit.

A simpler approach is to use a UHF oscillator tunable over an octave frequency range, and derive further ranges by a combination of binary division and mixing. The PSG1000B uses this technique.

To produce a synthesized signal source the UHF oscillator is phase locked to a high stability crystal reference, thus enabling precise frequency signals to be produced. An additional synthesizer loop improves the frequency resolution to 10/100Hz and allows the carrier to be frequency modulated.

Incorporating an AGC loop in the RF output path allows the carrier to be amplitude modulated and enables the carrier level to be incremented in 0.1dB steps.

When combined with a coarse 10dB step attenuator the carrier level dynamic range is increased to 146dB.



7.2 FUNCTIONAL DESCRIPTION OF CIRCUIT BOARDS

a) CONTROL BOARD

This board communicates with the user via the front panel or GPIB interface, and outputs serial data to the synthesizer and output RF enclosures to set up the required carrier frequency and level. The audio synthesized tone generator and fixed 1kHz modulation sources are also located on this board, in addition to SINAD and modulation control functions.

Refer to the overall block diagram on the adjacent page.

b) SYNTHESIZER BOARD

The main UHF synthesizer loop consists of an octave range UHF oscillator, programmable divider and phase detector. The reference frequency is derived from a high stability 10MHz crystal oscillator. This loop has a frequency resolution of 100kHz. Fine frequency steps are generated in the FM loop, which also permits frequency modulation of the carrier.

The output from this loop is used as a reference for the sum loop, which transfers the fine frequency steps, FM modulation and coarse frequency steps on to the output UHF oscillator located in the RF output box.

The RF enclosures are designed to provide high isolation between the synthesizer and RF output circuits, which is essential for good spectral purity. Also these enclosures ensure the RF carrier leakage is extremely small, permitting receiver sensitivity test down to $< 0.1\mu\text{V}$.

c) RANGE DIVIDER BOARD

The output UHF oscillator range is divided successively by two to produce a frequency coverage of 16MHz to 1GHz, which is extended down to 10kHz by a mixer loop operating at 100MHz.

An AGC loop enables fine RF level steps of 0.1dB to be produced, and maintains the RF level flatness over a wide frequency range.

Amplitude modulation is added on this AGC loop, whose reference signal is generated on the control board. The output amplifier and attenuator assembly increases the RF output dynamic range from +13dBm to -133dBm, and is an integral part of the range divider board.

8. C I R C U I T D E S C R I P T I O N S

- 8.1 Power supply board
- 8.2 Control board
- 8.3 Front panel board
- 8.4 Synthesizer board
- 8.5 Range divider board
- 8.6 Output amplifier board
- 8.7 Pulse modulation option
- 8.8 Fault finding charts

8.1 POWER SUPPLY BOARD

After the power switch SW1, mains power is passed to the primary of transformer TX1, via the voltage selector.

There are three secondary output of TX1 to provide low voltage power for the full wave rectifiers D1, BR1 and BR2. D1 is a schottky diode rectifier for maximum efficiency. After smoothing of the rectified signals, linear voltage regulators are utilised to provide stable low noise supplies of +5V, +12V and -10V for the instrument.

Two fixed +5V outputs are provided by U1, U2 and a fixed +12V output by U3.

The -10V regulator, U4, is an adjustable design with P1 setting the output voltage.

The secondary output for the +12V supply is separately rectified by D2, D3 to provide a fast responding advanced warning of power failure for the control circuit board.

For operation from an external d.c. supply, a separate inverter secondary winding on the transformer is used.

The coil of relay RL1 is supplied from the d.c. input and operates when the d.c. input is above the minimum level. Diode D12 in series with the relay coil prevents damage due to accidentally reversed d.c. polarity. Relay RL1 isolates the mains input socket and connects the inverter winding to the switching power MOSFETS Q3 and Q4. Drive for Q3 and Q4 is provided by a 70Hz nominal a stable multivibrator comprising transistors Q1, Q2 and associated circuitry. This drive level is routed to the control circuit board to provide battery level indication.

8.2 CONTROL BOARD

a) MICROPROCESSOR CONTROL

Circuit section CT1 forms the heart of the PSG1000B, providing the control for the rest of the instrument and containing the GPIB interface.

The circuit can be considered as 5 distinct sections, these are:

1. The control 'core' comprising the microprocessor, memory, and port decoding and the RESET and RAM protection circuitry.
2. The keyboard interface.
3. The parallel data output to sections CT2 and CT3.
4. The serial data transmission circuit which sends data to the boards in the instrument.
5. The instrument's GPIB digital interface.

These sections are described in more detail below.

1. The Microprocessor 'Core'

This comprises an 8085 8-bit microprocessor (U105) running at 2MHz, the obligatory address decoding latch (U104), 48k bytes of ROM (32k in U101, 16k in U102), 8k bytes of battery backed RAM (U103), the address and port decoding (U119 and U120), the RESET circuit (Q101 and half of U109) and the RAM protection latch (U106). As well as providing the system RAM, U103 is also used to store up to 100 front panel settings which are retained when the instrument is switched off. The SOD (serial output data) line on the 8085 is used to drive a peizo sounder and to provide a 'sweep synch out' signal.

2. The Keyboard Interface

The keyboard interface comprises an 8155 peripheral interface IC (U124) and an 8 input OR gate (U125). Six lines of port A on 8155 form the 'send' lines of the keyboard matrix and the 8 lines of port B are the keyboard 'return' lines. In its normal state all the send lines are held high and all the return lines are OR'ed by U125 to generate an interrupt when a key is pressed. In response the microprocessor initiates a keyboard scan, taking each line high separately and monitoring the return lines to see which key has been pressed.

Port C is used to read the output of U127, an interrupt priority encoder. This allows several peripheral devices to use a common interrupt line to the microprocessor. The 8155 IC also contains a programmable timer which is used in the implementation of the instrument's sweep function.

3. The Parallel Data Transmitter

Data is sent to the circuit sections CT2 and CT3 via 6 latches (U110 to U115). This data bus to these devices is buffered from the main system by U121. Since this device is only selected when data is sent to one of the 6 latches the amount of bus generated 'noise' on the board is reduced.

4. The Serial Data Transmitter

Circuit sections CT2 and CT3 are located on the same circuit board as section CT1 so the 8 bit parallel data bus described in 3. is the most direct transfer. In contrast, in order to reduce the amount of wiring between boards and to restrict the level of noise generated by the microprocessor busses, a serial system is used to transfer data to other boards in the instrument.

The serial data transmitter comprises U117, U116, U122, U123, U108 and half of U107. The microprocessor initiates a serial transmission by writing a data byte to latch U116. This action also starts counter U123 which is used to sequentially select all the 8 inputs to data selector U122. The resulting serial data on the output of U122 is sent with the serial clock (also derived from counter U123) to the other circuit boards.

The microprocessor then writes a byte to latch U117 which provides the enable signals for the serial receive latches on the other circuit boards.

The serial clock to the range divider board and the synthesizer board is buffered and gated by U108-C and U108-D. This enables this signal to be 'switched off' when the serial data is destined for another board. The gateing signal is provided by a port line from the 8155. The serial data rate is 1 bit/8us.

A second serial data line to the range divider board doubles up as an interrupt input when the serial data circuit is not in operation. This interrupt warns the microprocessor of a 'reverse power' condition on the instrument's RF output.

5. The GPIB Interface

The GPIB interface is implemented using propriety IC's which interface directly to the microprocessor. The GPIB comprises U128, U129 and U130. U128 is an intelligent GPIB interface IC and performs all the necessary bus protocol when transferring data on the bus. U129 and U130 are receiver/driver IC's for the bus data and control lines respectively. The interrupt output from the interface goes to the interrupt priority encoder U127.

THE SOFTWARE

The microprocessor spends most of its time in a 'sleep' mode and only wakes up when it is interrupted by the keyboard, the programmable timer, GPIB or a 'reverse power' condition on the RF output. On receiving an interrupt the microprocessor scans these sources to determine which one sent the interrupt. It then takes the appropriate action and returns to its 'sleep' mode.

The exception to this is when the instrument is being controlled by the GPIB. In this case when a interrupt is first identified the programme jumps to a secondary loop which continually searches for character from the appropriate interface and executes valid commands. The programme returns to the main loop either by a direct command from the interface or by the user pressing the LOCAL/CLEAR key on the front panel (the only key which is recognised in this mode).

b) TONE GENERATOR

Synthesized audio signals in the range 10Hz to 9.999kHz are generated by section CT2. IC's U201 to U204 form a 4 decade BCD rate multiplier, clocked at 2MHz. The resulting series of pulses is divided by 4 with U207 to produce a square wave output. Further division by 5, U208 and 10, U209 gives a maximum 10kHz square wave input to the switched capacitor filter, U210. The filter is clocked at a rate of 50 times the input frequency by the signal from pin 13 of U207.

For audio frequencies of < 1kHz an extra divide by 10, U205, is switched in by the gate U206.

The sine wave output from pin 3 of U210 is passed through an active low pass filter to remove unwanted signals at the clock frequency. This filter has 3 ranges, <100Hz, <1kHz and <10kHz, with the filter capacitors switched in by gates U211-C, U211-D. The audio output at pin 2 of U210 is adjusted in level by P201 and passed to the modulation control section, CT3.

For 2 tone modulation applications when the audio synthesizer is mixed with another source, the synthesizer level is reduced to approximately 20% of the normal level when gate U212-A is enabled.

c) MODULATION CONTROL

Control of the modulation level is performed by section CT3.

The 2MHz clock from CT1 is divided by 2 with U308, then successively by 10 with U309 to U311. The resulting 1kHz fixed square wave is passed to the input of the switched capacitor filter, U312.

This filter is clocked at 100kHz by the signal from pin 12 of U309 and the resulting 1kHz sine wave passed to the modulation control section via gate U301-C. This gate is disabled for EXT MOD and the external signal passed through gate U301-B to amplifier U302-A. Summing of the synthesizer and 1kHz signals is performed by R302, R304 and passed to the modulation level DAC via amplifier U302-B.

U315 comprises a 10 bit DAC enabling the audio level at pin 1 of U305-A to be adjusted in 0.1% steps by the 10 bit modulation level code from CT1.

When INT 1kHz is selected a fixed level of 1V rms is routed to the front panel modulation socket via gate U303-A and amplifier U316. Enabling the synthesizer routes the adjustable modulation signal through gate U303-B to the modulation socket. This provides an audio synthesized output adjustable both in frequency and level.

For FM and phase modulation the audio signal is routed to the FM drive amplifier U307-A.

A stable reference voltage for the RF level control is generated by zener diode D301 and attenuated by P303.

When AM is selected the modulation signal is summed with the RF level control voltage in amplifier U305-B and the combined signal passed to the RF level control DAC, U306. This combined signal is attenuated in fixed steps corresponding to 0.1dB steps of the RF level. These steps are controlled by the 10 bit AGC control code from CT1.

Amplifier U307-B provides the combined RF level control and AM drive signal for the output amplifier.

d) SINAD

Section CT4 comprises the SINAD and front panel meter drive circuits.

The 1kHz SINAD input signal is fed to the AGC amplifier U401 whose output remains constant at approximately 200mV pk-pk over an input level variation of more than 40dB. U402 comprises a switched capacitor 1kHz notch filter clocked at 100kHz. The resulting noise and distortion signal is amplified by U407 and gated through U405-B to the meter drive circuit.

When enabled, the battery level and external modulation signals are also routed through U405 to the meter drive.

The audio signal is detected by U404 and U406 which has a true rms response. The d.c. output at pin 14 of U404 is then further amplified by U403-B to drive the front panel meter.

8.3 FRONT PANEL BOARD

The front panel membrane switch connections are routed through the display circuit board socket S1 to the control circuit CT1, via a 20 way ribbon cable.

All LED segments and individual LED indicators on the display circuit board are driven by the serially loaded IC's, U1 to U4. The drivers sink a controlled current for each LED which is set by resistors R1 to R4 and P2.

Resistors R1 to R4 allow the controlled sink current to be varied between each driver U1 to U4 while P2 sets the overall current for all four drivers. This allows adjustment of the brightness of all the LED's.

A serial data stream (SB DATA) comprised of 8 bit bursts of data is fed to all four drivers. At each positive going edge of the clock (DP CLOCK) the data stream is accepted. 6 bursts of data are required to load one driver.

When the enable line to any driver is inactive (high) the received data bits are forced to zero and the latched data is unchanged. In the active (low) mode the enable line allows the received data to be accepted. The first burst of data is used for initialisation while the following 34 bits of data are used to load the driver.

On receipt of the 34th data bit the received data is latched to the driver outputs.

To provide an audible click indication of a front panel key depression relay RL1 is operated by the software for approximately 6ms.

8.4 SYNTHESIZER

a) 10MHz REFERENCE

The main reference for the synthesizer is located in section HS1. Power connections are +5V at pin X102 and +12V at pin X101. XTL1 is a temperature compensated 10MHz crystal which is coarse tuned by P101 and fine tuned by the back panel potentiometer. The instrument may be referenced from XTL1 or externally from a 10MHz source connected to the back panel input.

When internal reference is selected, pin 11 of U202 (external select line) is set high. The 10MHz signal is passed through U102-C, U1102-D and pin 3 of U102-A is set high. This gates the 10MHz signal to the input of U101 and to RL1. U101 divides the clock by 10 to provide a 1MHz signal for the synthesizer.

When the down converter range is selected (<16MHz) RL1 is enabled by pin 11 of U603, routing the 10MHz reference to the output box.

For external reference the microprocessor sets pin 11 of U202 low, forcing pins 8 and 11 of U102 high and reverse biasing D102. The back panel input via D101 is level converted by Q101 and inverted by U102-A.

b) FM OSCILLATOR

The FM oscillator is located in section HS3. Power connections are +12V at X302 and -10V at X303. FET Q301 and varactor diodes D301 and D302 form a voltage tuned oscillator. The tuning voltage at X301-2 is composed of a d.c. voltage and the FM drive signal.

The FM drive signal is adjusted to compensate for the reduction of FM deviation when the main UHF output oscillator is divided down to form other RF ranges.

c) FM STEP LOOP

Section HS2 contains the FM step loop. Power connections are +5V at S201-5, +12V at S201-3 and -10V at S201-4. The FM loop phase locks the FM oscillator over the range 125.0MHz to 126.25MHz. For carrier frequencies of <128MHz the FM loop is locked in 1kHz steps to produce an output frequency resolution of 10Hz. Above 128MHz the step loop goes in 1.25kHz steps for an output resolution of 100Hz.

Serial latch U202 loads the synthesizer IC U203 with 8 bit data, controlled by the enable line ENO. A common enable signal (S201-8) is used for the FM step loop and the UHF step loop. A low level on pin 4 of U211 gates the enable via U214-a, U213-A, U213-B to the FM step loop latches. A high level on pin 4 of U211 gates the enable line to the UHF step loop latches (U603, U604). Refer to the latched data information on the next page.

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PSG1000B SYNTHESIZER DATA 4SZX0802 ISSUE A

LATCHED DATA FOR FM LOOP SYNTHESIZER (+R. +N. +A LATCHES) U202

PIN No.	Q1	D0	-	N2	N6	A0	A4	R0	R4	R8
4	Q1	D0	-	N2	N6	A0	A4	R0	R4	R8
5	Q2	D1	-	N3	N7	A1	A5	R1	R5	R9
6	Q3	D2	N0	N4	N8	A2	A6	R2	R6	R10
7	Q4	D3	N1	N5	N9	A3	-	R3	R7	-
14	DS0	0	1	0	1	0	1	0	1	0
13	DS1	0	0	1	1	0	0	1	1	1
12	DS2	0	0	0	0	1	1	1	1	1
11	Q8	EXTERNAL REFERENCE SELECT								

LATCHED DATA FOR UHF LOOP SYNTHESIZER (+R. +N. +A LATCHES) U603

PIN No.	Q1	D0	-	N2	N6	A0	A4	R0	R4	R8
4	Q1	D0	-	N2	N6	A0	A4	R0	R4	R8
5	Q2	D1	-	N3	N7	A1	A5	R1	R5	R9
6	Q3	D2	N0	N4	N8	A2	A6	R2	R6	R10
7	Q4	D3	N1	N5	N9	A3	-	R3	R7	-
14	DS0	0	1	0	1	0	1	0	1	0
13	DS1	0	0	1	1	0	0	1	1	1
12	DS2	0	0	0	0	1	1	1	1	1
11	Q8	DOWN CONVERTER REFERENCE ENABLE								

MODULATION RANGE CONTROL AND SWITCHING LATCH U211

PIN No.	Q1	SYNTHESIZER DATA STEERING
4	Q1	SYNTHESIZER DATA STEERING
5	Q2	DC FM SELECT
6	Q3	FM OFF SELECT
7	Q4	FM 10kHz SELECT
14	Q5	D0 L L L L L H
13	Q6	D1 L L L L L H
12	Q7	D2 L L L L L H
11	Q8	D3 L H H H H H

FM MODULATION DAC SETTING U212

FREQUENCY RANGE MHz	FM RANGE <10kHz	MAXIMUM PEAK DEVIATION KHz	FM RANGE >10kHz
0.01 TO <16	+2	4.99 9.99	5.0 100 200 400 800 1600
16 TO <32	+1	-	-50
32 TO <64	+1	+1	+1 NA NA NA NA NA
64 TO <128	+2	+2	- +2 +1 NA NA NA NA
128 TO <256	+4	+4	- +4 +2 +1 NA NA NA NA
256 TO <512	+8	+8	- +8 +4 +2 +1 NA NA NA NA
512 TO <1024	+16	+16	- +16 +8 +4 +2 +1 NA NA NA NA

The synthesizer integrated circuit, U203, contains 3 programmable counters "R", "N" and "A" which are set by 8 internal latches. These latches can be independently programmed by address lines DSO, DS1 and DS2. The latched data is transferred to the counter coincident with data transfer to latch 1 (address 000). This is the final latch addressed during a frequency change.

Refer to the FM loop diagram on page 8-10.

The "R" counter is set either to 500 or 400 to give phase detector reference of 1kHz or 1.25kHz. In the locked condition "N" and "A" counters are programmed so that the VCO frequency is divided down to either 1kHz or 1.25kHz exactly. The divider chain is composed of U205 ($\div 64/65$) and U201 ($\div 2$). A modulus control output derived from the "A" counter sets the combined ratio to $\div 128$ ($A=0$) or $\div 129$ ($A > 1$).

In the unlocked condition the phase detector outputs (pins 1, 2 U203) force the integrator (U208-A) output in the required direction for the FM oscillator to lock.

The FM drive enters the synthesizer box on S201-9 from the control board. This level varies with the set modulation deviation, 1V rms corresponding to 100kHz deviation.

For FM deviation of < 10 kHz a switched attenuator is selected by pins 7 of U211 and U215C, with P203 calibrating this range.

The modulation signal is then buffered by amplifier U210-A and passed to the FM range DAC, U212. Depending upon the carrier frequency range, the DAC divides the modulation signal by 1, 2, 4, 8 or 16 (refer to latched data information of settings). This control information is strobed into U211 by the enable line EN1 from the microprocessor. When FM is not selected the modulation signal is shorted to ground by U215-D.

Amplifier U290-B provides gain control for the modulation with P201 the calibration adjustment. The FM drive signal is then combined with the integrated output in the difference amplifier U209-A, thus providing tuning and modulation for the FM oscillator.

At low rate modulation deviations the normal closed loop synthesizer action would remove this deviation.

When DC FM is selected (pin 5 of U211) the FM step synthesizer is disabled, with the digital and analogue outputs from the phase detector switched to open circuit, U207-A and U207-B.

d) UHF OSCILLATOR

The main UHF step oscillator is located in section HS7. Power connections are +12V at X605 and -10V at X606. Transistor Q701 and varactor diodes D701, D702 form a voltage tuned oscillator covering the frequency range 502MHz to 1014MHz. The UHF step loop phase locks this oscillator to the crystal reference in steps of 100kHz or greater.

e) UHF STEP LOOP

Section HS6 contains the UHF step loop. Power connections are +5V at X604, +12V X602 and -10V at X603. Serial data present at pin 2 of U603 is clocked into the 8 stage shift register, U603. Transfer of data is controlled by the enable line ENO.

A high on pin 4 of U211 gates the enable ENO as active data is transferred simultaneously into the output latches of U603 and the synthesizer latches U604.

Refer to the UHF step loop diagram on page 8-10.

The "R" counter is set to 10, to give a reference of 50kHz at the phase detector. In the locked condition "N" and "A" counters are programmed such that the VCO output is divided down to 50kHz exactly.

The divider chain is comprised of U607 ($\div 2$), U606 ($\div 64/65$) and U604 ($\div N$).

A modulus control signal derived from the "A" counter switches U606 to either $\div 64$ ($A = 0$) or $\div 65$ ($A > 1$).

In the unlocked condition the phase detector outputs (pins 1, 2 of U604) force the integrator (U605) output in the direction required for the UHF step oscillator to lock. This oscillator is locked exactly 10MHz below the output UHF for steps > 100 kHz.

f) SUM LOOP

The UHF sum loop is located in section HS5. Power connections are +5V at X504 and +12V at X503. The UHF step oscillator is buffered by amplifiers U608, U505 and passed to the local oscillator input of mixer U503. Amplifier U504 buffers the UHF output oscillator signal which is fed to the RF input of mixer U503. In the locked condition the mixer IF output is 10MHz. This signal is passed through a low pass filter comprising C507-C509, C503, C504 and amplified by U502.

The 10MHz signal is then divided by 8 (U501) to give 1.25MHz signal which forms one input of the sum phase detector, U509. A 1.25MHz reference signal for this detector is obtained by dividing the output of the FM step loop by 100 with U206.

g) SUM INTEGRATOR

Section HS4 contains the sum integrator. Power connections are +12V at X403 and -10V at X404. The 2 outputs from the sum phase detector, U509, are passed to the sum integrator, U401, whose d.c. output voltage tunes the output UHF oscillator. In the unlocked condition the integrator tunes the output UHF oscillator until a frequency is reached where the IF output of mixer U503 is exactly 10MHz.

If the tuning voltage of the output and step loop UHF oscillators is vastly different the IF output from U502 will fall outside the maximum operating frequency of the $\div 8$ counter U501. To prevent this occurrence a lock acquisition circuit comprising U601, D602, D606 and D607 is utilised which compares the tuning voltage of the 2 UHF oscillators.

If the output UHF oscillator tuning voltage exceeds the step oscillator voltage by more than +1.2V then pin 7 of U602 goes low and is inverted by U601-A. This forces the sum integrator low via D401, reducing the output UHF oscillator tuning voltage (and frequency).

Conversely, if the tuning error is more than -1.2V, pin 1 of U602 goes low and is inverted by U601-D. This forces the sum integrator high via D402, increasing the output UHF oscillator frequency. The correction signal on U601-D is latched so the integrator output will be forced up through the operating window until the latch is reset by the tuning error exceeding +1.2V.

This ensures the 2 UHF oscillators are phase locked 10MHz apart and track together over wide variations of their respective tuning voltages.

8.5 RANGE DIVIDER BOARD

a) UHF OSCILLATOR AND DIVIDERS

An octave tuned varactor oscillator (section RD2) comprising transistor Q201 and varactor diodes, D201, D202, provides a stable RF output covering 512MHz to 1024MHz. This oscillator is phased locked to the synthesizer UHF oscillator via the tuning line.

Amplifier U1 provides a buffered oscillator signal for the UHF synthesizer while amplifier U2 isolates the oscillator from the digital dividers. These divider stages, covering +2 to +32, are switched in for each RF range. The serial latch U5 controls the range selection. By using digital dividers only one UHF oscillator is required to cover the range 16MHz to 1000MHz.

Each digital divider output is followed by a voltage tuned low pass tracking filter to produce a sine wave output from the square wave input. The tuning voltage for the varactor tuned filters is derived from the UHF oscillator tuning voltage and buffered by amplifier U3.

All the digital divider outputs have individual PIN diode isolating switches, routed through to a common amplifier U12.

The resulting 16MHz to 1000MHz signal is passed through to the output amplifier at pin X3.

b) MIXER BAND

Output frequencies in the range 10kHz to 15.99MHz are derived by mixing a fixed 100MHz source with 100.01MHz to 115.99MHz from the divider ranges. This down converter range is located in section RD3 of the range divider.

The 100.01MHz to 115.99MHz RF input signal is routed to the mixer U300 from the output attenuator. The down converter section is switched in when required by transistors Q300 and Q301 in the +12V and +5V power rails. FET Q303 and inductor L300 form the 100MHz voltage tuned local oscillator which is phased locked to the main 10MHz crystal reference. The 100MHz signal is divided by ten with U301 and passed to the phase detector U302 which is referenced from the internal 10MHz crystal in the synthesizer. Feedback amplifier U303 completes the loop and locks the oscillator to exactly 100MHz.

The IF output from the mixer is passed through a 20MHz low pass filter comprising L303, L304, L305 and amplified by Q307.

The 10kHz to 15.99MHz signal is then passed to the output attenuator at pin X8.

c) OUTPUT CONTROL

The down converter RF switching, 10dB fixed attenuator steps and the reverse power protection relay are operated by the output control section RD4. Serial latch U400 selects which relay to operate.

All the switching for the relay coils is designed for minimum power consumption. For example, the down converter select has a series resistor R402 which is shorted out by transistor Q401 for approximately 5ms after Q400 is turned on. This peak voltage of approximately +4.0V at pin X10 ensures the relay switches correctly.

After this 5ms period transistor Q410 is turned off and the coil voltage reduces to a holding level of about +1.5V.

To protect the RF attenuator from reverse power damage a series relay is provided to isolate the attenuator. The detector diodes are located in the output attenuator and the detected level at points X21, X22 is passed to amplifier U402-A.

When the preset trip level is exceeded the output of U403-B goes high, triggering the reverse power latch U401 and operating the protection relay.

To prevent the reverse power detector self tripping on the instruments own high level output of +13dBm, the trip level is set at +6.0V. For additional protection at lower RF levels (<-3dBm) this trip level is reduced to +1.2V when gate U402-D is enabled.

8.6 OUTPUT AMPLIFIER BOARD

The combined RF signal from pin X3 of the range divider is boosted to the maximum level of +13dBm by the output amplifier which also contains the 10dB step attenuator.

For carrier frequencies of <128MHz relay RL8 is energised switching in the low pass filter comprising L4, L5, C38 and C39, thus reducing unwanted higher frequency harmonics.

An adjustable RF attenuator composed of PIN diodes D1, D2 and D3 forms the amplitude modulator and AGC level control. Amplifier U2 boosts the signal to a maximum of +13dBm output. To control the RF level in 0.1dB and 1dB steps a feedback AGC loop is utilised. The RF level is detected by schottky diode D7 and filtered by R18 and L2. Transistors Q1 and Q2 form a constant current source to provide a small forward bias current for D7 thus extending its dynamic range.

The AGC loop is completed by the error amplifier U1 whose output controls the PIN diode attenuator bias through R4. This AGC loop also acts dynamically to control the amplitude modulation depth. The combined d.c. level control voltage and amplitude modulation signal is applied to pin 2 of amplifier U1.

The RF signal is then passed through R20 to the 10dB step attenuator.

For carrier frequencies of <16MHz relay RL1 routes the RF signal to the down converter section and allows the IF signal to the attenuator through the low pass filter comprising L3, C34 and C35.

The output attenuator is arranged in sections of 10dB, 20dB, 30dB and 60dB (30dB + 30dB) switched in by relays RL2 to RL6.

Carrier levels in the range +13dBm to -2.9dBm are controlled by the fine level AGC loop with no 10dB attenuator switched in. At a carrier level of -3.0dBm the AGC loop sets the output amplifier level to +7dBm and a 10dB attenuator is switched in. This combination allows the RF level to be adjusted in a 0.1dBm steps over the entire carrier level range.

To protect the attenuator and output amplifier from excessive reverse voltage a protection relay, RL7, is incorporated. Diodes D8 to D11 detect the RF signal in the attenuator. When an excessive signal detected relay RL7 disconnects the attenuator from the instruments RF output connector.

When the instrument is switched off relay RL7 is normally in the open circuit mode thus providing additional protection.

8.7 PULSE MODULATION OPTION

When this option is fitted it is located in series with the main RF output between the output box and the front panel connector.

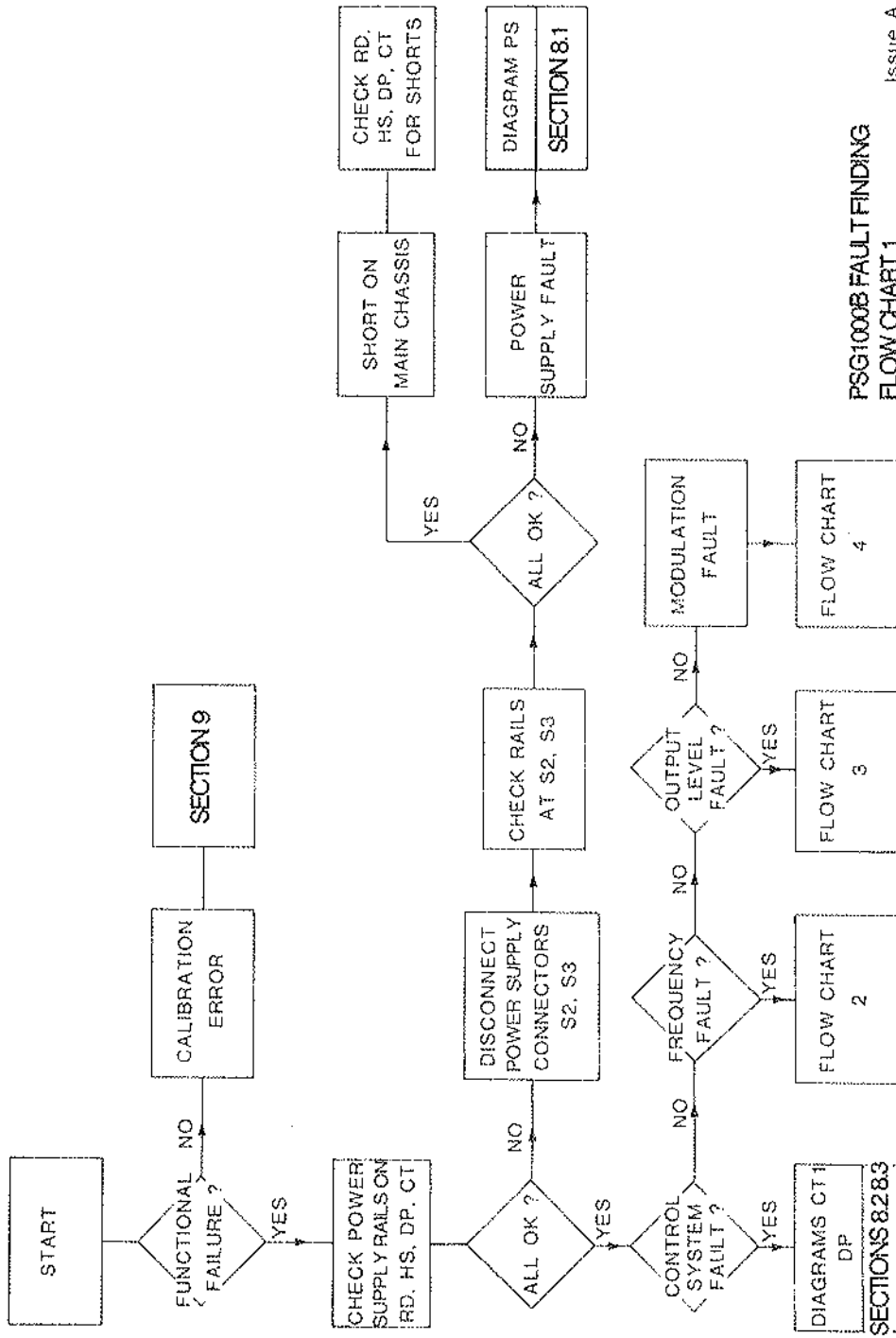
Relays RL1 and RL2 short out the pulse modulator when not required thus minimising RF level accuracy errors.

To enable the pulse modulator the pulse mod enable line is connected to +5V.

PIN diodes D3, D4, D5 and D6 form a compound series switch with high isolation and low insertion loss. In the carrier on mode, transistor Q1 is turned off allowing diodes D4 and D5 to be forward biased through R3 and R4. Simultaneously diodes D3 and D6 are reverse biased thus providing a low impedance path from RF input to RF output.

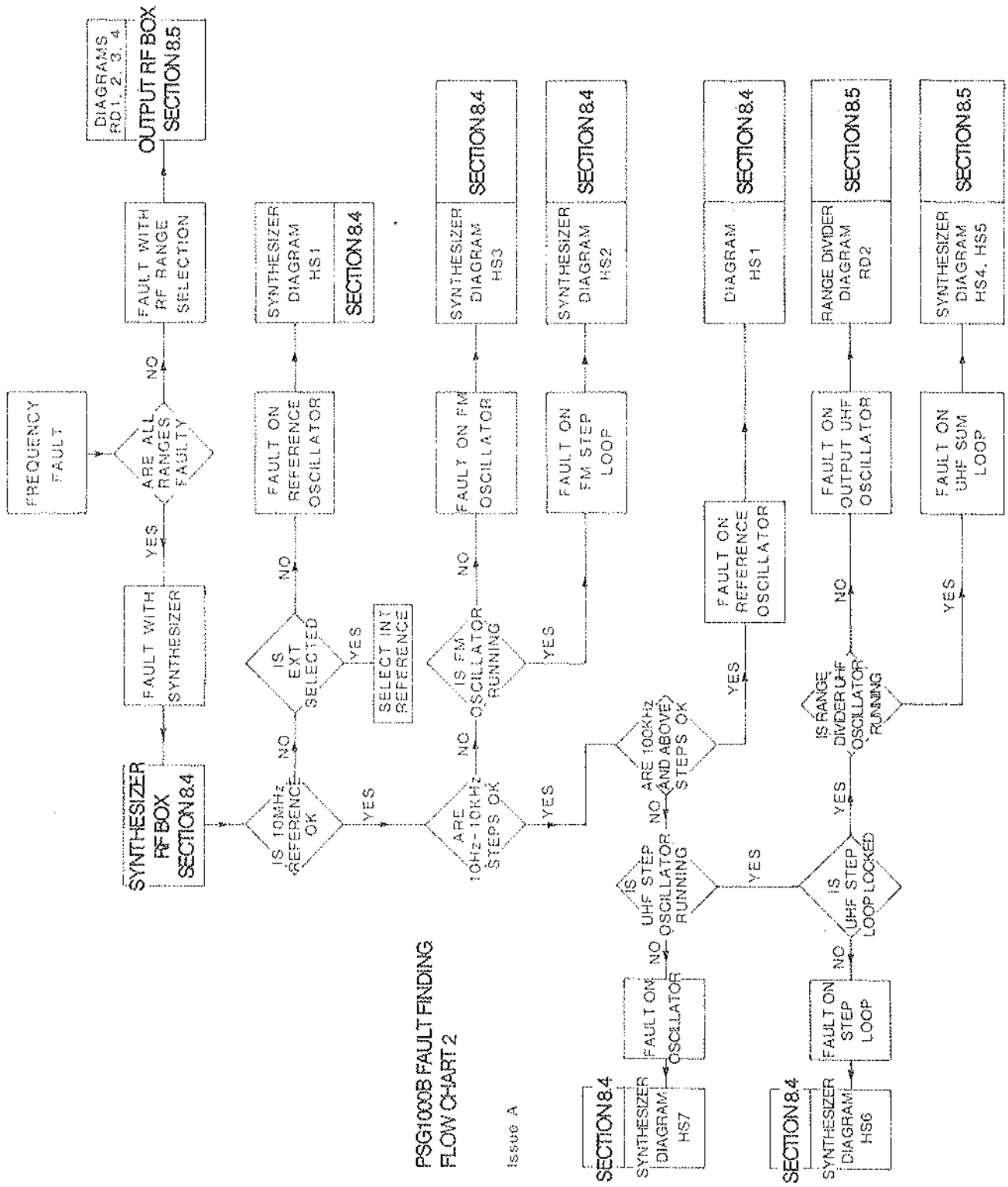
When the pulse input line is grounded (carrier off), transistor Q1 is turned on reverse biasing D4, D5 and forward biasing D3 and D6. This results in maximum attenuation between the RF input and RF output.

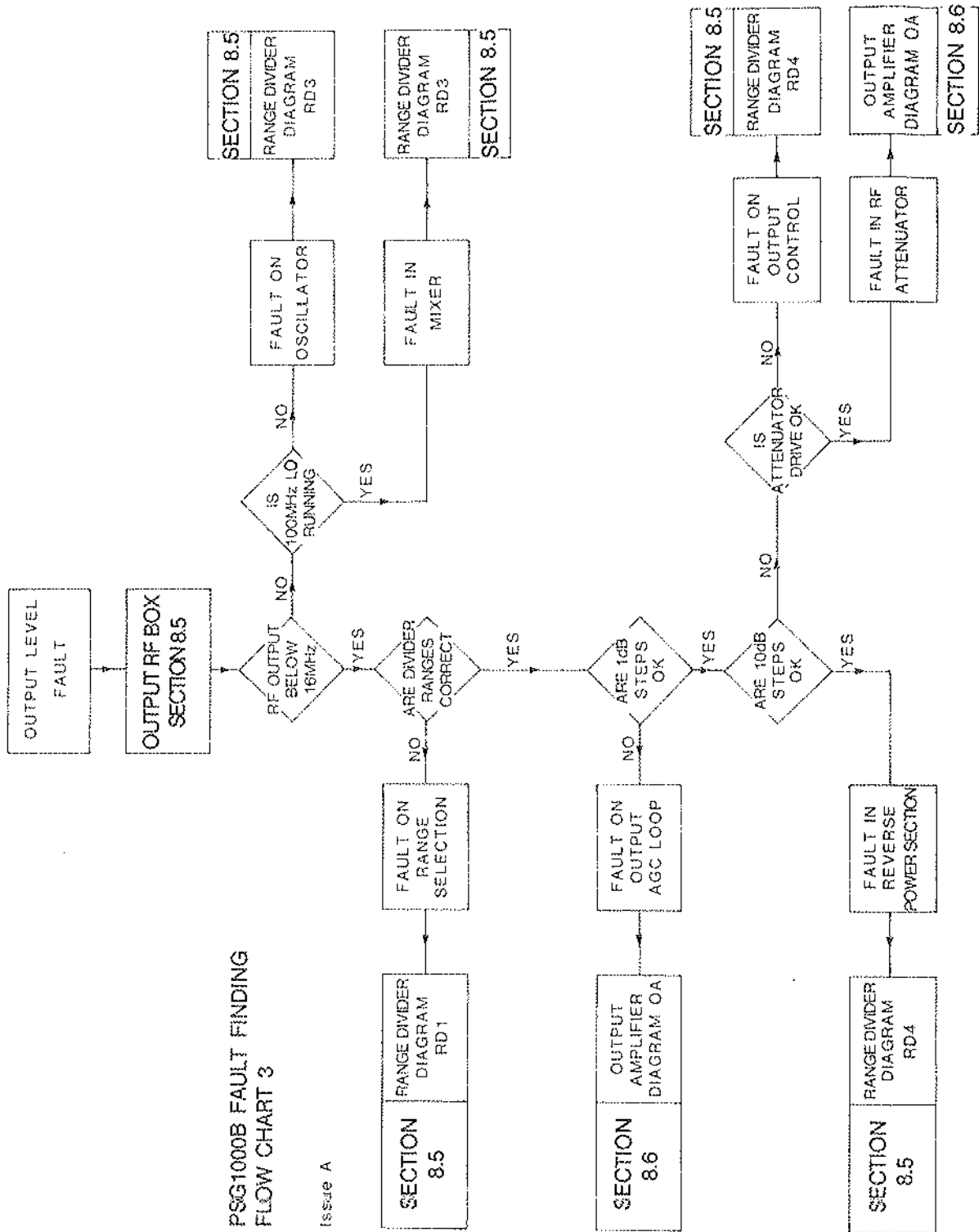
8.8 FAULT FINDING CHARTS



PSG1000B FAULT FINDING FLOW CHART 1

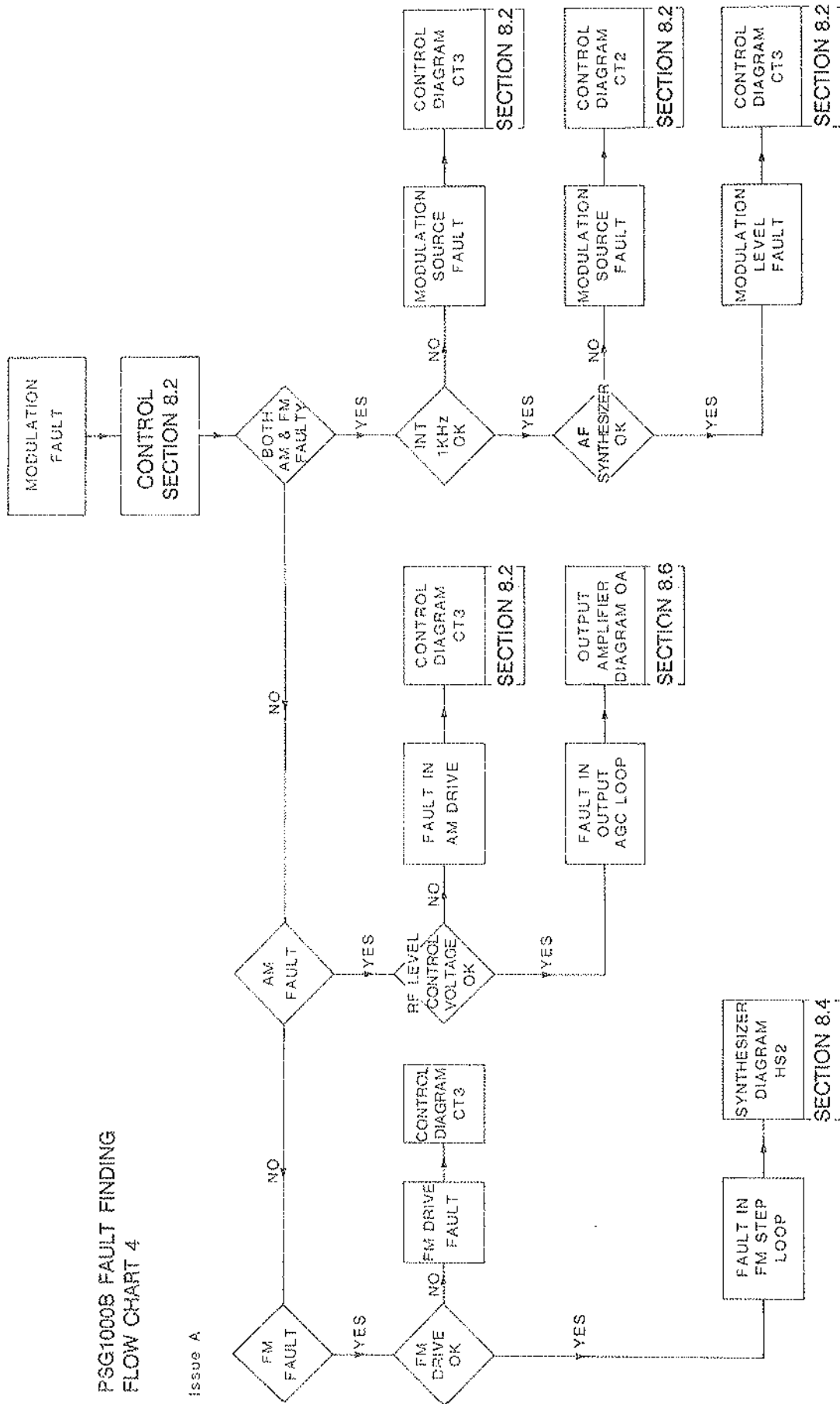
Issue A





PSG1000B FAULT FINDING
FLOW CHART 4

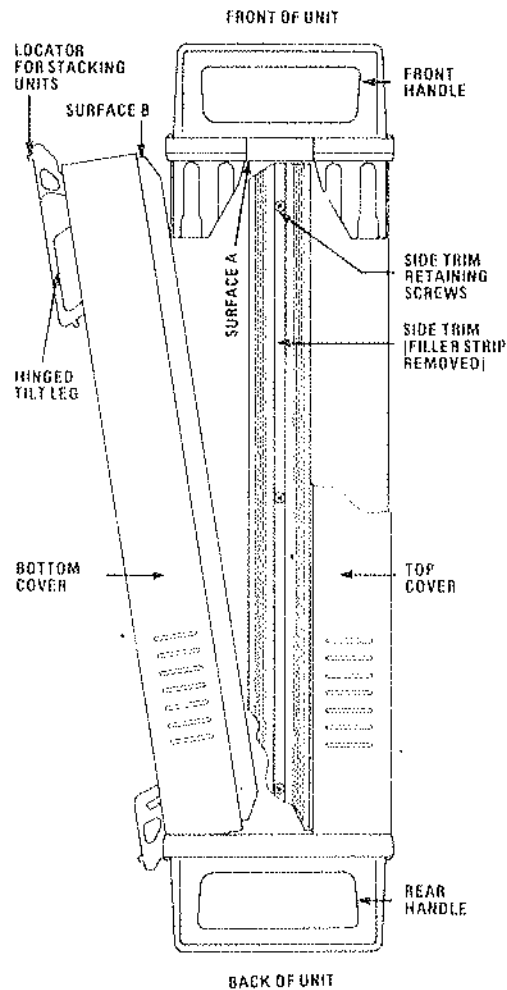
Issue A



9. CALIBRATION PROCEDURE

- 9.1 Access
- 9.2 Software upgrades
- 9.3 Test equipment
- 9.4 Audio calibration
- 9.5 Frequency calibration
- 9.6 Spectral purity
- 9.7 RF level calibration
- 9.8 AM calibration
- 9.9 FM calibration

9.1 ACCESS



TO REMOVE COVERS (FIGURE 1)

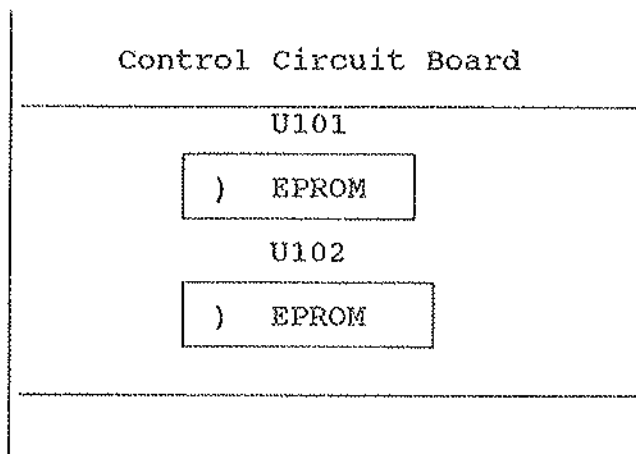
1. Prise out plastic filler strips from the side trims.
2. Remove side trim retaining screws (4 screws). Remove side trims.
3. Working from front: for each cover, slide backwards to clear recess in front handles. Widen the front to clear the front handles. Hinge cover away from the unit to just clear front handles. Then pull forwards.

9.2 SOFTWARE UPGRADES

See section 6.3 part c) for details of how to display the software version which is fitted.

WARNING Refer to the safety section at the start of this manual which details handling precautions for static sensitive parts if it is intended to change the system software.

The PSG1000B operating system software is contained in two EPROMS located on the control board which is immediately below the bottom cover of the unit.



When replacing these devices, ensure that the replacements marked U101 and U102 are fitted to the correct sockets and that the pin orientation is correct as identified by the semi-circles in the above drawing.

9.3 TEST EQUIPMENT

The following equipment is recommended for calibration of the Farnell PSG1000B. Substitutes must have equal and better specification to these instruments listed:-

Frequency standard with error not exceeding $\pm 0.1\text{ppm}$

Spectrum Analyzer, Hewlett Packard 8558B

RF Power Meter, Hewlett Packard 436A + 8482A detector head

Modulation Analyzer, Farnell AMM2000

Digital Multimeter, Solartron Schlumberger 7150

Distortion Measurement Set, Hewlett Packard 339A

9.4 AUDIO CALIBRATION

All adjustments are located on the control circuit board.

a) Select INT 1kHz. Monitor input/output BNC on front panel using a true rms voltmeter. Set P306 (1kHz LEVEL) for a level of 1.00V rms \pm 10mV rms.

Select INT 1kHz and 0.00kHz FM. Monitor pin 1 of U307 with a DVM. Set P301 (DAC OFFSET) for 0.00mV \pm 1mV.

Select SYNTH RATE at 1.00kHz. Set 99.9% AM. Set P201 (SYNTH LEVEL) for 1.00V rms \pm 10mV rms at input/output BNC.

b) Select EXT modulation and feed in a 1.00V peak (0.707V rms) 1kHz sine wave to the modulation input BNC. Set the front panel modulation level pot fully clockwise.

Set P405, P407 to mid travel. Remove 1kHz input and monitor pin 7, U403. Set P406 for 0.00V. Reconnect 1kHz input and adjust P405 for near FSD then adjust P407 for FSD.

c) Connect a source of frequency 1.5kHz and level 1V rms to the SINAD input. Monitor X401 on an oscilloscope and set P402 for 1.0V pk-pk.

With SINAD input removed, adjust P404 (SINAD OFFSET) for 0.00mV at pin 6 of U407.

Feed in a standard 25% distorted 1kHz signal to the SINAD input. Adjust P403 (SINAD CAL) for a front panel reading of 12dB. Re-check P404 adjusted as above.

Connect a 12V (24V if option A fitted) d.c. source to the power supply and monitor the d.c. volts on a DVM. With 12.0V (24.0V if option A fitted) input adjust P401 (BATTERY CAL) so the front panel battery level indication is on the red/black marker.

9.5 FREQUENCY CALIBRATION

a) Select 1GHz and monitor the RF output on a frequency counter referenced from a frequency standard.

Adjust P101 (FREQ TUNE HS1) for a reading of $1\text{GHz} \pm 100\text{Hz}$.

Fine tune the frequency using the back panel control.

b) Monitor the FM loop tuning voltage on socket X301 with a DVM.

Select 512.0MHz and adjust the core of L301 for reading of $0.0\text{V} \pm 0.2\text{V}$ on the DVM.

9.6 SPECTRAL PURITY

a) Select 512MHz and monitor the RF output on a spectrum analyzer, scan width 1MHz per division.

Adjust P401 (OFFSET ADJUST) located in section HS4 on the synthesizer C/B for minimum amplitude of the 1.25MHz reference sideband, typically -65dBc .

b) Select 256MHz and +7dBm. Monitor pin 3 of U4 on the range divider with a DVM.

Adjust P2 (FILTER TUNE) for a reading of $1.0\text{V} \pm 0.1\text{V}$.

Check the harmonic content is $< -25\text{dBc}$.

9.7 RF LEVEL CALIBRATION

a) Select 100MHz and +13.0dBm. Monitor the RF output on a power meter. Adjust P303 (RF LEVEL CAL) on the control C/B for reading of +13.0dBm.

Select -2.0dBm and adjust P2 (DETECTOR BIAS) on the output amplifier C/B for a reading of -2.0dBm. Re-check the +13.0dBm setting.

b) Select 10.0MHz and +13.0dBm. Adjust P300 (IF LEVEL) on the range divider C/B for a reading of +13.0dBm.

9.8 AM CALIBRATION

Allow the unit to warm up for 30 minutes before making adjustments.

a) Select 100MHz, +6.9dBm and 80% AM INT 1kHz. Monitor the RF output on a modulation analyzer.

Adjust P302 (AM CAL) on the control C/B for a reading of 80.0%.

b) Select -2.9dBm and adjust P1 (AF SHARPER) on the output amplifier C/B to mid travel and check the modulation distortion is less than 1%.

Check the difference between 80% AM at +6.9dBm and -2.9dBm is less than 1.0% AM. If not, slightly re-adjust P2 (DETECTOR BIAS) and re-check the RF level calibration.

9.9 FM CALIBRATION

a) Adjust P305 (FM CAL) on the control C/B to mid travel.

Monitor pin 1 of U209 on the synthesizer C/B with a DVM. Select MOD OFF and note the d.c. offset.

Deselect MOD OFF and adjust P202 (OFFSET ADJUST HS2) for the same d.c. offset as above.

b) Select 100MHz, 0dBm, INT 1kHz, 99.9kHz deviation.

Monitor the RF output on a modulation analyzer. Adjust P201 (FM CAL, HS2) for a reading of 99.9kHz.

Change frequency to 16MHz and monitor the distortion on the modulation analyzer. Adjust the core of L301 for minimum distortion (typically <3%). Recheck the FM accuracy at 100MHz, adjust if necessary.

Change the deviation setting to 5.0kHz and adjust P203 (10kHz ADJUST HS2) for a modulation analyzer reading 5.0kHz.

c) Select 450MHz, DCFM and monitor the RF output on a counter. At selected FM deviations of 5kHz and 50kHz S.O.T. R333 (on the control C/B) so that an external d.c. input of +1.00V gives the indicated peak frequency shift, $\pm 5\%$.

10. MAINTENANCE

10.1 GUARANTEE

The equipment supplied by Farnell Instruments Limited is guaranteed against defective material and faulty manufacture for a period of twelve months from the month of despatch. In the case of material or components employed in the equipment but not manufactured by us we allow the customer the period of any guarantee extended to us.

The equipment has been carefully inspected and submitted to comprehensive tests at the factory prior to despatch. If, within the guarantee period, any defect is discovered in the equipment in respect of material or workmanship and reasonably within our control, we undertake to make good the defect at our own expense subject to our standard conditions of sale. In exceptional circumstances and at the discretion of the Service Manager, a charge for labour and carrier cost incurred may be made.

Our responsibility is in all case limited to the cost of making good the defect in the equipment itself. The guarantee does not extend to third parties, nor does it apply to defects caused by abnormal conditions of working, accident, misuse, neglect or wear and tear.

10.2 MAINTENANCE

In the event of difficulty or apparent circuit malfunction, it is advisable to contact the Service Department or your local Sales Engineer or Agent (if overseas) for advice before attempting repairs.

For repairs and recalibration it is recommended that the complete instrument be returned to:-

The Service Department
Farnell Instruments Limited
Osborn House
Sandbeck Way
Wetherby
West Yorkshire
LS22 4DH
U.K.

Telephone: U.K. dialling 0937 581961
Overseas dialling +44 937 581961
Fax: U.K. dialling 0937 586907
Overseas dialling +44 937 586907
Telex: 557294 Farist G

When returning the instrument please ensure adequate care is taken with packing and arrange insurance cover against transit damage or loss. If possible re-use the original packing box, following the instructions below:-

Wrap the instrument in anti-static polythene and tape up then place into primary box ensuring the feet are next to the polystyrene supports. Wrap up accessories and instruction/service manual and place into the primary box, fit the corner blocks and place into the outer box ensuring the corner blocks are positioned correctly. Finally, seal the outer box.

11. O P T I O N S

11.1 23 TO 30V D.C. INPUT, ORDER CODE 1ERPSG1000B/A

A factory fitted option that allows the d.c. power inlet to accept a voltage of 23 to 30V d.c. rather than the standard 11.5 to 15V d.c.

11.2 RECHARGEABLE 12V 4AH ADD-ON BATTERY PACK, ORDER CODE 15B10100

For use with standard 11.5 to 15V d.c. input only. Refer to section 5.4. PSG1000B Battery Pack.

11.3 RACK MOUNTING KIT, ORDER CODE 15A20100

Refer to section 5.3. Rack Mounting.

11.4 RF OUTPUT MOVED TO BACK PANEL, ORDER CODE 1ERPSG1000B/F

A factory fitted option. The RF output fitted on the back panel, with a blanking plate fitted over the front panel connector hole.

11.5 PROTECTIVE PADDED CARRYING CASE, ORDER CODE 15A20110

This padded case with shoulder strap includes a side pocket to carry cables and connectors.

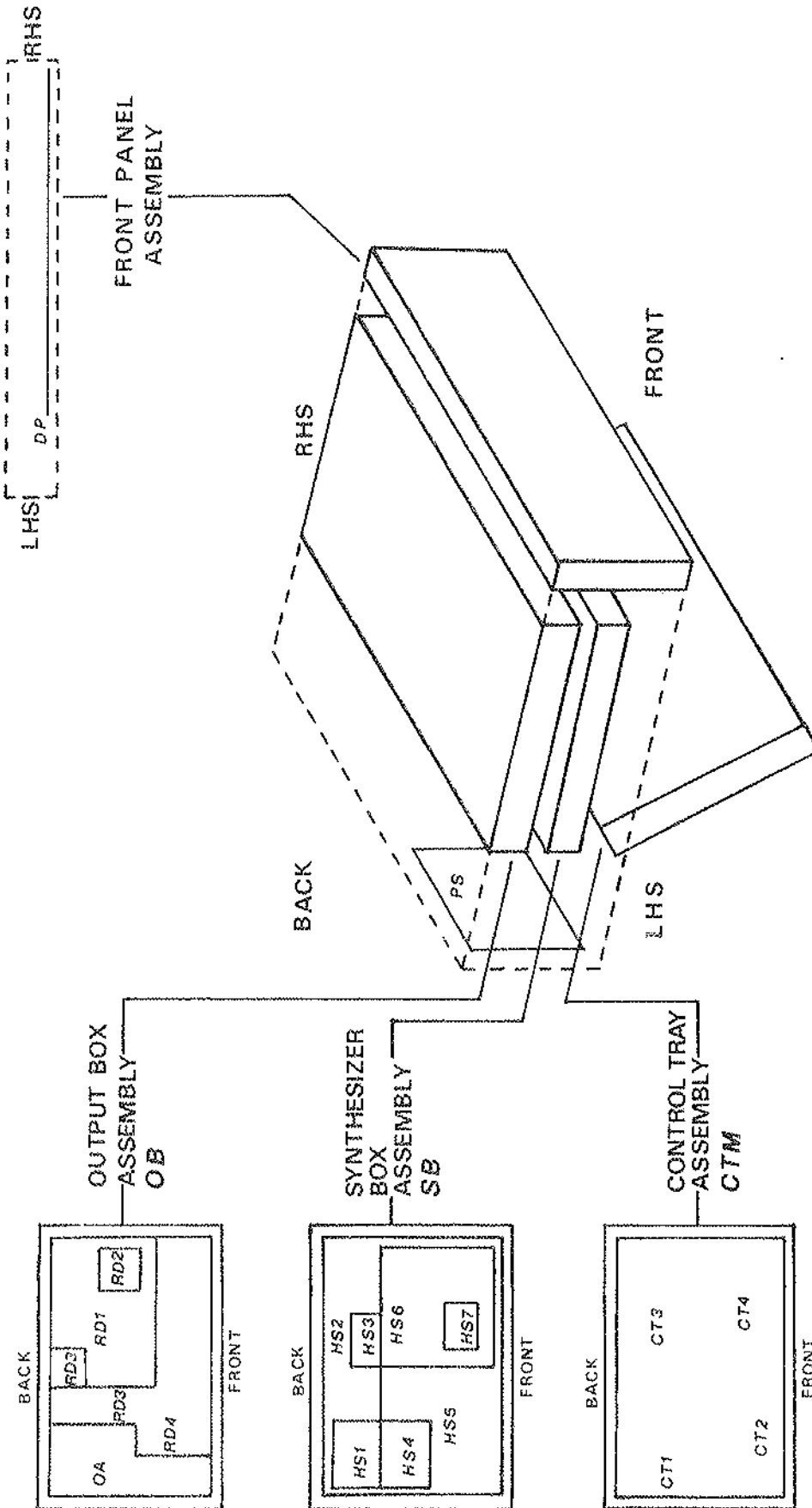
11.6 HIGH STABILITY FREQUENCY REFERENCE, ORDER CODE 1ERPSG1000B/0

A factory fitted option. Refer to section 4, SPECIFICATION.

11.7 PULSE MODULATION, ORDER CODE 1ERPSG1000B/M

A factory fitted option, in series with the RF output. Refer to section 4, SPECIFICATION.

12. LOCATION DIAGRAMS



ASSEMBLY & BOARD LOCATION
DIAGRAM 4ZU10050220 ISS-A

12.1 CONTROL TRAY ASSEMBLY CTM

The control circuit board (CT) is housed in the control tray assembly and is divided into 4 sections listed below:

Microprocessor control,	CT1
Audio synthesizer,	CT2
Modulation control,	CT3
SINAD and meter drive,	CT4

12.2 SYNTHESIZER BOX ASSEMBLY SB

The synthesizer circuit board (HS) is housed in a fully screened RF enclosure and is divided into 7 sections listed below:

10MHz reference oscillator,	HS1
FM step,	HS2
FM oscillator,	HS3
Sum integrator,	HS4
UHF sum,	HS5
UHF step,	HS6
UHF oscillator,	HS7

12.3 OUTPUT BOX ASSEMBLY OB

The range divider circuit board (RD) is also housed in a fully screened RF enclosure and is divided into 4 section listed below:

Range divider,	RD1
UHF oscillator,	RD2
Down converter,	RD3
Output control,	RD4

NB

The output amplifier, OA, is an integral part of the range divider circuit board.

13. CONNECTION LISTS

- 13.1 Power supply board (PS)
- 13.2 Control board (CT1-4)
- 13.3 Front panel board (DP)
- 13.4 Synthesizer board (HS1-7)
- 13.5 Range divider board (RD1-4)
- 13.6 Auxiliary circuit board (AX)
- 13.7 Keyboard laminate

13.1 POWER SUPPLY BOARD (PS)

CONNECTOR	TITLE	DESTINATION	
S1 -	1	+5V SECONDARY	TX1
	2	+5V SECONDARY	TX1
	3	OV	TX1
	4	+12V SECONDARY	TX1
	5	+12V SECONDARY	TX1
	6	-10V SECONDARY	TX1
	7	-10V SECONDARY	TX1
	8	NC	-
	9	NC	-
	10	RELAY COIL	RL1
	11	INVERTER	TX1
	12	INVERTER	RL1
	13	BATTERY -VE	S4
	14	INVERTER	RL1
	15	BATTERY +VE	S4
S2 -	1	+5V	RD4 S400-3
	2	+5V	HS2 S201-5
	3	OV	STAR EARTH
	4	OV	STAR EARTH
	5	+5V	DP S3-1
	6	+5V	CT1 S103-12
S3 -	1	BATTERY LEVEL	CT1 S103-6
	2	OV	STAR EARTH
	3	-10V	RD4 S400-2
	4	-10V	HS2 S201-4
	5	-10V	CT3 S302-7
	6	SECONDARY SENSE	CT1 S103-11
	7	+12V	RD4 S400-1
	8	+12V	HS2 S201-3
	9	+12V	CT3 S302-9
	10	OV	STAR EARTH

13.2 CONTROL BOARD (CT1, 2, 3, 4)

CONNECTOR	TITLE	DESTINATION
S101	20 WAY RIBBON CABLE	DP S2
S102	24 WAY RIBBON CABLE	BACK PANEL IEEE SOCKET
S103-1	NC	-
2	NC	-
3	NC	-
4	NC	-
5	SWEEP SYNC	BACK PANEL
6	BATTERY STATE	PS S3-1
7	NC	-
8	NC	-
9	NC	-
10	NC	-
11	SECONDARY SENSE	PS S3-6
12	+5V	PS S2-6
S301-1	NC	-
2	METER DRIVE	DP S4-2
3	+12V	DP S4-3
4	SCREEN	DP S4-4
5	LEVEL POT WIPER	DP S4-5
6	SCREEN	DP S4-6
7	LEVEL POT	DP S4-7
8	MODULATION INPUT/OUTPUT	DP S4-8
9	SCREEN	DP S4-9
10	SINAD INPUT	DP S4-10
11	SCREEN	DP S4-11
12	CLICK RELAY	DP S4-12
S302-1	NC	-
2	OUTPUT ENABLE EN2	RD4 S400-7
3	OUTPUT CLOCK	RD4 S400-6
4	OUTPUT DATA	RD4 S401-8
5	SCREEN	OB
6	AM DRIVE	RD4 S400-9
7	-10V	PS S3-5
8	OV	STAR EARTH
9	+12V	PS S3-9
10	NC	-
11	SYNTHESIZER CLOCK	HS2 S201-6
12	SYNTHESIZER DATA	HS2 S201-7
13	SYNTHESIZER ENABLE EN1	HS2 S201-10
14	SYNTHESIZER ENABLE ENO	HS2 S201-8
15	FM DRIVE	HS2 S201-9
16	SCREEN	SB

13.3 FRONT PANEL BOARD (DP)

CONNECTOR	TITLE	DESTINATION
S1	14 WAY RIBBON CABLE	MEMBRANE FRONT PANEL
S2	20 WAY RIBBON CABLE	CT1 S101
S3 - 1	+5V	PS S2-5
2	OV	STAR EARTH
S4 - 1	NC	-
2	METER DRIVE	CT4 S301-2
3	+12V	CT3 S301-3
4	SCREEN	CT3 S301-4
5	LEVEL POT WIPER	CT3 S301-5
6	SCREEN	CT3 S301-6
7	LEVEL POT	CT3 S301-7
8	MODULATION INPUT/OUTPUT	CT3 S301-8
9	SCREEN	CT3 S301-9
10	SINAD INPUT	CT4 S301-10
11	SCREEN	CT4 S301-11
12	CLICK RELAY	CT1 S301-12
X1	METER DRIVE	FRONT PANEL METER
X2	OV	FRONT PANEL METER
X3	MODULATION INPUT/OUTPUT	FRONT PANEL BNC

13.4 SYNTHESIZER BOARD (HS1-7)

CONNECTOR	TITLE	DESTINATION
S201-1	10MHz FINE TUNE	BACK PANEL
2	NC	-
3	+12V	PS S3-8
4	-10V	PS S3-4
5	+5V	PS S2-2
6	SYNTHESIZER CLOCK	CT1 S302-11
7	SYNTHESIZER DATA	CT1 S302-12
8	SYNTHESIZER ENABLE ENO	CT1 S302-14
9	FM DRIVE	CT3 S302-15
10	SYNTHESIZER ENABLE EN1	CT1 S302-13
X103	10MHz REFERENCE	RD3 X41
X104	10MHz REFERENCE (INPUT/OUTPUT)	BACK PANEL BNC
X405	UHF OSCILLATOR TUNE	RD1 X1
X505	UHF SIGNAL	RD1 X2

13.5 RANGE DIVIDER BOARD (RD1 - 4)

CONNECTOR	TITLE	DESTINATION
S400-1	+12V	PS S3-7
2	-10V	PS S3-3
3	+5V	PS S2-1
4	NC	-
5	NC	-
6	OUTPUT CLOCK	CT1 S302-3
7	OUTPUT ENABLE EN2	CT1 S302-2
8	OUTPUT DATA	CT3 S302-4
9	AM DRIVE	CT3 S302-6
10	NC	-
X1	TUNING INPUT	HS5 X505
X2	UHF SIGNAL	HS4 X405
X4	10MHz REFERENCE	HS1 X103
X3	RF INPUT	OA
X8	DOWN CONVERTER RF OUTPUT	OA
X9	DOWN CONVERTER RF INPUT	OA
X10	DOWN CONVERTER RF SELECT	OA
X11	30dB SELECT	OA
X12	30dB SELECT	OA
X13	30dB SELECT	OA
X14	20dB SELECT	OA
X15	10dB SELECT	OA
X16	REVERSE POWER SELECT	OA
X17	AM DRIVE	OA
X19	FILTER SELECT	OA
X21	REVERSE POWER DETECT -VE	OA
X22	REVERSE POWER DETECT +VE	OA
X23	+12V	OA
X24	-10V	OA

13.6 AUXILIARY CIRCUIT BOARD (AX) (LOCATED ON BACK PANEL)

CONNECTOR	TITLE	DESTINATION
S1 - 1	NC	-
2	NC	-
3	10MHZ FINE TUNE	HS2 S201-1
4	OV	STAR EARTH
5	+5V	POWER SUPPLY
6	PULSE MOD ENABLE	PULSE MODULATOR - OPTION
7	PULSE INPUT	PULSE MODULATOR - OPTION
8	OV	PULSE MODULATOR - OPTION
9	SWEEP SYNC	CT1 S103-5
10	NC	-
11	NC	-
12	NC	-

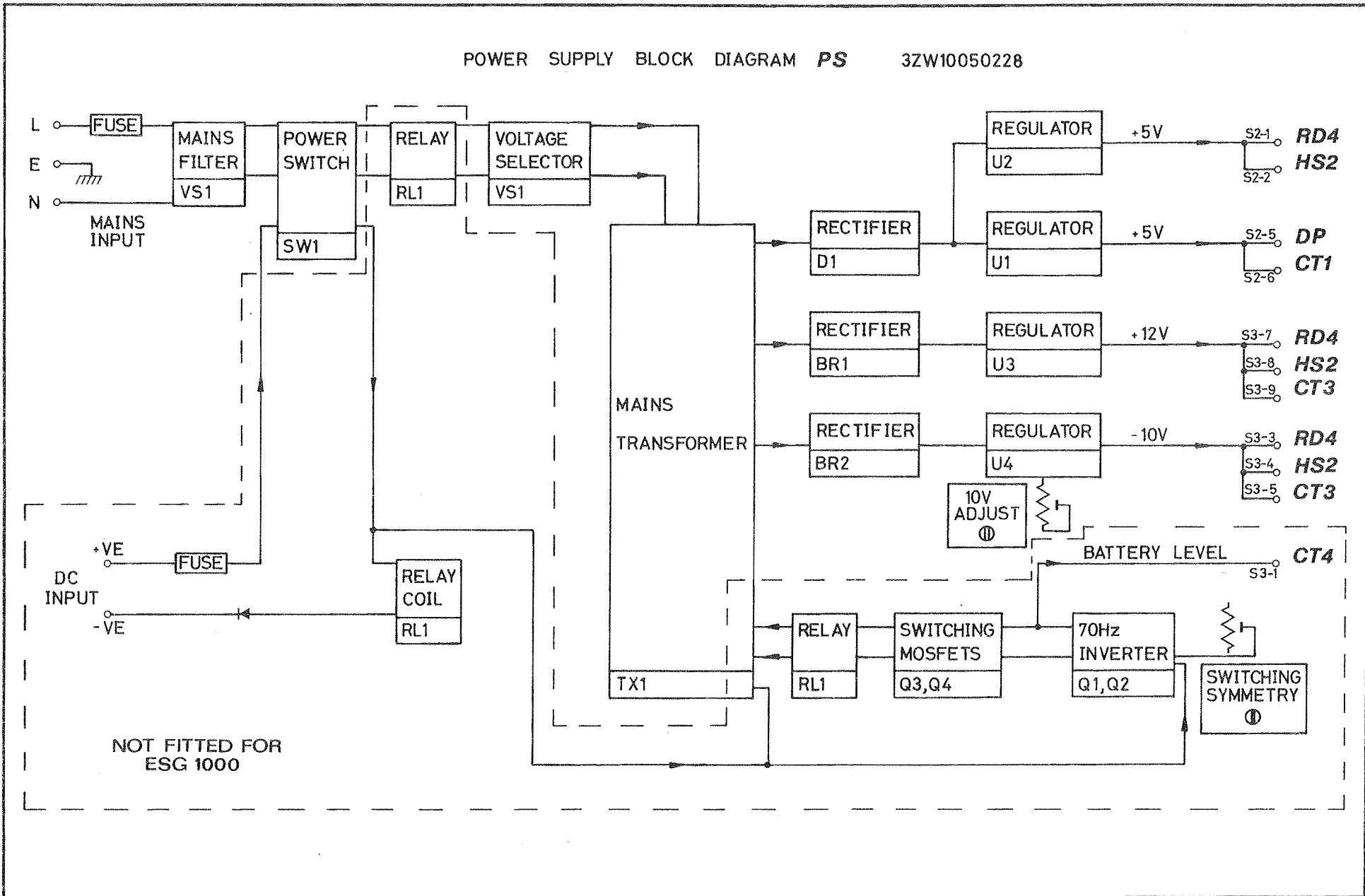
BACK PANEL AUXILIARY CONNECTIONS

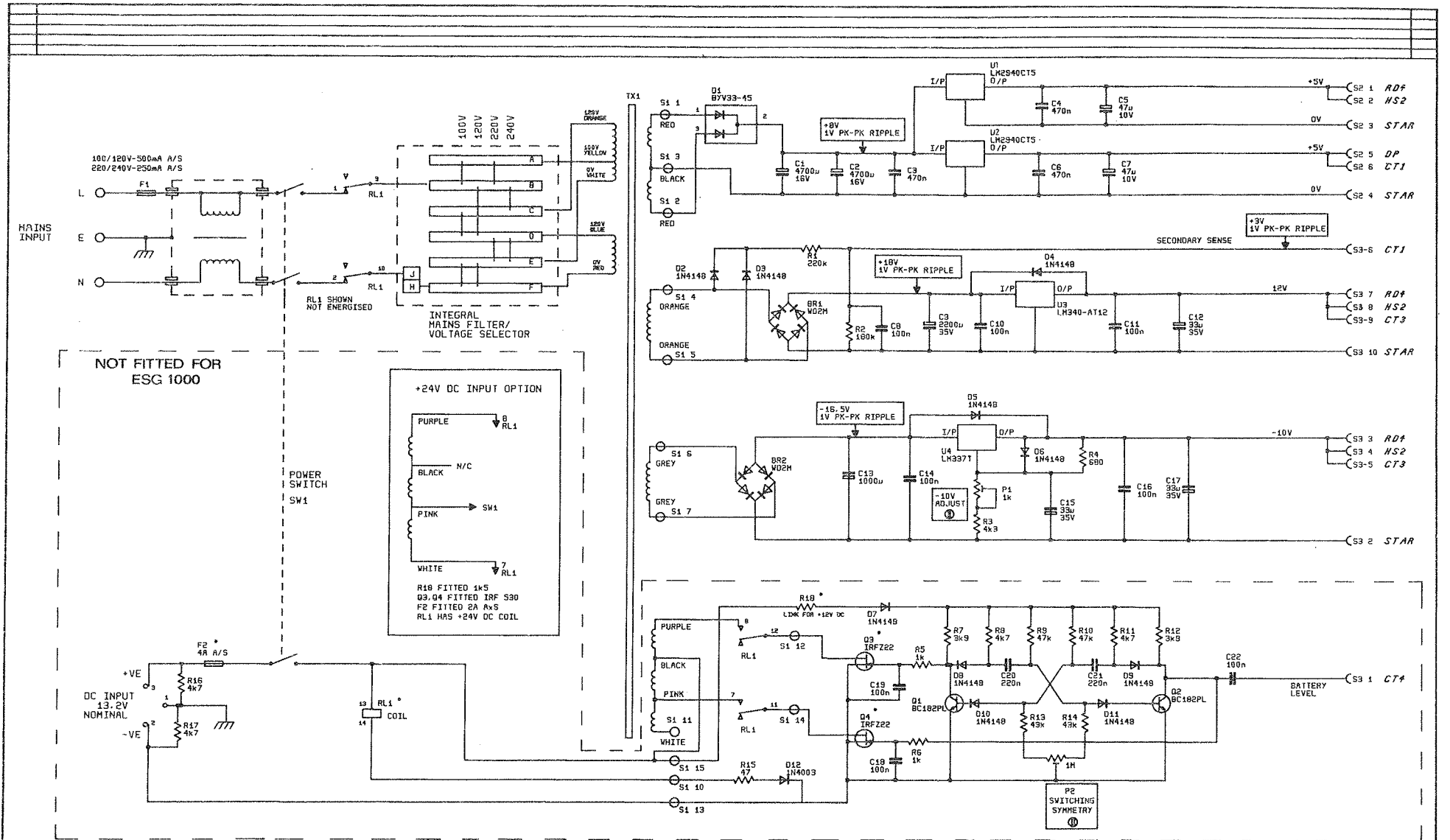
S3 -1	+5V	LINK TO	ONLY PRESENT
2	PULSE MOD	ENABLE	FOR PULSE MODULATION
3	PULSE INPUT		OPTION
4	OV		
5	SWEEP SYNC		
6	NC		

14. C I R C U I T D I A G R A M S

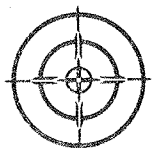
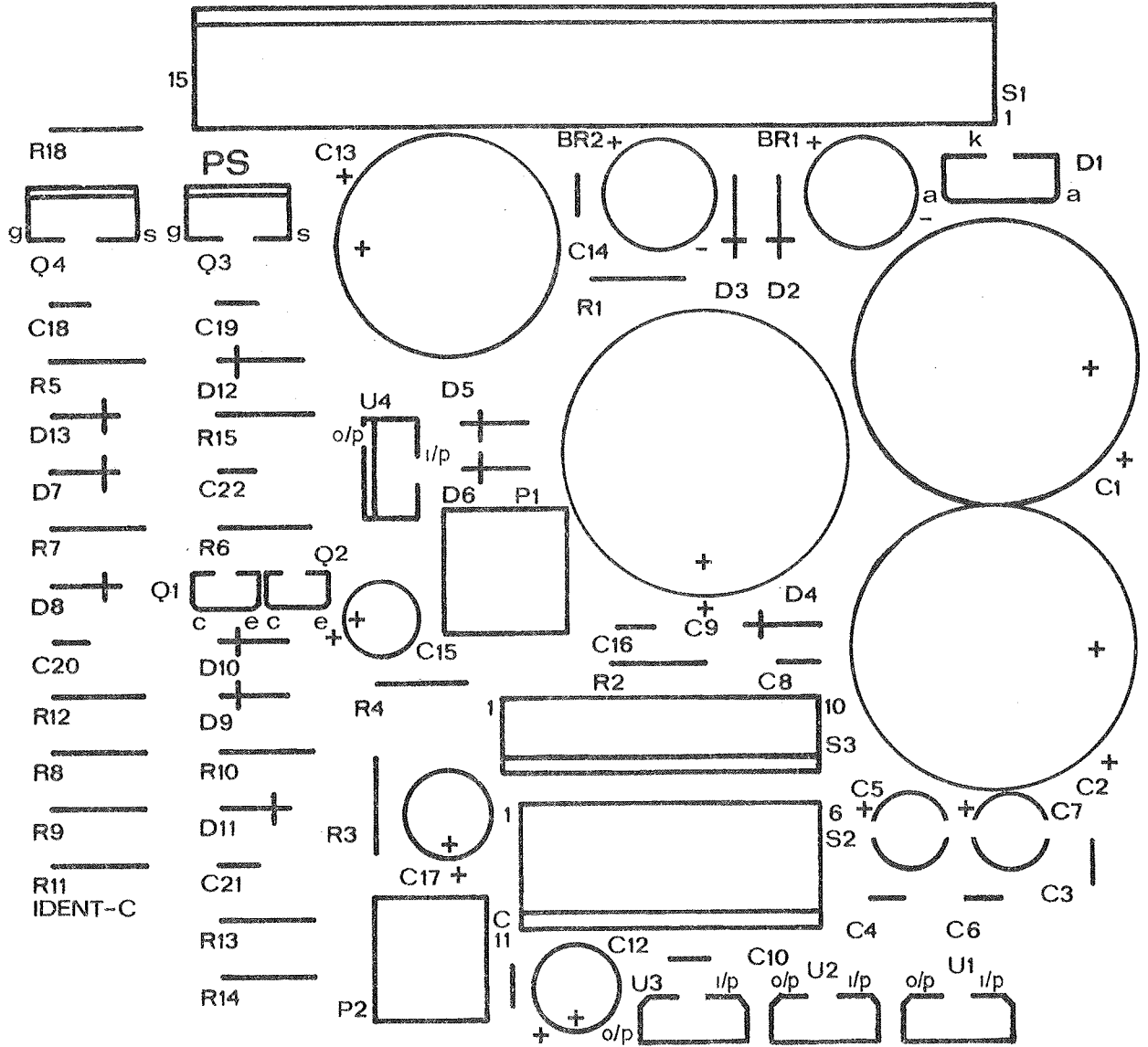
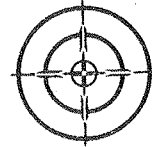
DESCRIPTION	BLOCK DIAGRAM	CIRCUIT DIAGRAM	PCB IDENT	PAGE
POWER SUPPLY	3ZW10050228	CZX10050201	BC10353	14-2
CONTROL	RZW10050229	SZX0796 SHT 1	BC17313	14-5
	RZW10050230	SZX0796 SHT 2		14-8
	RXW10050231	SZX0796 SHT 3		14-10
	CZW10050227	SZX0796 SHT 4		14-12
FRONT PANEL	RZW10050233	2SZX0790	BC17273	14-14
SYNTHESIZER	RZW10050232	RSZX0322	BC10403	14-17
RANGE DIVIDER	3ZW10050223	CZX10050202 SHT 1	BC10373	14-20
	4ZW10050224	CZX10050202 SHT 2		14-23
	CZW10050225	CZW10050202 SHT 3		14-25
OUTPUT AMPLIFIER	CZW10050226	2SZX0867	37DKK10383A	14-27
AUXILIARY	-	3ZX10050207	BC10943	14-30
PULSE MODULATOR	-	3ZX10051201	-	14-32
RECHARGEABLE 12V BATTERY	-	3ZX10059100	-	14-33
23-30V DC INPUT	-	4ML10052002	-	14-34
RACK MOUNTING	-	UK10053	-	14-35
HIGH STABILITY REFERENCE	-	4ML17PSG1000	-	14-36

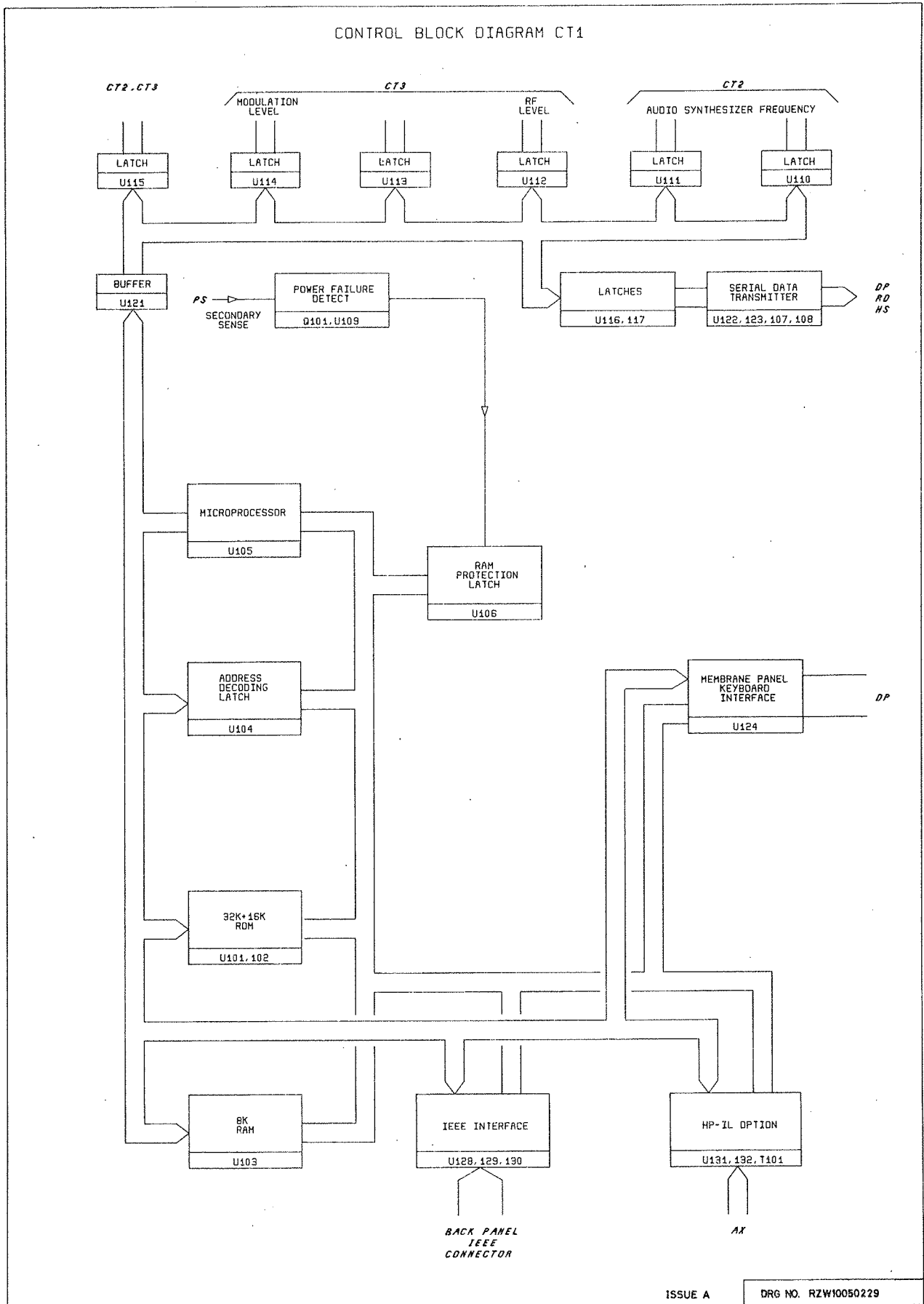
POWER SUPPLY BLOCK DIAGRAM PS 3ZW10050228

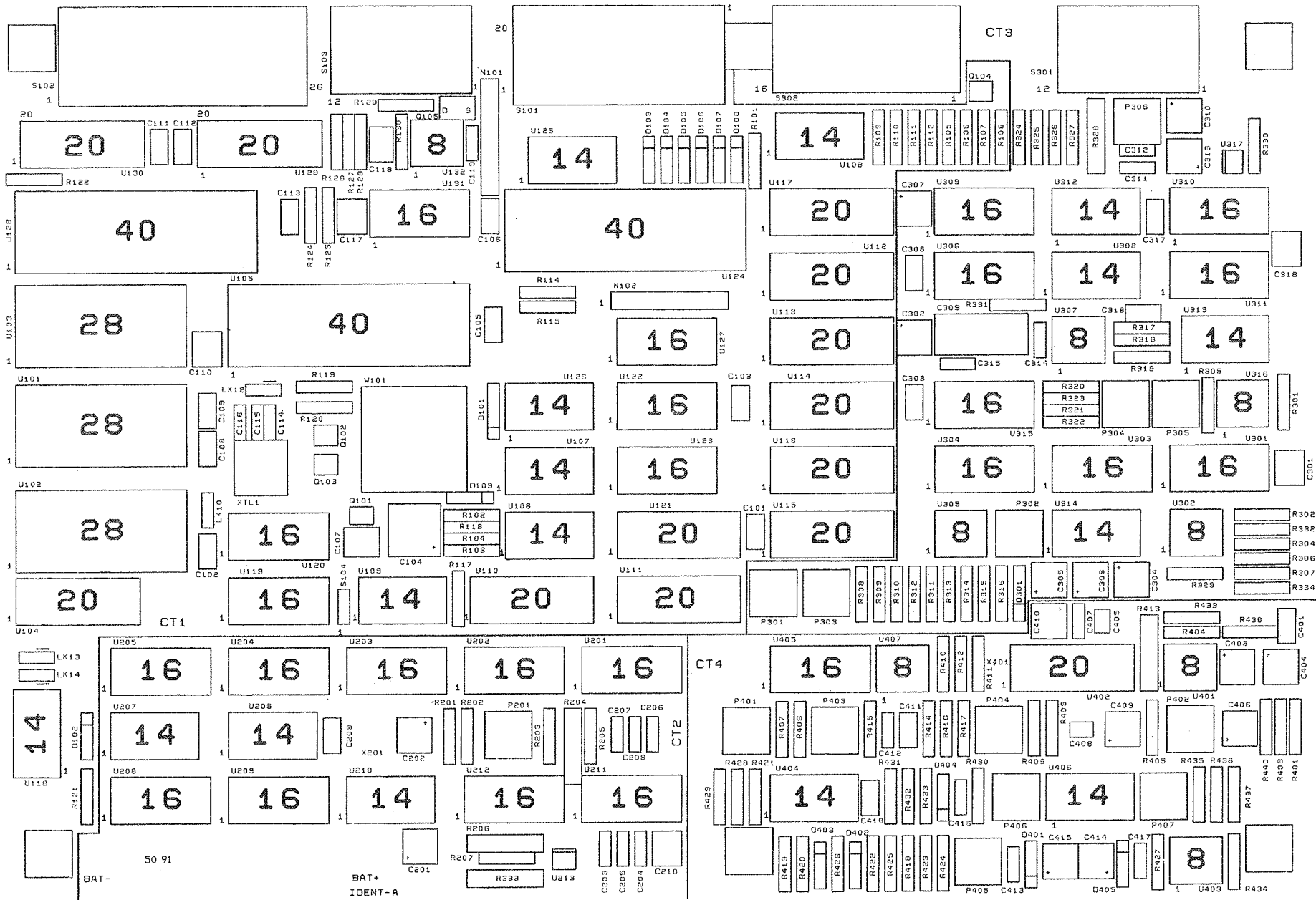




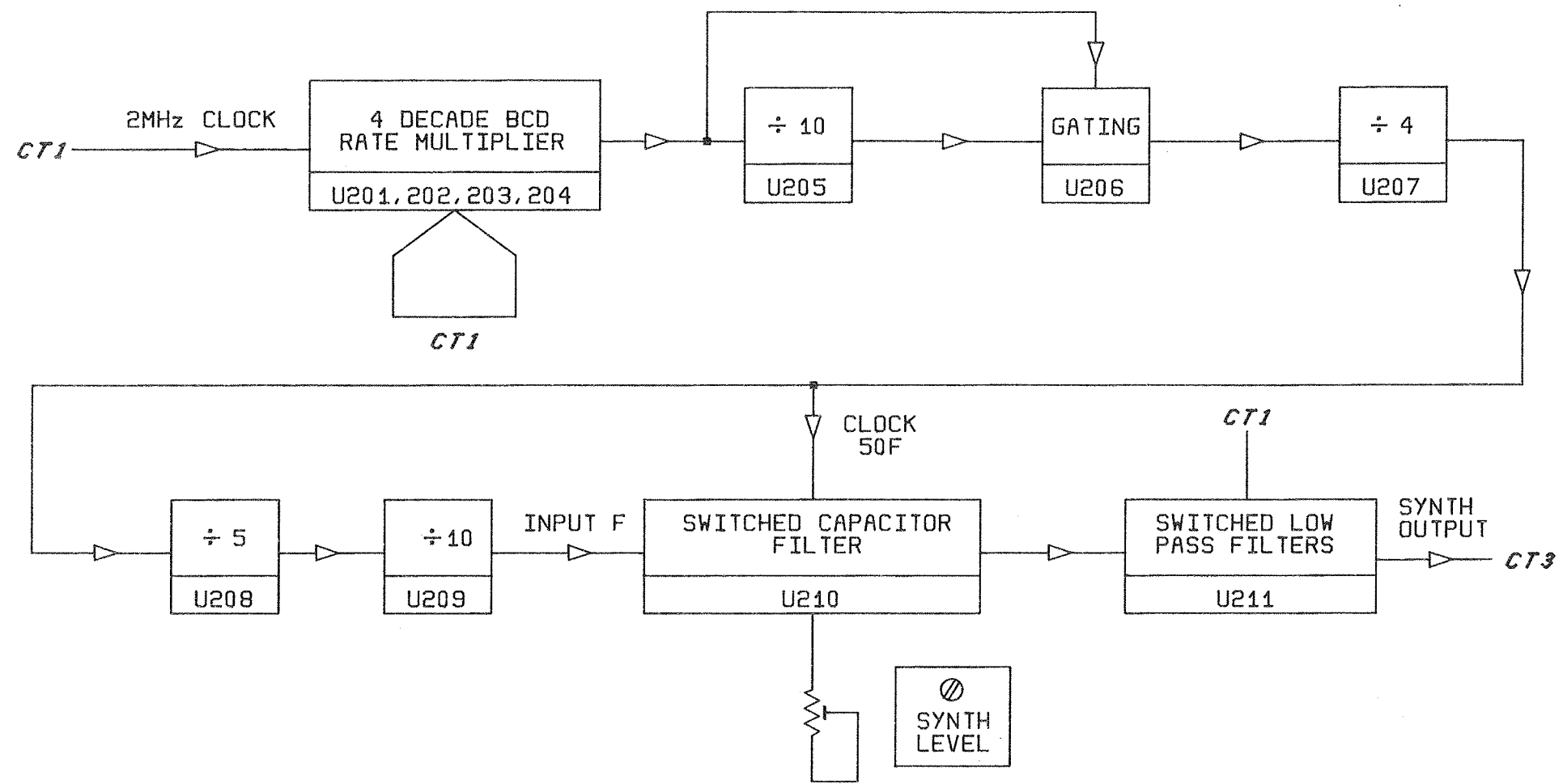
REV	A	B
001	17/4/88	18/1/87
002		
003		
004		
005	J.C.	H.D.





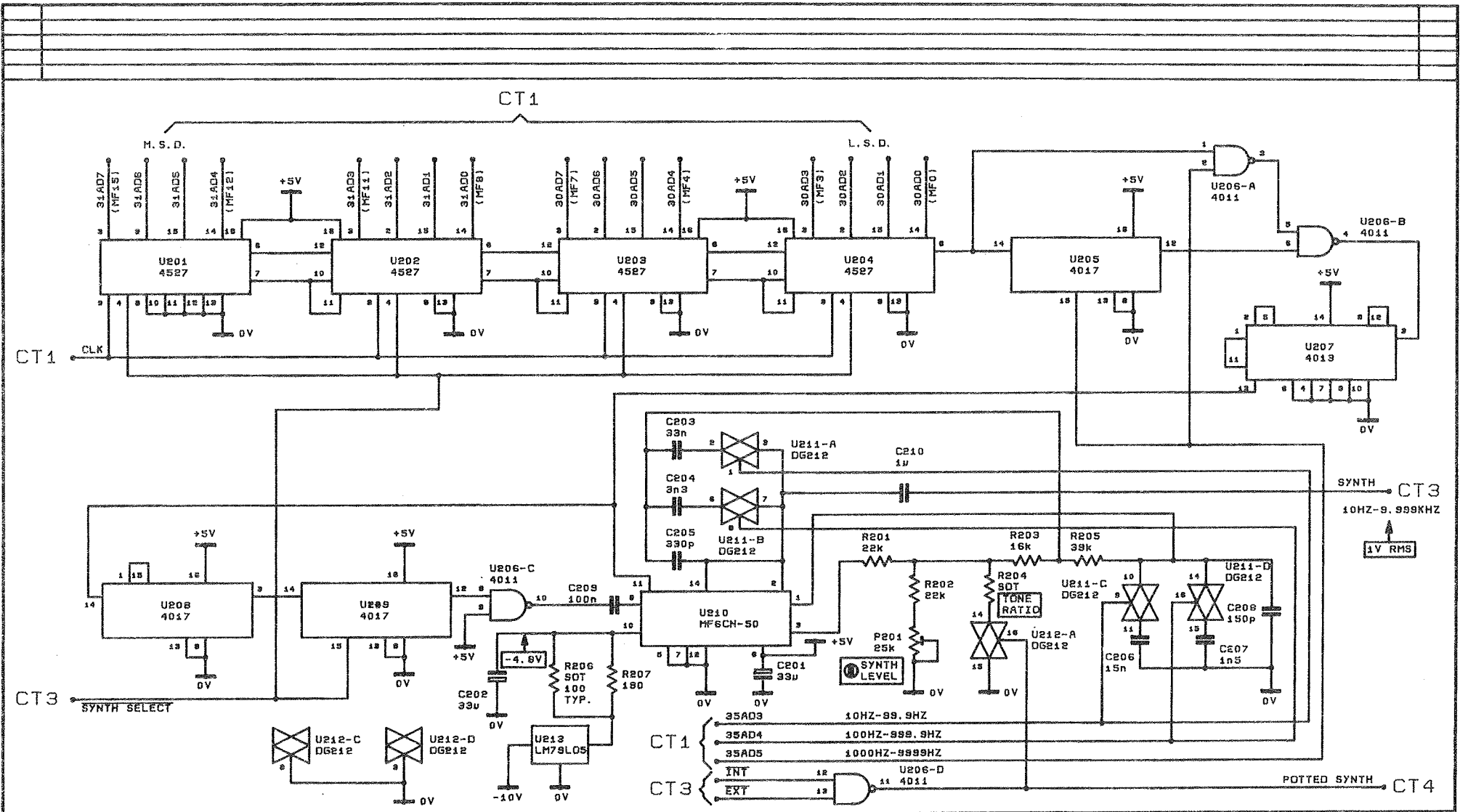


AUDIO SYNTHESIZER CT2 BLOCK DIAGRAM



ISSUE A

DRG NO. RZW10050230



DESIGN	A								
DATE	2/8/81								
REV. NO.	-								
CHK'D BY	SD								
APP'D BY	JEC								

PSG1000B

ALL CAPACITOR VALUES IN P.
ALL RESISTOR VALUES IN OHMS.

WELDED APPROVED STAMP

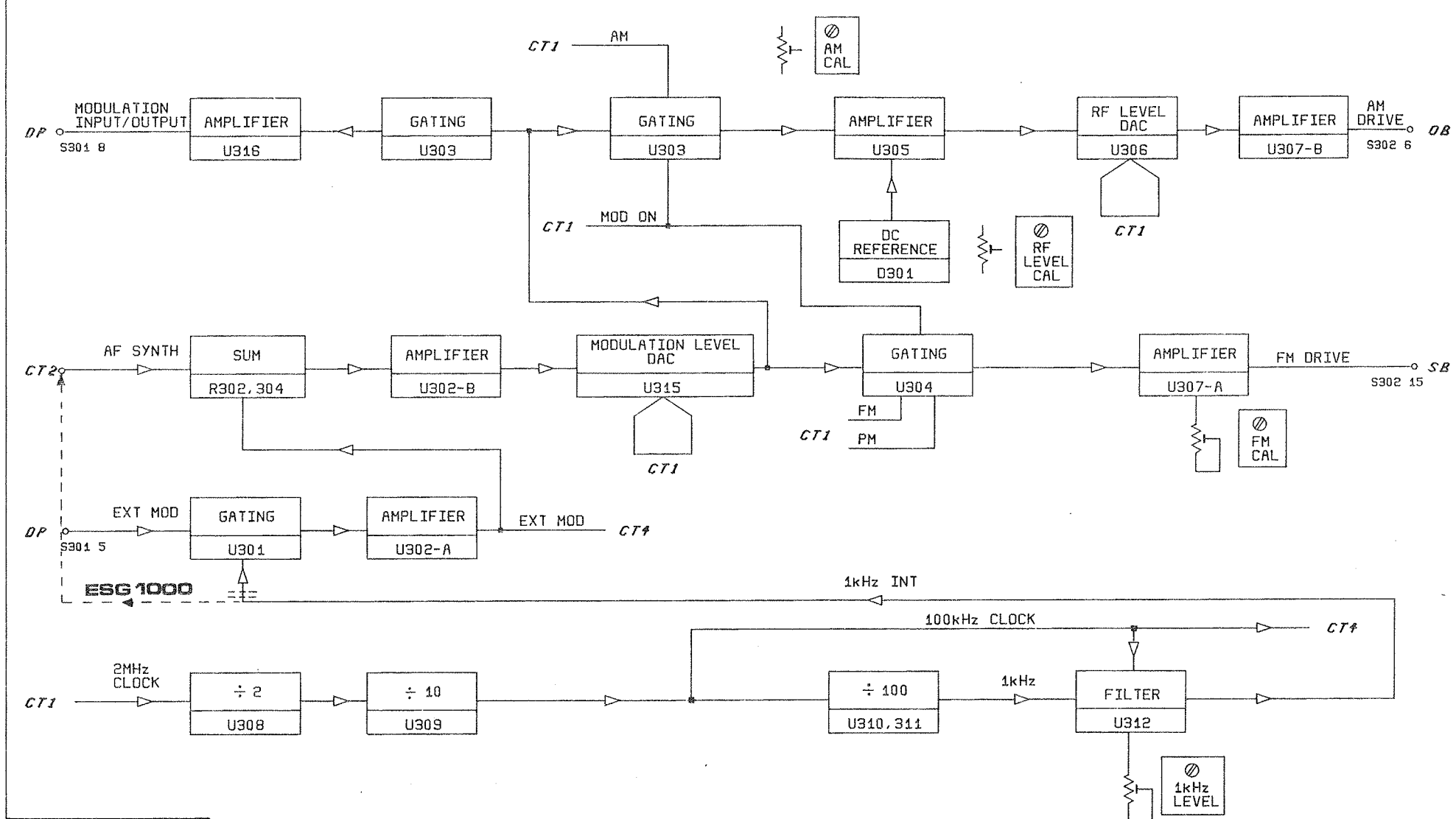
FARNELL INSTRUMENTS LTD. SANDBECK WAY, WETHERBY, YORKS. LS22 4JH

TITLE: CONTROL BOARD CIRCUIT DIAGRAM
CT2 AUDIO SYNTHESIZER

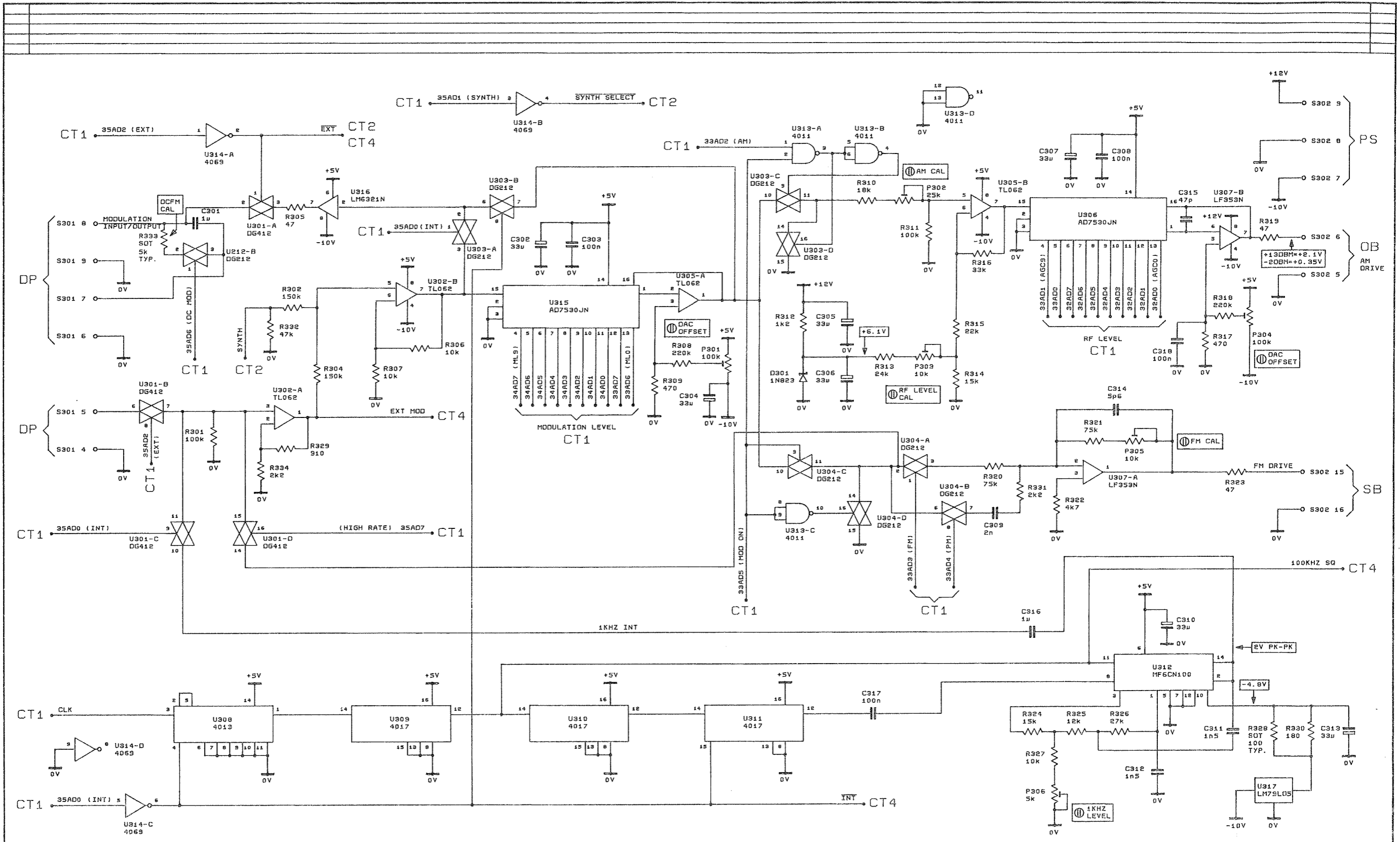
REVISION NO. 3SZX0796

SHEET 2 OF 4 SHEETS

MODULATION CONTROL CT3 BLOCK DIAGRAM



DRG NO. RZW10050231 ISSUE A

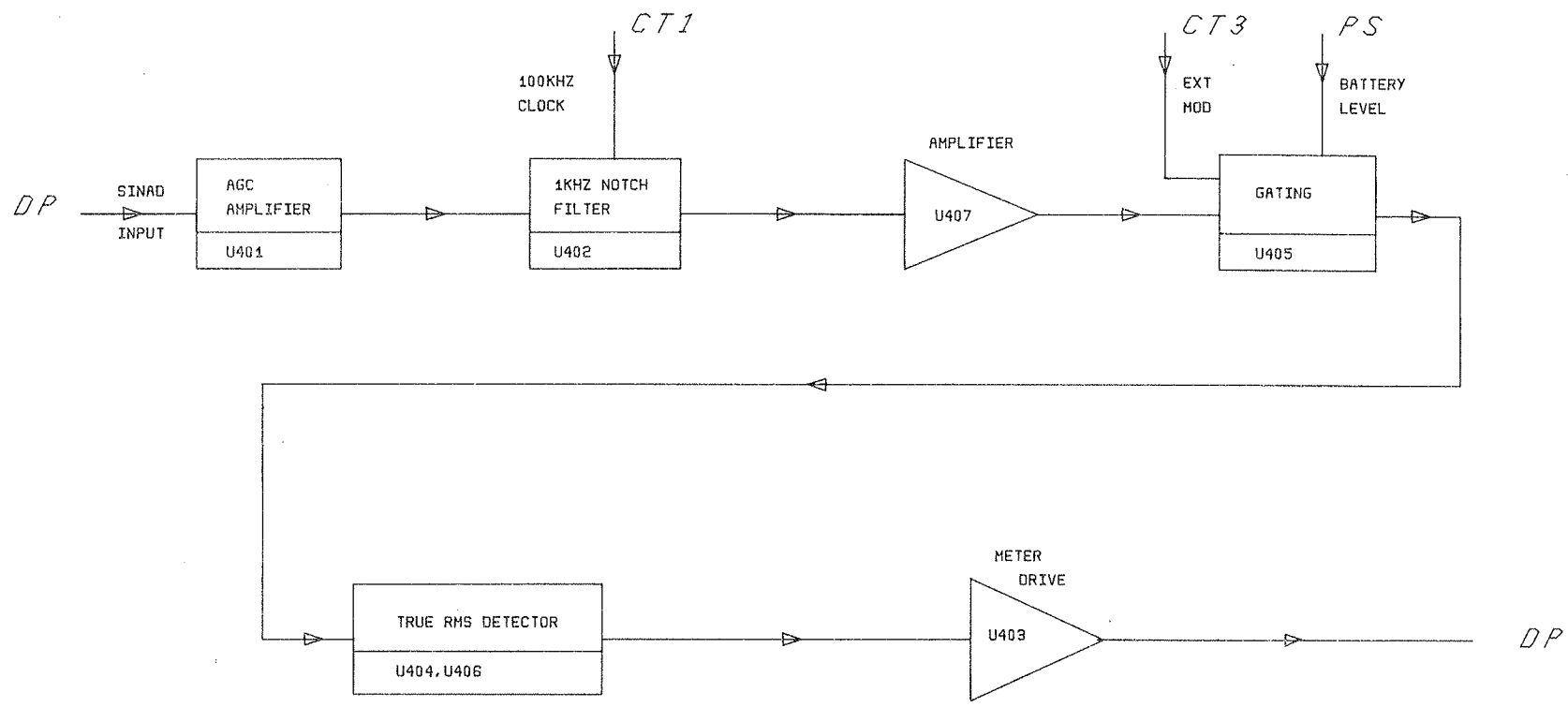


ISS					
DATE	2/3/91				
PROJ. NO.					
CHK'D	SD				
NAME	JEC				

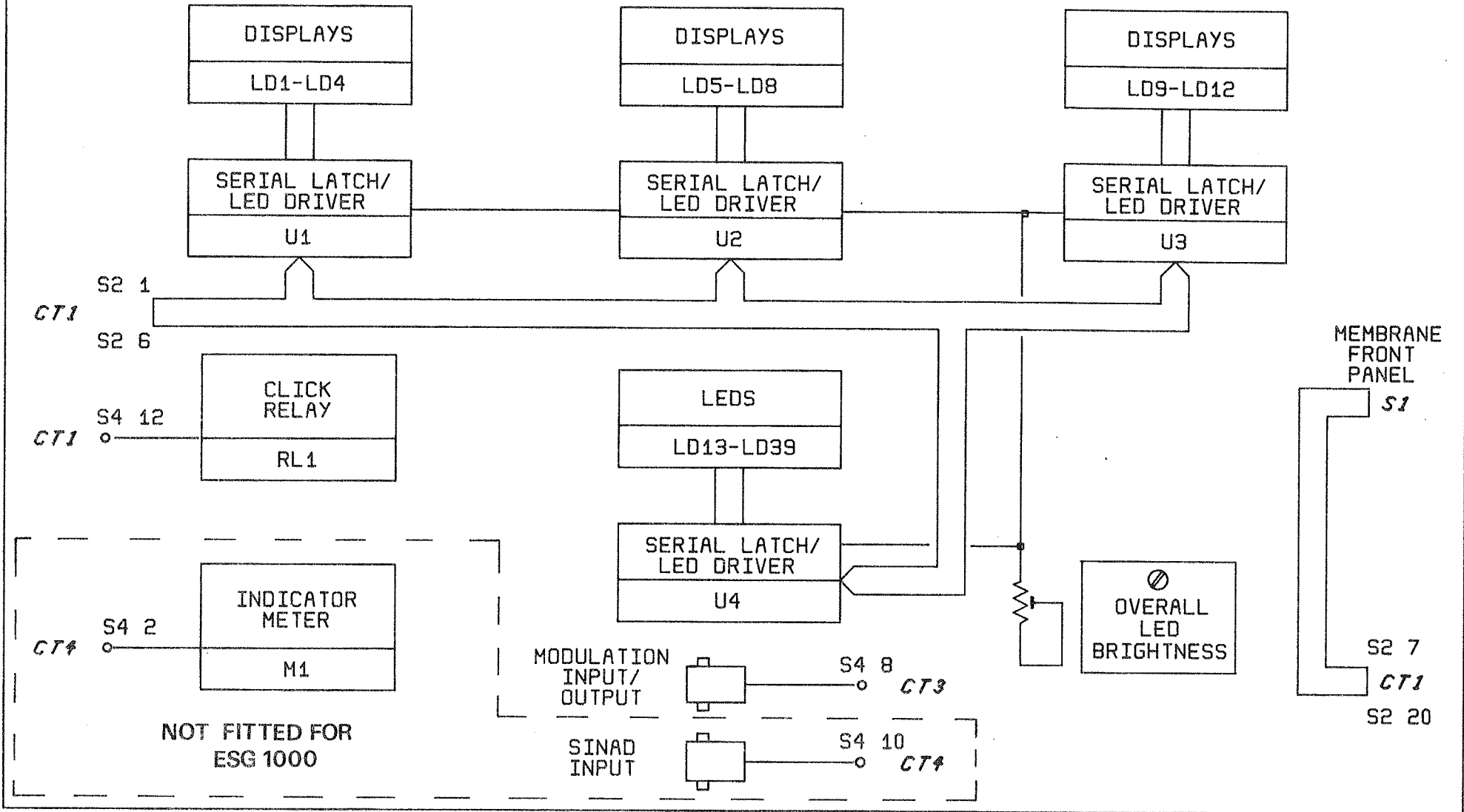
USED ON:
PSG1000B

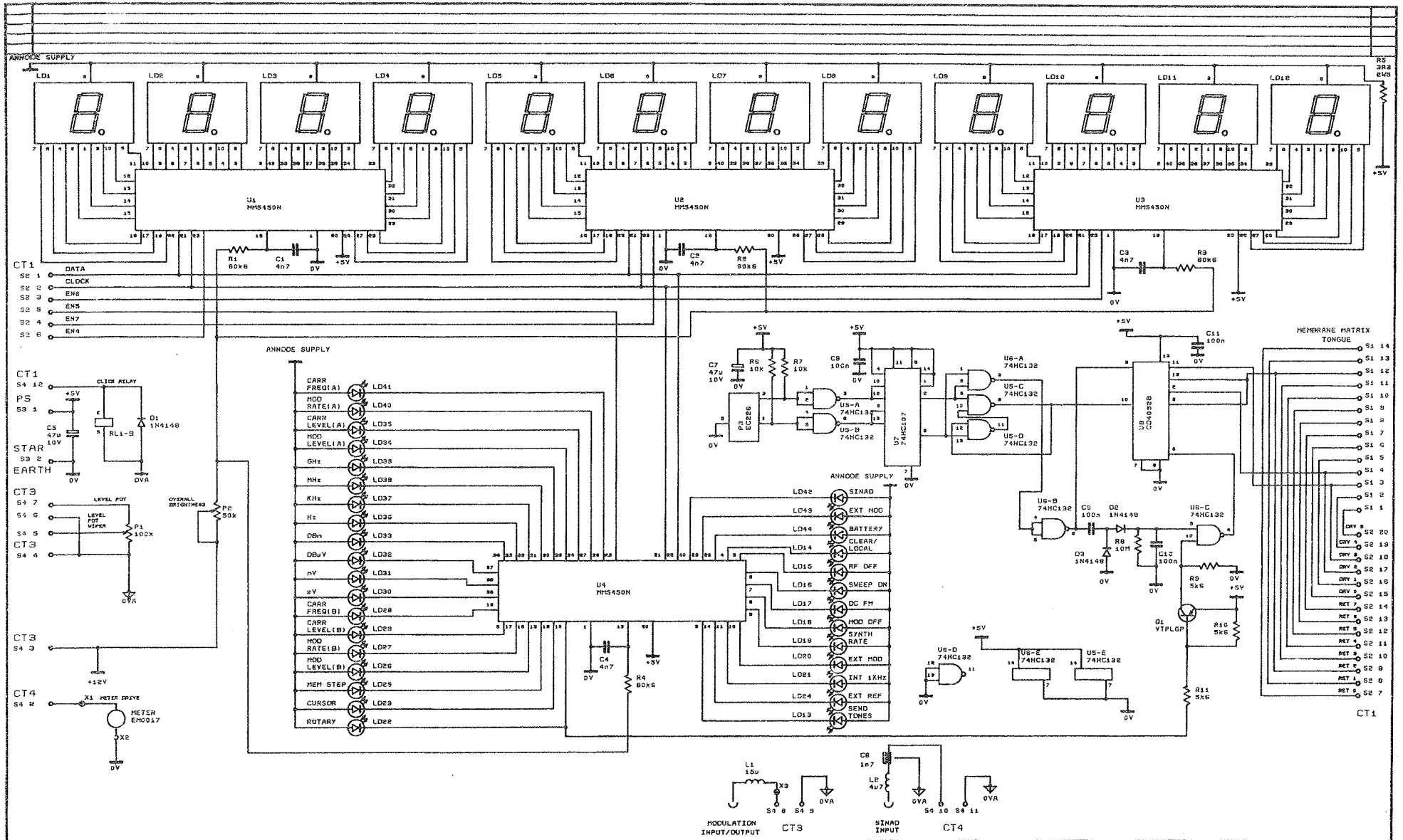
NOTES:
ALL CAPACITOR VALUES IN F.
ALL RESISTOR VALUES IN OHMS.
UNLESS OTHERWISE STATED

FARNELL INSTRUMENTS LTD., SANDBECK WAY, WETHERBY, YORKS. LS22 4DH
 TITLE CONTROL BOARD CIRCUIT DIAGRAM
 CT3 MODULATION CONTROL
 DRAWING NO. 2SZX0796
 SHEET 3 OF 4 SHEETS



DISPLAY BLOCK DIAGRAM DP





REV	A	B			
DATE	1-1-84	10-11-81			
DESIGN NO.					
REVISED BY	SD				
DATE	ST	ST			

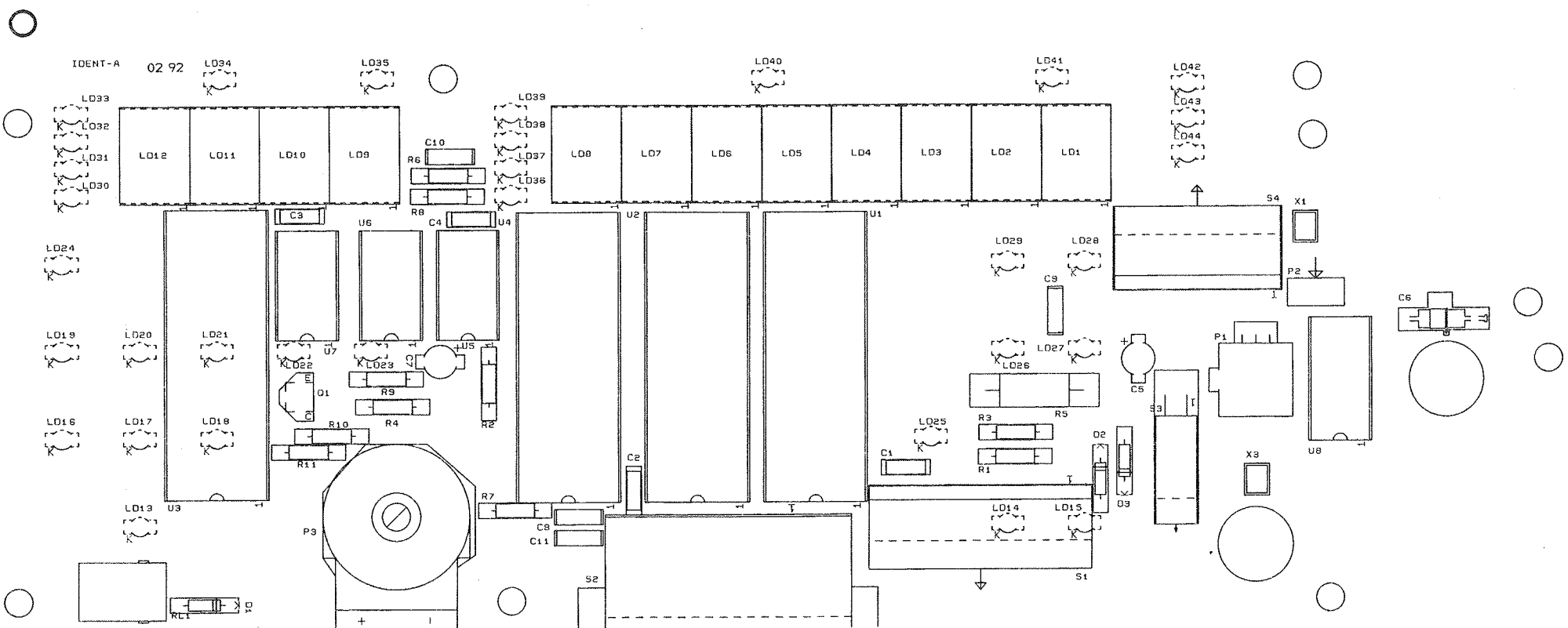
REV	01
DATE	

NOTE: ALL CAPACITOR VALUES IN P.F. ALL RESISTOR VALUES IN OHMS.

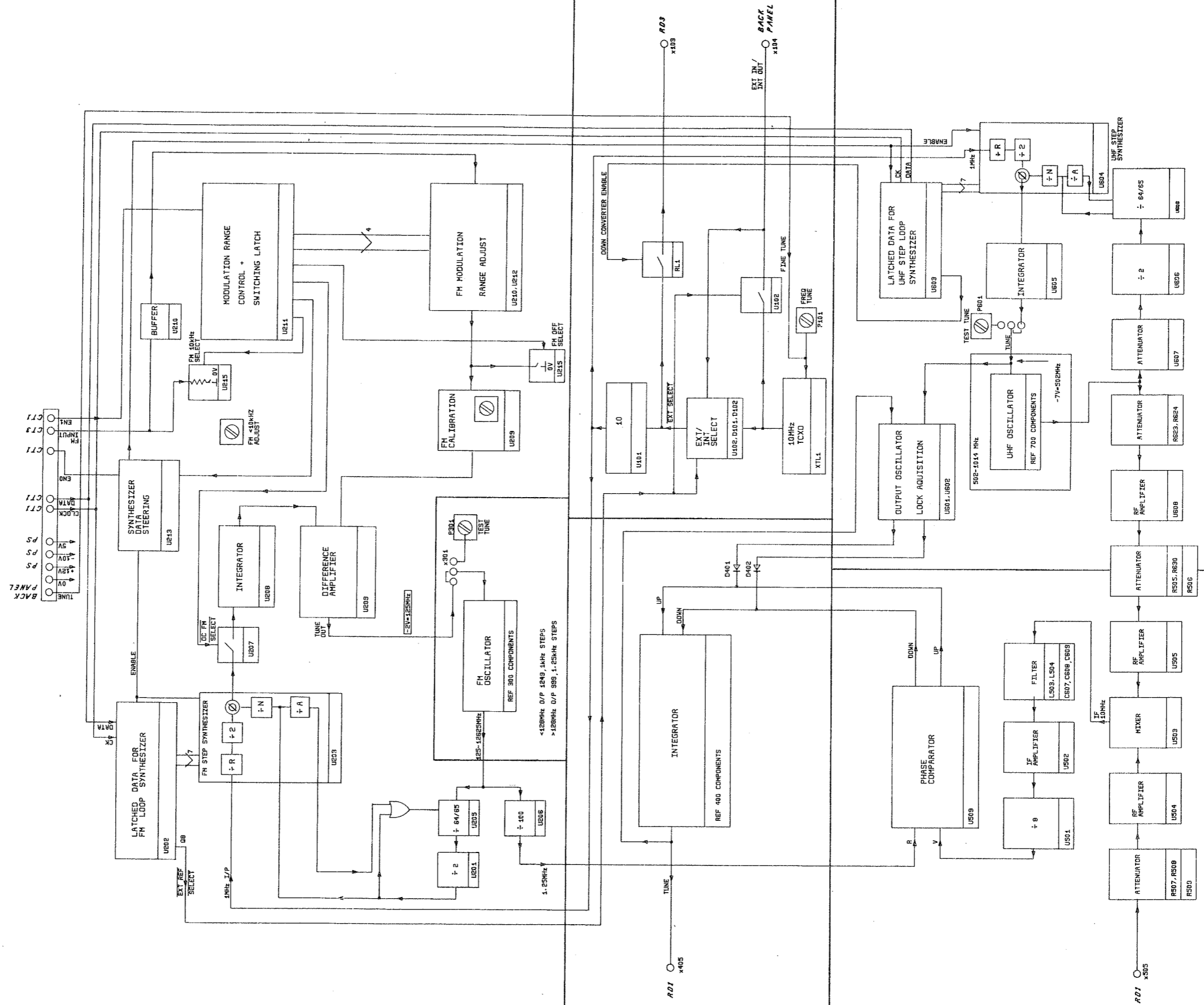
FARNELL INSTRUMENTS LTD. SANDRECK WAY, WETHERBY, YORKS. LS22 4QH

PSG1000B DISPLAY BOARD DP

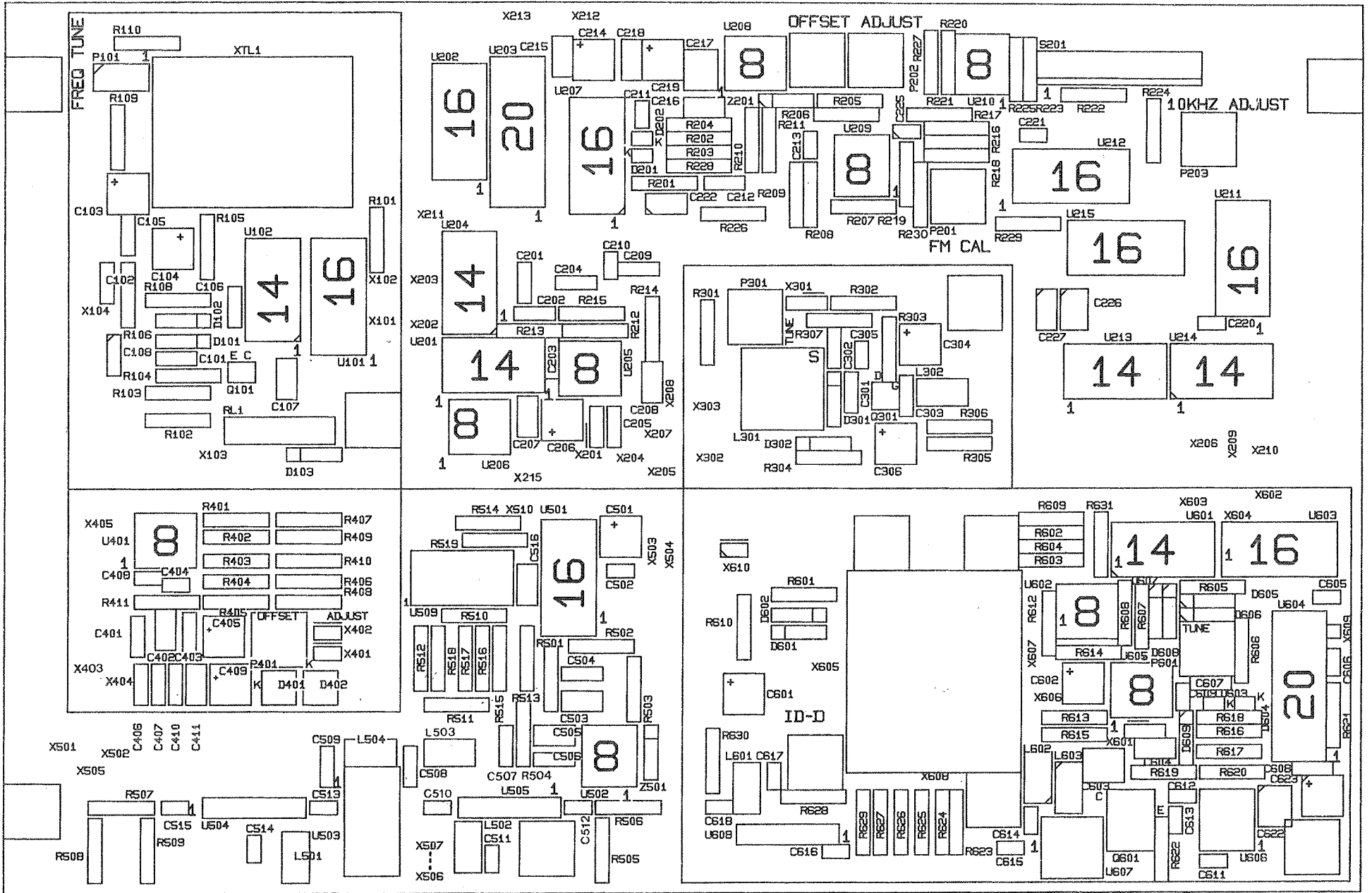
PARCNO. 25ZX0790



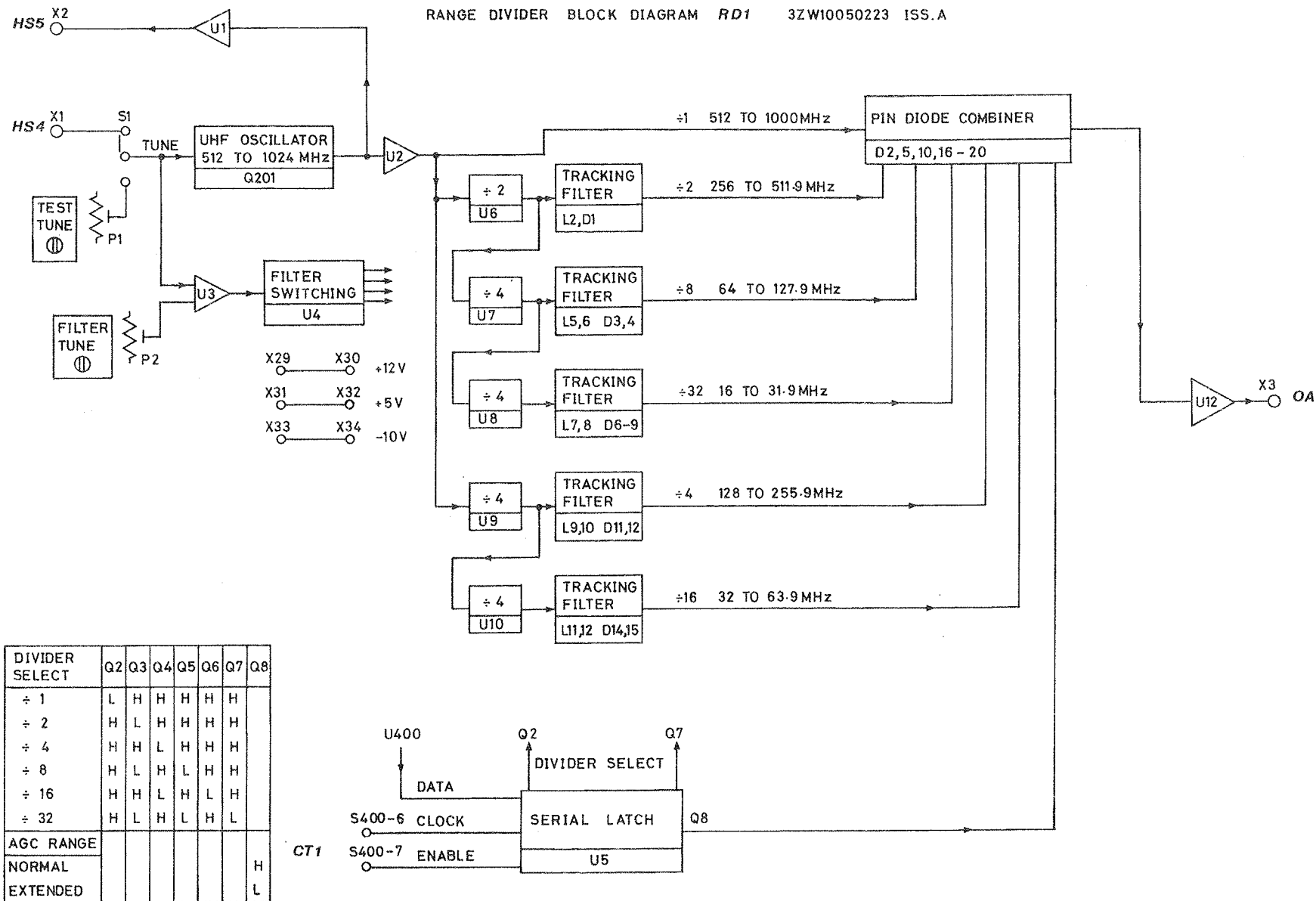
PSG1000 SYNTHESIZER BLOCK DIAGRAM



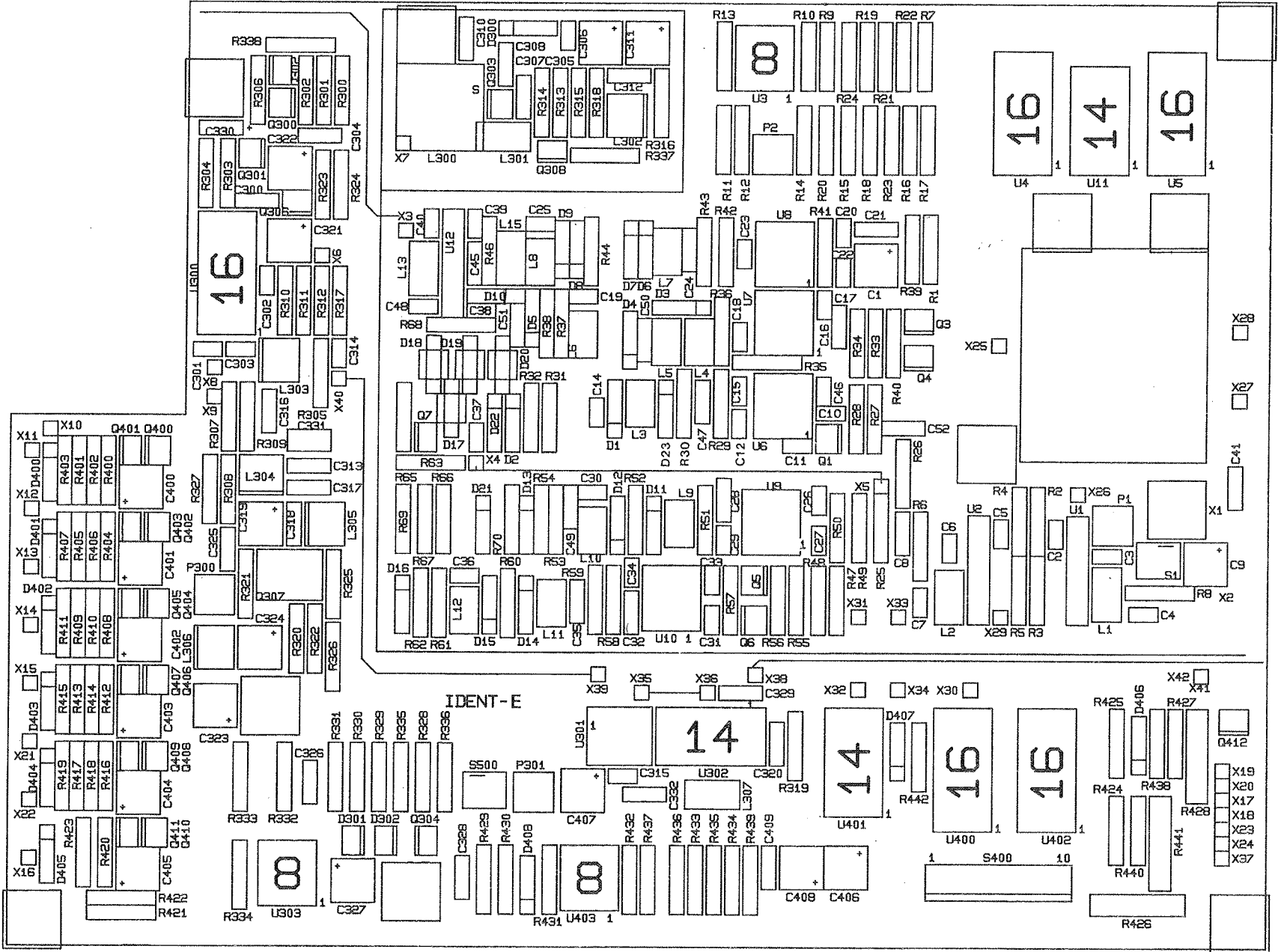
DRG NO. RZW10050232



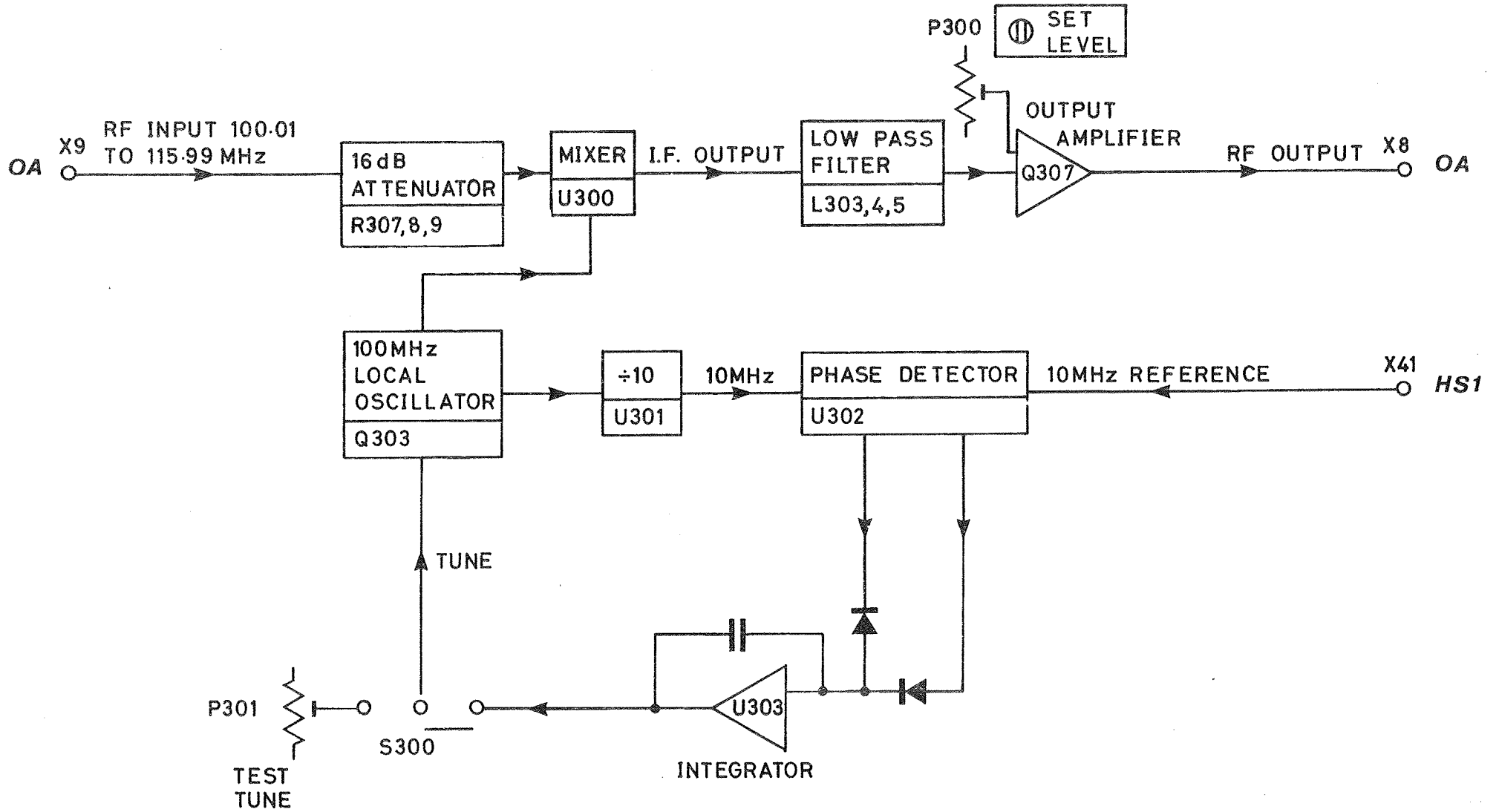
RANGE DIVIDER BLOCK DIAGRAM RD1 3ZW10050223 ISS.A

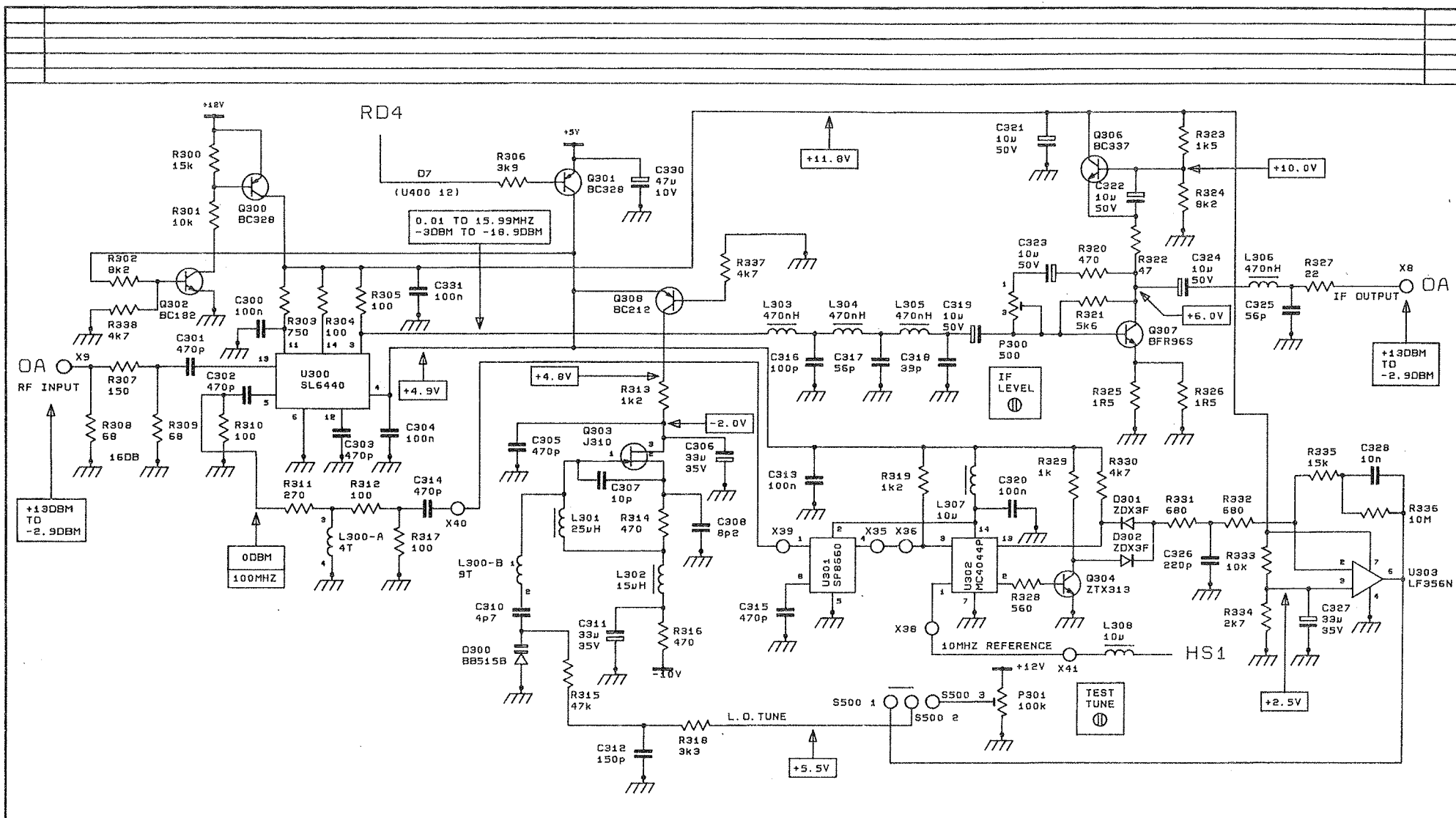


DIVIDER SELECT	Q2	Q3	Q4	Q5	Q6	Q7	Q8
÷ 1	L	H	H	H	H	H	
÷ 2	H	L	H	H	H	H	
÷ 4	H	H	L	H	H	H	
÷ 8	H	L	H	L	H	H	
÷ 16	H	H	L	H	L	H	
÷ 32	H	L	H	L	H	L	
AGC RANGE							
NORMAL							H
EXTENDED							L



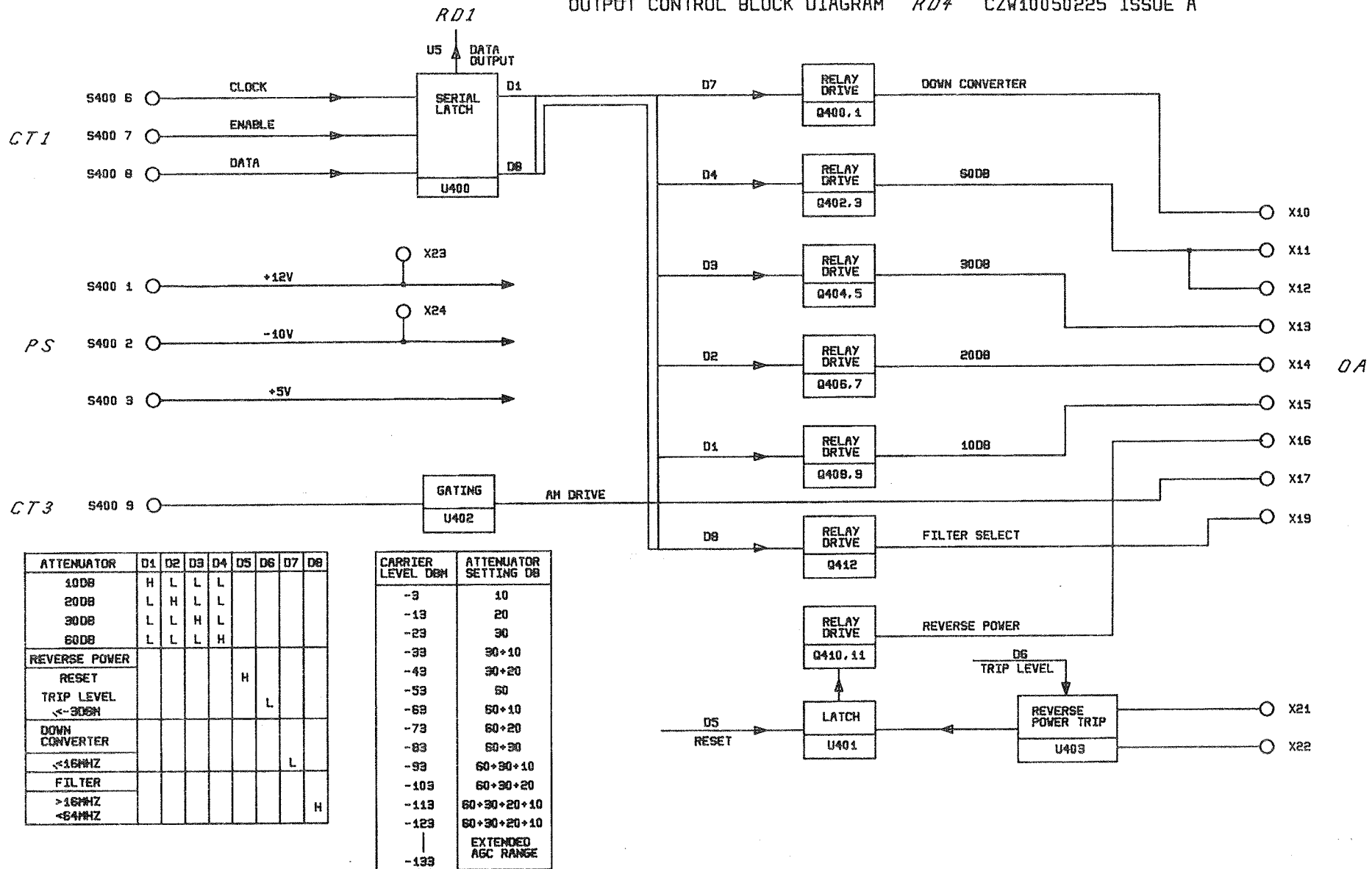
DOWN CONVERTER BLOCK DIAGRAM RD3 4ZW10050224 ISS.A

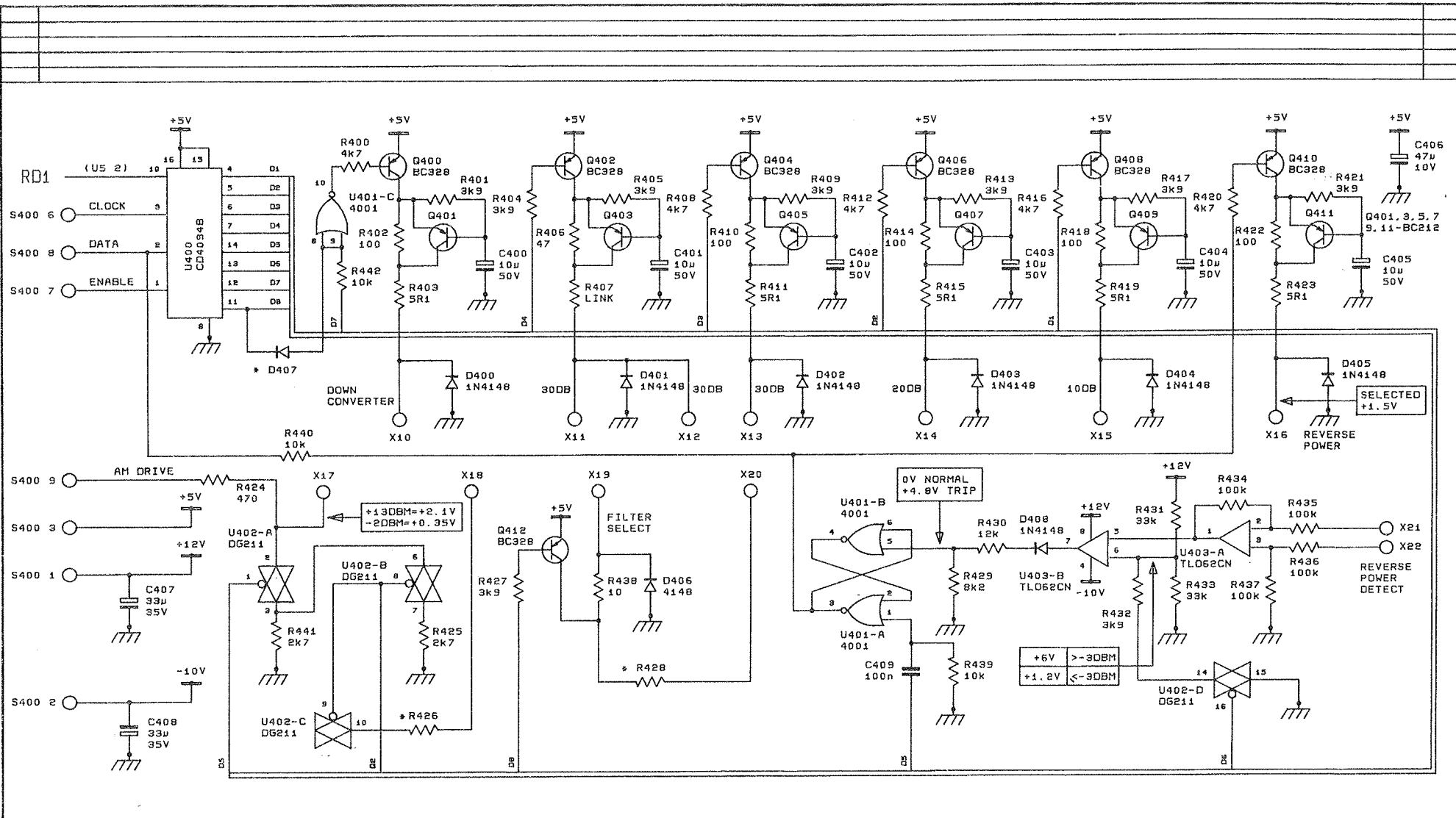




ISS	A	B	C	D	E	F			USED ON:	NOTES:	FARNELL INSTRUMENTS LTD., SANDBECK WAY, WETHERBY, YORKS. LS22 4DH	DRAWING NO.
DATE	24/10/86	18/2/87	8/12/88	8/12/88	28/1/93	8/6/93			PSG1000 F10050	ALL CAPACITOR VALUES IN F. ALL RESISTOR VALUES IN OHMS. PREFIX 300		CZX100.50202
MOD. NO.	-	12342 12624	13568	13608	16448	16767			1ERP5G1000B			
CHK'D	SD	SD	SD	SD	SD	SD						
NAME	JEC	JEC	SAM	SAM	JEC	JEC				UNLESS OTHERWISE STATED		SHEET 2 OF 3 SHEETS

OUTPUT CONTROL BLOCK DIAGRAM RD4 CZW10050225 ISSUE A





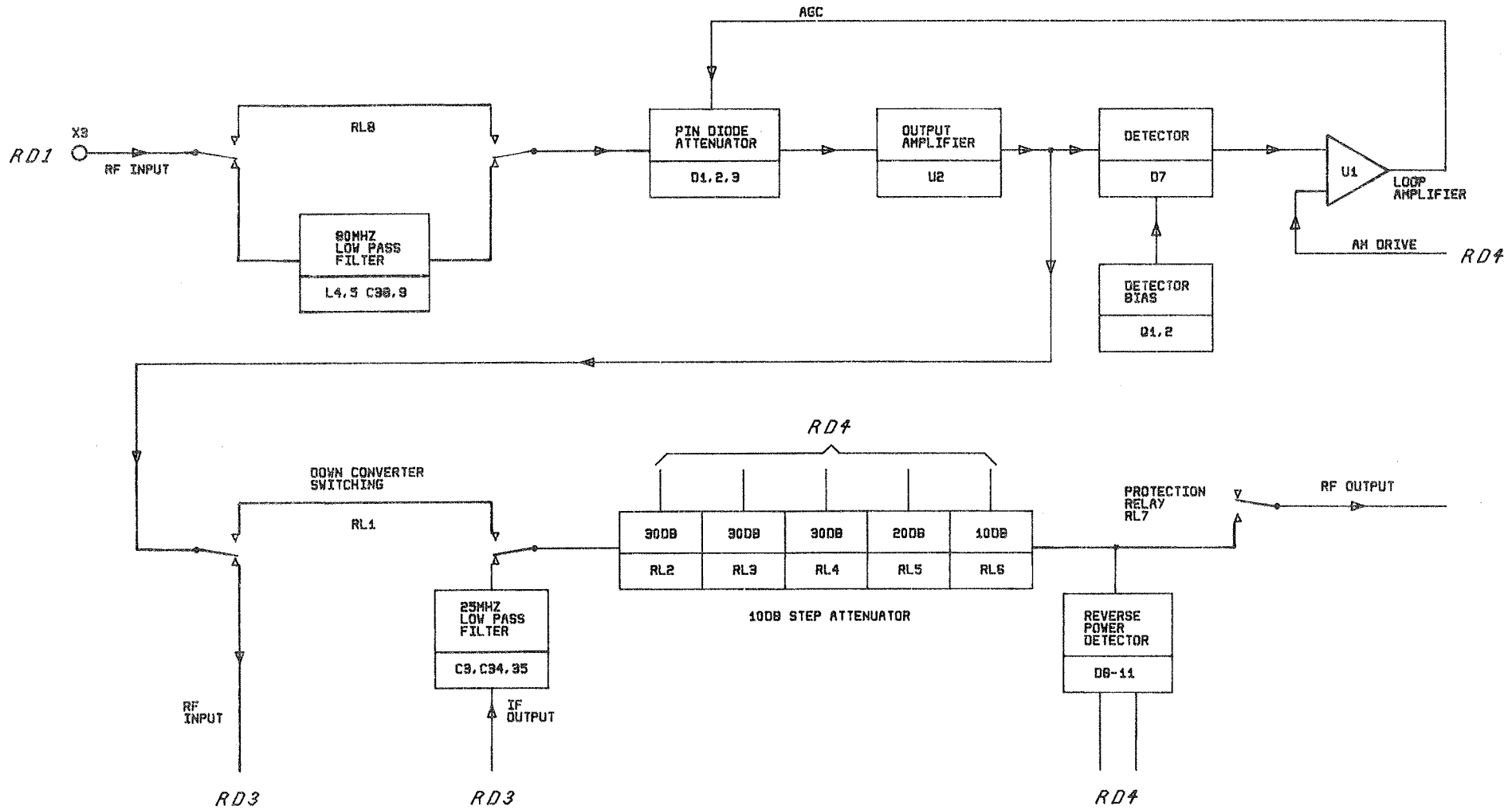
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MOD. NO.	-	12624	13541	16767						
CHK'D	SD	SD	SD	SD						
NAME	JEC	JEC	JEC	JEC						

USED ON:	
PSG1000	F10050
1ERP3G1000B	

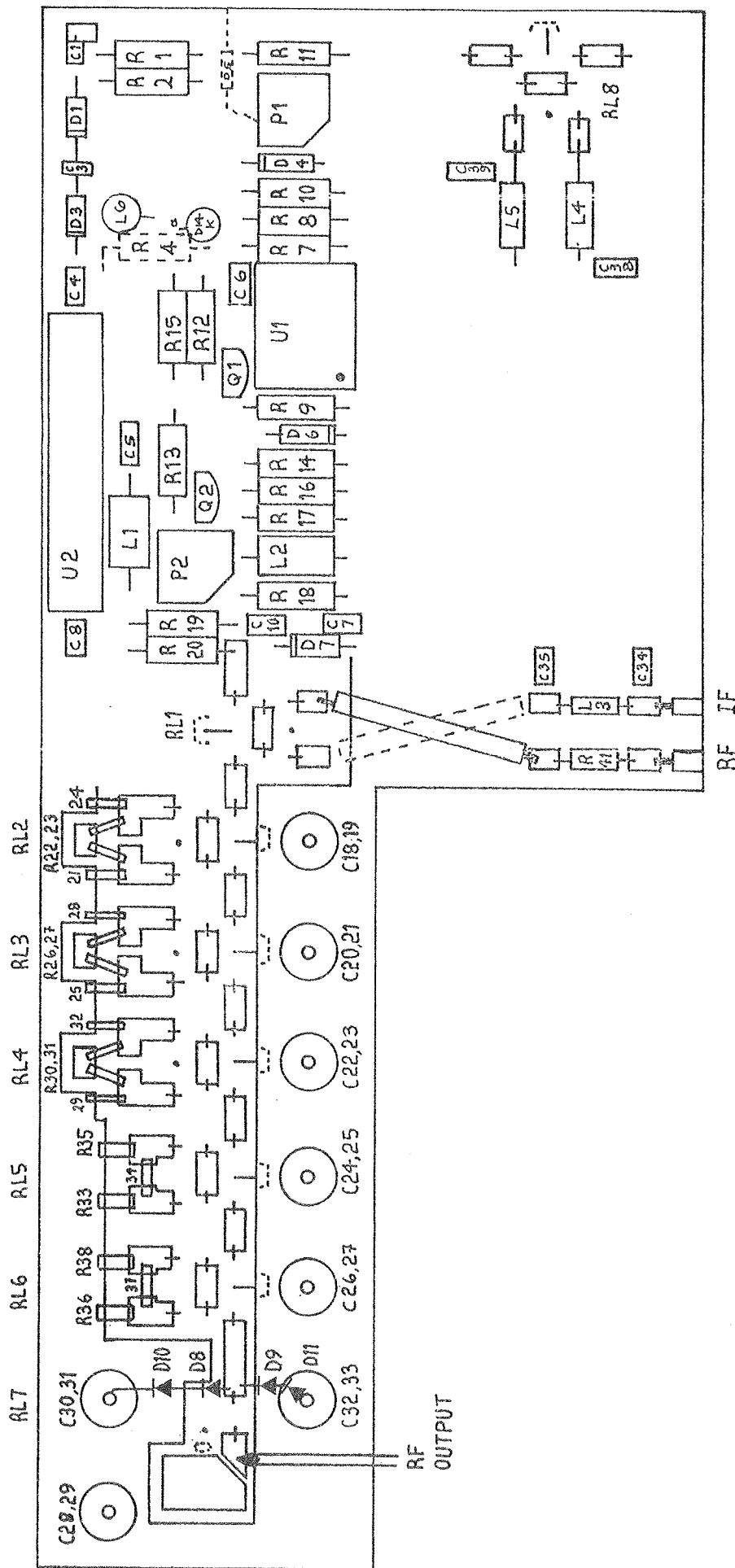
NOTES:
 ALL CAPACITOR VALUES IN F.
 ALL RESISTOR VALUES IN OHMS.
 * COMPONENT NOT FITTED
 UNLESS OTHERWISE STATED

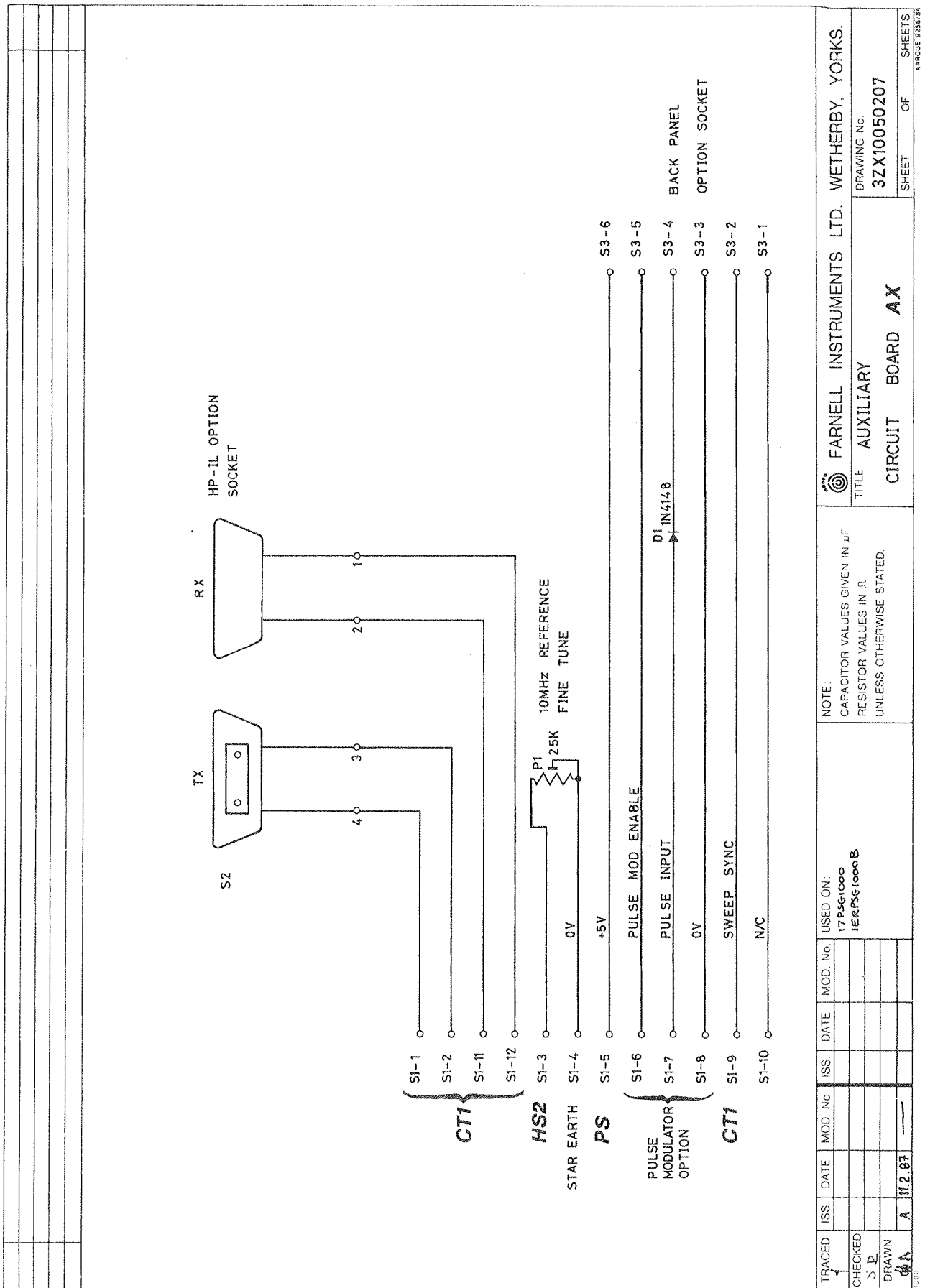
FARNELL INSTRUMENTS LTD. SANDBECK WAY, WETHERBY, YORKS. LS22 4DH TITLE	RANGE DIVIDER CIRCUIT DIAGRAM OUTPUT CONTROL SECTION RD4
	DRAWING NO. CZX10050202 SHEET 3 OF 3 SHEETS

OUTPUT AMPLIFIER BLOCK DIAGRAM DA CZW10050226 ISSUE A

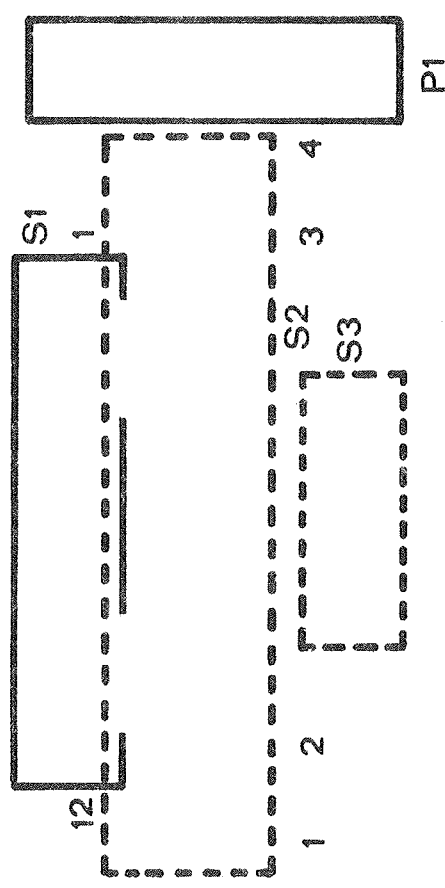
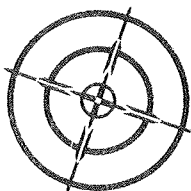
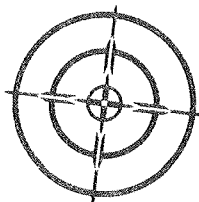


37DKK10383A PSG1000B OUTPUT AMPLIFIER/ATTENUATOR COMPONENT IDENT

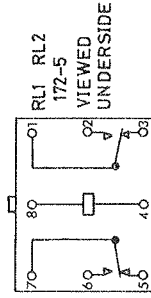
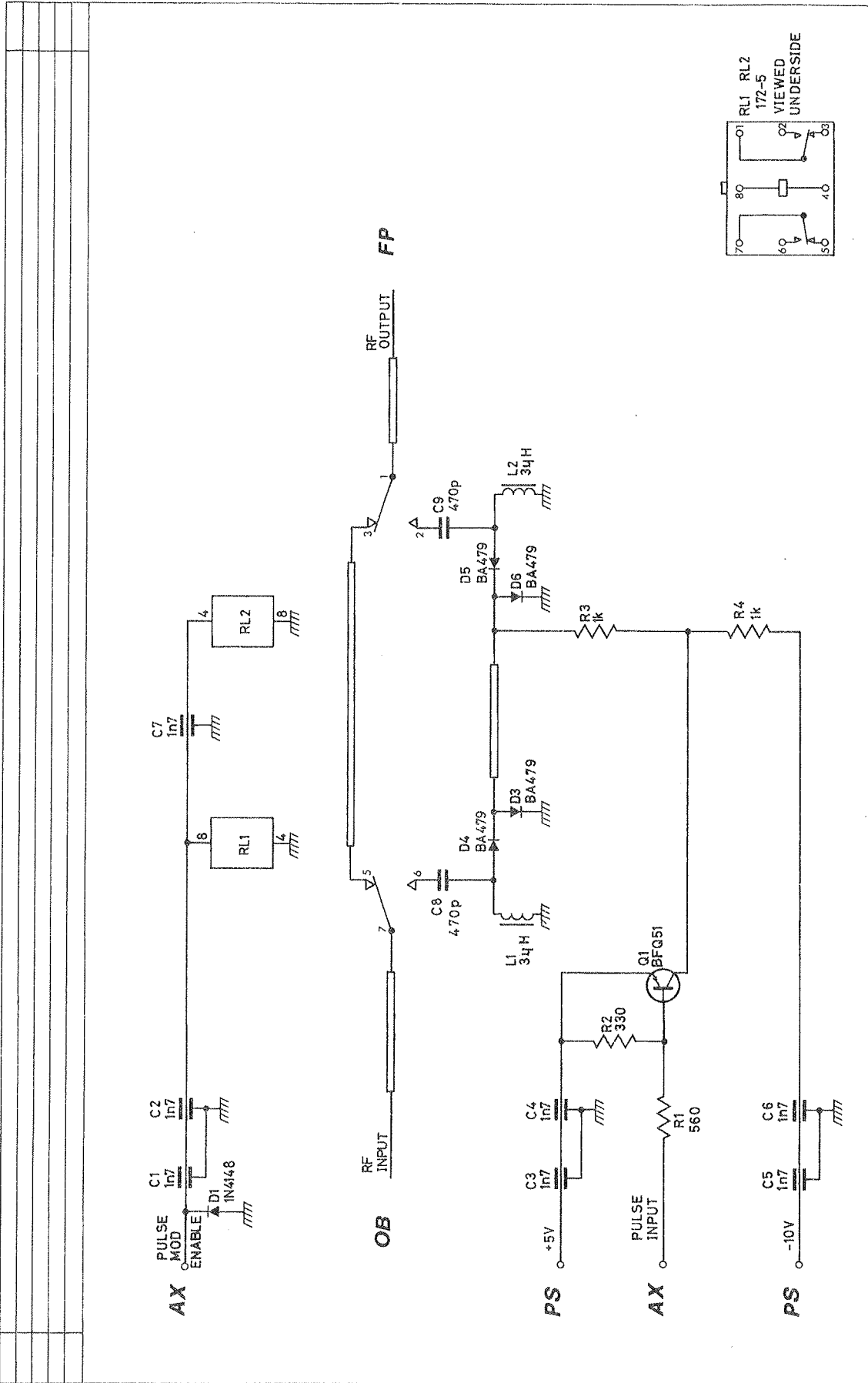




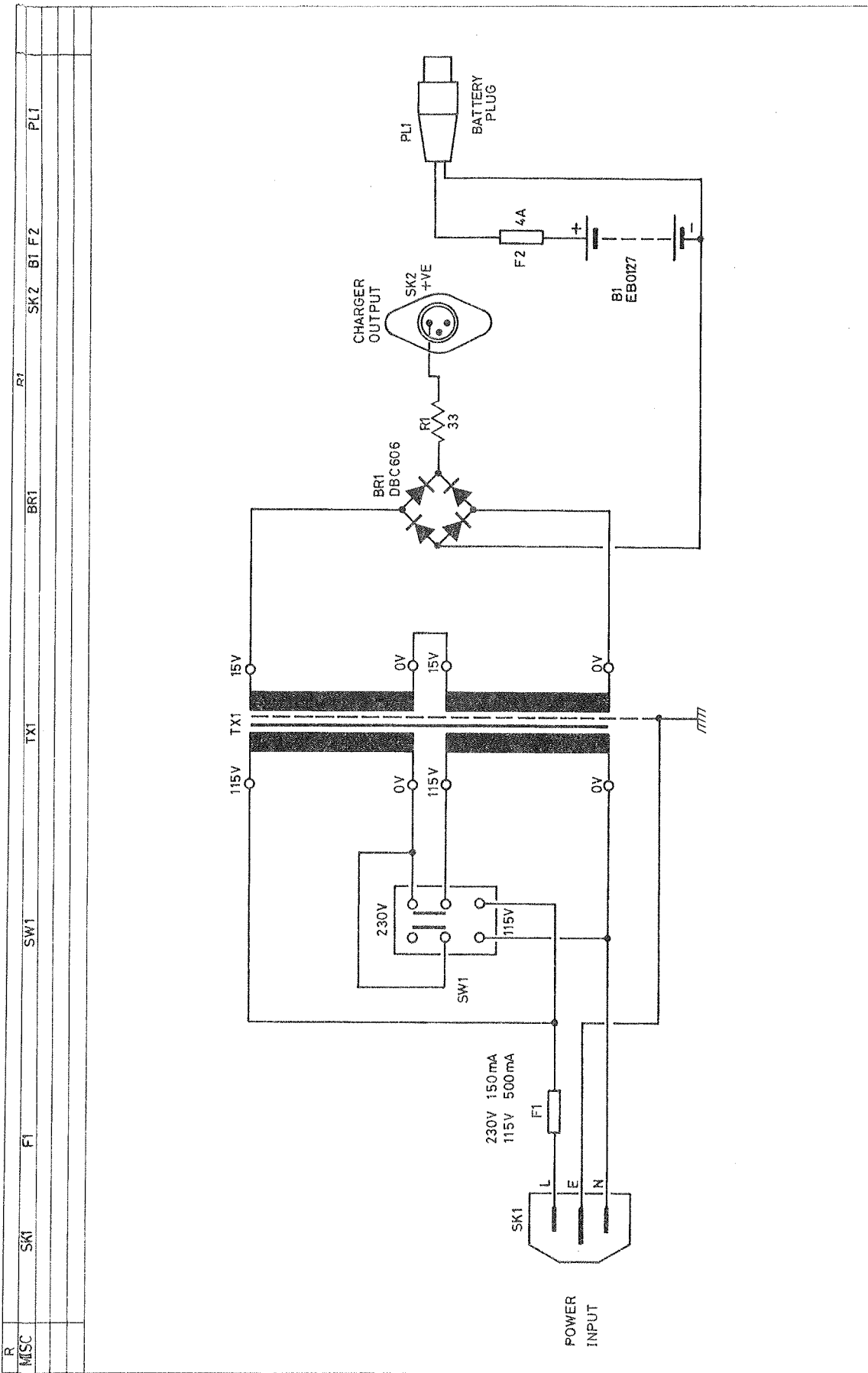
TRACED	ISS	DATE	MOD. No.	ISS	DATE	MOD. No.	USED ON:	NOTE: CAPACITOR VALUES GIVEN IN μ F RESISTOR VALUES IN Ω UNLESS OTHERWISE STATED.	FARNELL INSTRUMENTS LTD. WETHERBY, YORKS. TITLE AUXILIARY DRAWING No. 3ZX10050207	SHEET OF SHEETS 3Z10050207 OF 34
CHECKED						17 P561000 1E6P561000 B				
DRAWN										
DATE	A	17.2.87								



IDENT-A



TRACED	ISS.	DATE	MOD. No.	USED ON:	FARNELL INSTRUMENTS LTD. WETHERBY, YORKS. TITLE PULSE MODULATOR DRAWING No. 3ZM10051201 SHEET 1 OF 1 SHEETS ARBORE 928724
CHECKED				PSG1000-F10051	
DRAWN					
NOTE: CAPACITOR VALUES GIVEN IN μ F. RESISTOR VALUES IN Ω UNLESS OTHERWISE STATED.					
A 11.2.87					



R	SK1	F1	SW1	TX1	BR1	SK2	B1 F2	PL1
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TRACED	ISS.	DATE	MOD. No.	ISS.	DATE	MOD. No.	USED ON:
CHECKED							F10059
DRAWN							
AC	A	7-12-87					

NOTE:
CAPACITOR VALUES GIVEN IN μ F.
RESISTOR VALUES IN Ω
UNLESS OTHERWISE STATED.

FARNELL INSTRUMENTS LTD. WETHERBY, YORKS.
TITLE **RE CHARGEABLE BATTERY OPTION**
DRAWING No. **3ZX10059100**
SHEET 1 OF 1 SHEETS
PART NO. 9230/04

QTY.		SHT. OF		DWG.	4	ML	10052002	
USED ON	PSG1000A F10052			ASSEMBLY TITLE 24/28VDC INPUT OPTION				
	FARNELL INSTRUMENTS LTD.			No. OFF	F		DRAWN LDG	CHECKED
ITEM No.	REF No.	ORIGIN OF PART	DESCRIPTION	PART No.	ISSUE	QUANTITY		
						PER	TOTAL	ISSUED
1	RL1	BoF	24V RELAY	SRHC424		1		
3	R18	BoF	1K5Ω MRS25	RM4-1K5025		1		
5	Q3	BoF	HEXFET IRF530	VF530		1		
6	Q4	"	" "	"		1		
ISSUE		A						
DATE		14.5.87						
MOD. No		-						

UNIT KEY



TYPE PSG1000E	COMPUTER No. HB2529	Sht 1 of 1 Shts	UK10053
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	DRAWING No.	COMPUTER No.	DESCRIPTION	QTY		MODIFICATION REF														
				T	S	1	2	3	4	5	6	7	8	9	10					
1	2SUDC2529	HB2529	HANDLE BKT	1	A	2														
2	2SUDC2530	HB2530	HANDLE BKT EXT	1	A	2														
3	—	KCAMB	M4x8mm c/s screws	8	-															
4																				
5																				
6																				
7																				
8																				
9																				
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23																				
24																				
25																				

REF	1	2	3	4	5	6	7	8	9	10
ISSUE	A	B	C							
DATE	14.5.87	23/2/89	30/1/90							
MOD	—	M13811	—							
DRAWN	11	12	13	14	15	16	17	18	19	20
DATE										

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Main Unit Item Number : 1ERPSG1000B Description: Portable Signal Generator

Important explanation - Please read before ordering parts.

Due to limitations in the number of character spaces available the information in the circuit reference field has been abbreviated and the following notes are provided as a guide to its interpretation.

1. Where a component is used more than once on an assembly the alphabetic portion of the circuit reference for its second and subsequent locations has been omitted; eg. the circuit reference information for a component located at R1 and R6 will appear as: R1 6
2. The circuit reference numbers are presented in ascending decade blocks delimited by colons; second and subsequent numbers within a decade block represent only the unit value of the location (the tens and hundreds values being implied); eg. for a component located at R54, R57, R59, R82, R87, R102, R110 and R112 the circuit reference entry will be: R54 7 9:82 7:102:10 2
3. Where components are used in a series of neighbouring circuit reference locations the circuit reference numbers are represented as inclusive blocks using a hyphen; eg. for a component located at R16, R19, R21, R24, R25, R26, R31, R37, R38, R39, R40, R44, and R46 will be represented as R16 9:21 4-6: 31 37-40 4 6 (An exception to the rules occurs when a series crosses a decade block in which case the tens value is inserted).
4. Comments are preceded by a semicolon.

When ordering replacement parts please be sure to quote the part number provided.

PARENT 1ERPSG1000B

SIG GEN 10KHZ TO 1GHZ

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
2ERPSG1000B	SIG GEN 10KHZ TO 1GHZ			A	1.00000	2
3ERPSG1000B	CASING MATERIALS PSG1000B			A	1.00000	3
7SU4605	TOP COVER	00F	1SUDJ4605	A	1.00000	
AAS20	ALUMINIUM 2 X 1 METRE SHEET	99A	20+SWG		0.00001	
7SU4606	BOTTOM COVER	00F	1SUDJ4606	A	1.00000	
AAS20	ALUMINIUM 2 X 1 METRE SHEET	99A	20+SWG		0.07100	
NC3M1ZC	CAPTIVE BUSH M3 ISO	24P	PS-4.4OUNC-1-TPA-M3		8.00000	
7SU4607	FOOT RETAINER	00F	2SUDF4607	A	2.00000	
ASS20Z	ZINTEC STEEL 2 X 1 METRE SHEET	39W	20+SWG		0.00001	
		62T	20+SWG			
NC3M1ZC	CAPTIVE BUSH M3 ISO	24P	PS-4.4OUNC-1-TPA-M3		2.00000	
7SX4609	SIDE TRIM	00F	2SUDF4609	A	2.00000	
AX0057	SIDE TRIM EXTRUSION "INST"	33B	3SXC10057	A	0.00001	
8P1075101	CASING INFO			A	1.00000	
8P1075102	CASING INFO			A	1.00000	
9HPSG1000B	HANDBOOK	00F	PSG1000B		1.00000	
HC0010	COAX CABLE ASSEMBLY	01G	4SC000010	A	1.00000	
HC22V2	PLUG & LEAD 22/V/2	50C	22-V-2		1.00000	
HF0011	FOOT AND LEG ASSEMBLY	14K	2SV000067+&+68	A	2.00000	
HF0067	MOULDED FOOT	14K	2SV000067	C	2.00000	
HF0070	FOOT INSERT	14K	4SV000070	A	6.00000	
HW3114003	EXTRACTOR	11C	4SU003114003	A	1.00000	
JP0019	PSG1000	51A	3SJP0019	A	1.00000	
TG212	MINIATURE PLUG 3 POLE 2.5AMP	05D	RPC212P3S		1.00000	
TR201A	N-BNC ADAPTOR	10R	UG201A/U		1.00000	

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
47PSGBCT	CONTROL C/B ASM PSG1000B			A	1.00000	4
5HPSGBCT1	CONTROL SECTION "1" C/B			A	1.00000	5
CASOT	CAP SELECT ON TEST				1.00000	C116
CC233POLG	33PF 2% 100V N150	RP050	01P 683+34339		2.00000	C114 5
CC100UHM	100UF 20% 35V	R050	134N KMVB		1.00000	C104
CR6100NKM	100NF 20% 63V	R050	159W MKS2MIN		11.00000	C101-103 5 6 8 9:11-13 9
CR6220NKK	220NF 10% 63V	R050	159W MKS2		1.00000	C118
CRA1U00KM1	1.0UF 20% 63V	R050	159W MKS2		3.00000	C107:10 7
DG4003	DIODE		11G 1N4003		1.00000	D101
DG4148	DIODE		23N 1N4148		7.00000	D102-109
EA889	BUZZER (STK NO. 09984H)		30S 889-1521A		1.00000	W101
RM275ROFF	75R0 1% 0W60 50PPM 250V	18P	MRS25		7.00000	R101 6-8:10-12
RM310ORFF	100R 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R130
RM339ORFF	390R 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R125
RM347ORFF	470R 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R120
RM41K0OFF	1K00 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R121
RM44K7OFF	4K70 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R118
RM510KOFF	10K0 1% 0W60 50PPM 250V	18P	MRS25		6.00000	R105 9:17 9:22 4
RM512KOFF	12K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R126
RM539KOFF	39K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R127
		53D	SMA0207TK50			
RM547KOFF	47K0 1% 0W60 50PPM 250V	18P	MRS25		4.00000	R102 4:14 5
M6470KFF	470K 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R103
		53D	SMA0207TK50			
RM71M0OFF	1M00 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R128 9
RM510K0850	N/WORK 10K 850/91 SIL	22A	850-91-10K		2.00000	M101 2
TBM2512PT	R/H PIN HEADER 12 WAY 2.54MM	23M	4094+22-05-2121		1.00000	S103
TIH2520NR1S	I.D.C. 20 WAY PIN HEADER	88M	ID101-H20-K-06-E1		1.00000	S101
		25V	M52-1220-850			
TIH2526NR1S	I.D.C. 26 WAY PIN HEADER	88M	ID101-H26-K-06-E1		1.00000	S102
		25V	M52-1226-850			
VA062	IC TL062CP	STATIC	01T TL062CP		1.00000	U132
VD27C128K	IC M5L27C128K	STATIC	51T M5L27C128K		1.00000	U102
VD27C256	IC MMC27C256Q25	STATIC	01T TM527C25625JL		1.00000	U101
			29S TM527C25625JL			
VD4001P	IC HEF4001P	STATIC	01P HEF4001P		1.00000	U109
VD4013BE	IC CD4013BE	STATIC	23N CD4013BE		1.00000	U126
			70H CD4013BE			
VD4040BCN	IC CD4040BCN/BE	STATIC	23N CD4040BCN		1.00000	U123
			70H CD4040BE			
VD4078B	IC CD4078BE	STATIC	70H CD4078B		1.00000	U125
VD428E8	IC ZN428E-8	STATIC	43G ZN428E-8		1.00000	U131
VD4532P	IC HEF4532P	STATIC	01P HEF4532P		1.00000	U127
			23N HEF4532P			
VD6264LP15	HM6264ALP15	STATIC	76H HM6264ALP15		1.00000	U103
VD7210C	IC UPD7210C IEE		35N UPD7210C		1.00000	U128
VD74HC00N	IC 74HC00N	STATIC	01T 74HC00N		1.00000	U106
			23N 74HC00N			
VD74HC02	IC 74HC02	STATIC	23N 74HC02		2.00000	U107 8
			02M MC74HC02N			
VD74HC08N	IC MM74HC08N	STATIC	23N MM74HC08N		1.00000	U118
VD74HC138N	IC 74HC138N	STATIC	23N 74HC138N		2.00000	U119:20
			01T SN74HCT138N			
VD74HC240	IC MM74HC240	STATIC	23N MM74HC240		1.00000	U121

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
VD74HC251	IC MM74HC251	STATIC	23N MM74HC251		1.00000	U122
VD74HC374N	IC 74HC374N	STATIC	01T 74HC374N		8.00000	U110-117
			23N 74HC374N			
VD74HCT373	IC 74HCT373	STATIC	23N 74HCT373		1.00000	U104
			01T 74HCT373N			
VD75160AN	INT CCT SN75160AN -BN		01T SN75160AN-BN		1.00000	U129
			23N SN75160AN			
VD75161AN	INT CCT SN75161BN		01T SN75161BN		1.00000	U130
VD80C85	MSM80C85A ARS	STATIC	180 MSM80C85A		1.00000	U105
VD81C55	IC MSM81C55	STATIC	180 MSM81C55		1.00000	U124
VFN2110A	ZVN 2110A /100V/4R	STATIC	03Z ZVN2110A		1.00000	Q105
VS14L	IC SKT 14WAY		28I 703-3314-01-04-10		7.00000	U106-109:18:25 6
			08R 1CO-143-S8A-T			
VS16L	IC SKT 16WAY		28I 703-3316-01-04-10		6.00000	U119:20 2 3 7:31
			08R 1CO-163-S8A-T			
VS20L	IC SKT 20 WAY		28I 703-3320-01-04-10		12.00000	U104:10-17:21 9
			08R 1CO-203-S8A-T			:30
VS28C	28W CARRIER 612-92-628		27F 612-92-628		3.00000	U101-103
VS40C	40W CARRIER 612-92-640		27F 612-93-640		1.00000	U105
VS40L	IC SKT 40 WAY		28I 703-3340-03-04-10		2.00000	U124 8
			08R 1CO-406-S8A-T			
VS8P	IC SKT 8WAY		28I 703-3308-01-04-10		1.00000	U132
			08R 1CO-083-S8A-T			
VT328	BC328 NO NEW DES (PGP)		01P BC328		2.00000	Q103 4
VT337	BC337 NO NEW DES (NGP)		01P BC337		2.00000	Q101 2
VX4M00HC43U	CRYSTAL 4MHZ 5PPM HC43U		23I HC43U+A120A		1.00000	XTL101

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
5NPSGBCT2	CONTROL SECTION "2" C/B			A	1.00000	5
CC3120PLG	120PF 2% 100V N150	RP050	01P 683+34121		1.00000	C208
CC3330PLG	330PF 2% 100V N750	RP050	01P 683+58331		1.00000	C205
CEB33U0IM	33UF 20% 40V	R025	134N KMBV		2.00000	C201 2
CR41N50LJ	1.5NF 5% 100V	R050	159W FKS5		1.00000	C207
CR43N30LM	3.3NF 20% 100V	R050	159W FKS2		1.00000	C204
CR515N0KK	15NF 10% 63V	R050	159W MKS2		1.00000	C206
CR533N0KM	33NF 20% 63V	R050	159W MKS2		1.00000	C203
CR6100NKM	100NF 20% 63V	R050	159W MKS2MIN		1.00000	C209
CRA1U00KM1	1.0UF 20% 63V	R050	159W MKS2		1.00000	C210
EB6117	LITHIUM BATTERY		06V 6117501501		1.00000	
PM525K0KV	25K0 10% PRESET VERT STURN	02S	63P		1.00000	P201
RASOT	#### SELECT ON TEST ####	00F	RASOT		1.00000	R206
RM3180RFF	180R 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R207
			53D SMA0207TK50			
RM43K30FF	3K30 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R204
RM516K0FF	16K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R203
RM522K0FF	22K0 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R201 2
			53D SMA0207TK50			
RM539K0FF	39K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R205
			53D SMA0207TK50			
VA6CN50	IC MF6CN-50	23N	MF6CN-50		1.00000	U210
VA79L05ACZ	IC LM79L05ACZ	23N	LM79L05ACZ		1.00000	U213
VD14017BCP	IC MC14017BCP	STATIC	70H CD4017BE		3.00000	U205 8 9
VD212CJ	IC DG212CJ	STATIC	41S DG212CJ		2.00000	U211 2
VD4011BE	IC CD4011BE	STATIC	70H CD4011BE		1.00000	U206
VD4013BE	IC CD4013BE	STATIC	23N CD4013BE		1.00000	U207
			70H CD4013BE			
VD4527	IC HEF4527BP	STATIC	01P HEF4527BP		4.00000	U201-204
VS14L	IC SKT 14WAY		28I 703-3314-01-04-10		3.00000	U206 7:10
			08R ICO-143-S8A-T			
VS16L	IC SKT 16WAY		28I 703-3316-01-04-10		9.00000	U201-205 8 9
			08R ICO-163-S8A-T			:11 2

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
5NPSGBCT3	CONTROL SECTION "3" C/B			A	1.00000	5
CC15P60LC	5.6PF .25PF 100V NPO	RP050	01P 683+09568		1.00000	C314
CC247POLG	47PF 2% 100V N150	RP050	01P 683+34479		1.00000	C315
CEB33U01M	33UF 20% 40V	R025	134N KNVB		7.00000	C302 304-307 :10 3
CR41N50LJ	1.5NF 5% 100V	R050	159W FKS5		2.00000	C311 2
CR6100NKM	100NF 20% 63V	R050	159W MKS2MIN		4.00000	C303 8:17 8
CRA1U00KM1	1.0UF 20% 63V	R050	159W MKS2		2.00000	C301:16
CS42N00HF	2.0NF 1% 30V	AXIAL	47L FSC/TP		1.00000	C309
DZ16V20D1	6.2V 0W40		28C 1N823		1.00000	D301
PM45K00KV	5K00 10% PRESET VERT	STURN	02S 63P		1.00000	P306
PM510K0KV	10K0 10% PRESET VERT	STURN	02S 63P		2.00000	P303 5
PM525K0KV	25K0 10% PRESET VERT	STURN	02S 63P		1.00000	P302
PM6100KKV	100K 10% PRESET VERT	STURN	02S 63P		2.00000	P301 4
RAOMIT	RESISTORS OMITTED		01B RAOMIT		1.00000	R303
RASOT	#### SELECT ON TEST ####		00F RASOT		2.00000	R328:33
RM227ROFF	27R0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R305
		53D	SMA0207S			
RM247ROFF	47R0 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R319:23
RM318ORFF	180R 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R330
		53D	SMA0207TK50			
RM347ORFF	470R 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R309:17
RM391ORFF	910R 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R329
		53D	SMA207TK50			
RM42K2OFF	2K20 1% 0W60 50PPM 250V	18P	MRS25		3.00000	R312:31 4
RM44K7OFF	4K70 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R322
RM510KOFF	10K0 1% 0W60 50PPM 250V	18P	MRS25		3.00000	R306 7:27
RM512KOFF	12K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R325
RM515KOFF	15K0 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R314:24
RM518KOFF	18K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R310
RM522KOFF	22K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R315
		53D	SMA0207TK50			
RM524KOFF	24K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R313
		53D	SMA0207TK50			
RM527KOFF	27K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R326
RM530KOFF	30K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R316
		53D	SMA0207TK50			
RM547KOFF	47K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R332
RM575KOFF	75K0 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R320 1
RM6100KFF	100K 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R301:11
RM6150KFF	150K 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R302 4
RM6220KFF	220K 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R308:18
		53D	SMA0207TK50			
TBM2512PT	R/H PIN HEADER 12 WAY 2.54MM	23M	4094+22-05-2121		1.00000	S301
TBM2516PT	R/H PIN HEADER 16 WAY 2.54MM	23M	4094+22-05-2161		1.00000	S302
VA062	IC TL062CP	STATIC	01T TL062CP		2.00000	U302 5
VA353N	IC LF353N	STATIC	23N LF353N		1.00000	U307
VA6321N	LM6321N OP AMP		23N LM6321N		1.00000	U316
VA6CN100	IC MF6CN100	STATIC	23N MF6CN-100		1.00000	U312
VA79L05ACZ	IC LM79L05ACZ		23N LM79L05ACZ		1.00000	U317
VD14017BCP	IC MC14017BCP	STATIC	70H CD4017BE		3.00000	U309-311
VD212CJ	IC DG212CJ	STATIC	41S DG212CJ		2.00000	U303 4
VD4011BE	IC CD4011BE	STATIC	70H CD4011BE		1.00000	U313
VD4013BE	IC CD4013BE	STATIC	23N CD4013BE		1.00000	U308
		70H	CD4013BE			

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
VD4069UBE	IC CD4069UBE	STATIC	23N CD4069UBE		1.00000	U314
			70H CD4069UBE			
VD412DJ	IC DG412DJ SIL		41S DG412DJ		1.00000	U301
VD7533JN	AD/MP7533JN	STATIC	55A AD/MP7533JN		2.00000	U306:15 (ALT VD7530JN)
VS14L	IC SKT 14WAY		28I 703-3314-01-04-10		4.00000	U308:12-14
			08R IC0-143-S8A-T			
VS16L	IC SKT 16WAY		28I 703-3316-01-04-10		8.00000	U301 3 4 6 9:10
			08R IC0-163-S8A-T			1 5
VS8P	IC SKT 8WAY		28I 703-3308-01-04-10		4.00000	U302 5 7:16
			08R IC0-083-S8A-T			

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
5NPSGBCT4	CONTROL SECTION "4" C/B			A	1.00000	5
CC215POLG	15PF 2% 100V NPO	RP050	01P 683+10159		1.00000	C416
CC247POLG	47PF 2% 100V N150	RP050	01P 683+34479		1.00000	C417
CC3100PLG	100PF 2% 100V N150	RP050	01P 683+34101		2.00000	C412 3
CC6100NJM	100NF 20% 50V X7R	RM025	01P CW20C104M		2.00000	C405 8
CEB10U0JM1	10UF 20% 50V FC +2.5MM	134N	KMVB		1.00000	C403
CEB33U0IM	33UF 20% 40V	R025	134N KMVB		4.00000	C409:10 4 5
CEB47U0JM	47UF 20% 50V	R035	134N KMVB		1.00000	C406
CEC100UBM	100UF 20% 6.3V	R050	50D K1006		1.00000	C404
CR510NOLM	10NF 20% 100V	R050	159W FKS2MIN		1.00000	C411
CR522NOKM	22NF 20% 63V	R050	159W MKS2MIN		1.00000	C407
CR547NOKM	47NF 20% 63V	R050	159W MKS2		1.00000	C401
CRA1U00KM1	1.0UF 20% 63V	R050	159W MKS2		1.00000	C418
DG4148	DIODE	23N	1N4148		5.00000	D401-405
PM3500RKV	500R 10% PRESET VERT STURN	02S	63P		1.00000	P407
PM45K00KV	5K00 10% PRESET VERT STURN	02S	63P		1.00000	P402
PM510K0KV	10K0 10% PRESET VERT STURN	02S	63P		1.00000	P401
PM6100KKV	100K 10% PRESET VERT STURN	02S	63P		3.00000	P404-406
PM71M00KV	1M00 10% PRESET VERT STURN	02S	63P		1.00000	P403
RAOMIT	RESISTORS OMITTED	01B	RAOMIT		1.00000	R404
RASOT	#### SELECT ON TEST ####	00F	RASOT		1.00000	R413
RG71M00BJ	1M00 5% 0W25 100PPM 1K1V	18P	VR25		1.00000	R403
RM247ROFF	47R0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R440
RM3100RFF	100R 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R435
RM41K00FF	1K00 1% 0W60 50PPM 250V	18P	MRS25		5.00000	R416:23 4:32 9
RM42K00FF	2K00 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R427:30
		53D	SMA0207TK50			
RM42K70FF	2K70 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R405
RM44K70FF	4K70 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R401 7
RM45K60FF	5K60 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R411
		53D	SMA0207TK50			
RM510K0FF	10K0 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R408:12
RM515K0FF	15K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R437
RM522K0FF	22K0 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R436 8
		53D	SMA0207TK50			
RM547K0FF	47K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R406
RM6100KFF	100K 1% 0W60 50PPM 250V	18P	MRS25		11.00000	R414 18-422 6 8
						9:31 4
RM6200KFF	200K 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R409:10
		53D	SMA0207TK50			
RM6270KFF	270K 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R417
		53D	SMA0207TK50			
RM6470KFF	470K 1% 0W60 50PPM 250V	18P	MRS25		3.00000	R415:25:33
		53D	SMA0207TK50			
VA061	IC TL061CP	STATIC	01T TL061CP		1.00000	U407
VA062	IC TL062CP	STATIC	01T TL062CP		1.00000	U403
VA064CN	IC TL064CN	STATIC	01T TL064CN		1.00000	U404
VA10CN	IC MF10CN	STATIC	23N MF10CCN		1.00000	U402
VA3046	VT ARRAY CA3046 RCA		70H CA3046		1.00000	U406
VA6270CDP	IC 8DIL SL6270CDP		43G SL6270CDP		1.00000	U401
VD211CJ	IC DG211CJ	STATIC	41S DG211CJ		1.00000	U405
VS14L	IC SKT 14WAY		28I 703-3314-01-04-10		2.00000	U404 6
			08R ICO-143-S8A-T			
VS16L	IC SKT 16WAY		28I 703-3316-01-04-10		1.00000	U405
			08R ICO-163-S8A-T			

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
VS20L	IC SKT 20 WAY	28I	703-3320-01-04-10		1.00000	U402
		08R	IC0-203-S8A-T			
VS8P	IC SKT 8WAY	28I	703-3308-01-04-10		3.00000	U401 3 7
		08R	IC0-083-S8A-T			
8ZX100502041	CONTROL BD CT1 CCT DIAG	00F	C2X10050204	B	1.00000	
8ZX100502042	CONTROL BD CT2 CCT DIAG	00F	C2X10050204	A	1.00000	
8ZX100502043	CONTROL BD CT3 CCT DIAG	00F	C2X10050204	E	1.00000	
8ZX100502044	CONTROL BD CT4 CCT DIAG	00F	C2X10050204	C	1.00000	
BC1731	CONTROL PSG1000B	01K	1N7RBT17310	A	1.00000	
TBM2503PO	STRAIGHT PIN HEADER 3 WAY 2.54	23M	4030+22-03-2031		1.00000	

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
47PSGBFP	FRONT PANEL ASM PSG1000B			A	1.00000	4
5NPSGBDP	DISPLAY BOARD			A	1.00000	5
7SU4624	METER MOUNT BRACKET	00F	4SUDA4624	A	1.00000	
ASS16Z	ZINTEC STEEL 2 X 1 METRE SHEET	39W	16+SWG		0.00110	
8L10050101	METER SCALE LABEL PSG1000			D	1.00000	
8P1043901	FRONT PANEL DISPLAY BOARD			H	1.00000	
8P1043902	FRONT PANEL DISPLAY BOARD			F	1.00000	
8ZX10050206	DISPLAY BOARD CCT DIAG	00F	RZX10050206	B	1.00000	
BC1727	DISPLAY PSG1000B	01K	1N7RBT17270	A	1.00000	PCB
CC44N70LK	4.7NF 10% 100V RPO50	01P	630+19472		4.00000	C1-4
CEB47UODM	47UF 20% 10V FC +5MM	134N	KMVB		2.00000	C5 7
CI41N00VZ	1.0NF 600V -20+80%	95B	TPS014B		1.00000	C6
CR6100NKM	100NF 20% 63V R050	159W	MKS2MIN		4.00000	C8-11
DG4148	DIODE	23N	1N4148		3.00000	D1-3
EC226	SHAFT ENCODER	23C	LA226		1.00000	P3
EM0017	METER PSG1000	99C	3SMO00017	B	1.00000	M1
LD1301RED	LED HLMP-1301 RED	02H	HLMP-1301		32.00000	LED13-44
LD5551	LED RED HDSP5551 GD"B"	02H	HDSP5551		12.00000	LED1-12
MC1	CERAMIC BEAD SMALL	57M	1PB/1		2.00000	R5 X1/L
PM550KOKH2	50K0 10% PRESET HORZ STURN	02S	63X		1.00000	P2
PM6100KMN	100K 20% LIN 1/8X16SPIN NPRSET	94M	12PE+1/8X16+BUSH6.35		1.00000	P1
RG810M0BJ	10M0 5% 0W25 250PPM 1K1V	18P	VR25		1.00000	R8
RM45K60FF	5K60 1% 0W60 50PPM 250V	18P	MRS25		3.00000	R9-11
			53D SMA0207TK50			
RM510K0FF	10K0 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R6 7
RM533K0FF	33K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R4
RM580K6FF	80K6 1% 0W60 50PPM 250V	18P	MRS25		3.00000	R1-3
			53D SMA0207TK50			
RW13R30JJ	3R30 5% 2W50	04E	74ER		1.00000	R5 (MC1 X1/L)
SRG2V5	G2E 5V ORM	24I	G2E-182P-M+5V+DC		1.00000	RL1
TBA3902PR	2W PIN WAFER 90DEG WITH LOCK	07A	640389-2		1.00000	S3
TBM2512PT	R/H PIN HEADER 12 WAY 2.54MM	23M	4094+22-05-2121		1.00000	S4
TBM2514PT	R/H PIN HEADER 14 WAY 2.54MM	23M	4094+22-05-2141		1.00000	S1
TIH2520NR1S	I.D.C. 20 WAY PIN HEADER	88M	1D101-H20-K-06-E1		1.00000	S2
			25V M52-1220-850			
TP1510	BRASS TUBE EYELET	26P	B1.5X0.25X10MS		4.00000	X1-X4
VAS450N	MM5450N/M5450B7	29S	M5450B7		4.00000	U1-4
VD4052B	IC CD4052B	23N	CD4052B		1.00000	U8
			70H CD4052BE			
VD74HC107	74HC107	23N	MM74HC107		1.00000	U7
VD74HC132	IC M74HC132	29S	M74HC132		2.00000	U5 6
VS14L	IC SKT 14WAY	28I	703-3314-01-04-10		3.00000	U5-7
			08R ICO-143-S8A-T			
VS16L	IC SKT 16WAY	28I	703-3316-01-04-10		1.00000	U8
			08R ICO-163-S8A-T			
VS40C	40W CARRIER 612-92-640	27F	612-93-640		1.00000	U3
VS40L	IC SKT 40 WAY	28I	703-3340-03-04-10		3.00000	U1 2 4
			08R ICO-406-S8A-T			
VTPLGP	2N2907A BC327 T092 P	03Z	BC327(3SC0148)	A	1.00000	Q1
			01P BC327(3SC0148)			
			02M MPS2907A(3SC0148)			
YT22	T/C WIRE 22SWG	55M	22SWG		0.07000	
7SF3280	BNC INSULATOR WASHER	00F	4SU003280	A	2.00000	
AFS116	FIBGLASS SHT 1/16 THK	19V	E14+EG818		0.00010	
7SU4592	FALSE FRONT PANEL	00F	1SUBA4592	A	1.00000	

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
AAS16	ALUMINIUM 2 X 1 METRE SHEET	99A	16+SWG		0.02500	
NC3M15KFH	CAPTIVE C.B. STUD M3 X15MM ISO	18C	CKFN-M3-15		7.00000	
NC3M1AS	FLOATING INSERT M3 ISO	09P	AS-M3-1		6.00000	
NC3M1ZC	CAPTIVE BUSH M3 ISO	24P	PS-4.40UNC-1-TPA-M3		2.00000	
NC4M1ZC	CAPTIVE BUSH M4 ISO	24P	S-M4-1-ZC		8.00000	
HK290006	KNOB GREY	01S	S290+006+GREY		1.00000	
HK290GY	KNOB CAPS GREY	01S	C290+GREY		1.00000	
HKC110125GY	KNOB CAP GY 1/8" SIFAM	01S	C110+125GY		1.00000	
HKS111125GY	KNOB GY 1/8" W/L SIFAM	01S	S111125GY		1.00000	
HW0242	MEMBRANE PANEL PSG1000B	47R	2SC0242		1.00000	MW +SCREEN
NF3M	FULL NUT M3	05T	NF3M		12.00000	
NF4B	FULL NUT 4BA	05T	NF4B		7.00000	
NR3M04CR	SPACER M3 X 4MM CLEAR ROUND	01H	R6361-02		7.00000	
TR004N	SOCKET + SOLDER TAG	02B	LX04-0503-Z2004N		2.00000	
TR10942	"N" BULKHEAD JACK	01G	SK1094/2-15131C285NG		1.00000	
WW3M	WAVEY WASHER M3	24L	LS508/54		12.00000	
WW60	WAVEY WASHER N TYPE	24L	LS508/60		1.00000	
WW63	WAVEY WASHER BNC TYPE	24L	LS508/63		2.00000	
YX85	S/R COAX UT85 TINNED	22S	UT85		1.00000	
ZC15U10	CHOKE 15UH SC10 ITT	103S	32801D		1.00000	L1
ZC4U730	CHOKE SC30 4.7UH	103S	66247GM		1.00000	L2

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
47PSGBMF	MAIN FRAME ASM PSG1000B			A	1.00000	4
47PSGBOA	OUTPUT AMP ATTENUATOR PSG/B			A	1.00000	4
5NPSGBOA	OUTPUT AMP BOARD			A	1.00000	5
8P1074901	OUTPUT ATTENUATOR C/B			A	1.00000	
8P1074902	OUTPUT ATTENUATOR C/B			A	1.00000	
8P1074903	OUTPUT ATTENUATOR C/B			A	1.00000	
8P1074904	OUTPUT ATTENUATOR C/B			A	1.00000	
8ZX10050203	O/P AMP BOARD CCT DIAG	00F	CZX10050203	F	1.00000	
BC1038	ATTENUATOR AND OUTPUT AMP BD.	01K	37DKK10380	D	1.00000	B
BP60232	CCT BD OAK 602 1/32 2.5	10W	602-310		0.01300	
CAOMIT	CAPACITORS OMITTED				3.00000	C2:11:36
CC0P560LC	0.56PF .25PF 100V P100	RP050	01P 683+03567		1.00000	C41
CC12P20LC1	2.2PF .25PF 100V NPO	RP025	01P 682+09228		1.00000	C3
CC210POLG	10PF 2% 100V NPO	RP050	01P 683+10109		1.00000	C39
CC210P0UM	10PF 20% 500V N470	DL050	95B CD06TH10POMS		1.00000	C40
CC215POLG	15PF 2% 100V NPO	RP050	01P 683+10159		1.00000	C38
CC222POLG	22PF 2% 100V N150	RP050	01P 683+34229		1.00000	C34
CC247POLG1	47PF 2% 100V N150	RP025	01P 682+34479		2.00000	C7:10
CC3220PLG	220PF 2% 100V N750	RP050	01P 683+58221		1.00000	C6
CC3470PLK1	470PF 10% 100V	RP025	01P 630+18471		4.00000	C1 4 5 8
CI41N00VZ	1.0NF 600V -20+80%	95B	TPS014B		23.00000	C12-34
DAOMIT	DIODES OMITTED	00F	DAOMIT		1.00000	D2
DG2826	DIODE	02H	5082-2826		2.00000	D6 7
DG4148	DIODE	23N	1N4148		3.00000	D4 5:14
DG479	DIODE	34A	BA479		2.00000	D1 3
DG62	DIODE	01P	BAW62		4.00000	D8-11
DZ15V60H1	5.6V 5% 1W30	01P	BZV85-C5V6		2.00000	D12 3
HW10050542	ATTENUATOR COVER	33D	30010050542	A	1.00000	
HW10050543	ATTENUATOR COVER	33D	30010050543	A	1.00000	
PM3500RMV	500R 20% PRESET VERT STURN	02S	75H		1.00000	P2
PM6100KHV	100K 20% PRESET VERT STURN	02S	75H		1.00000	P1
RAOMIT	RESISTORS OMITTED	01B	RAOMIT		3.00000	R3 5 6
RASOT	#### SELECT ON TEST ####	00F	RASOT		1.00000	R43
RM15R10FF	5R10 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R41
RM22R0FF	22R0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R20
RM268R0FF	68R0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R19
		53D	SMA0207TK50			
RM3470RFF	470R 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R18
RM41K50FF	1K50 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R4
RM41K80FF	1K80 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R17
		53D	SMA0207TK50			
RM42K20FF	2K20 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R1 2
RM42K70FF	2K70 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R8 9
RM43K30FF	3K30 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R10
RM43K90FF	3K90 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R7
		53D	SMA0207TK50			
RM44K70FF	4K70 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R42 4
RM45K60FF	5K60 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R12
		53D	SMA0207TK50			
RM51K0KFF	10K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R14
RM539K0FF	39K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R13
		53D	SMA0207TK50			
RM547K0FF	47K0 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R15 6
RM6100KFF	100K 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R11
RUM2536FCO	53R6 1% MINI-MELF	17V	501-2		6.00000	R21 4 5 8 9:32

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
RUM3240GA0	240R 2% 1206	18P	RC01-240R-2%		1.00000	R34
RUM3392FC0	392R 1% MINI MELF	17V	501-2		6.00000	R22 3 6 7:30 1
SR1725	RELAY 172-5	20T	172-5		8.00000	RL1-8
TR1820	SMA RIGHT ANGLE PLUG	04Q	42-1820-061		1.00000	
		01G	GE65102B285			
UCC2820JA0KC	82PF 5% 50V 1206 COG	08V	1206A820JXAT		1.00000	C35
		62S	1206J0500820JC/C09			
		44M	GRM426COG820J50PT			
URM2560FC0	56R 1% MINI MELF	67P	ER0-10MKF56R0		2.00000	R33 5
		70S	MS1			
		53D	SMM0204			
URM2750GA0	75R 2% 1206	18P	RC-01		1.00000	R37
		77S	DC2			
		53D	CR1206			
URM2953FC0	95R3 1% MINI-MELF	67P	ER010MKF95R3		2.00000	R36 8
		70S	MR1			
VA356TC	IC UAF356TC/LF356N	23N	LF356N		1.00000	U1
VAOM370	AMPLIFIER OM370	01P	OM370		1.00000	U2
VS8P	IC SKT 8WAY	28I	703-3308-01-04-10		1.00000	
		08R	IC0-083-S8A-T			
VT182PL	BC182PL NO NEW USE NLGP	03Z	BC182PL		1.00000	Q2
VT212PL	BC212PL NO NEW USE PLGP	03Z	BC212PL		1.00000	Q1
YX85	S/R COAX UT85 TINNED	22S	UT85		0.16500	
ZC0290	YE315S 4 TURNS CHOKE	22K	3SR0290	C	1.00000	L1
YE0315S	.315 BS4520/1 RED GD2	05B	0.315MM+(RED)		0.00100	
ZF1115	FERRITE BEAD L=5.6MM OD=4.15	15P	FX1115		1.00000	
ZC0292	YE315S 6 TURNS CHOKE	22K	3SR0292	A	1.00000	L2
YE0315S	.315 BS4520/1 RED GD2	05B	0.315MM+(RED)		0.00100	
ZF1115	FERRITE BEAD L=5.6MM OD=4.15	15P	FX1115		1.00000	
ZCOU510	CHOKE 0U47 SC10	103S	32792G		1.00000	L3
ZC15U10	CHOKE 15UH SC10 ITT	103S	32801D		1.00000	L6
ZC4U7	CHOKE 47NH	28I	551-5172-05-02+00		2.00000	L4 5
7NU10050541	IC SCREEN	00F	40010050541	A	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00030	
7SU2400	PARTION "A" BRACKET	00F	4SU002400	A	2.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00010	
CR6100NKM	100NF 20% 63V R050	159W	MKS2MIN		1.00000	C2
HW0190	PSG ATTENUATOR ASM	80P	4SC0190	B	1.00000	

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
4NPSGBCH	CHASSIS ASSEMBLY			A	1.00000	
4NPSGBOB	OUTPUT BOX ASSEMBLY			A	1.00000	4
4NPSGBRD	RANGE DIVIDER ASSEMBLY			A	1.00000	4
5NPSG1000UHF	UHF CIRCUIT BOARD ASSEMBLY			G	1.00000	5
7NU10050528	OSC SCREEN "A"	00F	40010050528	A	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00110	
7NU10050529	OSC SCREEN "B"	00F	40010050529	A	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00110	
8P1044701	UHF OSCILLATOR C/BOARD ASSM			C	1.00000	
8P1044702	UHF OSCILLATOR C/BOARD ASSM			D	1.00000	
8P1044703	UHF OSCILLATOR C/BOARD ASSM			G	1.00000	
BC1036	U.H.F. OSCILLATOR BOARD	01K	37SKK10360	B	1.00000	B
BP60232	CCT BD OAK 602 1/32 2.5	10W	602-310		0.00300	
CC247POLG1	47PF 2% 100V N150 RP025	01P	682+34479		1.00000	C3
CEB47UOEM2	47UF 20% 16V R050	50D	K-143-245		1.00000	C04
CI41N00VZ	1.0NF 600V -20+80%	95B	TPS014B		3.00000	C206-208
DG221	DIODE VARACTOR	31I	BB221		2.00000	D01 2
RM268ROFF	68R0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R07
		53D	SMA0207TK50			
RM282ROFF	82R0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R06
RM327ORFF	270R 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R01 4
RM43K3OFF	3K30 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R05
RM527KOFF	27K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R08
TM16P51	FEED THROUGH TERMINAL	22S	001-1007-040519		2.00000	
UCC1560JA0KC	5P6 5% 50V 1206 COG	08V	1206A		1.00000	C5
		62S	1206			
		44M	GRM426COG5R6J50PT			
UCC2100JA0KC	10PF 5% 50V 1206 COG	08V	1206A100JXAT		1.00000	C2
		62S	1206J0500100JC/C09			
		44M	GRM426COG100J50PT			
UCC2330JA0KC	33PF 5% 50V 1206 COG	08V	1206A330JXAT		1.00000	C1
		62S	1206J0500330JC/C09			
		44M	GRM426COG330J50PT			
URM3150GA0	150R 2% 1206	18P	RC-01		1.00000	R3
		77S	DC2			
		53D	CR1206			
URM3560GA0	560R 2% 1206	18P	RC-01		1.00000	R2
		77S	DC2			
		53D	CR1206			
VTR90A	BFR90A/02 SOT37	01P	BFR90A/02		1.00000	Q01
ZC15U10	CHOKE 15UH SC10 ITT	103S	32801D		1.00000	L03
ZC1U10	CHOKE 1UH SC10 ITT	103S	32794C		1.00000	L01
ZC4U730	CHOKE SC30 4.7UH	103S	66247GM		1.00000	L02

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
5NPSGBRD	RANGE DIVIDER BOARD			A	1.00000	5
5NPSGBRD3	DOWN CONVERTER			A	1.00000	5
CAOMIT	CAPACITORS OMITTED				1.00000	C329
CC14P70LC	4.7PF .25PF 100V NPO RP050 01P 683+09478				1.00000	C310
CC18P20LC	8.2PF .25PF 100V NPO RP050 01P 683+09828				1.00000	C308
CC210P0LG	10PF 2% 100V NPO RP050 01P 683+10109				1.00000	C307
CC239P0LG	39PF 2% 100V N150 RP050 01P 683+34399				1.00000	C318
CC256P0LG	56PF 2% 100V N150 RP050 01P 683+34569				2.00000	C317:25
CC3100PLG	100PF 2% 100V N150 RP050 01P 683+34101				1.00000	C316
CC3150PLG	150PF 2% 100V N150 RP050 01P 683+34151				1.00000	C312
CC3220PLG	220PF 2% 100V N750 RP050 01P 683+58221				1.00000	C326
CC3470PLK1	470PF 10% 100V RP025 01P 630+18471				6.00000	C301-303 5:14 5
CEB10U0JM2	10UF 20% 50V FC +5MM 134N KMVB				5.00000	C319:21-24
CEB33U0IM1	33UF 20% 40V FC +5MM 134N KMVB				3.00000	C306:11:27
CEB47U0DM	47UF 20% 10V FC +5MM 134N KMVB				1.00000	C330
CR510N0LJ	10NF 5% 100V R050 159W FKS2				1.00000	C328
CR6100NKM	100NF 20% 63V R050 159W MKS2MIN				6.00000	C300 4:13:20 :31 2
DG221	DIODE VARACTOR	31I	BB221		1.00000	D300
DGD3F	DUAL DIODE	03Z	ZDX3F		2.00000	D301 2
PM3500RMV	500R 20% PRESET VERT STURN	02S	75H		1.00000	P300
PM6100KMV	100K 20% PRESET VERT STURN	02S	75H		1.00000	P301
RGB10M0BJ	10M0 5% 0W25 250PPM 1K1V	18P	VR25		1.00000	R336
RM11R50FF	1R50 1% 0W60 100PPM 250V	18P	MRS25		2.00000	R325 6
RM22R0FF	22R0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R327
RM24R0FF	47R0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R322
RM26R0FF	68R0 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R308 9
		53D	SMA0207TK50			
RM3100RFF	100R 1% 0W60 50PPM 250V	18P	MRS25		5.00000	R304 5:10 2 7
RM3150RFF	150R 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R307
		53D	SMA0207TK50			
RM3270RFF	270R 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R311
RM3470RFF	470R 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R314 6
RM3560RFF	560R 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R328
RM3680RFF	680R 1% 0W60 50PPM 250V	18P	MRS25		3.00000	R320:31 2
		53D	SMA0207TK50			
RM3750RFF	750R 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R303
RM41K00FF	1K00 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R329
RM41K20FF	1K20 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R313 9
RM41K50FF	1K50 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R323
RM42K70FF	2K70 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R334
RM43K30FF	3K30 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R318
RM43K90FF	3K90 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R306
		53D	SMA0207TK50			
RM44K70FF	4K70 1% 0W60 50PPM 250V	18P	MRS25		3.00000	R330 7 8
RM45K60FF	5K60 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R321
		53D	SMA0207TK50			
RM48K20FF	8K20 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R302:24
RM510K0FF	10K0 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R301:33
RM515K0FF	15K0 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R300:35
RM547K0FF	47K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R315
TBM2503PO	STRAIGHT PIN HEADER 3 WAY 2.54	23M	4030+22-03-2031		1.00000	S500
VA356TC	IC UAF356TC/LF356N	23N	LF356N		1.00000	U303
VA6440CDP	IC SL6440CDP	43G	SL6440CDP		1.00000	U300
VA8660DP	IC SP8660DP	43G	SP8660DP		1.00000	U301

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
VD4044P	INT CCT MC4044P				1.00000	U302
		02M	MC4044P			
VF310S	J310 SILICONIX	STATIC	41S J310		1.00000	Q303
VS14L	IC SKT 14WAY		28I 703-3314-01-04-10		1.00000	U302
			08R ICO-143-S8A-T			
VS16L	IC SKT 16WAY		28I 703-3316-01-04-10		1.00000	U300
			08R ICO-163-S8A-T			
VS8P	IC SKT 8WAY		28I 703-3308-01-04-10		1.00000	U303
			08R ICO-083-S8A-T			
VT182PL	BC182PL NO NEW USE NLGP		03Z BC182PL		1.00000	Q302
VT212PL	BC212PL NO NEW USE PLGP		03Z BC212PL		1.00000	Q308
VT328	BC328 NO NEW DES (PGP)		01P BC328		2.00000	Q300 1
VT337	BC337 NO NEW DES (NGP)		01P BC337		1.00000	Q306
VTR96S	BFR96S MUL SOT37		01P BFR96S		1.00000	Q307
VTX313	ZTX313 NOT NEW DESIGNS		03Z ZTX313		1.00000	Q304
ZC0290	YE315S 4 TURNS CHOKE		22K 3SR0290	C	1.00000	L307
YE0315S	.315 BS4520/1 RED GD2		05B 0.315MM+(RED)		0.00100	
ZF1115	FERRITE BEAD L=5.6MM OD=4.15		15P FX1115		1.00000	
ZC0292	YE315S 6 TURNS CHOKE		22K 3SR0292	A	1.00000	L301
YE0315S	.315 BS4520/1 RED GD2		05B 0.315MM+(RED)		0.00100	
ZF1115	FERRITE BEAD L=5.6MM OD=4.15		15P FX1115		1.00000	
ZC0U510	CHOKE OU47 SC10		103S 32792G		4.00000	L303-306
ZC15U10	CHOKE 15UH SC10 ITT		103S 32801D		1.00000	L302
Z29F30131	CHOKE R/DIV PSG	5	01B Z29F30131	D	1.00000	L300
ZB2175	530217503COIL/FORM3PINCK		28I 530-2175-00-03-00		1.00000	
ZZZBBH	BBH COST FACTOR		00F ZZZBBH		0.45000	
ZZZC	INVTR WINDING SP FACTOR		00F ZZZC		2.09300	

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
5NPSGBRD4	OUTPUT CONTROL			A	1.00000	5
CEB10U0JM2	10UF 20% 50V FC +5MM	134N	KMVB		6.00000	C400-405
CEB33U01M1	33UF 20% 40V FC +5MM	134N	KMVB		2.00000	C407 8
CEB47U0DM	47UF 20% 10V FC +5MM	134N	KMVB		1.00000	C406
CR6100NKM	100NF 20% 63V R050	159W	MKS2MIN		1.00000	C409
DAOMIT	DIODES OMITTED	00F	DAOMIT		1.00000	D407
DG4148	DIODE	23N	1N4148		8.00000	D400-406 8
RALINK	RESIST	99F	RALINK		1.00000	R407
RAOMIT	RESISTORS OMITTED	01B	RAOMIT		4.00000	R424 5 8:41
RASOT	#### SELECT ON TEST ####	00F	RASOT		1.00000	R426
RM15R10FF	5R10 1% 0W60 50PPM 250V	18P	MRS25		5.00000	R403:11 5 9:23
RM210R0FF	10R0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R438
RM247R0FF	47R0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R406
RM3100RFF	100R 1% 0W60 50PPM 250V	18P	MRS25		5.00000	R402:10 4 8:22
RM3470RFF	470R 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R424
RM43K90FF	3K90 1% 0W60 50PPM 250V	18P	MRS25		9.00000	R401 4 5 9:13 7
		53D	SMA0207TK50			:21 7:32
RM44K70FF	4K70 1% 0W60 50PPM 250V	18P	MRS25		5.00000	R400 8:12 6:20
RM48K20FF	8K20 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R429
RM510K0FF	10K0 1% 0W60 50PPM 250V	18P	MRS25		3.00000	R439:40 2
RM512K0FF	12K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R430
RM533K0FF	33K0 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R431 3
RM6100KFF	100K 1% 0W60 50PPM 250V	18P	MRS25		4.00000	R434-37
TBM2510PS	STRAIGHT PIN HEADER 10 WAY	23M	6410+22-27-2101		1.00000	S400
VA062	IC TL062CP	01T	TL062CP		1.00000	U403
VD211CJ	IC DG211CJ	41S	DG211CJ		1.00000	U402
VD4001BCN	IC CD4001BE	23N	CD4001BCN		1.00000	U401
		70H	CD4001BE+			
VD4094BCN	IC CD4094BCN	23N	CD4094BCN		1.00000	U400
		70H	CD4094BE			
VS14L	IC SKT 14WAY	28I	703-3314-01-04-10		1.00000	U401
		08R	ICO-143-S8A-T			
VS16L	IC SKT 16WAY	28I	703-3316-01-04-10		2.00000	U400 2
		08R	ICO-163-S8A-T			
VS8P	IC SKT 8WAY	28I	703-3308-01-04-10		1.00000	U403
		08R	ICO-083-S8A-T			
VT212PL	BC212PL NO NEW USE PLGP	03Z	BC212PL		6.00000	Q401 3 5 7 9:11
VT328	BC328 NO NEW DES (PGP)	01P	BC328		7.00000	Q400 2 4 6 8:10
						2
7NU10050540	RANGE DIVIDER "A"	00F	40010050540	A	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00080	
8P1044401	RANGE DIV C/B ASSEMBLY			E	1.00000	
8P1044402	RANGE DIV C/B ASSEMBLY			J	1.00000	
8P1044403	RANGE DIV C/B ASSEMBLY			C	1.00000	
8P1044404	RANGE DIV C/B ASSEMBLY			B	1.00000	
8P1044405	RANGE DIV C/B ASSEMBLY			D	1.00000	
8P1044406	RANGE DIV C/B ASSEMBLY			C	1.00000	
8P1044407	RANGE DIV C/B ASSEMBLY			D	1.00000	
8P1044408	RANGE DIV C/B ASSEMBLY			G	1.00000	
8P1044409	RANGE DIV C/B ASSEMBLY			D	1.00000	
8P1044410	RANGE DIV C/B ASSEMBLY			C	1.00000	
8ZX100502021	RANGE DIV BD RD1/2 CCT DIAG	00F	CZX10050202	G	1.00000	
8ZX100502022	RANGE DIV BD RD3 CCT DIAG	00F	CZX10050202	D	1.00000	
8ZX100502023	RANGE DIV BD RD4 CCT DIAG	00F	CZX10050202	B	1.00000	
BC1037	RANGE DIVIDER BOARD	01K	37SKK10370	H	1.00000	

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
CAOMIT	CAPACITORS OMITTED				2.00000	C8:50
CC11P80LC	1.8PF .25PF 100V NPO	RP050	01P 683+09188		1.00000	C47
CC14P70LC	4.7PF .25PF 100V NPO	RP050	01P 683+09478		2.00000	C49:52
CC247POLG	47PF 2% 100V N150	RP050	01P 683+34479		2.00000	C24:35
CC3100PLG	100PF 2% 100V N150	RP050	01P 683+34101		1.00000	C45
CC3470PLK1	470PF 10% 100V	RP025	01P 630+18471		32.00000	C2-7:10-12 4 5 17-20 2 3 25-27 29-31 3 4 36-40 6 8
CC44N70LK	4.7NF 10% 100V	RP050	01P 630+19472		4.00000	C16:21 8:32
CEB33U01M1	33UF 20% 40V	FC +5MM	134N KMVB		2.00000	C1 9
CR41N00LJ	1.0NF 5% 100V	R050	159W FKS2		1.00000	C41
DG221	DIODE VARACTOR		31I BB221		4.00000	D1 3:11 2
DG284	DIODE		85S BA284		7.00000	D2 5:10 3 6:22 3
DG329	TUNING DIODE		38A BB329		7.00000	D4 6-9:14 5
DG4148	DIODE		23N 1N4148		1.00000	D21
PM550KOMV	50K0 20% PRESET VERT STURN	O2S	75H		1.00000	P2
PM6100KMV	100K 20% PRESET VERT STURN	O2S	75H		1.00000	P1
RAOMIT	RESISTORS OMITTED		01B RAOMIT		1.00000	R50
RM210ROFF	10R0 1% 0W60 50PPM 250V	18P	MRS25		3.00000	R31 5:52
RM218ROFF	18R0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R43
RM222ROFF	22R0 1% 0W60 50PPM 250V	18P	MRS25		4.00000	R34:40 8:56
RM233ROFF	33R0 1% 0W60 50PPM 250V	18P	MRS25		7.00000	R6;25 9;37;53 9 :61
RM247ROFF	47R0 1% 0W60 50PPM 250V	18P	MRS25		3.00000	R7;41;60
RM251ROFF	51R0 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R26:49
RM310ORFF	100R 1% 0W60 50PPM 250V	18P	MRS25		8.00000	R1 3 5 8:27:44 57:63
RM318ORFF	180R 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R4
RM327ORFF	270R 1% 0W60 50PPM 250V	18P	MRS25	53D SMA0207TK50	1.00000	R2
RM41K2OFF	1K20 1% 0W60 50PPM 250V	18P	MRS25		7.00000	R15-19:54:62
RM42K7OFF	2K70 1% 0W60 50PPM 250V	18P	MRS25		6.00000	R32 8:46:65 8:70
RM43K9OFF	3K90 1% 0W60 50PPM 250V	18P	MRS25		5.00000	R28:33 9:47:55
RM45K6OFF	5K60 1% 0W60 50PPM 250V	18P	MRS25	53D SMA0207TK50	5.00000	R30 6:42:51 8
RM510KOFF	10K0 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R11:66
RM515KOFF	15K0 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R12 3
RM527KOFF	27K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R67
RM533KOFF	33K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R14
RM547KOFF	47K0 1% 0W60 50PPM 250V	18P	MRS25		6.00000	R20-24:69
RM568KOFF	68K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R10
RM6120KFF	120K 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R9
TBM2503PO	STRAIGHT PIN HEADER 3 WAY 2.54	23M	4030+22-03-2031		1.00000	S1
TL2W	JUMPER 2WAY	23M	7859-15-38-1024		2.00000	S1:500
VA061	IC TL061CP	STATIC	01T TL061CP		1.00000	U3
VA3199E	NOT FOR NEW DESINGS		70H CA3199E		4.00000	U7-10
VAOM350	HYBRID AMP OM350		01P OM350		3.00000	U1 2:12
VD212CJ	IC DG212CJ	STATIC	41S DG212CJ		1.00000	U4
VD4001BCN	IC CD4001BE	STATIC	23N CD4001BCN		1.00000	U11
VD4094BCN	IC CD4094BCN	STATIC	23N CD4094BCN		1.00000	U5
VD581C	IC PB581C		35N UPB581C		1.00000	U6

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
VP1A	TRANSISTOR PAD TW1A	27K	NW1802		5.00000	L302 3 5 6 9
VS14L	IC SKT 14WAY	281	703-3314-01-04-10		2.00000	U11
		08R	IC0-143-S8A-T			
VS16L	IC SKT 16WAY	281	703-3316-01-04-10		2.00000	U4 5
		08R	IC0-163-S8A-T			
VS8P	IC SKT 8WAY	281	703-3308-01-04-10		1.00000	U3
		08R	IC0-083-S8A-T			
VT212PL	BC212PL NO NEW USE PLGP	03Z	BC212PL		1.00000	Q7
VT328	BC328 NO NEW DES (PGP)	01P	BC328		5.00000	Q1 3-6
YX9307	CONFORMABLE CABLE 9307	04Q	9037		0.12000	
ZC0290	YE315S 4 TURNS CHOKE	22K	3SR0290	C	3.00000	L1 2:13
YE0315S	.315 BS4520/1 RED GD2	05B	0.315MM+(RED)		0.00100	
ZF1115	FERRITE BEAD L=5.6MM OD=4.15	15P	FX1115		1.00000	
ZC0291	YE315S 1 TURN CHOKE	22K	3SR0291	C	1.00000	L15
YE0315S	.315 BS4520/1 RED GD2	05B	0.315MM+(RED)		0.00100	
ZF1115	FERRITE BEAD L=5.6MM OD=4.15	15P	FX1115		1.00000	
ZZ9F30132	CHOKE R/DIV PSG 5	01B	ZZ9F30132	B	3.00000	L4 5 6
ZB04264	50/042/64COIL/FORM2PINEK	06N	50-042-64		1.00000	
ZZZBBH	BBH COST FACTOR	00F	ZZZBBH		0.43000	
ZZZC	INVTR WINDING SP FACTOR	00F	ZZZC		0.50000	
ZZ9F30133	CHOKE R/DIV PSG 5	01B	ZZ9F30133	B	2.00000	L7 8
ZB04264	50/042/64COIL/FORM2PINEK	06N	50-042-64		1.00000	
ZZZBBH	BBH COST FACTOR	00F	ZZZBBH		0.47000	
ZZZC	INVTR WINDING SP FACTOR	00F	ZZZC		0.53000	
ZZ9F30134	CHOKE R/DIV PSG 5	01B	ZZ9F30134	B	2.00000	L9:10
ZB04264	50/042/64COIL/FORM2PINEK	06N	50-042-64		1.00000	
ZZZBBH	BBH COST FACTOR	00F	ZZZBBH		0.32670	
ZZZC	INVTR WINDING SP FACTOR	00F	ZZZC		0.49670	
ZZ9F30136	CHOKE R/DIV PSG 5	01B	ZZ9F30136	B	2.00000	L11 2
ZB04264	50/042/64COIL/FORM2PINEK	06N	50-042-64		1.00000	
ZZZC	INVTR WINDING SP FACTOR	00F	ZZZC		0.54170	
ZZ9F30139	L3 CHOKE PSG1000 5	01B	ZZ9F30139	P1	1.00000	L3
ZB04264	50/042/64COIL/FORM2PINEK	06N	50-042-64		1.00000	
ZZZBBH	BBH COST FACTOR	00F	ZZZBBH		0.37170	
ZZZC	INVTR WINDING SP FACTOR	00F	ZZZC		0.50900	
7NU10050530	TOP RNG DIV SCREEN	00F	30010050530	D	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00450	
7NU10050531	RD SCREEN BOTTOM	00F	30010050531	A	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00170	
8P1075001	RANGE DIVIDER METALWORK			A	1.00000	
8P1075002	RANGE DIVIDER METALWORK			A	1.00000	
8P1075003	RANGE DIVIDER METALWORK			A	1.00000	
8P1075004	RANGE DIVIDER METALWORK			A	1.00000	
8P1075005	RANGE DIVIDER METALWORK			A	1.00000	
CC11P80LC	1.8PF .25PF 100V NPO	RP050	01P 683+09188		1.00000	C55
CC13P30LC	3.3PF .25PF 100V NPO	RP050	01P 683+09338		1.00000	C51
CC3470PLK1	470PF 10% 100V	RP025	01P 630+18471		1.00000	C54
CI41N00VZ	1.0NF 600V -20+80%		95B TPS014B		3.00000	C42-44
CR6100NKM	100NF 20% 63V	R050	159W MKS2MIN		1.00000	C53
DG221	DIODE VARACTOR	31I	BB221		1.00000	D26
DG329	TUNING DIODE	38A	BB329		2.00000	D24 5
DG479	DIODE	34A	BA479		4.00000	D17-20
RM15R10FF	5R10 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R72
RM42K70FF	2K70 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R64
ZC0290	YE315S 4 TURNS CHOKE	22K	3SR0290	C	1.00000	L14

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
YE0315S	.315 BS4520/1 RED GD2	05B	0.315MM+(RED)		0.00100	
ZF1115	FERRITE BEAD L=5.6MM OD=4.15	15P	FX1115		1.00000	
ZC15U10	CHOKE 15UH SC10 ITT	103S	32801D		1.00000	L17
7NU10050520	OUTPUT BOX	00F	100010050520	A	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.03630	
7NU10050521	SIDE FLNG A	00F	300010050521	C	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00430	
7NU10050535	SIDE FLNG B	00F	30010050535	B	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00300	
7NU10050536	SIDE FLNG F	00F	20010050536	A	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00460	
7SU2525	SIDE FLANGE "C"	00F	2SU002525	A	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00460	
7SU2526	SIDE FLANGE "B"	00F	3SU002526	A	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00300	
7SU3228	IF SIDE FLANGE "D"	00F	3SU003228	B	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00440	
CI41N00VZ	1.ONF 600V -20+80%	95B	TPS014B		14.00000	C600-13
HR31212	RECEPT 312/12 CAM	18C	312-12		6.00000	
KP3M5	SCREW M3 X 5 PAN HD POZI	05T	KP3M5		11.00000	
KP3M6	SCREW M3 X 6 PAN HD POZI	05T	KP3M6		11.00000	
NR3M10TH	SPACER M3 X 10MM THR'D HEX	01H	R6374-02		11.00000	
NV320D	POP RIVET 2.4MM DIA DOMED HD	08T	TAPD+33+BS		12.00000	
TR1820	SMA RIGHT ANGLE PLUG	04Q	42-1820-061		1.00000	
		01G	GE65102B285			
TR50675	FEED THROUGH	22S	50/675/0000/31		1.00000	
WW3M	WAVEY WASHER M3	24L	LS508/54		11.00000	
YMMNS513	RF GASKET 0090-0030 3	24K	FSP282-0032-0095		1.50000	
YT24	T/C WIRE 24SWG	55M	24SWG		0.07000	L600-06
YX85	S/R COAX UT85 TINNED	22S	UT85		0.15000	

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
4NPSGBSB	SYNTHESIZER BOX ASM			A	1.00000	4
4NPSGBHS	HS SYNTHESIZER COMPS			A	1.00000	4
5NPSG1000UHF	UHF CIRCUIT BOARD ASSEMBLY			G	1.00000	B
7NU10050528	OSC SCREEN "A"	00F	40010050528	A	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00110	
7NU10050529	OSC SCREEN "B"	00F	40010050529	A	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00110	
8P1044701	UHF OSCILLATOR C/BOARD ASSM			C	1.00000	
8P1044702	UHF OSCILLATOR C/BOARD ASSM			D	1.00000	
8P1044703	UHF OSCILLATOR C/BOARD ASSM			G	1.00000	
BC1036	U.H.F. OSCILLATOR BOARD	01K	37SKK10360	B	1.00000	B
BP60232	CCT BD OAK 602 1/32 2.5	10W	602-310		0.00300	
CC247POLG1	47PF 2% 100V N150 RP025	01P	682+34479		1.00000	C3
CEB47UOEM2	47UF 20% 16V R050	50D	K-143-245		1.00000	C04
CI41N00VZ	1.0NF 600V -20+80%	95B	TPS014B		3.00000	C206-208
DG221	DIODE VARACTOR	311	BB221		2.00000	D01 2
RM268ROFF	68R0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R07
		53D	SMA0207TK50			
RM282ROFF	82R0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R06
RM327ORFF	270R 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R01 4
RM43K3OFF	3K30 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R05 (DO NOT BEND)
RM527KOFF	27K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R08
TM16P51	FEED THROUGH TERMINAL	22S	001-1007-040519		2.00000	
UCC1560JA0KC	5P6 5% 50V 1206 COG	08V	1206A		1.00000	C5
		62S	1206			
		44M	GRM426COG5R6J50PT			
UCC2100JA0KC	10PF 5% 50V 1206 COG	08V	1206A100JXAT		1.00000	C2
		62S	1206J0500100JC/C09			
		44M	GRM426COG100J50PT			
UCC2330JA0KC	33PF 5% 50V 1206 COG	08V	1206A330JXAT		1.00000	C1
		62S	1206J0500330JC/C09			
		44M	GRM426COG330J50PT			
URM3150GA0	150R 2% 1206	18P	RC-01		1.00000	R3
		77S	DC2			
		53D	CR1206			
URM3560GA0	560R 2% 1206	18P	RC-01		1.00000	R2
		77S	DC2			
		53D	CR1206			
VTR90A	BFR90A/02 SOT37	01P	BFR90A/02		1.00000	Q01
ZC15U10	CHOKE 15UH SC10 ITT	103S	32801D		1.00000	L03
ZC1U10	CHOKE 1UH SC10 ITT	103S	32794C		1.00000	L01
ZC4U730	CHOKE SC30 4.7UH	103S	66247GM		1.00000	L02

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
5NPSGBHS	HF SYNTHESIZER BOARD			A	1.00000	B
5NPSGBHS1	HF SYNTHESIZER "1" COMPS			A	1.00000	5
CC256P0LG	56PF 2% 100V N150	RP050	01P 683+34569		1.00000	C108
CC41N00LK	1.0NF 10% 100V	RP050	01P 630+19102		1.00000	C106
CC44N70LK	4.7NF 10% 100V	RP050	01P 630+19472		3.00000	C101 2 5
CEB33U01M	33UF 20% 40V	R025	134N KMBV		1.00000	C103
CEB47U0DM	47UF 20% 10V FC +5MM	134N	KMBV		1.00000	C104
CR510N0LM	10NF 20% 100V	R050	159W FKS2MIN		1.00000	C107
DG284	DIODE	85S	BA284		2.00000	D101 2
DG4148	DIODE	23N	1N4148		1.00000	D103
PM510K0KV2	10K0 10% PRESET VERT MTURN	02S	64W		1.00000	P101
RM210R0FF	10R0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R101
RM222R0FF	22R0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R109
RM333R0FF	33R0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R106
RM41K00FF	1K00 1% 0W60 50PPM 250V	18P	MRS25		3.00000	R102 4 5
RM41K50FF	1K50 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R108
RM510K0FF	10K0 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R103:10
SR161A	REED RELAY 161A-1	52A	161A-1		1.00000	RL1
VD74HC00N	IC 74HC00N	STATIC	01T 74HC00N		1.00000	U102
			23N 74HC00N			
VD74HC390N	IC 74HC390N	STATIC	01T 74HC390N		1.00000	U101
			23N 74HC390N\			
VS14L	IC SKT 14WAY	28I	703-3314-01-04-10		1.00000	U102
		08R	IC0-143-S8A-T			
VS16L	IC SKT 16WAY	28I	703-3316-01-04-10		1.00000	U101
		08R	IC0-163-S8A-T			
VTX313	ZTX313 NOT NEW DESIGNS	03Z	ZTX313		1.00000	Q101

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
5NPSGBHS2	HF SYNTHESIZER "2" COMPS			A	1.00000	5
CAOMIT	CAPACITORS OMITTED				2.00000	C216:25
CC247POLG1	47PF 2% 100V N150	RP025	01P 682+34479		1.00000	C211
CC3470PLK	470PF 10% 100V	RP050	01P 630+19471		6.00000	C201-205 9
CC3470PLK1	470PF 10% 100V	RP025	01P 630+18471		4.00000	C210 3:20 1
CEB22U0GT	22UF 50% 25V	AXIAL	01P 030-36229		1.00000	C228
CEB33U0IM	33UF 20% 40V	R025	134N KMVB		2.00000	C214 9
CEB47U0DM	47UF 20% 10V	FC +5MM	134N KMVB		1.00000	C206
CR41N50LM	1.5NF 20% 100V	R050	159W FKS2		1.00000	C212
CR510N0LM	10NF 20% 100V	R050	159W FKS2MIN		1.00000	C207
CR522N0KM	22NF 20% 63V	R050	159W MKS2MIN		1.00000	C222
CR6100NKM	100NF 20% 63V	R050	159W MKS2MIN		3.00000	C208:15 8
CR6470NKK	470NF 10% 63V	R050	159W MKS2		1.00000	C227
CRA1U00KM1	1.0UF 20% 63V	R050	159W MKS2		1.00000	C217
DGD3F	DUAL DIODE	03Z	ZDX3F		2.00000	D201 2
DZ12V70E	2.7V 5% 0W50	31I	ZPD2.7		1.00000	Z201
PM41K00KV	1K00 10% PRESET VERT STURN	02S	63P		1.00000	P201
PM45K00KV	5K00 10% PRESET VERT STURN	02S	63P		2.00000	P202 3
RAOMIT	RESISTORS OMITTED	01B	RAOMIT		1.00000	R230
RASOT	#### SELECT ON TEST ####	00F	RASOT		1.00000	R220
RG71M00BJ	1M00 5% 0W25 100PPM 1K1V	18P	VR25		1.00000	R226
RG72M20BJ	2M20 5% 0W25 250PPM 1K1V	18P	VR25		2.00000	R201 2
RM210R0FF	10R0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R209
RM251R0FF	51R0 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R212 4
RM310RFF	100R 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R213 5
RM3470RFF	470R 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R220
RM41K00FF	1K00 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R216 9
RM41K80FF	1K80 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R218
		53D	SMA0207TK50			
RM42K70FF	2K70 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R211
RM43K90FF	3K90 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R224
		53D	SMA0207TK50			
RM510K0FF	10K0 1% 0W60 50PPM 250V	18P	MRS25		5.00000	R205-208:10
RM522K0FF	22K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R204
		53D	SMA0207TK50			
RM543K0FF	43K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R217
		53D	SMA0207TK50			
RM547K0FF	47K0 1% 0W60 50PPM 250V	18P	MRS25		3.00000	R222 3 5
RM582K0FF	82K0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R229
RM6120KFF	120K 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R203:28
RM6220KFF	220K 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R227
		53D	SMA0207TK50			
TBM2503PO	STRAIGHT PIN HEADER 3 WAY 2.54	23M	4030+22-03-2031		1.00000	X201
TBM2512PS	STRAIGHT PIN HEADER 12 WAY	23M	6410+22-27-2121		1.00000	S201
TL2W	JUMPER 2WAY	23M	7859-15-38-1024		2.00000	LK1 2
VA062	IC TL062CP	STATIC	01T TL062CP		2.00000	U209:10
VA356TC	IC UAF356TC/LF356N		23N LF356N		1.00000	U208
VA8821DP	IC NJ8821DP		43G NJ8821BDP		1.00000	U203
VD212CJ	IC DG212CJ	STATIC	41S DG212CJ		2.00000	U207:15
VD4013BE	IC CD4013BE	STATIC	23N CD4013BE		1.00000	U201
			70H CD4013BE			
VD4069UBE	IC CD4069UBE	STATIC	23N CD4069UBE		1.00000	U214
			70H CD4069UBE			
VD4071BCN	IC CD4071BCN	STATIC	70H CD4071BCN		1.00000	U204
			23N CD4071BCN+!			

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
VD4081BCN	IC CD4081BCN	STATIC	70H CD4081BCN		1.00000	U213
VD4094BCN	IC CD4094BCN	STATIC	23N CD4094BCN		1.00000	U211
			70H CD4094BE			
VD74HC4094	IC M74HC4094BCN	STATIC	29S M74HC4094BCN		1.00000	U202
			23N M74HC4094BCN			
VD7523JN	IC AD7523JN	STATIC	55A AD7523JN		1.00000	U212
VD8629DP	INT CCT SP8629DP PLSY		43G SP8629DP		1.00000	U206
VD8718DG	IC TYPE SP8718DG PLSY		43G SP8718DG		1.00000	U205
VS14L	IC SKT 14WAY		281 703-3314-01-04-10		4.00000	U201 4:13 4
			08R IC0-143-S8A-T			
VS16L	IC SKT 16WAY		281 703-3316-01-04-10		5.00000	U202 7:11 2 5
			08R IC0-163-S8A-T			
VS20L	IC SKT 20 WAY		281 703-3320-01-04-10		1.00000	U203
			08R IC0-203-S8A-T			
VS8P	IC SKT 8WAY		281 703-3308-01-04-10		5.00000	U205 6 8-10
			08R IC0-083-S8A-T			
YT22	T/C WIRE 22SWG		55M 22SWG		0.01000	C226(SLEEVED)

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
5NPSGBHS3	HF SYNTHESIZER "3" COMPS			A	1.00000	5
CC210POLG	10PF 2% 100V NPO	RP050	01P 683+10109		2.00000	C302 3
CC247POLG	47PF 2% 100V N150	RP050	01P 683+34479		1.00000	C301
CC3470PLK1	470PF 10% 100V	RP025	01P 630+18471		1.00000	C305
CEB22U0GT	22UF 50% 25V	AXIAL	01P 030-36229		1.00000	C309
CEB33U0IM	33UF 20% 40V	R025	134N KMVB		2.00000	C304 6
DG809	DIODE		01P BB809		2.00000	D301 2
PM6100KKV	100K 10% PRESET VERT	STURN	02S 63P		1.00000	P301
RM247ROFF	47R0 1% 0W60 50PPM	250V	18P MRS25		1.00000	R301
RM310ORFF	100R 1% 0W60 50PPM	250V	18P MRS25		2.00000	R302 6
RM42K2OFF	2K20 1% 0W60 50PPM	250V	18P MRS25		1.00000	R303
RM44K30FF	4K30 1% 0W60 50PPM	250V	18P MRS25		1.00000	R305
RM44K70FF	4K70 1% 0W60 50PPM	250V	18P MRS25		2.00000	R304 8
RM510KOFF	10K0 1% 0W60 50PPM	250V	18P MRS25		1.00000	R307
TBM2503PO	STRAIGHT PIN HEADER 3 WAY	2.54	23M 4030+22-03-2031		1.00000	X301
TL2W	JUMPER 2WAY		23M 7859-15-38-1024		1.00000	LK3
VF310S	J310 SILICONIX	STATIC	41S J310		1.00000	Q301
ZC0292	YE315S 6 TURNS CHOKE		22K 3SR0292	A	1.00000	L302
YE0315S	.315 BS4520/1 RED GD2		05B 0.315MM+(RED)		0.00100	
ZF1115	FERRITE BEAD L=5.6MM OD=4.15		15P FX1115		1.00000	
ZD2250BRS	BRASS CORE		28I 575-2250-01-15-00		1.00000	L301
ZZ9F30130	CHOKE SYNTHESIZER PSG	5	01B ZZ9F30130	D	1.00000	L301
ZB2175	530217503COIL/FORM3PINCK		28I 530-2175-00-03-00		1.00000	
ZZ2BBH	BBH COST FACTOR		00F ZZ2BBH		0.43000	
ZZ2C	INVTR WINDING SP FACTOR		00F ZZ2C		2.06900	
5NPSGBHS4	HF SYNTHESIZER "4" COMPS			A	1.00000	5
CASOT	CAP SELECT ON TEST				1.00000	C401
CC233POLG	33PF 2% 100V N150	RP050	01P 683+34339		2.00000	C406 7
CC3330PLG	330PF 2% 100V N750	RP050	01P 683+58331		2.00000	C403:10
CC3470PLK1	470PF 10% 100V	RP025	01P 630+18471		2.00000	C404 8
CEB33U0IM	33UF 20% 40V	R025	134N KMVB		2.00000	C405 9
CR44N70LJ	4.7NF 5% 100V	R050	159W FKS2MIN		2.00000	C402:11
DG45	DIODE		01P BAV45		2.00000	D401 2
PM6100KKV	100K 10% PRESET VERT	STURN	02S 63P		1.00000	P401
RM310ORFF	100R 1% 0W60 50PPM	250V	18P MRS25		1.00000	R402
RM41K0OFF	1K00 1% 0W60 50PPM	250V	18P MRS25		1.00000	R401
RM41K8OFF	1K80 1% 0W60 50PPM	250V	18P MRS25		2.00000	R403 8
RM43K0OFF	3K00 1% 0W60 50PPM	250V	18P MRS25		2.00000	R409:10
RM44K70FF	4K70 1% 0W60 50PPM	250V	18P MRS25		4.00000	R404-7
RM510KOFF	10K0 1% 0W60 50PPM	250V	18P MRS25		1.00000	R411
TBM2502PO	STRAIGHT PIN HEADER 2 WAY	2.54	23M 4030+22-03-2021		2.00000	X401 2
TL2W	JUMPER 2WAY		23M 7859-15-38-1024		2.00000	LK4 5
VA5534AN	INT CCT NE5534AN		01P NE5534AN		1.00000	U401
VP1A	TRANSISTOR PAD TW1A		27K NW1802		2.00000	D401 2
VS8P	IC SKT 8WAY		28I 703-3308-01-04-10		1.00000	U401
			08R IC0-083-S8A-T			

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
5NPSGBHS5	HF SYNTHESIZER "5" COMPS			A	1.00000	5
CC256POLG	56PF 2% 100V N150 RP050	01P	683+34569		2.00000	C507 9
CC282POLG	82PF 2% 100V N150 RP050	01P	683+34829		1.00000	C508
CC3470PLK1	470PF 10% 100V RP025	01P	630+18471		7.00000	C502:10-15
CC41N00LK	1.0NF 10% 100V RP050	01P	630+19102		2.00000	C504 6
CEB47J0DM	47UF 20% 10V FC +5MM	134N	KMVB		1.00000	C501
CR6100NKM	100NF 20% 63V R050	159W	MKS2MIN		1.00000	C516
CR6220NKK	220NF 10% 63V R050	159W	MKS2		2.00000	C503 5
DZ16V20E	6.2V 5% 0W50	31I	ZPD6.2		1.00000	Z501
RM247ROFF	47R0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R501
RM251ROFF	51R0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R504
RM268ROFF	68R0 1% 0W60 50PPM 250V	18P	MRS25		3.00000	R506 8 9
		53D	SMA0207TK50			
RM310ORFF	100R 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R505
RM336ORFF	360R 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R503
		53D	SMA0207TK50			
RM339ORFF	390R 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R507
RM368ORFF	680R 1% 0W60 50PPM 250V	18P	MRS25		6.00000	R510 3 16-19
		53D	SMA0207TK50			
RM41K0OFF	1K00 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R511 4
RM42K2OFF	2K20 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R512 5
RM49K1OFF	9K10 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R502
		53D	SMA0207TK50			
VA12040P	INT CCT MC12040P/L	02M	MC12040P		1.00000	U509
VA610C	INT CCT SL610CCM	43G	SL610CCM		1.00000	U502
VAOM350	HYBRID AMP OM350	01P	OM350		2.00000	U504 5
VD74F161APC	IC 74F161APC	STATIC	23N	74F161APC	1.00000	U501
VPT099DIL	IC PAD T099DIL SPREAD	01F	T099DIL		1.00000	FIT TO U502
VS16L	IC SKT 16WAY	28I	703-3316-01-04-10		1.00000	U501
		08R	1CO-163-S8A-T			
VS8P	IC SKT 8WAY	28I	703-3308-01-04-10		1.00000	U502
		08R	1CO-083-S8A-T			
ZC0290	YE315S 4 TURNS CHOKE	22K	3SR0290	C	2.00000	L501 2
YE0315S	.315 BS4520/1 RED GD2	05B	0.315MM+(RED)		0.00100	
ZF1115	FERRITE BEAD L=5.6MM OD=4.15	15P	FX1115		1.00000	
ZC4U7	CHOKE 47NH	28I	551-5172-05-02+00		2.00000	L503 4

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
5NPSGBHS6	HF SYNTHESIZER "6" COMPS				1.00000	5
CC3470PLK1	470PF 10% 100V	RP025	01P 630+18471	A	12.00000	C605 6 609-618
CC3680PLK	680PF 10% 100V	RP050	01P 630+19681		1.00000	C607
CC41N00LK	1.0NF 10% 100V	RP050	01P 630+19102		1.00000	C608
CEB33U0IM	33UF 20% 40V	R025	134N KMBV		2.00000	C601 2
CEB47U0JM	47UF 20% 50V	R035	134N KMBV		1.00000	C623
CR510N0LM	10NF 20% 100V	R050	159W FKS2MIN		1.00000	C604
CR6470NKK	470NF 10% 63V	R050	159W MKS2		1.00000	C622
CRA1U00KM1	1.0UF 20% 63V	R050	159W MKS2		2.00000	C603:24
DG4148	DIODE	23N	1N4148		8.00000	D601 2 605-610
DGD3F	DUAL DIODE	03Z	ZDX3F		2.00000	D603 4
PM6100KKV	100K 10% PRESET VERT STURN	02S	63P		1.00000	P601
RG71M00BJ	1M00 5% 0W25 100PPM 1K1V	18P	VR25		2.00000	R603 4
RM15R10FF	5R10 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R614
RM222R0FF	22R0 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R627 9
RM239R0FF	39R0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R628
			53D SMA0207TK50			
RM251R0FF	51R0 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R624 5
RM310R0FF	100R 1% 0W60 50PPM 250V	18P	MRS25		6.00000	R610 2 3:23 6:30
RM318R0FF	180R 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R622
			53D SMA0207TK50			
RM347R0FF	470R 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R615
RM41K00FF	1K00 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R618
RM42K70FF	2K70 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R620
RM44K70FF	4K70 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R606 7
RM45K60FF	5K60 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R602 9
			53D SMA0207TK50			
RM46K80FF	6K80 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R621
RM510K0FF	10K0 1% 0W60 50PPM 250V	18P	MRS25		5.00000	R601 5 8:19:31
RM6220KFF	220K 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R616 7
			53D SMA0207TK50			
TBM2502PO	STRAIGHT PIN HEADER 2 WAY 2.54	23M	4030+22-03-2021		1.00000	X610
TBM2503PO	STRAIGHT PIN HEADER 3 WAY 2.54	23M	4030+22-03-2031		1.00000	X601
TL2W	JUMPER 2WAY	23M	7859-15-38-1024		1.00000	LK71
VA062	IC TL062CP	STATIC	01T TL062CP		1.00000	U602
VA5534AN	INT CCT NE5534AN		01P NE5534AN		1.00000	U605
VA862BS	INT CCT U862BS	STATIC	41S U862BS		1.00000	U607
VA8821DP	IC NJ8821DP		43G NJ8821BDP		1.00000	U604
VAOM350	HYBRID AMP OM350		01P OM350		1.00000	U608
VD4011BE	IC CD4011BE	STATIC	70H CD4011BE		1.00000	U601
VD74HC4094	IC M74HC4094BCN	STATIC	29S M74HC4094BCN		1.00000	U603
			23N M74HC4094BCN			
VD8718DG	IC TYPE SP8718DG PLSY		43G SP8718DG		1.00000	U606
VS14L	IC SKT 14WAY		28I 703-3314-01-04-10		1.00000	U601
			08R 1C0-143-S8A-T			
VS16L	IC SKT 16WAY		28I 703-3316-01-04-10		1.00000	U603
			08R 1C0-163-S8A-T			
VS20L	IC SKT 20 WAY		28I 703-3320-01-04-10		1.00000	U604
			08R 1C0-203-S8A-T			
VS3P	IC SKT 8WAY		28I 703-3308-01-04-10		2.00000	U602 5
			08R 1C0-083-S8A-T			
VTR90A	BFR90A/02 SOT37		01P BFR90A/02		1.00000	Q601
ZC0290	YE315S 4 TURNS CHOKE		22K 3SR0290	C	3.00000	L601-603
YE0315S	.315 BS4520/1 RED GD2		05B 0.315MM+(RED)		0.00100	
ZF1115	FERRITE BEAD L=5.6MM OD=4.15		15P FX1115		1.00000	

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
8ZX0322	SYNTH BOARD C.D. PSG/ESG1000	00F	RSZX0322	G	1.00000	
BC1040	SYNTHESIZER BOARD	01K	37SKK10400	E	1.00000	
YX9307	CONFORMABLE CABLE 9307	04Q	9037		0.34000	
7NU10050532	SYNTH SCREEN "A"	00F	20010050532	C	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00550	
7NU10050533	SYNTH SCREEN "B"	00F	40010050533	C	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00050	
7NU10050534	SYNTH SCREEN "C"	00F	20010050534	D	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00200	
7NU10050539	SYNTH SCREEN "D"	00F	40010050539	B	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00120	
7SU4095	SYNTHESIZER SCREEN "E"	00F	2SU004095	A	1.00000	
AAS14	ALUMINIUM 2 X 1 METRE SHEET	99A	14SWG		0.04740	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00180	
NC4M1ZC	CAPTIVE BUSH M4 ISO	24P	S-M4-1-ZC		1.00000	
7SU4096	SYNTHESIZER SCREEN "F"	00F	4SU004096	A	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00490	
C141N00VZ	1.ONF 600V -20+80%	95B	TPS014B		10.00000	C109:307 8:412 3:516 7:619-21
CR6220NKK	220NF 10% 63V R050	159W	MKS2		1.00000	C625
CRA1U00KM1	1.0UF 20% 63V R050	159W	MKS2		3.00000	C223 4:624
RM15R10FF	5R10 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R611
VASBL1X	MIXER SBL1-X DALE	08D	SBL1-X		1.00000	U503
VX0386	CRYSTAL TCX04-B0386	44S	TCX04-B0386		1.00000	XTL1
7NU10050525	SIDE FLNG E	00F	30010050525	A	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00430	
7NU10050526	SYNTH BOX	00F	100010050526	B	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.03630	
7NU10050537	SIDE FLNG G	00F	20010050537	B	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00460	
7NU10050538	SIDE FLANGE "H"	00F	30010050538	D	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00300	
7SU2525	SIDE FLANGE "C"	00F	2SU002525	A	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00460	
7SU2526	SIDE FLANGE "B"	00F	3SU002526	A	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00300	
7SU3228	IF SIDE FLANGE "D"	00F	3SU003228	B	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00440	
C141N00VZ	1.ONF 600V -20+80%	95B	TPS014B		18.00000	C500-17
HR31212	RECEPT 312/12 CAM	18C	312-12		6.00000	
KP3M5	SCREW M3 X 5 PAN HD POZI	05T	KP3M5		12.00000	
KP3M6	SCREW M3 X 6 PAN HD POZI	05T	KP3M6		12.00000	
NR3M10TH	SPACER M3 X 10MM THR'D HEX	01H	R6374-02		12.00000	
NV320D	POP RIVET 2.4MM DIA DOMED HD	08T	TAPD+33+BS		12.00000	
WW3M	WAVEY WASHER M3	24L	LS508/54		12.00000	
YMMNS513	RF GASKET 0090-0030 3	24K	FSP282-0032-0095		2.50000	
YT24	T/C WIRE 24SWG	55M	24SWG		0.09000	L500-08
7NU0974573	DC FILTER BOX	00F	4000974573	C	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00010	
7NU0974574	DC CENTRE BOX	00F	4000974574	A	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00010	
7SU2520	BOX BRACKET "A"	00F	3SUCB2520	B	1.00000	
ASS16	STEEL 2 X 1 METRE SHEET	39W	16+SWG		0.00120	
		62T	16+SWG			
NC3M1ZC	CAPTIVE BUSH M3 ISO	24P	PS-4.40UNC-1-TPA-M3		4.00000	

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
NC3M8FH	CAPTIVE STUD M3 X 8MM ISO	09P	FH-M3-8-ZC		1.00000	
CI3150PLJ	150PF 100V 5%	44M	9002-208-COG151K100V		1.00000	C1
HC0119	CABLE ASSEMBLY	88M	4SC0119	C	1.00000	
		25V	4SC0119			
HR28S14	STUD 28S1/4 CAM	18C	28S1-4		12.00000	
RM15R10FF	5R10 1% 0W60 50PPM 250V	18P	MRS25		5.00000	R73:520-23
RM6100KFF	100K 1% 0W60 50PPM 250V	18P	MKS25		1.00000	L1
						(YE315M 10 TURN)
ZC0290	YE315S 4 TURNS CHOKE	22K	3SR0290	C	2.00000	L16:308
YE0315S	.315 BS4520/1 RED GD2	05B	0.315MM+(RED)		0.00100	
ZF1115	FERRITE BEAD L=5.6MM OD=4.15	15P	FX1115		1.00000	
7SU2521	RIGHT HAND SIDE PANEL	A 00F	2SUBA2521	A	1.00000	
AAS161X1	ALUMINIUM 1 X 1 METRE SHEET	99A	16SWG		0.05500	
NC3M1AS	FLOATING INSERT M3 ISO	09P	AS-M3-1		2.00000	
NC3M4SO	CAPTIVE STANDOFF M3 X 4MM ISO	09P	SO-M3-4-ZC		2.00000	
NC4M1ZC	CAPTIVE BUSH M4 ISO	24P	S-M4-1-ZC		8.00000	
7SU2522	LEFT HAND SIDE PANEL	A 00F	2SUBA2522	A	1.00000	
AAS161X1	ALUMINIUM 1 X 1 METRE SHEET	99A	16SWG		0.05500	
NC3M1AS	FLOATING INSERT M3 ISO	09P	AS-M3-1		2.00000	
NC3M4SO	CAPTIVE STANDOFF M3 X 4MM ISO	09P	SO-M3-4-ZC		2.00000	
NC4M1ZC	CAPTIVE BUSH M4 ISO	24P	S-M4-1-ZC		8.00000	
7SU3212	CONTROL C.B. BRACKET	K 00F	2SUBA3212	D	1.00000	
AAS18	ALUMINIUM 2 X 1 METRE SHEET	99A	18+SWG		0.08300	
NC3M12FH	FLUSH HEAD STUD M3 X 12MM ISO	09P	FH-M3-12-ZC		1.00000	
8P1074801	FINAL ASSEMBLY			A	1.00000	
8P1074802	FINAL ASSEMBLY			A	1.00000	
8P1074803	FINAL ASSEMBLY			A	1.00000	
8P1074804	FINAL ASSEMBLY			A	1.00000	
8P1074805	FINAL ASSEMBLY			A	1.00000	
GCNX0	CABLE CLIP 3.4MM I/D	04H	NX0		3.00000	
GCNX3	CABLE CLIP 8.0MM I/D	04H	NX3		1.00000	
GT23	CTY001/NT20 75C UL	28P	PLT1M-M		2.00000	
HA0065	HANDLE SSG1000	14K	1SV000065	H	4.00000	
HA0066	HANDLE INSERT	14K	2SV000066	E	4.00000	
HW2904	EARTH CLIP	77P	4SUCF2904	A	24.00000	
MB4205	TOP HAT BUSH M4	72H	4/4205	C	2.00000	
TBA3902HS	2W HOUSING WITH STRAIGHT LOCK	07A	640250-2		1.00000	S2(F/P)
TBA3906HS	6W HOUSING WITH STRAIGHT LOCK	07A	640250-6		1.00000	S2
TBM2506HP	CRIMP HOUSING 6 WAY 2.54MM	23M	6471+22-01-2065		1.00000	S3(AUX)
TBM2510HP	CRIMP HOUSING 10 WAY 2.54MM	23M	6471+22-01-2105		2.00000	S3:400
TBM2512HP	CRIMP HOUSING 12 WAY 2.54MM	23M	6471+22-01-2125		5.00000	S1 4:103:201:301
TBM2516HP	CRIMP HOUSING 16 WAY 2.54MM	23M	6471+22-01-2165		1.00000	S302
TS307	STRIP WIRE TAG	89C	T307		34.00000	
TS6B383	SOLDER TAG 6BA	05R	RC383/6BA		1.00000	

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
47PSGBPS	POWER SUPPLY MODULE PSG/B			A	1.00000	4
5NPSG1000AX	AUXILIARY CIRCUIT BOARD			A	1.00000	5
8P1044001	AUX CIRCUIT BOARD			B	1.00000	
8ZX10050207	AUXILIARY BOARD CCT DIAG	00F	3ZX10050207	A	1.00000	
BC1094	AUXILIARY BOARD PSG	01K	37PBA10940	A	1.00000	B
PM525K0KH1	25K0 10% PRESET HORZ MTURN	02S	43P		1.00000	P
TBM2506PS	STRAIGHT PIN HEADER 6 WAY 2.54	23M	6410+22-27-2061		1.00000	S3
TBM2512PS	STRAIGHT PIN HEADER 12 WAY	23M	6410+22-27-2121		1.00000	S1
5NPSG1000PS	POWER SUPPLY CIRCUIT BOARD			D	1.00000	5
8P1044101	POWER SUPPLY CIRCUIT BOARD			D	1.00000	
8ZX10050201	P/S BOARD CCT DIAG	00F	CZX10050201	B	1.00000	
BC1035	POWER SUPPLY BOARD PSG1000	01K	37PAA10350	C	1.00000	B
CEB33U0IM	33UF 20% 40V R025	134N	KMVB		3.00000	C12 5 7
CEB47U0DM	47UF 20% 10V FC +5MM	134N	KMVB		2.00000	C5 7
CED1M00GM	1.0MF 20% 25V R075	134N	KMVB		1.00000	C13
CED2M20JM	2.2MF 20% 50V N050	67P	ECET50R222SW		1.00000	C9
CED4M70EM1	4.7MF 20% 16V N050	67P	TSU-ECES1CU472D		2.00000	C1 2
CR6100NKM	100NF 20% 63V R050	159W	MKS2MIN		8.00000	C8:10 1 4 6 8 9 :22
CR6220NKK	220NF 10% 63V R050	159W	MKS2		2.00000	C20 1
CR6470NKK	470NF 10% 63V R050	159W	MKS2		3.00000	C3 4 6
DAOMIT	DIODES OMITTED	00F	DAOMIT		1.00000	D13
DBW02M	BRIDGE RECTIFIER	11G	W02G		2.00000	BR1 2 (MC1 X1/L)
DG3345	DIODE SCHOTTKY BARRIER	01P	BYV133-45		1.00000	D1
DG4003	DIODE	11G	1N4003		1.00000	D12
DG4148	DIODE	23N	1N4148		10.00000	D2-11
MC1	CERAMIC BEAD SMALL	57M	IPB/1		8.00000	BR1 2 X1/L
PM41K00KV	1K00 10% PRESET VERT STURN	02S	63P		1.00000	P1
PM71M00KV	1M00 10% PRESET VERT STURN	02S	63P		1.00000	P2
RALINK	RESIST	99F	RALINK		1.00000	R18
RAOMIT	RESISTORS OMITTED	01B	RAOMIT		1.00000	R18
RM247R0FF	47R0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R15
RM368R0FF	68R0 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R4
		53D	SMA0207TK50			
RM41K00FF	1K00 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R5 6
RM43K90FF	3K90 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R7:12
		53D	SMA0207TK50			
RM44K30FF	4K30 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R3
RM44K70FF	4K70 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R8:11
RM543K0FF	43K0 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R13 4
		53D	SMA0207TK50			
RM547K0FF	47K0 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R9:10
RM6180KFF	180K 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R2
		53D	SMA02076TK50			
RM6220KFF	220K 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R1
		53D	SMA0207TK50			
TBA3905PS	5W PIN WAFER WITH STRGHT LOCK	07A	640388-5		1.00000	SK1
TBA3906PS	6W PIN WAFER WITH STRGHT LOCK	07A	640388-6		1.00000	SK2
TBA3910PO	10W PN WAF WITHOUT STRGHT LOCK	07A	1-640384-0		1.00000	SK1
TBM2510PS	STRAIGHT PIN HEADER 10 WAY	23M	6410+22-27-2101		1.00000	SK3
VA2940CT12	VOLT REG LM2940CT12	23N	LM2940CT12		1.00000	U3
VA2940CT5	IC LM2940CT5	23N	LM2940CT5		2.00000	U1 2
VA337T	INT CCT LM337T NAT	23N	LM337T		1.00000	U4

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
VF22	HEXFET IRFZ22 "STATIC"	10I	IRFZ-22		2.00000	Q3 4
VT182PL	BC182PL NO NEW USE NLGP	03Z	BC182PL		2.00000	Q1 2
7NU10050512	REGULATOR HEAT SINK	00F	4BA10050512	B	1.00000	
AAS14	ALUMINIUM 2 X 1 METRE SHEET	99A	14SWG		0.00040	
7SU2433	BLANKING PLATE N	00F	4SUDA2433	A	1.00000	
AAS18	ALUMINIUM 2 X 1 METRE SHEET	99A	18+SWG		0.00020	
7SU2436	SWITCH BRACKET	KA 00F	3SUCB2436	B	1.00000	
ASS18	STEEL 2 X 1 METRE SHEET	39W	18+SWG		0.00200	
NC3M12C	CAPTIVE BUSH M3 ISO	24P	PS-4.4OUNC-1-TPA-M3		2.00000	
7SU2512	TRANSFORMER COVER	KA 00F	3SUDA2512	B	1.00000	
AAS181X1	ALUMINIUM 1 X 1 METRE SHEET	99A	18+SWG		0.04800	
NC3M12C	CAPTIVE BUSH M3 ISO	24P	PS-4.4OUNC-1-TPA-M3		3.00000	
NC3M8FH	CAPTIVE STUD M3 X 8MM ISO	09P	FH-M3-8-ZC		1.00000	
7SU2513	REGULATOR BRACKET	KA 00F	4SUBA2513	B	1.00000	
AAS161X1	ALUMINIUM 1 X 1 METRE SHEET	99A	16SWG		0.00700	
NC3M12C	CAPTIVE BUSH M3 ISO	24P	PS-4.4OUNC-1-TPA-M3		3.00000	
7SU2514	PSU BACK PANEL	A 00F	1SUYA2514	E	1.00000	
AAS16	ALUMINIUM 2 X 1 METRE SHEET	99A	16+SWG		0.06000	
NC3M8FH	CAPTIVE STUD M3 X 8MM ISO	09P	FH-M3-8-ZC		2.00000	
7SU2515	HPIL PLATE	00F	4SUDA2515	C	1.00000	
AAS18	ALUMINIUM 2 X 1 METRE SHEET	99A	18+SWG		0.00050	
7SU2814	TERMINAL COVER	KA 00F	3SUAJ2814	B	1.00000	
ASS18	STEEL 2 X 1 METRE SHEET	39W	18+SWG		0.00600	
7SX2511	HEATSINK	00F	3SUDA2511	B	1.00000	
AX5D	EXTRUSION "5D"	59M	05DN20000/A100		0.09700	
7SX2516	REAR CROSS MEMBER TOP	00F	2SUBA2516	A	1.00000	
AX0058	CROSS MEMBER EXTRUSION "RF"	33B	3SXC10058	B	0.29900	
7SX2517	REAR CROSS MEMBER BOTTOM	00F	2SUBA2517	A	1.00000	
AX0058	CROSS MEMBER EXTRUSION "RF"	33B	3SXC10058	B	0.29900	
FH2002	FUSE HOLDER 5 X 20MM P/MTG.	02B	L2002		1.00000	F2
FT250M11	FUSE 250 MILLIAMPS ANTI-SURGE	03B	TDC11		1.00000	F1
FT4A00S503	FUSE 4 AMP ANTI-SURGE	03B	S503		1.00000	F1
HC0120	CABLE ASSEMBLY	25V	4SC0120	C	1.00000	
		88M	4SC0120			
99CF	COMPONENT COST FACTOR	00F	IN+HOUSE+REFERENCE		4.90000	
TK57F20	RECEPTACLE 24WAY	38D	57FE2024020N(D35)		1.00000	
NR3M12TH	SPACER M3 X 12MM THR'D HEX	01H	R6334-02		2.00000	
RM44K70FF	4K70 1% 0W60 50PPM 250V	18P	MRS25		2.00000	R16 7
SA35093RD	SWITCH BUTTON RED	02L	035093-001		1.00000	SW1
SA5000A	TRANSPARENT SWITCH COVER	45L	5000A		1.00000	SW1
SB5020	MAINS SWITCH 6 WAY	45L	PBMS5020		1.00000	SW1
SRHC4	RELAY HC4 12V DC	67P	HC4+12V		1.00000	RL1
SRHC4B	RL BASE HC4 SS	67P	HC4-SS		1.00000	RL1
TBA3915HS	15W HOUSING WITH STRAIGHT LOCK	07A	1-640250-5		1.00000	S1
TG6J4	MAINS INPUT FILTER	06T	VS-F6J4		1.00000	
TK212	SOCKET DC 3 POLE	05D	RPC212RB3P		1.00000	SK4
TR30001	PLUG BNC CAP AND CHAIN	01G	GE30001BN		1.00000	SK1
TR35004	BNC PANEL JACK	50D	35004C24HBN		1.00000	SK1
		76S	35004C24HBN			
ZR0306	TRANSFORMER TOROID REF Z1447	01B	2SR0306	H	1.00000	TX1
7ZF2843	TORROIDE ANCHORAGE WASHER	00F	4SU002843	A	1.00000	
AFS332	FIBGLASS SHT 3/32 THK	19V	3/32"+THK		0.00020	
7SU3198	BACK PANEL END	K 00F	3SUDA3198	C	1.00000	
AAS181X1	ALUMINIUM 1 X 1 METRE SHEET	99A	18+SWG		0.00900	
NC3M12C	CAPTIVE BUSH M3 ISO	24P	PS-4.4OUNC-1-TPA-M3		3.00000	

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
7SU3199	COVER SIDES	00F	3SU003199	B	4.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.00200	
7SU3214	I.F. BOX COVER	00F	1SU003214	D	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.04280	
7SU3215	R.F. BOX COVER	00F	1SU003215	D	1.00000	
ASS23T	TIN PLATE 2 X 1 METRE SHEET	29L	23+SWG		0.04280	
7SX4608	TOP BOTTOM TRIM	00F	2SUDF4608	A	4.00000	
AX0056	TOP/BOTTOM EXTRUSION "INST"	33B	3SXC10056	B	0.00001	
8L0013	MOD STATE LABEL	00F	2SQ0013	A	1.00000	

PARENT 1ERPSG1000BA OPTION A 23 TO 30V DC INPUT

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
27PSG1000A	OPTION A 23 TO 30V DC INPUT				1.00000	
8P1046201	24V POWER SUPPLY OPTION "A"			C	1.00000	
8P1046202	24V POWER SUPPLY OPTION "A"			D	1.00000	
8P1046203	24V POWER SUPPLY OPTION "A"			B	1.00000	
8P1046301	24V P/S OPTION CIRCUIT BOARD			B	1.00000	
RM41K50FF	1K50 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R18
SRHC424	RELAY HC4 24V DC	67P	HC4+24V		1.00000	RL1
VF530	IRF530 220N	10I	IRF530		2.00000	Q3 4
		70H	IRF530			
		23N	IRF530			

PARENT 1ERPSG1000BF OPTION F RF. O/P ON REAR PANEL

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
27PSG1000F	OPTION F RF. O/P ON REAR PANEL				1.00000	
7SU2547	RF I/P BLANKING PLATE	00F	4SUAJ2547	A	1.00000	
7SU2548	BLANKING PLATE SUPPORT	00F	4SUAJ2548	A	1.00000	
8P1046401	REAR OUTPUT OPTION 'F'			B	1.00000	
8P1046402	REAR OUTPUT OPTION 'F'			B	1.00000	
YX85	S/R COAX UT85 TINNED	22S	UT85		0.52000	

PARENT 1ERPSG1000BM

OPTION M PULSE MODULATION

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
27PSG1000M	OPTION M PULSE MODULATION				1.00000	
5NPSG1000M	PULSE MODULATION CB ASM. STD.			E	1.00000	5
7SU10051501	PULSE MODULATION BOX	00F	30010051501	C	1.00000	
7SU10051502	PULSE DIVISION PLATE 'D'	00F	40010051502	B	1.00000	
7SU10051503	PULSE DIVISION PLATE 'E'	00F	40010051503	B	1.00000	
7SU10051504	PULSE DIVISION PLATE 'A'	00F	40010051504	B	1.00000	
7SU10051505	PULSE DIVISION PLATE 'B'	00F	40010051505	B	1.00000	
7SU10051506	PULSE DIVISION PLATE 'C'	00F	40010051506	B	1.00000	
8P1045801	PULSE MOD ASSEMBLY			B	1.00000	
8P1045802	PULSE MOD ASSEMBLY			B	1.00000	
8P1045803	PULSE MOD ASSEMBLY			B	1.00000	
8P1045804	PULSE MOD ASSEMBLY			B	1.00000	
8P1045805	PULSE MOD ASSEMBLY			B	1.00000	
8P1045806	PULSE MOD ASSEMBLY			C	1.00000	
8ZX10051201	CCT. DIAG. PSG1000M OPTION	00F	3ZX10051201	A	1.00000	8
BC1186	PULSE MODULATION BOARD	01K	470KK11860	A	1.00000	B
CC3470PLK1	470PF 10% 100V RP025	01P	630+18471		2.00000	C8 9
CI41N00VZ	1.0NF 600V -20+80%	95B	TPS014B		7.00000	C1-7
DG4148	DIODE	23N	1N4148		2.00000	D1 2
DG479	DIODE	34A	BA479		4.00000	D3-6
RM3330RFF	330R 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R2
RM3560RFF	560R 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R1
RM41K00FF	1K00 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R3
SR1725	RELAY 172-5	20T	172-5		2.00000	RLA RLB
TR1820	SMA RIGHT ANGLE PLUG	04Q	42-1820-061		1.00000	
		01G	GE65102B285			
VT51	BFQ51 MUL ONLY SOT-37	01P	BFQ51		1.00000	Q1
ZC0303	YE315S 2 TURNS	22K	3SR0303		2.00000	L1 2
YE0315S	.315 BS4520/1 RED GD2	05B	0.315MM+(RED)		0.05500	
ZF1115	FERRITE BEAD L=5.6MM OD=4.15	15P	FX1115		1.00000	
YX178	COAX CABLE RG178BU	05D	RG178BU		1.60000	
8P1045701	PULSE MOD OPTION			B	1.00000	
8P1045702	PULSE MOD OPTION			B	1.00000	
8P1045901	PULSE MOD AUX CIRCUIT BOARD			B	1.00000	
8P1046001	PULSE MOD BLOCKING INFO			B	1.00000	
8P1046101	CASING INFORMATION			B	1.00000	
CC0P560LC	0.56PF.25PF 100V P100 RP050	01P	683+03567		1.00000	C10
RM41K00FF	1K00 1% 0W60 50PPM 250V	18P	MRS25		1.00000	R4
YX85	S/R COAX UT85 TINNED	22S	UT85		0.35000	

PARENT 1ERPSG1000B0

OPTION O HI-STAB FREQ. REF.

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
27PSG10000	OPTION O HI-STAB FREQ. REF.				1.00000	
8P1046501	CRYSTAL OPTION			B	1.00000	
VX10MK1270	CRYSTAL 10MHZ L1270	44S	L1270		1.00000	XTL1

PARENT 15S10100

RECHARGEABLE BATTERY PACK

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
25S10100	RECHARGEABLE BATTERY PACK			A	1.00000	
37PSG1000RB	F10059 CASING			B	1.00000	3
7SU2861	BATTERY BOX COVER	KA 00F	3SUDB2861	B	1.00000	
AAS181X1	ALUMINIUM 1 X 1 METRE SHEET	99A	18+SWG		0.05500	
NC3M12C	CAPTIVE BUSH M3 ISO	24P	PS-4.4OUNC-1-TPA-M3		6.00000	
NC3M8FH	CAPTIVE STUD M3 X 8MM ISO	09P	FH-M3-8-ZC		1.00000	
FT160M123	FUSE 160 MILLIAMPS ANTI-SURGE	03B	S504		1.00000	F1
FT4A00S503	FUSE 4 AMP ANTI-SURGE	03B	S503		1.00000	F2
FT500M123	FUSE 500 MILLIAMPS ANTI-SURGE	03B	S504		1.00000	110V FUSE
HB2529	HANDLE BRACKET	32R	2SUDC2529	A	2.00000	
AAA50304	50 X 30 X 4MM CUT TO 132MM	99A	ALUMINIUM+ANGLE		1.00000	
HB2530	HANDLE BRACKET EXTENSION	32R	2SUDC2530	A	1.00000	
AAA138504	138 X 50 X 4MM CUT TO 134MM	99A	ALUMINIUM+ANGLE		1.00000	
HC22V2	PLUG & LEAD 22/V/2	50C	22-V-2		1.00000	
KC4M8	SCREW M4 X 8 CSK HD POZI	05T	KC4M8		8.00000	
KP4M10	SCREW M4 X 10 PAN HD POZI	05T	KP4M10		4.00000	
WW4M	WAVEY WASHER M4	24L	LS508/56		4.00000	
7SU2860	BATTERY BOX	A 00F	2SUDJ2860	C	1.00000	
8SS10059100	BATTERY PACK SCREEN	00F	2ZY10059100		1.00000	
AAS16	ALUMINIUM 2 X 1 METRE SHEET	99A	16+SWG		0.06000	
NC4M12C	CAPTIVE BUSH M4 ISO	24P	S-M4-1-ZC		4.00000	
7SU2862	BATTERY BRACKET	00F	3SUBA2862	B	1.00000	
AAS16	ALUMINIUM 2 X 1 METRE SHEET	99A	16+SWG		0.01390	
NC3M8FH	CAPTIVE STUD M3 X 8MM ISO	09P	FH-M3-8-ZC		1.00000	
8LDHV	DANGER HAZARDOUS VOLTS LABEL				1.00000	
DBC606	BRIDGE RECTIFIER	11G	GBPC606		1.00000	BR1
EB0127	BATTERY PACK 12V	84S	3SC000127	D	1.00000	B1
FH2002	FUSE HOLDER 5 X 20MM P/MTG.	02B	L2002		2.00000	F1 2
GR1012	GROMMEX PS1012 HEL	45H	PS1012		0.10000	
GR2326	GROMMET HV2326	53M	HV2326		1.00000	
KC2M8	SCREW M2 X 8 CSK HD POZI	05T	KC2M8		2.00000	
KC3M10	SCREW M3 X 10 CSK HD POZI	05T	KC3M10		2.00000	
KC4M16	SCREW M4 X 16 CSK HD POZI	05T	KC4M16		1.00000	
KP3M10	SCREW M3 X 10 PAN HD POZI	05T	KP3M10		2.00000	
KP3M8	SCREW M3 X 8 PAN HD POZI	05T	KP3M8		2.00000	
KP4M6	SCREW M4 X 6 PAN HD POZI	05T	KP4M6		1.00000	
MR100BLK	RUB SLV BLK 100X50 OSK	40S	C100X50MM+BLK+X20MM		1.00000	
MT38150	FOAMPAD 38X150 7814780	49B	38+X+150++7814780		4.00000	
NF2M	FULL NUT M2	05T	NF2M		2.00000	
NF3M	FULL NUT M3	05T	NF3M		13.00000	
RW233ROWJ	33R0 5% 10W0	02W	WH5		1.00000	R1
SS2225B	SLIDE SW T2225B MARKED	12A	T2225B		1.00000	SW1
TG212	MINIATURE PLUG 3 POLE 2.5AMP	05D	RPC212P3S		1.00000	PL1
TK212	SOCKET DC 3 POLE	05D	RPC212RB3P		1.00000	SK2
TKCM3	IEC MAINS SOCKET 6AMP	50C	CL1920/MS-1S		1.00000	SK1
TS6B383	SOLDER TAG 6BA	05R	RC383/6BA		1.00000	
TS6B388	SOLDER TAG 6BA	05R	RC388/6BA		1.00000	
TV1867	SHROUD	28B	L1867		1.00000	
WF3M	FLAT WASHER M3	05T	WF3M		3.00000	
WS2M	SPRING WASHER M2	05T	WS2M		2.00000	
WS3M	SPRING WASHER M3	05T	WS3M		13.00000	
WW4M	WAVEY WASHER M4	24L	LS508/56		1.00000	
ZR207374	TRANSFORMER	06R	207-374		1.00000	TX1

PARENT 15A20100 RACK MOUNTING KIT 3U,3/4R

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
25A20100	RACK MOUNTING KIT 3U,3/4R			A	1.00000	
HB2529	HANDLE BRACKET	32R	2SUDC2529	A	1.00000	
AAA50304	50 X 30 X 4MM CUT TO 132MM	99A	ALUMINIUM+ANGLE		1.00000	
HB2530	HANDLE BRACKET EXTENSION	32R	2SUDC2530	A	1.00000	
AAA138504	138 X 50 X 4MM CUT TO 134MM	99A	ALUMINIUM+ANGLE		1.00000	
KC4M8	SCREW M4 X 8 CSK HD POZI	05T	KC4M8		8.00000	

PARENT 15A20110 CARRYING CASE 3U,3/4R

COMPONENT	DESCRIPTION	MAN.	MAN. PART NUMBER	ISS	QUANTITY	CIRCUIT REF
25A20110	CARRYING CASE 3U,3/4R			A	1.00000	
JPPSG1000	CARRYING CASE 3U,3/4 RACK	40T	10010055400	B	1.00000	

16. A D D E N D U M

Additional secondary commands for use with DCFM function:

- #24 Selects periodic relocking of the RF synthesizer when DCFM is selected with FM mode.
- #25 Disables periodic relocking.