

ATS-1 EXCITER LINEUP
Audio and 250 KHz section line up procedure.

Align module 54 (SSB Gen.) & 55 (Auto attenuator) together as a pair.

In Perth, it may be necessary to switch off ALL Seatex transmitter services while aligning module 54 (Step 12) due to interference getting into the oscilloscope leads.

All measured CRO voltages are peak to peak which is 2.828 times greater than the RMS figure in the handbook.

The following capacitors have been known to give low level problems in the tuned circuits, sometimes this only shows up after the exciter warms up. Replace the following C8, C27, C44, C57, C72, C78 all 0.01uF 5% Wima polycarbonate capacitors. Replace only with a high stability replacement. A suitable capacitor sold by Farnell part no. 42441003 Philips polystyrene 0.01uF 63V 1% (axial type). Bend one lead down to fit replacement capacitor on PC board.

Place the transmitter into dummy load. The transmitter must first be tuned correctly to 10 MHz, tune it manually if necessary. Check and rectify any problems with the 5 Volt and 15 Volt power supplies. Then switch **OFF** the Tuning Motors circuit breaker, the HT circuit breaker, the Gain Limiter and, put the Auto Attenuator Board (module 55) into the extender jig. Switch off the Exciter circuit breaker before removing and inserting exciter modules. There is no requirement for the transmitter power amplifier to be working during the exciter lineup. This will allow the exciter to be worked on indefinitely, with no strain on the rest of the transmitter.

SSB Alignment.

- 1) Module 55 on exciter extender board.
- 2) Apply a 1KHz tone at 0dBm to the i/p of the transmitter at the appropriate position on 4IDF. The level generator should be balanced, 600 ohm at this point.
- 3) Switch Audio i/p to "Line". Check this signal is present at PLA 1 & 2 on module 55. The level measuring set should be Balanced and Bridging.
- 4) Key Down. Check the o/p of module 55 is -24dBm at PLA 5 & 6 (5 is earth). The level measuring set should again be Bridging. This is an unbalanced measurement. Adjust the Audio Gain Pot (RV1) on the front panel if necessary. (This pot is called "Audio Level" on the circuit diagram). When set the dust cap can be returned to this pot.
- 5) With the level measuring set still at PLA 5 & 6 as in step 3:
- 6) Select test tone F1 on the front panel. Set RV 8 on the front panel fully clockwise, then adjust RV 2 for -16 dBm and re-adjust RV 8 for -30 dBm.
- 7) Select test tone F2 on the front panel. Set RV 9 on the front panel fully clockwise, then adjust RV 3 for -16 dBm and re-adjust RV 9 for -30 dBm.
- 8) Put the SSB Generator (Module 54) in the Extender Jig. Select **A3J** and Line i/p
- 9) Check AGC is disabled. (Link TP16 - TP17) and Clipper is disabled, (Unlink TP18 – TP19)

- 10) Set RV11 fully anti-clockwise (A3 adjustment not used)
- 11) Check for -24 dBm at the i/p to module 54. Use level meter in bridging mode across SKA 32 and 33. (32 is Earth).
- 12) Put the CRO probe on TP3 to view the 250 KHz i/p to the modulator. Key down and adjust L6 for the dip (between two peaks) in level. This should be at about 3.6 V p-p. Detuning will be necessary if the carrier leakage can't be reduced as in step 13.
- 13) Connect CRO to TP8 & adjust TMS to 6KHz @ -24dBm & peak L2, L3. Adjust TMS to 1KHz @ -24 dBm. Level should be around 1.5V pp. Adjustment of TR 2 will sharpen waveform as well as peaking waveform
- 14) Move CRO probe to TP 1 to view 250 KHz i/p to the carrier reinsertion circuits. Select **A1**. Key down and adjust TR5 for a peak. This should be at about 3.3 V p-p.
- 15) Move CRO probe to the top of R63 (ie. The junction of R63 and R66) and adjust TR6 for a peak. This should be at about 1.1V p-p
- 16) Move CRO probe to terminal 18, Clipper input. Select **A3J**, key down. Adjust RV2 for 3.0V p-p. At TP 18 the waveform should be balanced. This is a double sideband suppressed carrier waveform. If not balanced make slight adjustments to RV1 & C3 carrier leakage adjustments. This should bring the waveform into balance. This adjustment may also be made with audio input OFF, adjust RV1 & C3 for minimum carrier level at TP 18. Readjustment of level maybe required (RV2). Check C3 for damage if having adjustment problems & replace if necessary. If C3 is intact and unable to obtain minimum adjustment of carrier leakage, try swapping shorting links 10-11 or 12-13. If no improvement a matched set of modulator diodes (1N4148) MR 1-4 will have to be installed. Diodes matched by measuring forward resistances.

NOTE: Suitable replacements for C3 are Farnell 808 32659 (5.5 - 65 PF) or R.S. 125660 polyethelyne trimmers. The Farnell 809 08003 (5 - 57PF) PTFE trimmer is superior in construction but is more expensive.

- 17) Select **A3J**, key down with 0dBm at RDF. Connect a CRO to o/p of SSB Generator at SKA 13 and 17. (17 is Earth). Adjust RV9 for 566mV p-p. Should there not be enough level, then increase RV2 until 566mV can be achieved. However, this indicates a level/gain problem around VT17 which should be investigated. Leave the CRO connected to this point.
- 18) To calibrate level meter 54M1. With the meter switch in 0dB position (ie. Switched to the right), adjust RV 10 to give 0 dB on the meter. The meter is now calibrated for the 0dB range. We do not use the 10 dB range so do not worry about it.
- 19) Select **Fine Tune** on coarse/fine tune unit. Adjust RV4 for 453 mV p-p.
- 20) Select **A1** mode. Adjust RV5 for 566 mV p-p.
- 21) Adjust RV6 (**A3** mode) fully Counter-Clockwise as it is not used.
- 22) Select **A3H** mode. Switch audio i/p to "Off" Adjust RV7 for 282 mV p-p. Switch audio i/p to line and adjust RV1 on daughter board for 450mV, which should be a perfect foldover pattern.

- 23) Adjust RV8 (**A3A** mode) fully Counter-Clockwise as it is not used.
- 24) Confirm Meter readings in the following modes:

Mode	Meter
A1	0dB
A3J	0dB

- 17) Key up. **If Seatex transmitters had been switched off, return all services to operation.**

Carrier Adjustments

- 18) Insert a Bird Wattmeter in the coax at the aerial patch panel. Turn the HT circuit breaker and HT On switch to the on position. The transmitter should already be correctly tuned.
- 19) Select **Fine Tune** on coarse/fine tune unit. Adjust the Auto Gain pot on the front panel to give 630w on the power meter. Release the **Fine Tune** switch on coarse/fine tune unit. Select **A3J**, audio i/p to line and key down. Check for approximately 1KW on the meter. If the level is less than this, it may indicate tired PA tubes. Please note, the Auto Gain pot has a dramatic effect on tune power and other relative levels if not correctly set.
- 20) If the front panel power meter does not agree with the Bird power meter, refer to the handbook volume 3, page 2/10, section 2.5 - "Calibration of Reflectometer".
- 21) Select **A1**. Confirm 1KW on the power meter.
- 22) Remove the test jig and put the SSB Generator back into the transmitter.
- 23) Select A3J. Key Down. Select F1 on module 55. Confirm 250W o/p power.
- 24) Select F2 and confirm 250W o/p power. Key up.
- 25) Select Exciter Out on Multi-meter 3M1. Select Coarse Tune. Confirm meter deflection of 55 on the 0 - 100 scale. Turn Coarse Tune Off.
- 26) Ensure the Tuning Motors circuit breaker is off. Select Fine Tune. Confirm 630 W on the power meter. Switch Fine Tune off.
- 27) Select A3J, Audio i/p off, Key down. The power meter should not move. If it does there is a need to adjust carrier balance as per step 13.
- 28) To set up the RF Monitor Relay (3RFM) select A1. On module 55 turn RF Gain control fully anti-clockwise and switch to manual. Slowly increase the RF Gain control to give an o/p of 300W. Adjust pot 4RV9 in the top draw such that the RFM relay (at the left of the bank of relays in the top draw) just operates.
- 29) The procedure is now complete. If necessary the Coarse Tuning and Gain Limiter set-up procedures should also be followed to fully align the transmitter.

ATS1 Modifications

I was involved in designing & implementing most of the later mods.
Some could be mods to improve performance or reliability.

OR59 Blower to run on when LT turned off to keep Exciter from overheating.

OR62 RFA2 Tune Bracket to prevent damage to variable capacitor.

OR78 18 Channel Conversion (Circuit CE-T118 & CE-T105)

OR101 BFY90 replacing AS201 in Control Down Mixer to control lock-ups on 30MHz.

OR102 New SMA Connectors replacing obsolete original coaxial types.

OR105 RFA3 O/L Indicators (Circuit CE-C768)

RF Output Monitor: Replacement of leaky AS147 transistors with silicon BC547 type (or similar).

Heat sink fitted to 2N3866 Wideband Amplifier transistor on board 2R66450 in module 64. This transistor could overheat & fail if the operator changed channels & turned the HT off before the ATS1 could tune up. The "coarse tune" light being on was the indication this had happened.

CE-T00125 sh.1 Conversion from 8122 valves to 4CX350,s

CE-T00127 sh.1 to 3 Modification to top tray for Optomux Operation. Ningi & Perth only.

Since the 4CX350 mod there have been 3 further minor additions to fine tune it which were not documented officially. They were necessary following purchase of different valve batches.

1. Replace resistor 7R23 1.2K in Gain Limiter with 820 ohm to allow correct setting of RFA3 PV.

2. 2-6-94 Swap 39v Bias Zener 5MR2 with 36v 1.3 watt type for more bias swing on 4CX350's.

3. 24-2-95 Fit a parallel 100ohm 1 watt resistor across RFA2 cathode resistor 1R72 to improve the performance of the RFA2 driver stage. This shows up as reduced drive necessary from the Exciter & RFA1 stages.

17-10-2000

ATS 1 PERFORMANCE INSPECTION

PRE MAINTENANCE TASKS

1. Plot performance graph (for post maintenance comparison).
 - Make sure test key is up.
 - Switch to local mode.
 - Patch transmitter into dummy load
 - Plug in frequency box (@10MHz) and select channel.
 - Switch HT on.
 - Press start to tune.
 - Select CW mode (A1).
 - Check frequency out at monitor point. Should be 10MHz.
 - Spectrum analyser into monitor point.
 - Set ref. level to top of screen (A1 mode at 10MHz)
 - Select A3J mode and switch audio input to F1/F2 (audio attenuator module 55) and plot output for two-tone test. These shows inter-modulation products and carrier leakage generated by the transmitter.

MAINTENANCE

- Follow cleaning instructions as per annual maintenance procedure.

PERFORMANCE INSPECTION

- Plug in frequency selector box to channel 1 and select Ch 1 on the front control panel Switch on LT and let warm up.
Check valve emissions
- Switch on HT.
- Select A3J mode (ssbsc) and turn audio input off (module 55).
- Set the idle cathode currents for RFA2 (150ma) and RFA3 a,b,&c (80ma).
Check and adjust if necessary the following power supplies:
- In the exciter psu : - +5v measure at monitor point & adj pot
 +15v measure at monitor point & adj pot
 measure A.C. ripple if more than 50mv repair
- In the tx'er psu : - -25v. measure at tsa6 & adj at 5RV2
 measure A.C. ripple if more than 50mv repair
 +25v. measure at tsa5 & adj at 5RV3
 measure A.C. ripple if more than 50mv repair
 -20v. measure at tsA4 & adj at 5RV1
 measure A.C. ripple if more than 50mv repair

Check the 1MHz oscillator with a frequency counter.

MONTHLY METER READINGS FOR ATS-1 TRANSMITTERS

Tx. number:

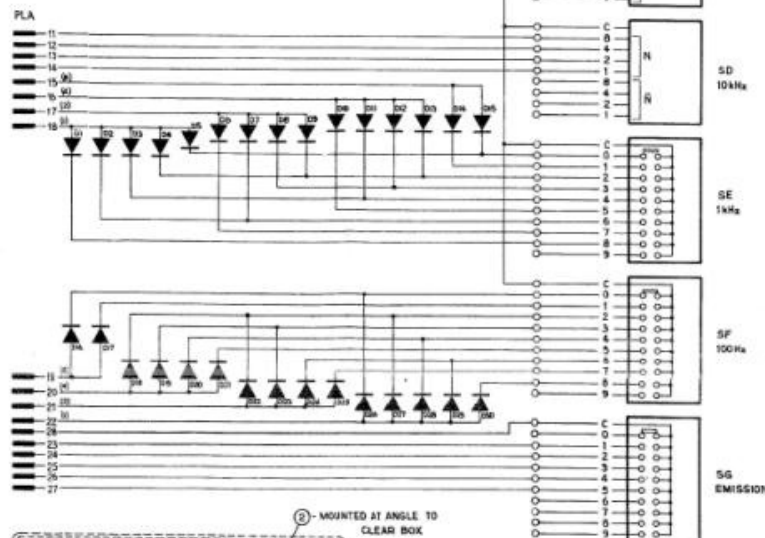
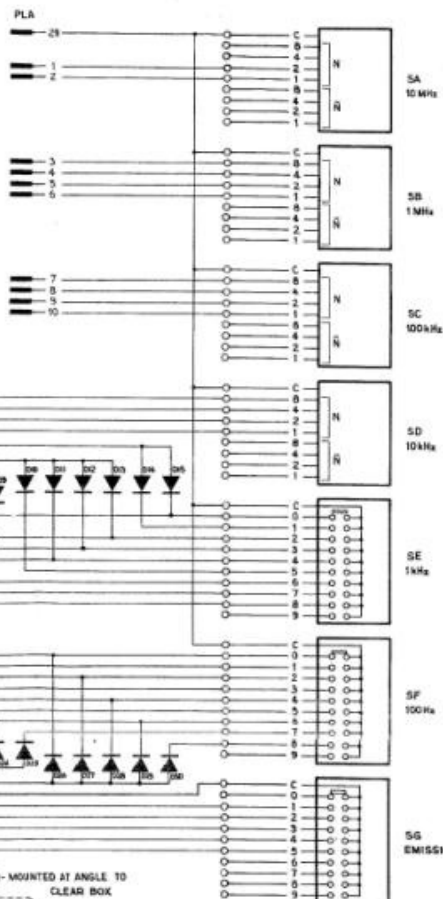
Normal Service:

**SELECT A1, AUDIO OFF, HIGH POWER, KEY DOWN UNLESS OTHERWISE SPECIFIED
Use the same frequency each time for consistency. Use working freq. NOT DISTRESS**

	Typical	Date:	Date:	Date:	Date:	Date:	Date:
A3J MODE, AUDIO OFF							
Check Lamps							
CHANNEL / FREQUENCY							
AERIAL							
Control 0 - 50V (+)	24						
Control 0 - 50V (-)	24						
Exciter 0 - 10V (+)	4.8						
Exciter 0 - 50V (+)	14.5						
Exciter 0 - 50V (-)	24						
(BIAS) RFA2 Cath. A3J	150						
(BIAS) RFA3A Cath. A3J	80						
(BIAS) RFA3B Cath. A3J	80						
(BIAS) RFA3C Cath. A3J	80						
A1 MODE							
RFA2 Cath. 0.5A	150mA						
RFA3A Cath. 0.5A	325mA						
RFA3B Cath. 0.5A	325mA						
RFA3C Cath. 0.5A	325mA						
RFA3 Screen 0 -100mA	±10 mA						
Forward Power 0 - 10	59						
Reflected Power 0 - 10	1						
RFA3 out 0 -50V	24						
RFA2 out 0 -50V	23						
RFA1 out 0 -50V	25						
EXCITER out 0 -50V	17						
EHT 0-2.5KV key up	2.3KV						
EHT 0-2.5KV key dn	2.2KV						
SCREEN 0 - 500V	380						
BIAS 0 -100V key up	73						
BIAS 0 - 100V key dn	36						
RFA1 SUPPLY 0-50V	20						
RFA3 Cathode Current	0.85						
POWER OUTPUT	>900W						
POWER OUTPUT A3J/F1	>250W						
<u>select Key Up ,Audio Line,Remote</u>							
INITIALS							

CIRCUIT DIAGRAM - THIS DRAWING	
1	UNIT ASSEMBLY - THIS DRAWING
2	BOARD ASSEMBLY - THIS DRAWING
3	LID DETAILS - THIS DRAWING
4	LABEL - BLACK METAL SCOTCHCAL - THIS DRAWING
5	CABLE - RAINBOW 1M
6	CABLE CLAMP - 3/8 NYLON 2
7	GROMMET 10 SUIT PART 5
8	BOX - STC TYPE 46R, C500, D43, Bco 1
9	BRACKET - MECCANO, RIGHT ANGLE 24x24x10 WIDE 2
10	VEROBOARD PART 122 CODE 01-0040A, LENGTH 47mm 1
PLA PLUG - OTC CE-787, OTC STOCK No 4564 1	
SA 1/2 SD	SWITCH, 'McMURDO' BINARY TYPE 3009-01-01 (BLACK) 4
SE 1/4 SG	SWITCH, 'McMURDO' DECIMAL TYPE 3008-01-01 (BLACK) 3
DI 1/4 SD	DIODE, 1N914 - GENERAL PURPOSE, OTC STOCK No 2661 30

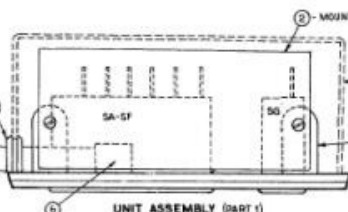
SEE NOTE 5



CIRCUIT DIAGRAM



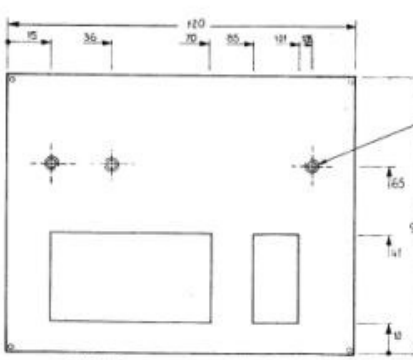
BOX DETAIL (CUT TO SUIT GROMMET)



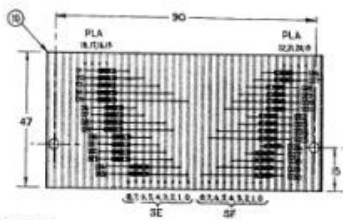
UNIT ASSEMBLY (PART 1)

NOTES

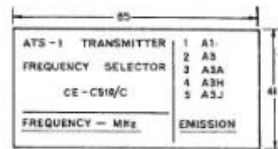
1. THIRD ANGLE PROJECTION
2. ALL DIMENSIONS ARE IN MILLIMETRES
3. GENERAL TOLERANCE ± 0.5 mm
4. CUT HOLE IN PART 8 TO SUIT GROMMET PART 7
5. WHEN ORDERING SWITCHES SA TO SG ENSURE THE FOLLOWING PARTS ARE INCLUDED -
 1. PAIR ENDOPLATES TYPE 387-02-08 (BLACK)
 1 SET OF BANKING RODS FOR A GROUP OF 4 NUTS
 1 SET OF BANKING RODS FOR 1 SWITCH
 4 NUTS
6. FINISH OF BOX PT 8 & LID PT 3 TO BE NATURAL



DETAILS PART 3 (LID OF BOX)



BOARD ASSEMBLY (PT. 2)



LABEL (PART 4)

ISSUE	CHANGES	REV.	CHK.	APP'D.	DATE	ISSUE	CHANGES	REV.	CHK.	APP'D.	DATE	OVERSEAS TELECOMMUNICATIONS COMMISSION (AUSTRALIA)
2	REVISION	3	4850	SKATING	2008	5A	R.N.	PC.22.01.16				ATS-1 TRANSMITTER FREQUENCY & EMISSION B.C.D. TEST SELECTOR TYPE 'C'

DRAWING NO. CE-C510
SHEET 7

CONNECTOR	PIN No.	FUNCTION	NORMAL VOLTAGE	OPERATING CURRENT
3TSD (Mains Input)	1 (R)	RED phase) 380/415 V	240	4 A
	2 (Y)	YELLOW phase) 50 Hz	240	4 A
	3 (B)	BLUE phase) 3-phase	240	4 A
	4 (N)	NEUTRAL) mains	-	-
4SKM (Channel and Emission Selection)	1 to 9	Channels 1 to 9 Selection Sw.	50	20 mA
	10	Channels 1 to 9 Earth Return	50	20 mA
	11	Spare		
	12	Emission A1 Selection Sw.	50	10 mA
	13	Emission A3 Selection Sw.	50	10 mA
	14	Emission A3A Selection Sw.	50	10 mA
	15	Spare		
	16	Emission A3H Selection Sw.	50	10 mA
	17	Emission A3J Selection Sw.	50	10 mA
	18	Emission Selection Earth Return	50	10 mA
	19-23	Spare		
4SKN (Antenna Selection and Interlock)	1	Channel 1 - Normally Closed	100 V max.	OR 1 A max.
	2	Channel 1 - Common	(30 W max.)	
	3	Channel 1 - Normally Open	"	
	4-5-6	Channel 2 - NC-C-NO	"	
	7-8-9	Channel 3 - NC-C-NO	"	
	10-11-12	Channel 4 - NC-C-NO	"	
	13-14-15	Channel 5 - NC-C-NO	"	
	16-17-18	Channel 6 - NC-C-NO	"	
	19-20-21	Channel 7 - NC-C-NO	"	
	22-23-24	Channel 8 - NC-C-NO	"	
	25-26-27	Channel 9 - NC-C-NO	"	
	28	Antenna Interlock	"	
	29-30-31	Spare		
4SKP (Transmitter Inputs)	1	Audio Input)	-	-
	2	Audio Input)	-	-
	3-4	Spare		
	5	KEY/PTT	50	40 mA
	6	Earth		
	7	Spare		
4SKQ (Transmitter Control Functions)	1	HT ON - POWER LOW	50	20 mA
	2	HT ON - POWER HIGH	50	10 mA
	3	HP/LP Earth Return	50	20 mA
	4	LT ON (Switch)	50	10 mA
	5	LT ON (Lamp)	100 V max.	OR 1 A max.
	6	HT ON (Lamp)	"	"
	7	RF ON (Lamp)	"	"
	8 & 9	Alarm - Normally Open	"	"
	10	REMOTE AVAILABLE (Lamp)	25	40 mA
	11	TUNE FAIL (Lamp)	25	40 mA
8SKA (Coaxial Socket Type HN)	Reflector- meter	R.F. Output - Recommended Cable RG34		

[illegible]

PLEASE NOTE:

Revision List No. 1 has been incorporated in this printing of the handbook.

Where applicable, all changes of component value, transistor and transformer types, etc., should also be made on the associated diagram.

Some or all of the changes in this Revision List may have been incorporated in this printing of the handbook.

CHAPTER 2

1. Modification No. 6

S.S.B. Generator Board 1R66439 has been modified by the addition of Printed Board Assembly 1R66468; Technical Service Bulletin TB/CT/59 of 20 November 1973 refers. The small added board enables adjustment of the signal level for the ASH transmission mode.

Page

- (v) - TABLE OF CONTENTS. After item 32 add the following:
33. Printed Board Assembly 1R66468 6/76
- 4/4 - (c) Modulator gain. After step (iii) add the following:
(iv) Set for ASH operation and feed in audio signal as in step (ii) above.
(v) Measure the output at SKA13-17 and adjust 68RV1 on board 1R66468 for 100 mV r.m.s. output.
- 5/26 - (m) 39RV9 adjustment. After step (ii) add the following:
(iii) Set for ASH operation.
(iv) Adjust 68RV1 on board 1R66468 for 100 mV r.m.s. output.
- 6/76 - COMPONENT SCHEDULE. After item 32 add the following:
- | | | | |
|------------------------------------|--|-----------------------|----------|
| 33. Printed Board Assembly 1R66468 | | | |
| 68C1 | 0.1 μ F \pm 80% \sim 20%, 25 VDCW, ceramic disc, barrier layer | Ducon CDR "Redcap" | 227082D |
| 68R1 | 4.7 k Ω \pm 5%, 200 mW, carbon film | Elcoma 2322-101-33472 | 610976E |
| 68R2 | 10 k Ω \pm 5%, 200 mW, carbon film | Elcoma 2322-101-33103 | 612071V |
| 68RV1 | 1 k Ω \pm 30%, 500 mW, variable, cermet | Beckman 62PR Helitrim | 1006900G |
| 68VT1 | Transistor | AWV AS201 | 906330W |

Drg. 66454A1 - Add details as per Fig. 1, below, to circuit diagram.
(Fig. 2-24)

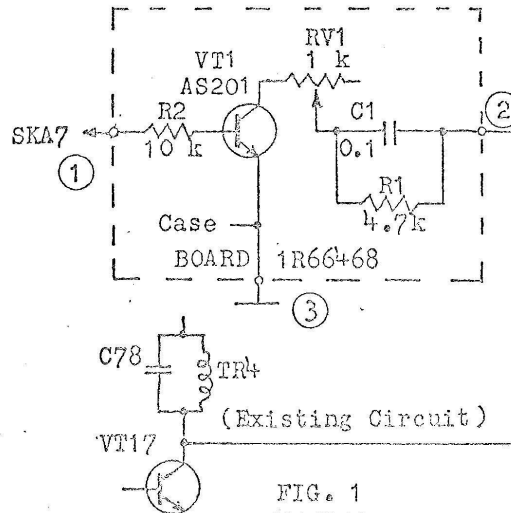


FIG. 1

2. Component Change

Page

6/53 - 4401. Change Manufacturer's Reference and AWA Stock Code Number to:
AWA 2Q62095 1008381R

Drg. 66444D1 - Change 10.7 MHz Filter type to: 2Q62095
(Fig. 2-14)

CHAPTER 3

Page

- 3/20 - 2C3. After word "metallised" add the word "polyester".
- 3/27 - 3CDH. Change current rating from "5A" to "8A" and AWA Stock Code Number to: 1007800K
- 3CBM. Change AWA Stock Code Number to: 1007800K
- 3/51 - 6C5. Change voltage rating from "20 VDCW" to "35 VDCW" and AWA Stock Code Number to: 1004278G
- 3/64 - 7RV1, 7RV2 and 7RV4. Change AWA Stock Code Number to: 609703W

Revision Record: Record the incorporation of this Revision List.
Authority: Change Orders 66426, 66449, 66578, 66996 and 67120.
Date of Issue: 11th December 1973.

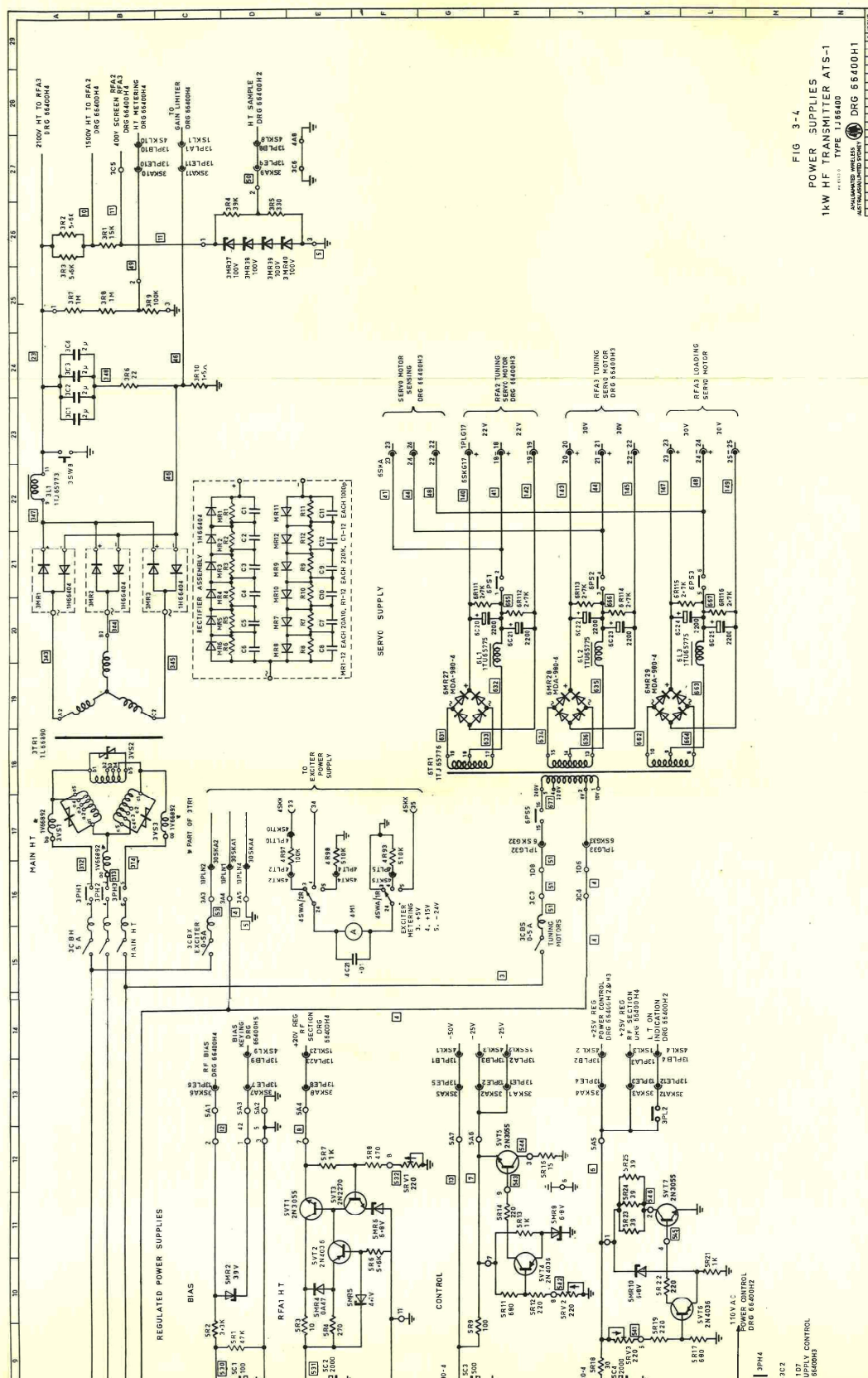
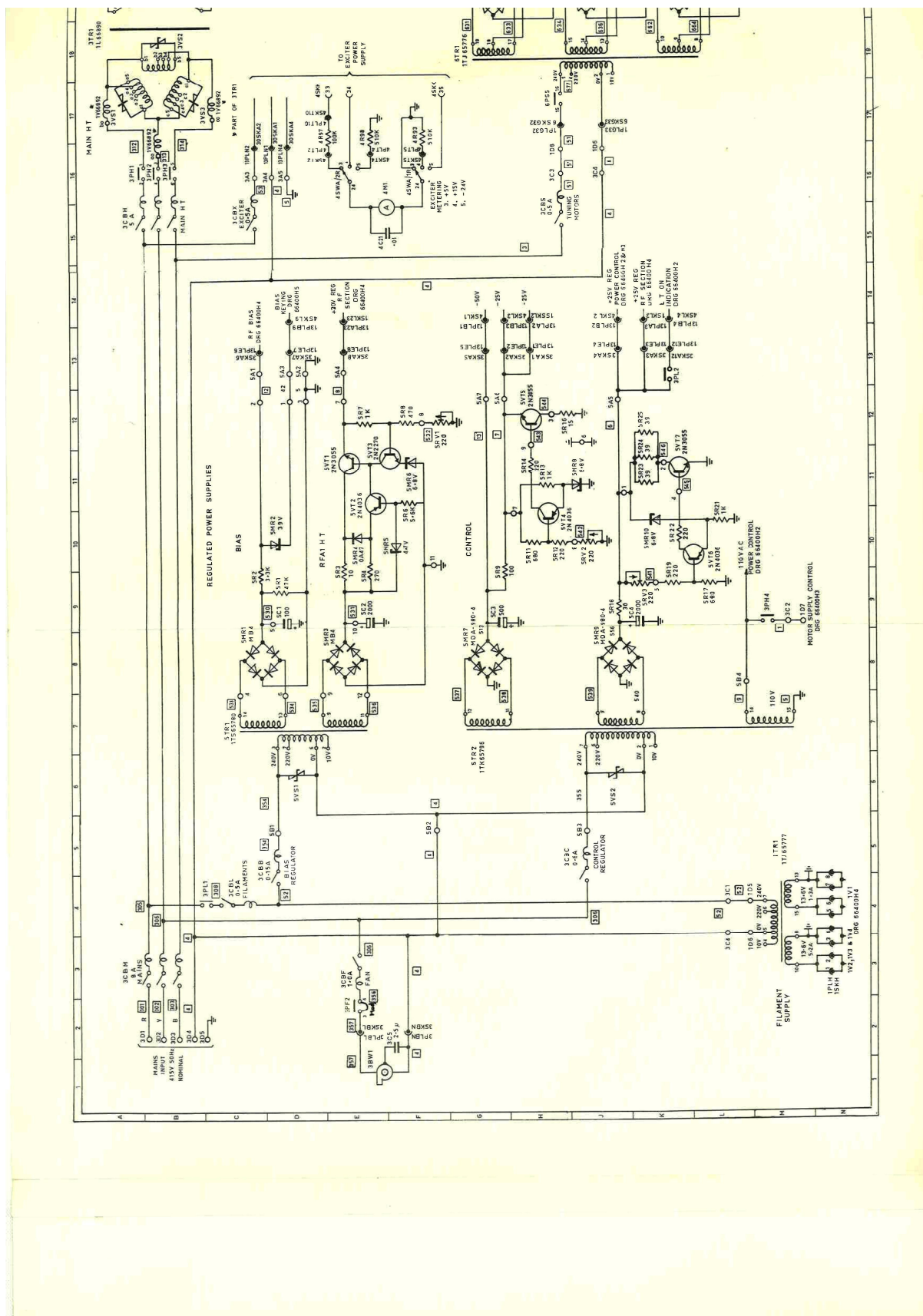
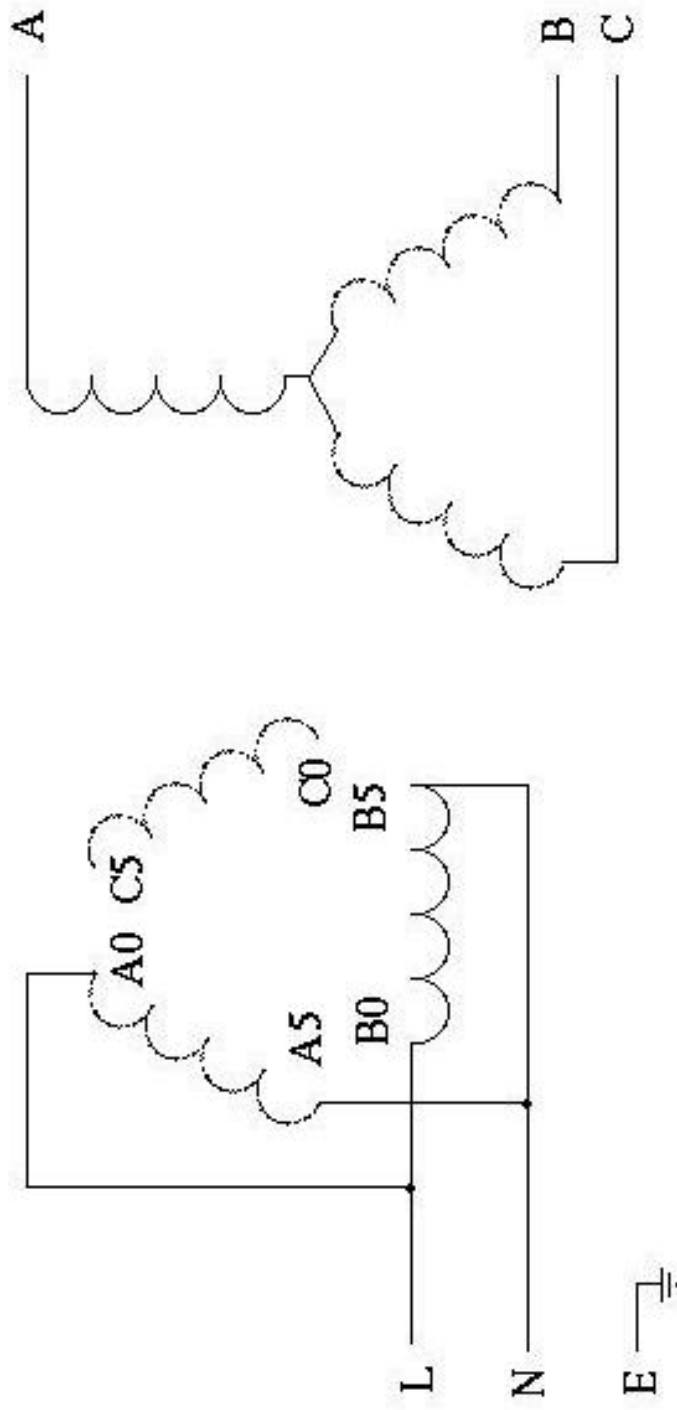


FIG 3-4
POWER SUPPLIES
1kW HF TRANSMITTER ATS-1
TYPE 1J66400

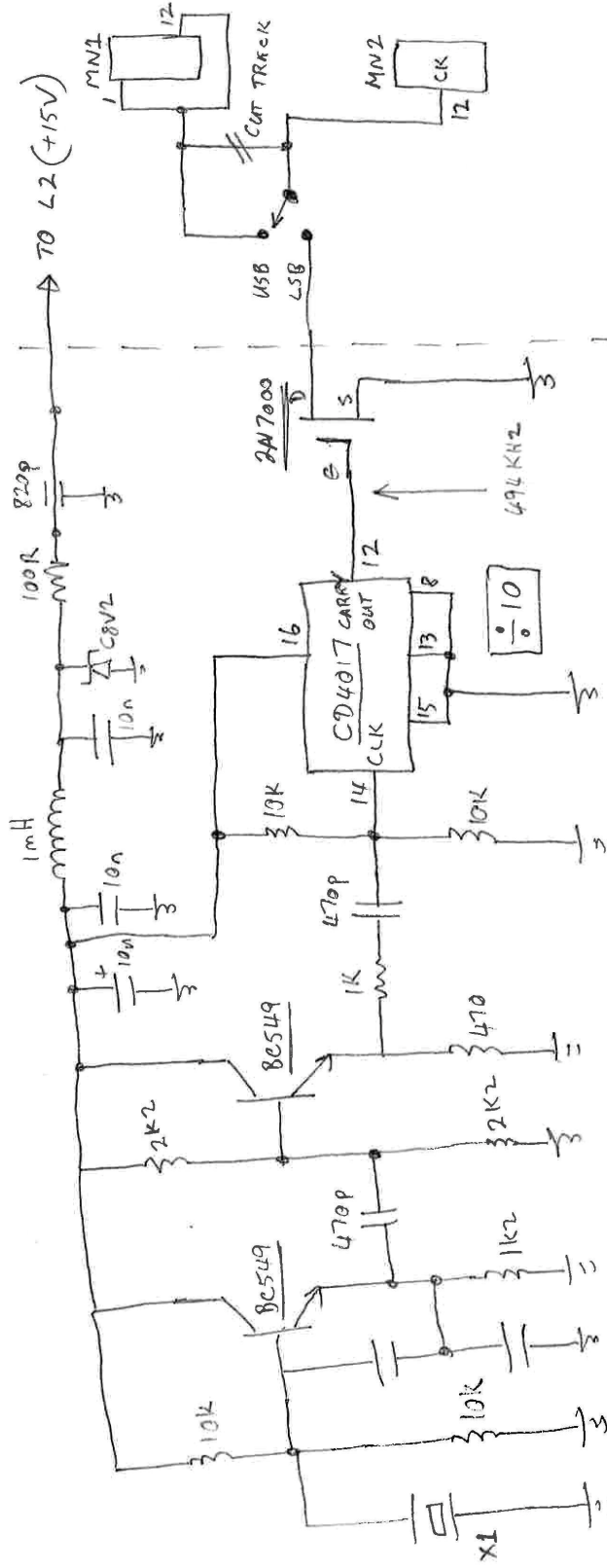


Single Phase Configuration



LSB CARRIER OSCILLATOR FOR AT51

- INSTALLED IN 2ND IF LOOP MODULE "51"



EXISTING PCB

ADDED OSC MODULE

X1 = HY-2 XTAL 4940-000 KHz
 " SPEC GG05F
 " HOLDER Q049/A