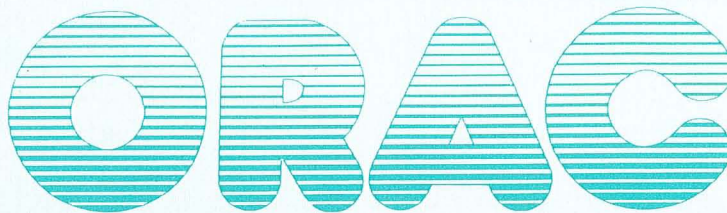


# ORAC

## SPARE PARTS MANUAL







## Computer Numerically Controlled (CNC) British built Bench Training Lathe.

ORAC manufactured by Denford Machine Tools is a CNC Lathe designed specifically for technical training. ORAC incorporates the latest micro-processor using a visual display unit and audio cassette deck instructing step by step programming. An RS232C link will interface ORAC to printers, paper tape punch units and computers.

### GENERAL SPECIFICATIONS

#### CNC CONTROL SYSTEM

1. Self contained Console.
2. Green on Black 5" V.D.U. with outlets to external T.V. and Monitor.
3. Touch Tone Alpha Numeric Keyboard allowing full manual data input.
4. Mini Magnetic Cassette Unit for program and tool offset storage.
5. RS232C Interface, for connection with computers, paper tape punch units and printers, etc.
6. Axis Jog on both axes with fast, slow and 0.01 mm increments.
7. Programmable Feedrate 0-1200 mm/min (48 inch/min).
8. Programmable Spindle Speed 0-2000 rpm.
9. Feedrate and Spindle Speed Override.
10. Linear Interpolation with vectorially correcting Feedrates.
11. Circular Interpolation.
12. Absolute/Incremental, Inch/mm programming throughout program.
13. Manual Program Stop.
14. Do-Loop facility allowing canned cycles for turning, facing, pecking and grooving.
15. Sub-routine facility.
16. Screwcutting from .35-3.5 mm Pitch 8-70 TPI.
17. Floating Program Datum.
18. 99 Block Memory.
19. Tool Offsets for up to 10 tools with tool wear compensation.
20. Programmable Dwell 0-99 secs.
21. 4 Auxiliary Outputs.
22. 4 Programmable Inputs.
23. System Resolution 0.01 mm (0.0004").

#### SAFETY FEATURES

Key Operated Isolator Switch, Membrane Keyboard, Chuck Guard, Axes Limit Switches - (adjustable on Z Axis), Electronic Shear Key built into Spindle Controller, Diagnostic Fault Finder.

#### EXTRA EQUIPMENT

A Full Range of Optional Equipment and Accessories are available including: Printers, Plotters, Computers, Software for Apple II, BBC Acorn, Epson HX20, Commodore, Pet, Paper Tape Punch Units and Porta Progs.

#### MECHANICAL

Swing Over Bed .....	200 mm (8")
Swing Over Cross-slide .....	115 mm (4½")
Distance between Centres .....	400 mm (15¾")
Spindle Speed (Stepless) .....	0-2000 rpm
Spindle Bore .....	20 mm (13/16")
Spindle Taper .....	No. 3
Tailstock Taper .....	No. 2
Tapers .....	.20 : 1 - 1 : 20
Radii .....	.2 mm to 3000 mm
Bed .....	Hardened and Ground Ways
X Axis Ballscrew .....	.8 mm dia. 2.5 mm Pitch
Z Axis Ballscrew .....	.16 mm dia. 5 mm Pitch
Toolpost - Quick Change with repeatability 0.0001", 40 different locations.	
Mechanical Resolution .....	.01 mm (0.0004")
<b>Machine Dimensions:-</b>	
Length 920 mm (36")	Width 560 mm (22")
Height 540 mm (21")	Weight 140 Kilos (310 lbs)

#### ELECTRICAL

50 Hz - 1 phase 240 volts  
60 Hz - 1 phase 220 volts

#### Spindle Motor

½ H.P. A.C. 0.37 kw 380-420 V 1.3 A incorporating A.C. Frequency Changer.

#### Axes Motors

Stepper Motors - 200 Steps/Rev D.C. 2.9 V 3.1 A.

#### STANDARD EQUIPMENT

RS 232C Link, Quick Change Toolpost and Holder, Self Centring 3 Jaw Chuck, Set of Outside Jaws, Installation, Maintenance and Instruction Manual, Spare Parts List, Map Light, Audio Cassette Deck and Headphone Outlet, Audio Instruction Tape, Video Instruction Film, Solar Calculator, Co-Axial T.V. Socket for V.D.U., Lathe Maintenance Tools, Mini Magnetic Cassette for Program Storage, Test Program with Component, Operator Training.

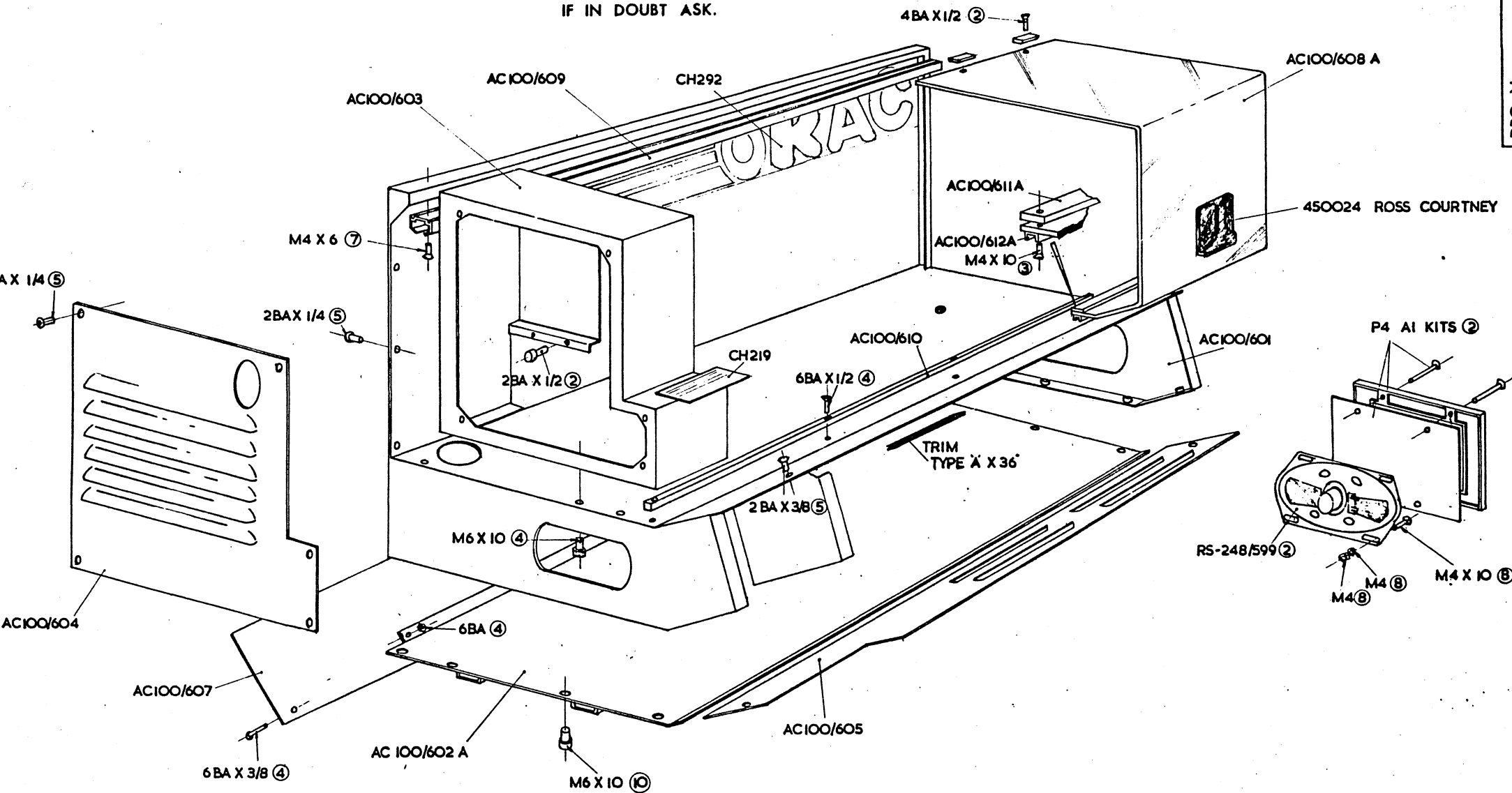


# ORAC

## PARTS ILLUSTRATIONS

HEADSTOCK & SPINDLE	AC 100/100
BED & SADDLE DRIVE	AC 100/200
SADDLE & CROSS SLIDE DRIVE	AC 100/300
TOP & SWIVEL SLIDE	AC 100/400
SPINDLE DRIVE	AC 100/500
CABINET & SLIDING GUARD	AC 100/600
TAILSTOCK	AC 100/700
TRANSFORMER BOX	AC 101
POWER CHUCK	AC 103
ROBOT ATTACHMENT	AC 104
INTERLOCKING GUARD	AC 105
COLLET ATTACHMENT	AC 107
QUICK CHANGE TOOLPOST	TP 100
INDEXING TOOLPOST	TP 110

IF IN DOUBT ASK.



AC100/600

				DENFORD MACHINE TOOLS LTD. BRIGHOUSE, YORKSHIRE.				LIMITS ON DIMENSIONS UNLESS OTHERWISE STATED.		MATL.		DRAWN	TRACED	CHECKED	APPROVED	DATE	SCALE
								ANGULAR $\pm \frac{1}{2}^{\circ}$ 3 PLACE DECIMAL $\pm .005^{\circ}$		MATL. SIZE		N				12/1/50	
								FRACTIONAL $\pm .010^{\circ}$ 4 PLACE DECIMAL $\pm .0005^{\circ}$		No. REQD.							
										MACHINE AT		DRAWING No.					
										GRIND AT 'G'							

DESCRIPTION  
ALTERATIONS

CHECKED APPD. DATE

DRG. No.

'ORAC'CABINET AND SLIDING GUARDAC.100/600

<u>PART No.</u>	<u>DESCRIPTION</u>	<u>QTY</u>
AC.100/601A	CABINET	1
602A	CABINET BASE	1
603	END DRIVE HOUSING	1
604	END DRIVE COVER	1
605	VENTILATION PANEL	1
606A		
607	REAR DOOR	1
608A	SLIDING GUARD	1
609	TOP SLIDING RAIL	1
610	BOTTOM RAIL	1
611A	GUARD CLAMP PLATE	1
612A	GUARD RETAINING CHANNEL	1
618	DIVIDING PANEL	1
CH.219	DENFORD LABEL	1
292	'ORAC' NAMEPLATE	1
304A	EARPHONE PLATE	1
305A	T.V. SOCKET PLATE	1
351	MAINS SUPPLY PLATE	1

<u>DESCRIPTION</u>	<u>MANUFACTURER &amp; REF</u>	<u>COMPUTER No.</u>	<u>QTY</u>
SLIDING GEAR	APEX ENTERPRISE	55501430	1
SPEAKER	RADIO SPARES 248/599	248/599	2
SPEAKER GRILL	UNICAR 1-05.071	55501432	2
KNOB	ELESA VTR 40B MB	55501214	1
EARPHONE(EXTRA)	EAGLE SE 500N	55501442	1

AC.100/601A	CABINET	1
602A	CABINET BASE	1
603	END DRIVE HOUSING	1
604	END DRIVE COVER	1
605	VENTILATION PANEL	1
606A		
607	REAR DOOR	1
608A	SLIDING GUARD	1
609	TOP SLIDING RAIL	1
610	BOTTOM RAIL	1
611A	GUARD CLAMP PLATE	1
612A	GUARD RETAINING CHANNEL	1
613	* SWITCH BRACKET	1
614	* GUARD STUD	1
615	* BUNDY TUBE ADAPTOR	2
616	* SWITCH GUARD	1
617	* REED SWITCH SPACER	2
618	DIVING PANEL	1
619	* BUNDY TUBE	1
CH.219	DENFORD LABEL	1
292	'ORAC' NAMEPLATE	1
304A	EARPHONE PLATE	1
305A	T.V. SOCKET PLATE	1
351	MAINS SUPPLY PLATE	1

DESCRIPTION	MANUFACTURER	REF.	NO. OFF
GUARD HANDLE	ROSS COURTNEY	450024	1
SLIDERS	W & S KERN	GLIDE-A-LONG(NYLON)	2
TRACK	W & S KERN	(SEE AC. 100/609)	1
SPEAKER	RADIO SPARES	248/599	2
SPEAKER GRILL	A1 KITS	P4	2
EARPHONES (EXTRA)	EAGLE	SE 500N	1 Pair
SKT CAP HEADS		M6 x 10	17
SKT C/SUNK		M4 x 10	8
" "		2BA x $\frac{1}{4}$	5
" "		4BA x $\frac{5}{16}$	3
" "		6BA x $\frac{1}{8}$	4
SKT BUTTON HEAD		2BA x $\frac{5}{16}$	6
CHEESE HEAD		2BA x $\frac{1}{4}$	10
HEX NUTS		M4	4
WASHER		M4	8
* REED SWITCH	RS	338-743	2
* ACTUATOR MAGNET	RS	338-759	2

\* EXTRA EQUIPMENT.

DENFORD MACHINE TOOLS LIMITED

PARTS LIST 'ORAC' TRANSFORMER

AC.101/1	TRANSFORMER BOX	1
2	TRANSFORMER BOX LID	1
AC.100/211.A.	WASHER	1
CH.329C	PANEL PLATE	1

DESCRIPTION	MANUFACTURER	REF.	NO.
TRANSFORMER	I.L.P.	XA 0375	1
SWITCH	R.S.	338 - 529	1
FUSE HOLDER	R.S.	412 - 863	1
FUSE HOLDER	R.S.	412 - 021	1
STRAIN BUSH	R.S.	542 - 894	2
CABLE TIE BASE	R.S.	543 - 901	1
PLUG	R.S.	488 - 208	1
TERMINAL BLOCK	KLIPPON	2435-2	4
SCREWED ROD		M8 - 120 LONG	1
HEX NUT		STD. M8	2
SOCKET	R.S.	489-245	1
V.D.R.	F.E.C.	V275LA40A	1

<u>PART No.</u>	<u>DESCRIPTION</u>	<u>QTY</u>
AC103/ 1	MAIN SPINDLE	1
2	CHUCK BACKPLATE	1
3	SPINDLE PIPE BRACKFT	1
CH 378	HEADSTOCK NAMEPLATE	1

<u>DESCRIPTION</u>	<u>MANUFACTURER &amp; REF</u>	<u>COMPUTER No.</u>	<u>QTY</u>
CHUCK	RICHARD.R.LEADER	55500050	1
VALVE	SCHRADER B43004PP054	55500050A	1
FILTER	" " B06-101-A2KD	" "	1
GAUGE	" " 18-013-909	" "	1
SELF GRIP ADAPTOR	ENOTS 97053102	" "	3
" " "	" 97053104	" "	6
" " BEND	" 97100502	" "	4
" " T BEND	" 97110102	" "	1
" " " "	" 97110104	" "	1
" " REDUCER	" 97151727	" "	1
SWITCH VALVE	" 03224000	" "	2
NYLON TUBE	4mm & 6mm DIA	" "	
LEGEND PLATE	R.R.LEADER S/P15435/6	" "	2
BRACKET	" " 18-001-053	" "	1
AIR LOCK	" "	55500050B	1
SOLENOID VALVE	" " DM / 240 1A	55500050C	1
ELBOW	ENOTS 36055510		1
TUBING SLEEVES	" " 36050104		2
" " NUTS	" " 36050004		2

SEE ALSO DRGS

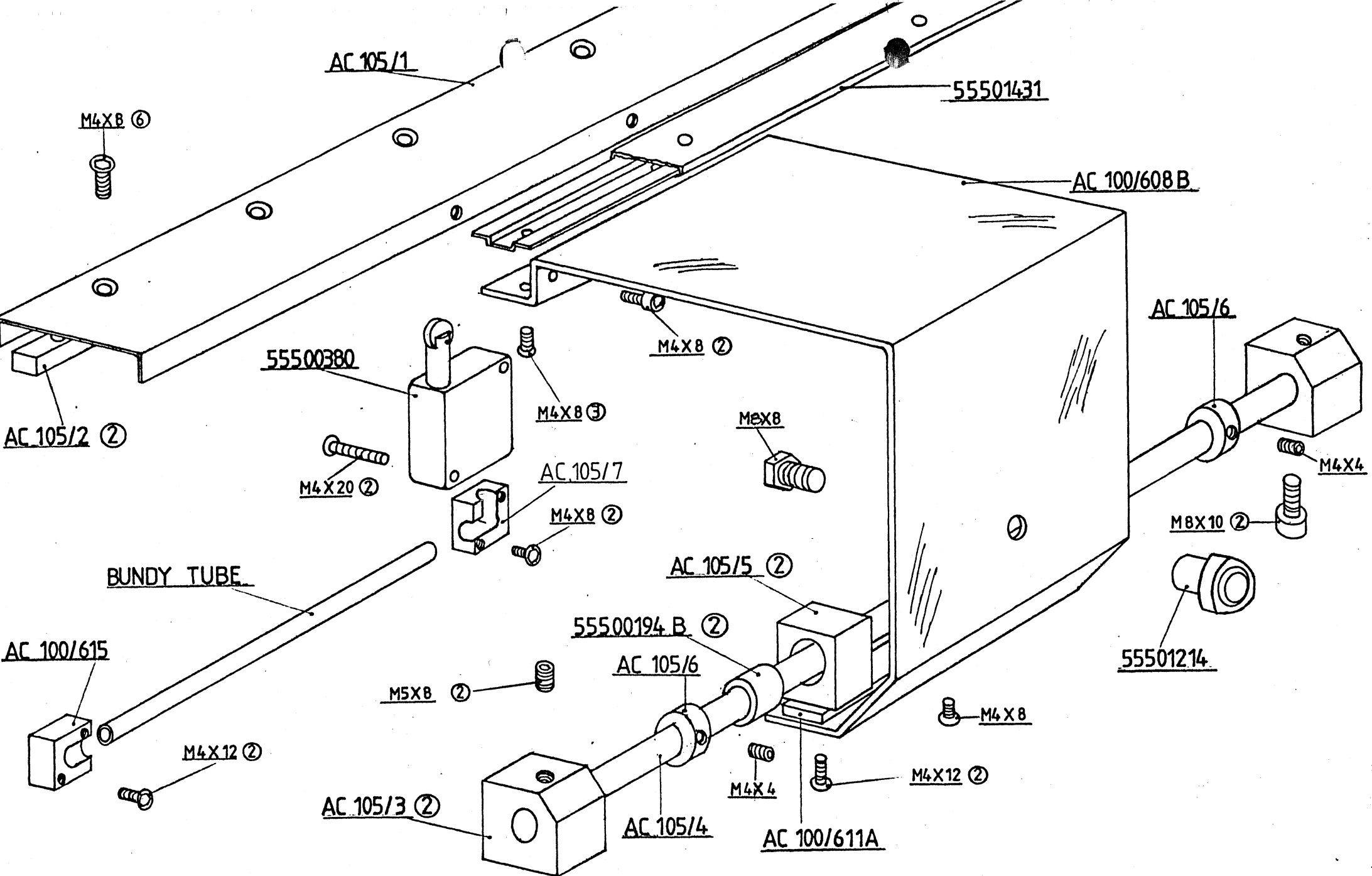
AC 103	TUBE FITTING LAYOUT
AC 103A	CIRCUIT DIAGRAM
AC 103B	EXTRA MACHINING OPERATIONS

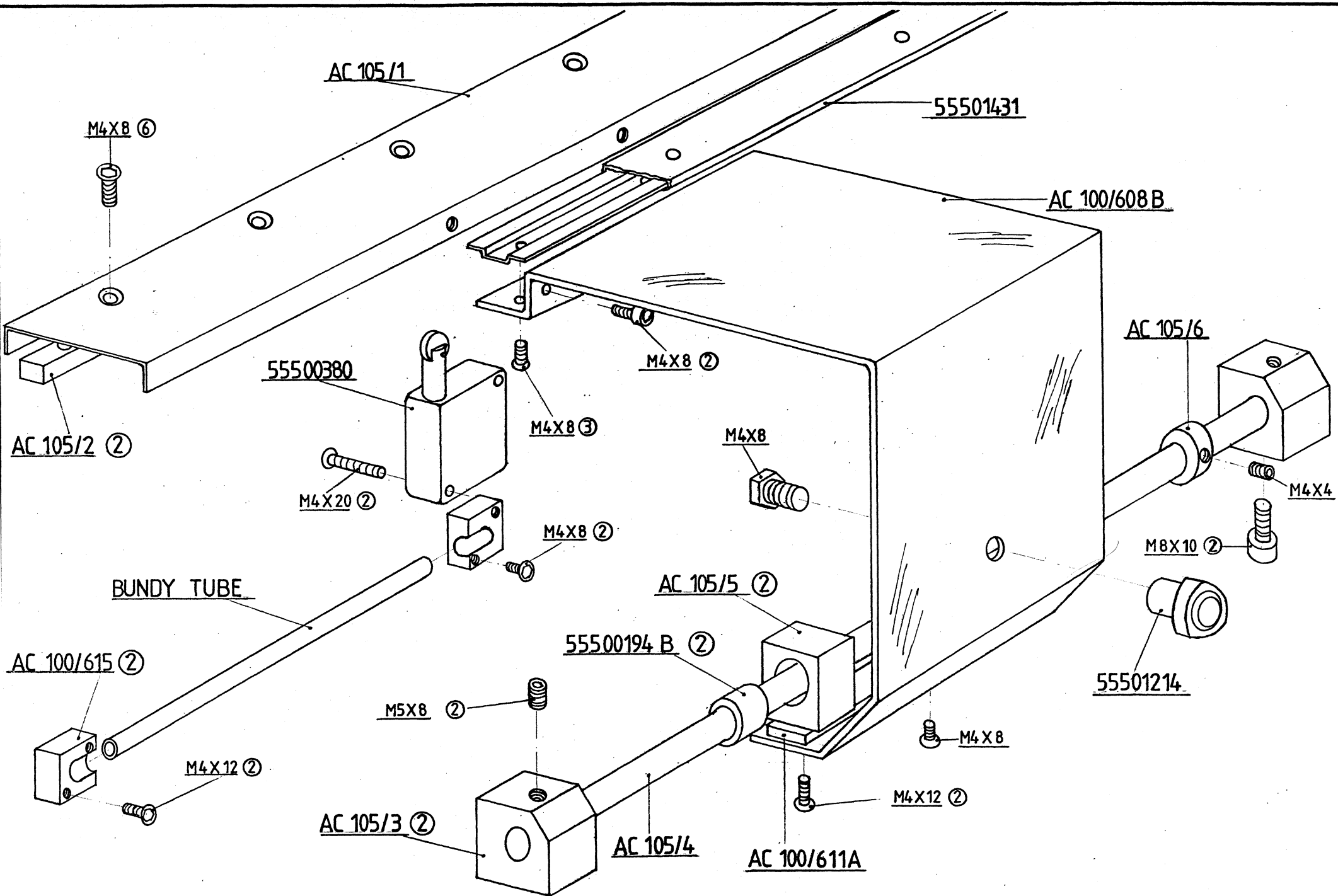


'ORAC'ROBOT ATTACHMENTAC 104

<u>PART No</u>	<u>DESCRIPTION</u>	<u>QTY</u>
AC 104/ 1	BAR RACK BASE	1
2	BAR RACKS	3
3	GUARD PUSH	1
4	ROBOT JAWS	2

<u>DESCRIPTION</u>	<u>MANUFACTURER &amp; REF</u>	<u>COMPUTER No</u>	<u>QTY</u>
ROBOT ARM	MITSUBISHI RM-501 MOVEMASTER	55501814	1







'ORAC'

INTERLOCKING GUARD

AC 105

<u>PART No.</u>	<u>DESCRIPTION</u>	<u>QTY</u>
AC 105/1	KNOCK OFF SUPPORT BRACKET	1
2	KNOCK OFF	2
3	ROD SUPPORT BLOCK	2
4	ROD	1
5	BEARING HOUSING	2
6	STOP	2
7	TUBE ADAPTOR	1
AC 100/608B	SLIDING GUARD	1
611A	GUARD CLAMP PLATE	1
615	BUNDY TUBE ADAPTOR	1

<u>DESCRIPTION</u>	<u>MANUFACTURER &amp; REF</u>	<u>COMPUTER No.</u>	<u>QTY</u>
MICRO SWITCH	BURGESS KB5EQR	55500380	1
TRACK	WIDNEY 2012-FN X 35 $\frac{1}{2}$ "	55501431	1
KNOB	ELESA VTR 40B M8	55501214	1
TUBE	BUNDY 5/16" OD.X 13 $\frac{7}{8}$ "		1
OILITE BUSH	MANGANESE BRONZE $\frac{1}{2}$ "X $\frac{5}{8}$ " X1"	55500194B	2

'ORAC'INTERLOCKING GUARDAC 105

<u>PART No.</u>	<u>DESCRIPTION</u>	<u>QTY</u>
AC 105/1	KNOCK OFF SUPPORT BRACKET	1
2	KNOCK OFF	2
3	ROD SUPPORT BLOCK	2
4	ROD	1
5	BEARING HOUSING	2
6	STOP	1
AC 100/608B	SLIDING GUARD	1
611A	GUARD CLAMP PLATE	1
615	BUNDY TUBE ADAPTOR	2

<u>DESCRIPTION</u>	<u>MANUFACTURER &amp; REF</u>	<u>COMPUTER No.</u>	<u>QTY</u>
MICRO SWITCH	BURGESS KB5EQR	55500380	1
TRACK	WIDNEY 2012-FN X 35 $\frac{1}{2}$ "	55501431	1
KNOB	ELESA VTR 40B M8	55501214	1
TUBE	BUNDY 5/16" OD.X 13 $\frac{7}{8}$ "		1
OILITE BUSH	MANGANESE BRONZE $\frac{1}{2}$ "X $\frac{5}{8}$ " X1"	55500194B	2

ORACCOLLET ATTACHMENTA.C. 107

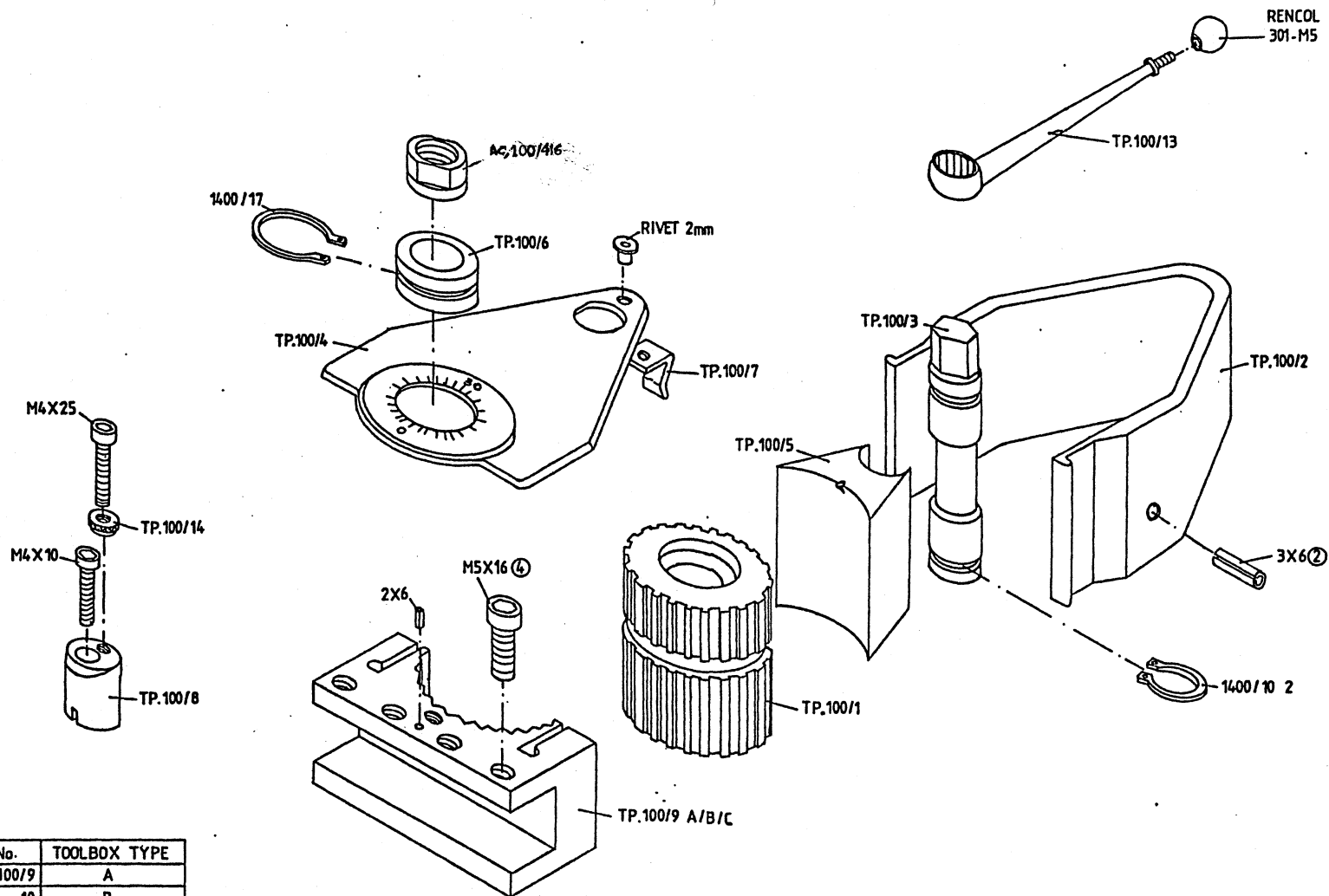
<u>PART No.</u>	<u>DESCRIPTION</u>	<u>QTY</u>
AC 107/1	DRAWBAR	1
2	DRAWBAR EXTENSION	1
3	HANDWHEEL	1
ML 107/3	COLLET ADAPTOR	1

<u>DESCRIPTION</u>	<u>MANUFACTURER &amp; REF</u>	<u>COMPUTER No.</u>	<u>QTY</u>
HANDWHEEL	RENCOL 325 (AC 107/3)	55501204	1
COLLET	327 0.125"	55500039	1
"	" 0.1875"	55500040	1
"	" 0.250"	55500041	1
"	" 0.3125"	55500042	1
"	" 0.375"	55500043	1
"	" 0.4375"	55500044	1
"	" 0.500"	55500045	1
"	" 3mm	55500039A	1
"	" 5mm	55500040A	1
"	" 6mm	55500041A	1
"	" 8mm	55500042A	1
"	" 10mm	55500043A	1
"	" 11mm	55500044A	1
"	" 12mm	55500045A	1



IF IN DOUBT, ASK.

DRG. No.

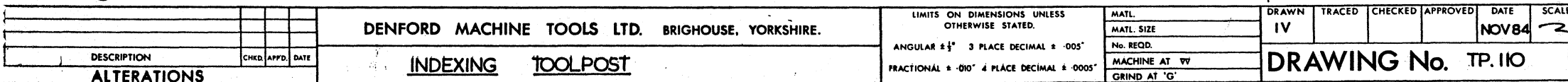


TP.100

No.	TOOLBOX TYPE
TP100/9	A
" " 10	B
" " 11	C

No.		DESCRIPTION		CHG. APPR. DATE		DENFORD MACHINE TOOLS LTD. BRIGHOUSE, YORKSHIRE.		LIMITS ON DIMENSIONS UNLESS OTHERWISE STATED. ANGULAR ± 1° 3 PLACE DECIMAL ± .005° FRACTIONAL ± .010" 4 PLACE DECIMAL ± .0005"		MATERIAL MATERIAL SIZE No. REQD. MACHINE AT "V" GRIND AT "G"		DRAWN A.M.		TRACED		CHECKED		APPROVED		DATE 23.4.85		SCALE	
ALTERATIONS						DRAWING No.																	

■ = ORAC ONLY  
 ● = EASITURN 3 ONLY



'ORAC' INDEXING TOOLPOSTPARTS LIST

<u>PART No.</u>	<u>DESCRIPTION</u>	<u>QTY</u>
TP.110/1	TOOLPOST BODY	1
2	TURRET	1
3	MAIN SHAFT	1
4	WORM SHAFT	1
5	WORM GEAR	1
6	WORM SHAFT END CAP	1
7	RATCHET STOP	1
8	RETAINING PIN	1
9	FRONT PLATE	1
10	REAR PLATE	1
11	TRANSDUCER DISC	1
12A	MOTOR JACKET	1
13		
14A	TEE BOLT	4
15	ELECTRICAL COVER	1
16	ADAPTOR PLATE	1
17A,B&C	COLLETS 6,8&12 DIA	1set
18	CHUCK ADAPTOR	1
19	GREASE RETAINING PLATE	1
20	SENSOR BOARD BRACKET	1
21		
22	CHIP GUARD EXTENTION (STARTURN 8 ONLY)	1
23	MANUAL SWITCH BRACKET	1
24	EXTENSION No.2 SOFT CENTRE	1

CH.321	'D' SYMBOL	1
CH.364	LIFTING WARNING PLATE	1
AC.100/608B	CHIP GUARD (EXTENDED)	1
611A	GUARD CLAMP PLATE	1
612A	GUARD RETAINING CHANNEL	1

<u>DESCRIPTION</u>	<u>MANUFACTURER &amp; REF</u>	<u>COMPUTER No.</u>	<u>QTY</u>
MOTOR	TRIDENT :		
	2332.912 11.151 000	55500302	1
GEARBOX	TRIDENT :		
	2938.804 0060.0 000	55500302A	1
BEARING	FAG : 7205 B	55500102B	1
BEARING	FAG : 6200 2RS	55500110	1
OILITE BUSH	16/22/25	55500195F	1
LOCKNUT	FAG : KM5	55500184A	1
TABWASHER	FAG : MB5	55500184B	1
OPTO SWITCH	RS 307 913	307 913	3
GREASE NIPPLE	LUMATIC : HDFV4		1
DISC SPRING	ANDERTON : AL 4017	55500196D	1
DRILL CHUCK	JACOBS : K10 ACG <sup>3</sup> / <sub>8</sub> x24M		1



DENFORD MACHINE TOOLS LTD.

'ORAC' INSPECTION SHEET

PART 1

SERIAL NO.	DATE	CUSTOMER	INSP. BY:

Check ✓

1. LUBRICATION

- a. LUBRICATE SADDLE SLIDES & BED .....
- b. LUBRICATE CROSS SLIDE SLIDES .....
- c. LUBRICATE CROSS SLIDE BEARINGS .....
- d. GREASE LEADSCREW .....
- e. GREASE CROSS SLIDE SCREW (REMOVE COVER) .....
- f. LUBRICATE TOPSLIDE ASSEMBLY .....
- g. GREASE HEADSTOCK BEARINGS (SPARINGLY) .....
- h. LUBRICATE TAILSTOCK BARREL .....
- i. LIGHTLY OIL TELESCOPIC COVERS ON LEADSCREW .....

RUNNING

- i. RUN IN 4 HRS. - TEST TAPE 0009 .....
- ii. RUN IN 2 HRS TEST TAPE 1177 .....
- iii. RUN IN 2 HRS TEST TAPE 291 .....
- iv. FIT CHUCK/TEST FOR TRUE .....
- v. CHECK ALL FREEDRATES AND INCHING BUTTONS
- vi. PROGRAM IN TEST PROGRAM .....
- vii. CHECK TEST PROGRAM AND CASSETTE LOAD .....
- viii. CHECK AUDIO EQUIPMENT (SPEAKERS AND EARPHONES)
- ix. CUT TEST PIECE TO TEST PROGRAM FROM  
CASSETTE (1936)
- xi. CHECK SPINDLE SPEED OVER-RIDE .....

/continued -

CHECK LIST

1. CHECK WITH .0015 FEELER GAUGE .....
  - a) SADDLE & BED .....
  - b) SADDLE & CROSS SLIDE .....
  - c) TOPSLIDE ASSEMBLY .....
  - d) TAILSTOCK SHOE & BED .....
2. CHECK TORQUE ON HIGH **SPEED**, COGGING ON LOW .....
3. CHECK SPINDLE SPEEDS .....
4. CHECK START, STOP AND EMERGENCY STOP BUTTONS .....
5. CHECK MAP LIGHT .....
6. FIT TOOLPOST AND CHECK CENTRE HEIGHT .....
7. CHECK TOPSLIDE FOR BACKLASH .....
8. CHECK SLIDES ENSURE CORRECT GRADUATIONS ON DIALS .....
9. CHECK ALL HANDLES AND KNOBS ARE SECURE .....
10. CHECK TAILSTOCK FOR FREE MOVEMENT ON BED, CLAMP AND  
ALIGNMENT .....
12. CHECK TAILSTOCK EJECTOR .....
13. CHECK TAILSTOCK BARREL FREE MOVEMENT AND GRADUATIONS
14. ZERO TAILSTOCK MARKING IN HORIZONTAL POSITION .....
15. CHECK ALL NAMEPLATES ARE FITTED :- CH.301 -CH.302(2)  
CH.219 CH.303 CH.304 CH.305  
CH.292 'ORAC' BACK SPLASH GUARD .....  
CH.287A HEADSTOCK .....  
CH.296 APRON PLATE REAR WARNING LABEL .....
16. CHECK DRIVE PLATE SEALED TO BACK SPLASH GUARD AND BASE
17. CHECK HEADSTOCK BEARINGS FOR OVERHEATING AFTER RUNNING  
IN .....
18. CHECK ALL ITEMS OF EXTRA EQUIPMENT AND ACCESSORIES FIT  
AND WORK CORRECTLY .....
19. FIT HOLE PLUGS TO ALL CAPHEAD SCREWS ON SHOW .....
20. CHECK GUARDS FOR SQUARENESS AND FIT .....
21. CHECK SLIDING GUARD FOR EASE OF MOVEMENT - LIGHTLY OIL  
SLIDES .....
22. CHECK PAINTWORK FOR CHIPS OR MARKS .....
23. CHECK KEYS LOCK AND WITHDRAW .....
24. CHECK FRONT FACIA FOR FIT AND SQUARE .....
25. CHECK BLACK STRIP FITTED .....
26. CHECK ALL FASTENING SCREWS ARE LOCKED UP .....
27. CHECK GREEN END GUARD STRIPS FITTED & SQUARE .....
28. CHECK BED STAMPED WITH FITTERS NO .....

Check

# ORAC

## PARTS ILLUSTRATIONS

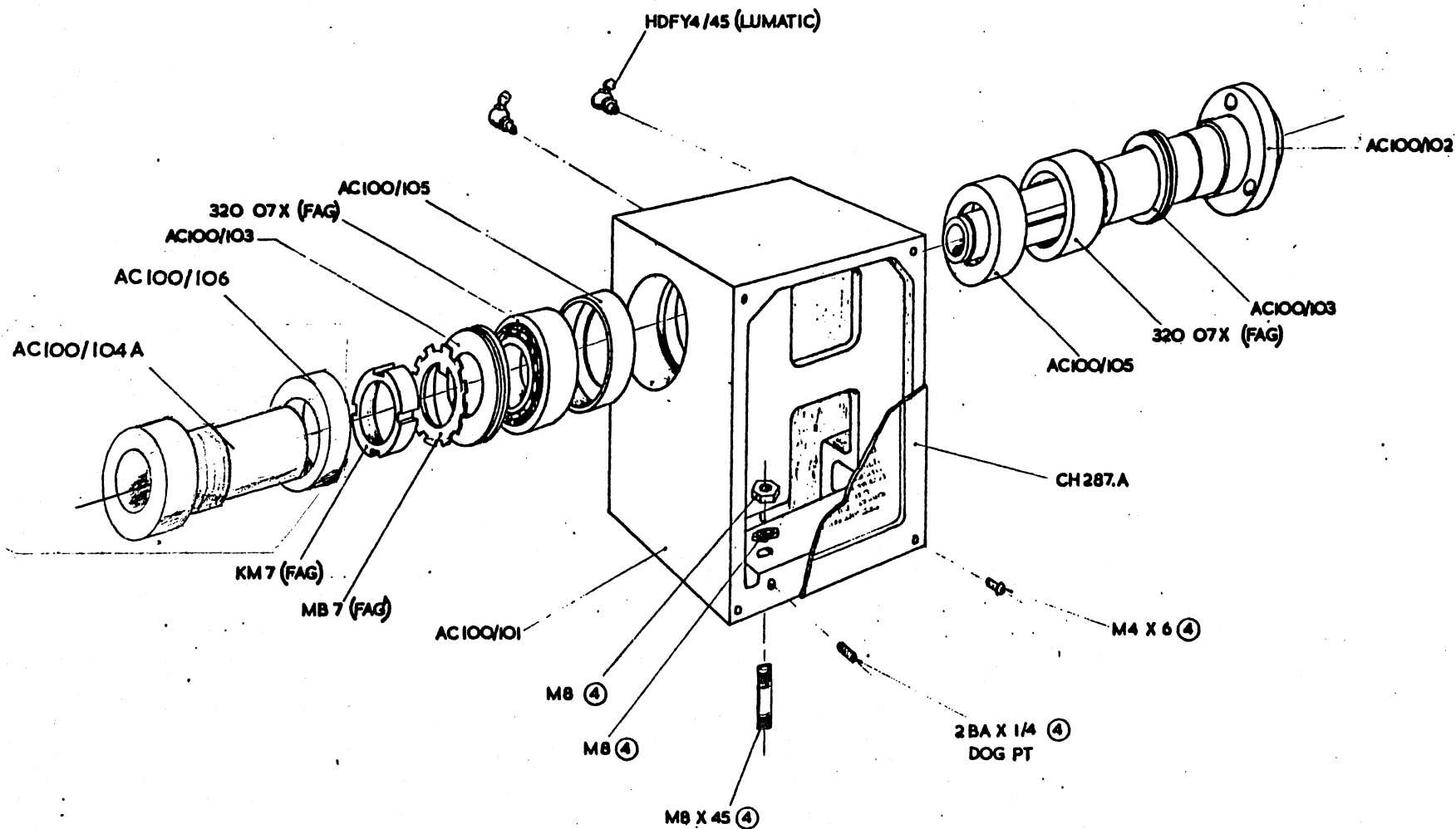
HEADSTOCK & SPINDLE	AC100/100
BED & SADDLE DRIVE	AC100/200
SADDLE & CROSS SLIDE DRIVE	AC100/300
TOP & SWIVEL SLIDE	AC100/400
SPINDLE DRIVE	AC100/500
CABINET & SLIDING GUARD	AC100/600
TAILSTOCK	AC100/700

# WIRING DIAGRAMS

## MK III

[illegible]

IF IN DOUBT ASK.



AC100/100

				DENFORD MACHINE TOOLS LTD. BRIGHOUSE, YORKSHIRE.				LIMITS ON DIMENSIONS UNLESS OTHERWISE STATED.				DRAWN		TRACED		CHECKED		APPROVED		DATE		SCALE	
								ANGULAR ± 1° 3 PLACE DECIMAL ± .005°				MATERIAL		N						14/12/82			
DESCRIPTION								FRACTIONAL ± .015" 4 PLACE DECIMAL ± .0005"				MATERIAL SIZE											
ALTERATIONS												No. REQD.											
												MACHINE AT TV											
												GRIND AT 'Q'											

DRAWING No.

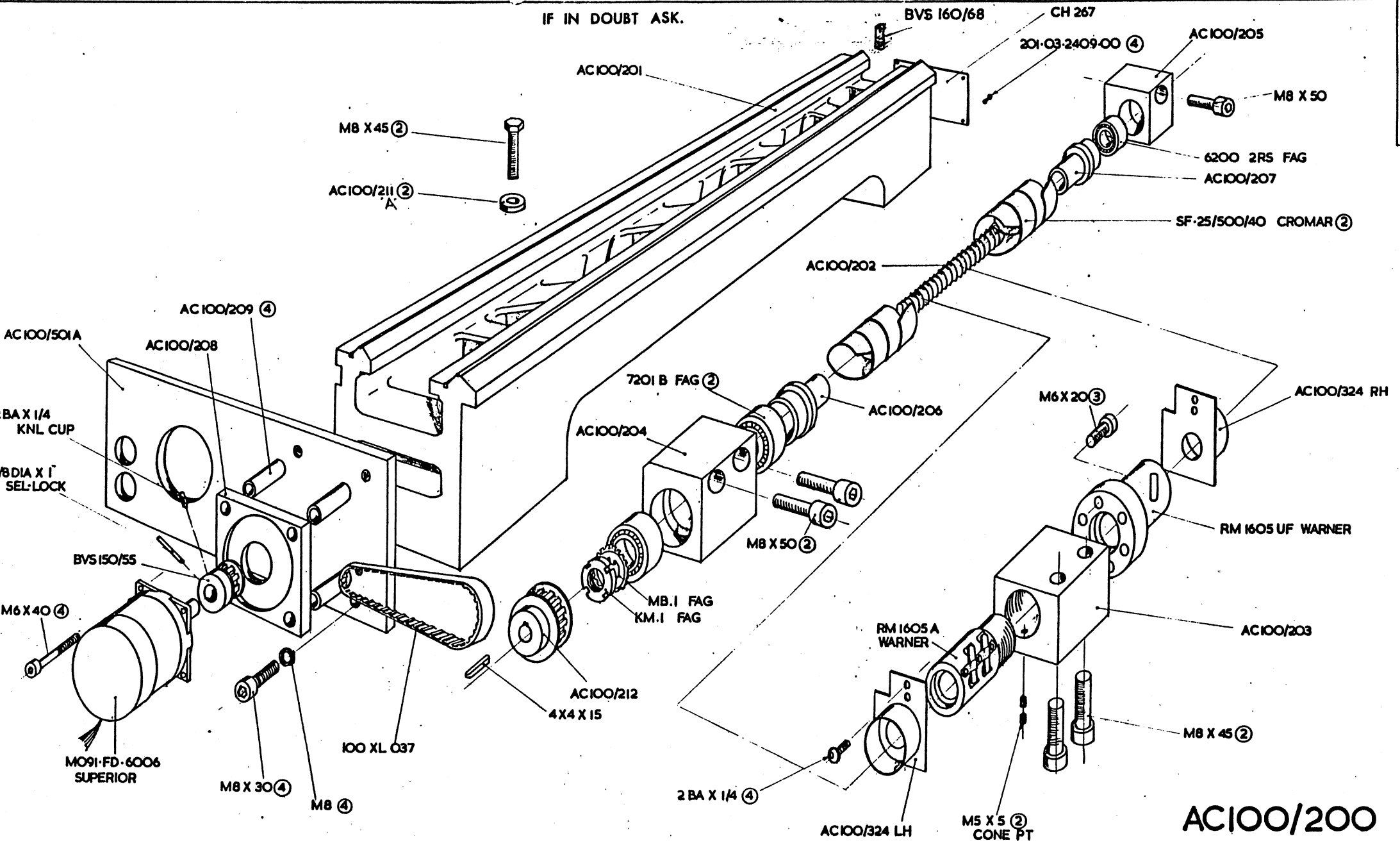
DENFORD MACHINE TOOLS LIMITED.

<u>'ORAC'</u>	<u>HEADSTOCK &amp; SPINDLE AC. 100/100.</u>	<u>No. OFF.</u>
AC. 100/101	HEADSTOCK	1
102	MAIN SPINDLE	1
103	GREASE RETAINING PLATE	2
104 A	SPINDLE END TUBE	1 •
105	GREASE CAP	2
106	SPINDLE END TUBE NUT	1 •
107	Chuck Guard Spigot	1 •
108A	Chuck Guard	1 •
CH. 287. A.	HEADSTOCK NAMEPLATE	1 •

<u>DESCRIPTION</u>	<u>MANUFACTURER</u>	<u>REF.</u>	<u>NO. OFF</u>
TAPER ROLLER BEARINGS	FAG	320 07X	2
LOCKNUT	FAG	KM 7	1 •
TAB	FAG	MB. 7	1 •
GREASE NIPPLES	LUMATIC	HDFY4/45	2 •
BUTTON HEADS		M4x6	4 •
HEX NUT		M8	4 •
WASHER		M8	4 •
GRUB SCREW		2BA x $\frac{1}{4}$ Dog PT	4 •
SPRING WASHER		M8	4 •



IF IN DOUBT ASK.



AC100/200

DESCRIPTION		CHG.	APPD.	DATE	DENFORD MACHINE TOOLS LTD. BRIGHOUSE, YORKSHIRE.		LIMITS ON DIMENSIONS UNLESS OTHERWISE STATED.		MATL.	DRAWN	TRACED	CHECKED	APPROVED	DATE	SCALE
ALTERATIONS							ANGULAR ± 1" 3 PLACE DECIMAL ± .005"		MATL. SIZE						
							FRACTIONAL ± .000" 4 PLACE DECIMAL ± .0005"		No. REQD.						
									MACHINE AT "V"						
									GRIND AT "G"						

DRAWING No.

DRG. No.

<u>'ORAC'</u>	<u>BED &amp; SADDLE DRIVE.</u>	<u>AC. 100/200</u>	<u>No. OFF.</u>
AC.100/201	BED		1
202	SADDLE BALLSCREW		1.
203	BALLNUT HOUSING		1.
204	BEARING HOUSING		1.
205	END SUPPORT BLOCK		1.
206	CENTERING FLANGE		1.
207	CENTERING FLANGE		1.
208	MOTOR PLATE		1.
209	MOTOR PLATE SPACER		4.
210			
211A	BED WASHER		2.
212	30T PULLEY		
213	ADJUSTABLE SADDLE STOP		1.
214	SADDLE STOP PLUNGER		1.
215	SADDLE STOP CLAMP PLATE		1.
216	PLUNGER HEAD		1.
CH. 267	SPECIFICATION PLATE		1.
BVS150/55	12T PULLEY		1.
BVS160/68	BED END STOP		1.

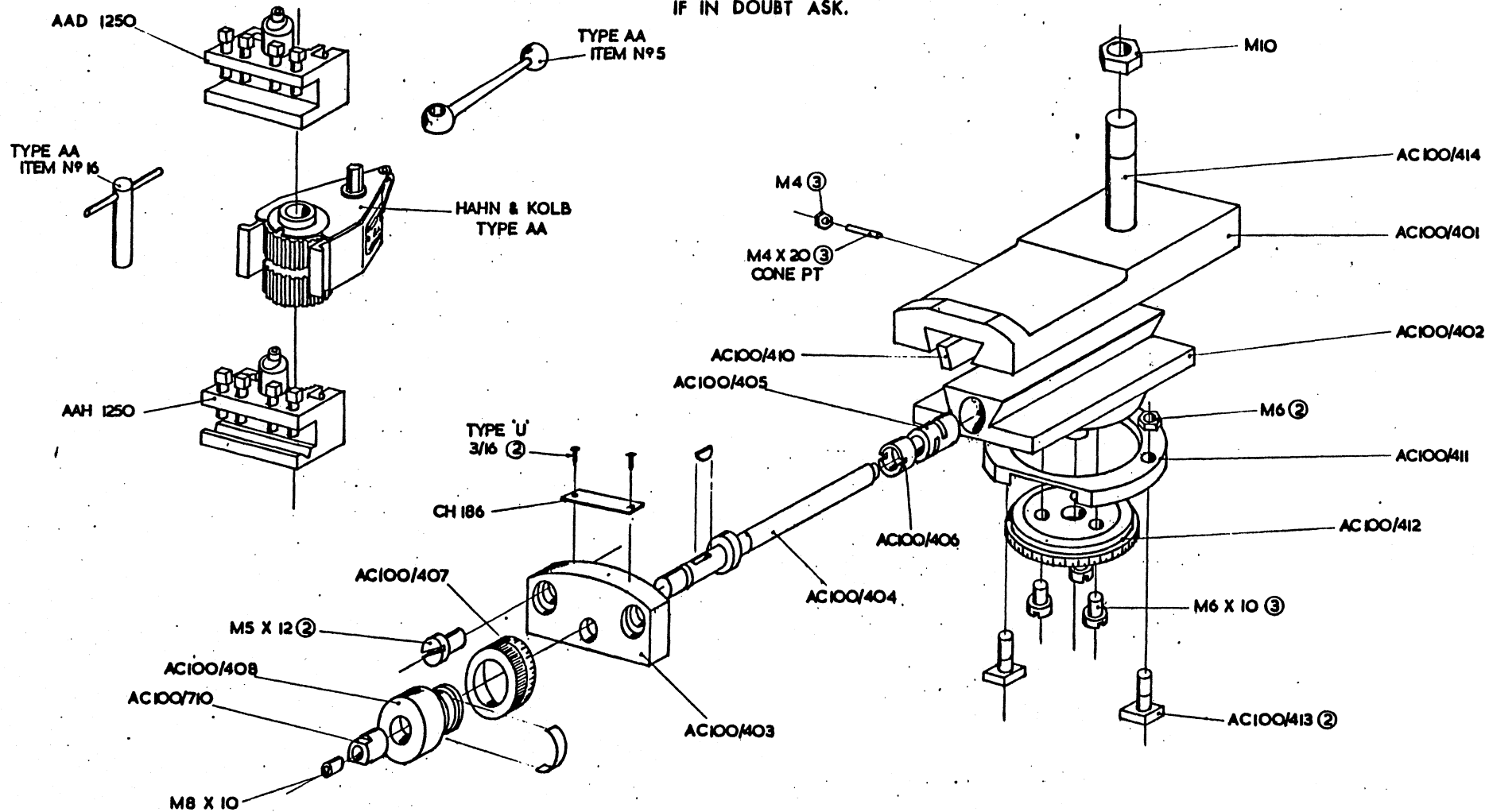
<u>DESCRIPTION</u>	<u>MANUFACTURER</u>	<u>REF.</u>	<u>NO. OFF.</u>
STEPPING MOTOR	ELECTRONIC DYNAMICS LTD	MHY 200 3424	
		310 A8	1
BALL NUT	WARNER	RM 1605 A	1
BALL NUT "	WARNER	RM 1605 UF	1
BEARING	FAG	7201 B	2
BEARING	FAG	6200 2RS	1
LOCKNUT	FAG	KM 1	1
TABWASHER	FAG	MB 1	1
TIMING BELT UNIROYAL	UNIROYAL	100 XL 037	1
SPRING COVERS	CROMAR	SF 25/500/40	2
SKT CAP HEAD		M8 x 50	5
" " "		M8 x 30	2
" " "		M8 x 10	1
" " "		M6 x 40	4
" " "		M6 x 20	3
SET SCREW		M8 x 45	2
GRUB SCREW		M5 x 5 CONE POINT	2
WASHER		M8	2
KEY		3 x 3 x 15	1
RIVETS (BLACK)	HARMSWORTH	201-03-2409-80	4



AC. 100/301	SADDLE	1
302	CROSS SLIDE	1
303	SADDLE FRONT GIB STRIP	1
304	SADDLE REAR GIB STRIP	1
305	CROSS SLIDE GIB STRIP	1
306	ADJUSTING STRIP	1
307	REAR DRIVE BRACKET	1
308	BEARING HOUSING	1
309	SPINDLE ADAPTOR	1
310A	CROSS SLIDE BALLSCREW	1
311A	BALL SCREW HOUSING	1
312	FRONT SUPPORT PLATE	1
313	BUSH	1
314	MOTOR PLATE SPACER	4
315	CROSS SLIDE COVER	1
316	TEE NUT	2
317	APRON PLATE	1
318	15T PULLEY	1
319	DRIVE GUARD	1
320		
321	SADDLE FILL IN PLATE	1
322	TRIP ROD	1
323	MICRO SWITCHSPACER	1
324	APRON END CAPS (LH & RH)	1 SET.
325	MICRO-SWITCH BEZEL	1
208	MOTOR PLATE	1
CH. 296	APRON COVER PLATE	1
CH. 301	LUBRICATION PLATE	1

DESCRIPTION	MANUFACTURER	REF.	NO. OFF
STEPPING MOTOR	CETRONIC DYNAMICS LTD	MHY 200 3424 310A8	1
TIMING BELT	UNIROYAL	100 XL 037	1
THRUST BEARING	NADELLA	AX 10 22	2
THRUST PLATE	NADELLA	CP 10 22	2
OILITE BUSH	MANGANESE BRONZE	10 x 10 x 16L	1
LOCKNUT	FAG	KM. 0	1
TAB WASHER	FAG	MB. 0	1
OILER	UNIMATIC	B 0 4	2
MICRO SWITCH	BURGESS	V3 SERIES VCSPYR	1
TERMINAL BOX	RADIO SPARES	509-939	1
GRUMET	PRESTIGE	$\frac{1}{2}$ DIA	1
SKT CAP HEAD		M6 x 65	4
" " "		M6 x 30	2
" " "		M5 x 20	3
" " "		M4 x 16	2
" " "		M4 x 10	5
SKT C/SUNK		M4 x 12	1
" " "		M4 x 6	4
" CAP HEAD		M8 x 20	2
BUTTON HEAD		2BA x $\frac{1}{4}$	12
GRUB SCREW		M4 x 35 CONE POINT	3
" " "		M4 x 4 DOG POINT	4
HEX NUT		M4	3
" " "		M6	4
RIVETS	HARMSWORTH	201-03-2409-00	6
SPRING WASHER		M6	4
MICRO SWITCH	BURGESS	V3 SERIES QVCF9D	1

IF IN DOUBT ASK.



AC100/400

DESCRIPTION		CHG. APPD. DATE		DENFORD MACHINE TOOLS LTD. BRIGHOUSE, YORKSHIRE.		LIMITS ON DIMENSIONS UNLESS OTHERWISE STATED.		MATERIAL		DRAWN		TRACED		CHECKED		APPROVED		DATE		SCALE	
ALTERATIONS						ANGULAR ± 1" 3 PLACE DECIMAL 0.005"		MATERIAL SIZE													
						FRACTIONAL 0.000" 4 PLACE DECIMAL 0.0005"		No. REQD.													
								MACHINE AT													
								GRIND AT 'G'													

DENFORD MACHINE TOOLS LTD. BRIGHOUSE, YORKSHIRE.

LIMITS ON DIMENSIONS UNLESS OTHERWISE STATED.

ANGULAR ± 1" 3 PLACE DECIMAL 0.005"

FRACTIONAL 0.000" 4 PLACE DECIMAL 0.0005"

MATERIAL

MATERIAL SIZE

No. REQD.

MACHINE AT

GRIND AT 'G'

DRAWN TRACED CHECKED APPROVED DATE SCALE

DRAWING No.

ORAC - TOP SLIDE SWIVEL & TOOLPOST

'ORAC' TOP SLIDE, SWIVEL & TOOLPOST		AC. 100/400	NO. OFF
AC.100/401	TOP SLIDE		1
402	SWIVEL SLIDE		1
403	TOP SLIDE END PLATE		1
404	TOP SLIDE SCREW		1
405	FEED NUT		1
406	FEED NUT RETAINING SCREW		1
407	FEED DIAL		1
408	TOP SLIDE HANDWHEEL		1
409			
410	GIB STRIP		1
411	CLAMPING COLLAR		1
412	GRADUATION PLATE		1
413	TEE BOLT		2
414	TOOLPOST STUD		1
415	NO. 2 MT SOCKET ADAPTOR		1
416	NO. 2 MT SOCKET, END PLATE		1
710	ADJUSTMENT SLEEVE		

DESCRIPTION	MANUFACTURER	REF.	NO. OFF
TOOLPOST	HAHN & KOLB	TYPE 'AA'	1
TOOLHOLDER	HAHN & KOLB	TYPE AAD 1250	1
HEX LOCKNUT		M10	1
HEX NUT		M6	2
" "		M4	3
CHEESE HEAD SCREW		M6 x 10	3
GRUB SCREWS		M4 x 20 CONE POINT	3
RIVETS (BRASS)	G.K.N.	TYPE 'U' - 3/16	2





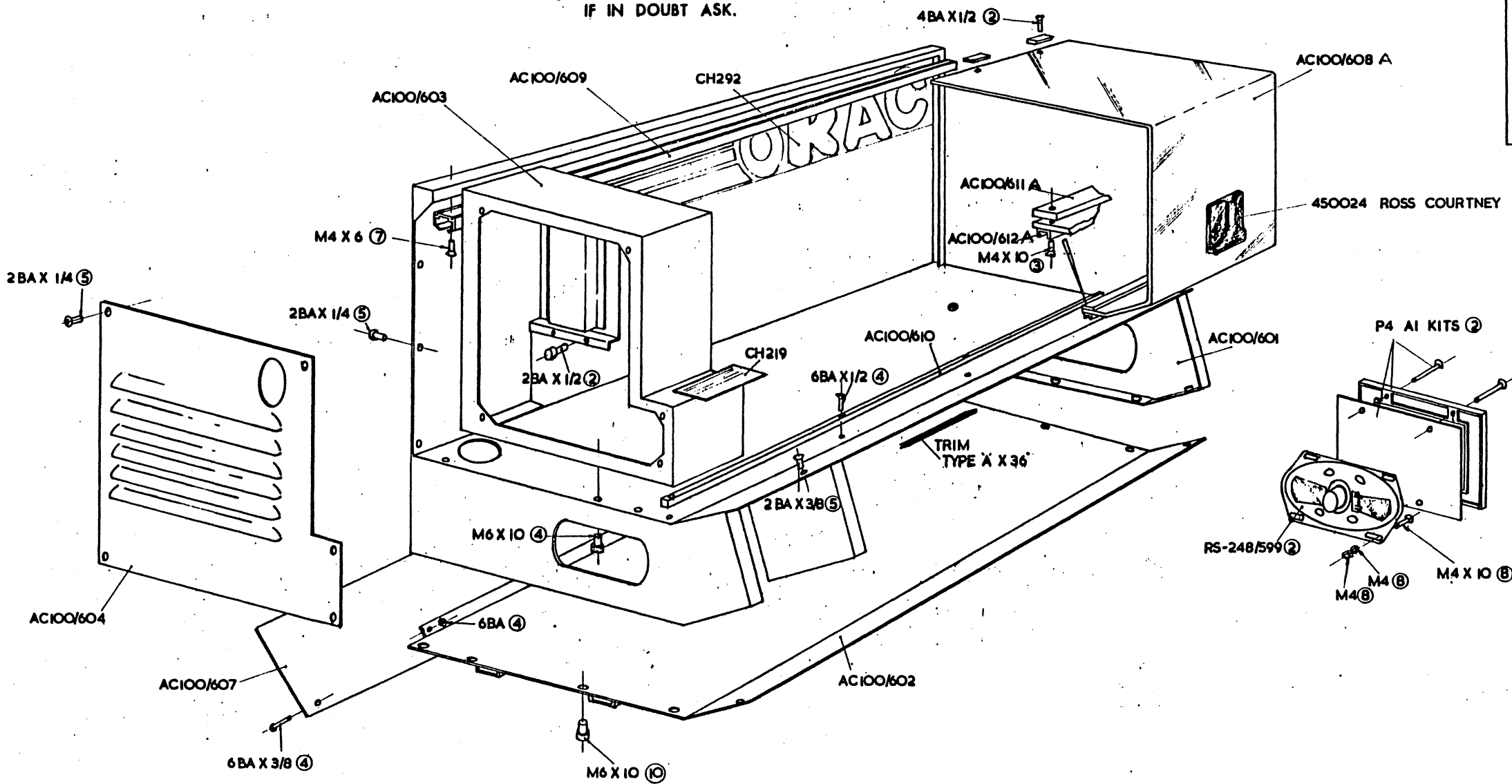
'ORAC' SPINDLE DRIVE AC. 100/500

NO. OFF

AC. 100/501A	SPINDLE DRIVE PLATE	1.
502	MOTOR PULLEY	1.
503A	MAIN SPINDLE PULLEY	1.
504	SPINDLE TRANSDUCER DISC	1.
505A	SPINDLE SENSOR BRACKET	1.
506	LOCKNUT	1

DESCRIPTION	MANUFACTURER	REF.	NO. OFF
DRIVE MOTOR	ASEA	MT 71 B1 4F 130-4	1.
DRIVE BELT		POLY 'V' J10220	1.
COMPRESSION GLAND	EGA	20mm ECG/2	1.
STRAIGHT ADAPTOR	EGA	20mm MFA/2	1.
KEY		8 x 5 x 35 LONG	1.
KEY		5 x 5 x 12 LONG	1
SKT CAP HEAD		M6 x 20	4.
GRUB SCREW		M5 x 5 PLAIN CUP	2.
" "		2BA x $\frac{3}{8}$ " " "	1.
" "		2BA x $\frac{1}{4}$ " " "	2.
WASHER		M6	4.
SKT CAP HEAD		M8 x 20	4.
SPRING WASHER		M8	4.
SKT CAP HEAD		M4 x 16	2.
" " "		6BA x $\frac{3}{8}$ "	2.

IF IN DOUBT ASK.



AC100/600

ALTERATIONS				DENFORD MACHINE TOOLS LTD. BRIGHOUSE, YORKSHIRE.		LIMITS ON DIMENSIONS UNLESS OTHERWISE STATED.		MATERIAL		DRAWN		TRACED		CHECKED		APPROVED		DATE		SCALE	
No.	DESCRIPTION	CHG.	APP'D.	DATE		ANGULAR ± 1° 3 PLACE DECIMAL ± .005°		MATL. SIZE										12/11			
						FRACTIONAL ± .010" 4 PLACE DECIMAL ± .0005"		No. REQD.													
								MACHINE AT 11°													
								GRIND AT 'G'													

DRAWING No.

'ORAC' CABINET AND SLIDING GUARD

AC. 100/600

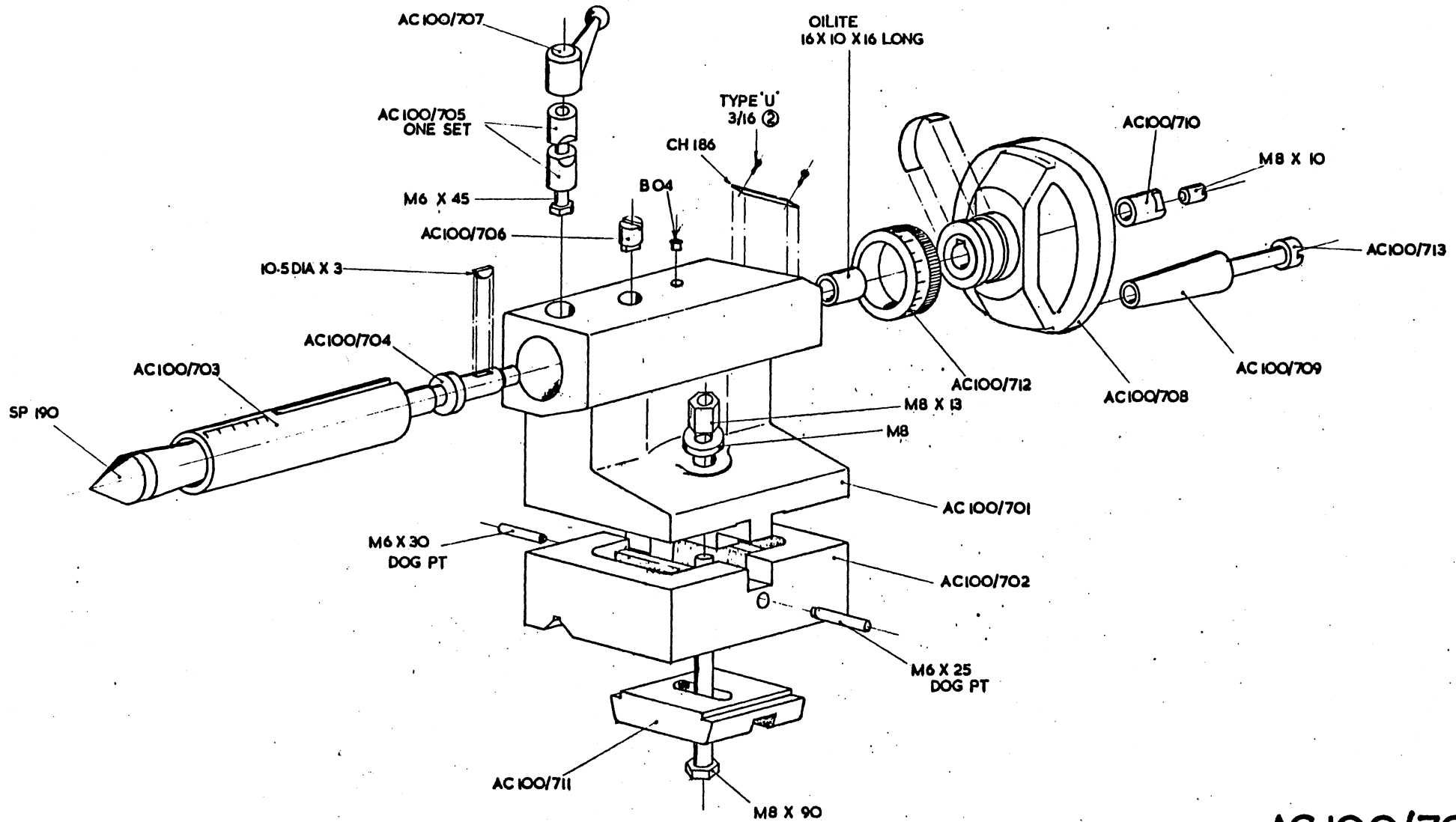
NO. OFF

AC. 100/601	CABINET (UPPER HALF)	1.
602	CABINET (LOWER HALF)	1.
603	END DRIVE HOUSING	1.
604	END DRIVE COVER	1.
605		
606A		
607	REAR DOOR	1.
608A	SLIDING GUARD	1.
609	TOP SLIDING RAIL	1.
610	BOTTOM RAIL	1.
611A	GUARD CLAMP PLATE	1.
612A	GUARD RETAINING CHANNEL	1.

CH.	219	DENFORD LABEL	1.
	292	'ORAC' NAMEPLATE	1.
	302	RESET PLATE	2.
	303	MAINS INPUT PLATE	1.
	304A	EARPHONE PLATE	1.
	305A	T.V. SOCKET PLATE	1.

DESCRIPTION	MANUFACTURER	REF.	NO. OFF
GUARD HANDLE	ROSS COURTNEY	450024	1.
SLIDERS	W & S KERN	GLIDE-A-LONG(NYLON)	2.
TRACK	W & S KERN	(SEE AC. 100/609)	1.
SPEAKER	RADIO SPARES	248/599	2.
SPEAKER GRILL	A1 KITS	P4	2.
EARPHONES (EXTRA)	EAGLE	SE 500N	1 Pair.
SKT CAP HEADS		M6 x 10	17.
SKT C/SUNK		M4 x 10	8.
" "		2BA x $\frac{1}{4}$	5.
" "		4BA x 5/16	3.
" "		6BA x $\frac{1}{2}$	4.
SKT BUTTON HEAD		2BA x $\frac{1}{8}$	6.
CHEESE HEAD		2BA x $\frac{1}{4}$	10.
HEX NUTS		M4	4.
WASHER		M4	8.

IF IN DOUBT ASK.



AC 100/700

DRG. No.

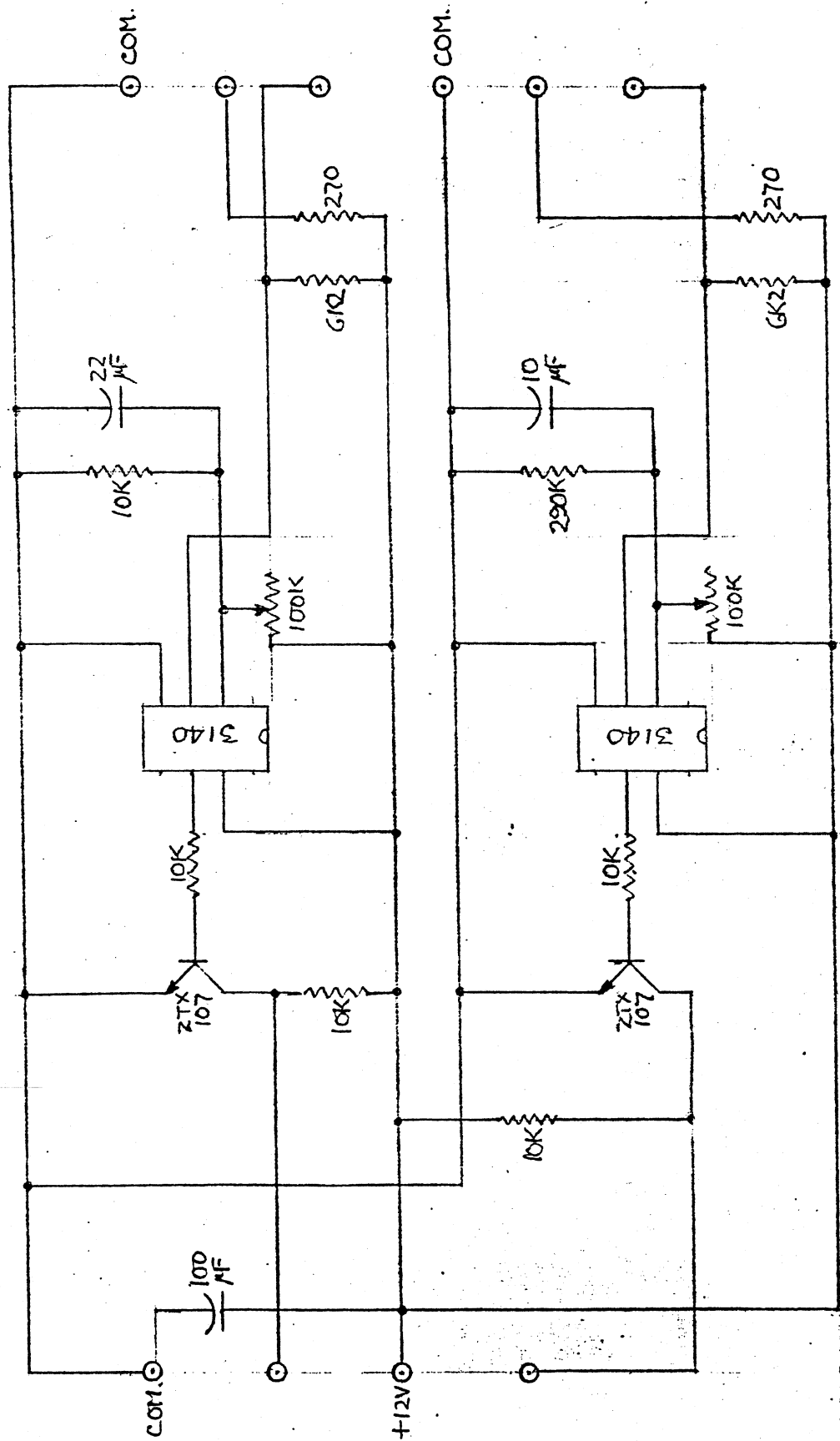
DESCRIPTION		CHECKED	APPROVED	DATE	DRAUGHTSMAN		DRAWN	TRACED	CHECKED	APPROVED	DATE	SCALE
ALTERATIONS							1/1				11/11	
DENFORD MACHINE TOOLS LTD. BRIGHOUSE, YORKSHIRE.					LIMITS ON DIMENSIONS UNLESS OTHERWISE STATED.			DRAWING No.				
					ANGULAR ± 1° 3 PLACE DECIMAL ± .005°							
					FRACTIONAL ± .005" 4 PLACE DECIMAL ± .0005"							
					MATERIAL							
					MATERIAL SIZE							
					No. REQD.							
					MACHINE AT							
					GRIND AT 'G'							

'ORAC' TAILSTOCK		AC. 100/700	NO. OFF
AC. 100/701	TAILSTOCK BODY		1
702	TAILSTOCK SHOE		1
703	TAILSTOCK BARREL		1
704	BARREL SCREW '		1
705	BARREL CLAMPS		1 SET
706	BARREL KEY		1
707	CLAMP LEVER		1
708	TAILSTOCK HANDWHEEL		1
709	HANDWHEEL HANDLE		1
710	ADJUSTMENT SLEEVE		1
711	TAILSTOCK CLAMP		1
712	DIAL		1
713	SHOULDER SCREW		1

SP. 190 NO. 2 SOFT CENTRE 1

DESCRIPTION	MANUFACTURER	REF.	NO. OFF
WOODRUFF KEY		10.5 Dia x 3	1
OILITE BUSH		16x10x10 Long	1
OILER	LUMATIC	B04	1
SET SCREW		M8 x 90	1
SET SCREW		M6 x 45	1
GRUB SCREW		M6 x 25 DOG POINT	1
GRUB SCREW		M6 x30 DOG POINT	1
HEX NUT		M8 x 13 LONG	1
STD WASHER		M8	1
RIVETS (BRASS)	G.K.N.	TYPE 'U' - 3/16"	1





REVISIONS

TITLE

CIRCUIT DIAGRAM FOR SENSOR-PC1607

JOB  
CODE  
DRN.  
CKD.  
DATE

J.B.

14. 8. 83

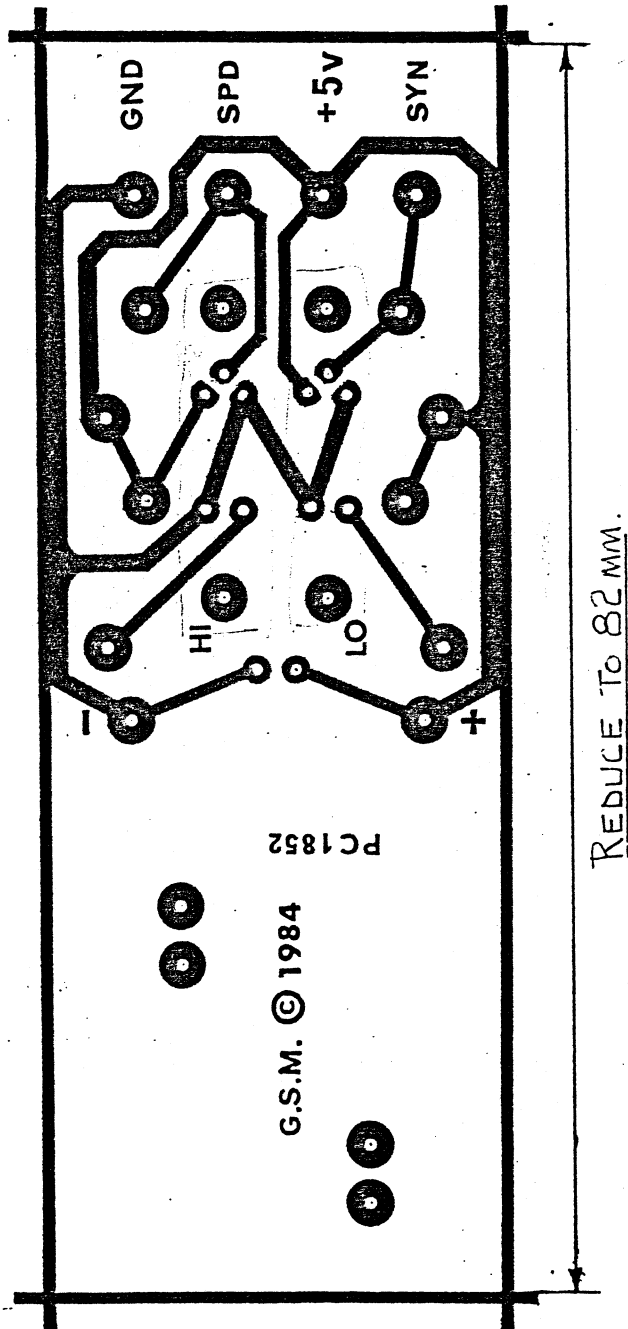
GSM ELECTRICAL CONTROLS LTD.  
VICTORIA WORKS,  
QUEENS MILL ROAD,  
HUDDERSFIELD.  
W. YORKS. HD1 3PJ  
PHONE 0484 351012



DRG. No.

S1666

NOTE! THIS SIDE IS THE TRACK SIDE



FOR DRILLING DETAILS SEE S1853.

MATERIAL:  $\frac{3}{32}$  GLASS FIBRE BOARD.

SCALE: TWICE FULL-SIZE.

REVISIONS REDRAWN FROM PC1752 TO INCLUDE 2x1K-ohm. FULL-UP RESISTORS & 100nF CAPACITOR.

TITLE SYNTELECT MK III OPTO SENSOR P.C.B. (AXIAL MTG.).

GSM-SYNTEL LTD.

VICTORIA WORKS,  
QUEENS MILL ROAD,  
HUDDERSFIELD,  
W. YORKS. HD1 3PG  
Phone: 0484 35101/2

DRG. No.

PC1852

JOB

CODE

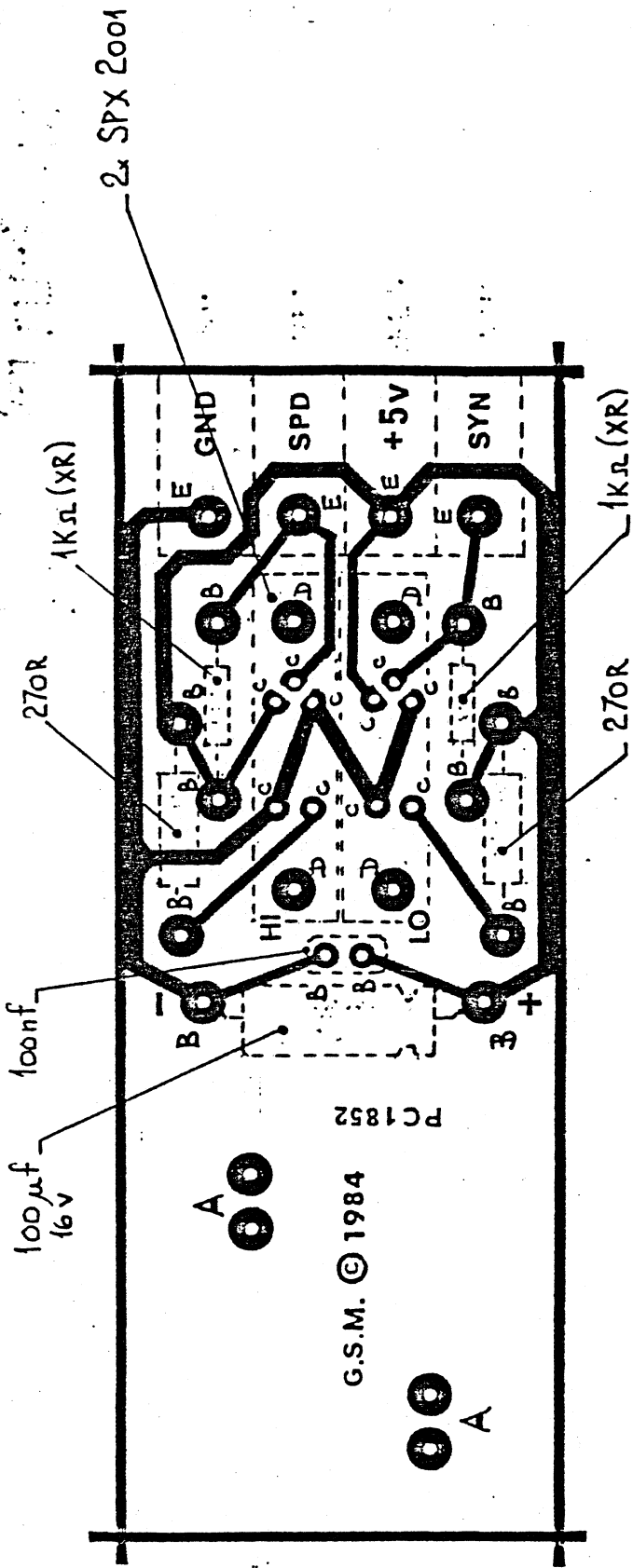
DRN.

CKD.

DATE

PLA

20.2.84



HOLE REF.	N° OFF	DRILLING DETAILS.
A	2	DRILL 2x N° 26 THEN SLOT.
B	12	DRILL N° 60
C	10	PILOT N° 70 THEN N° 60
D	4	DRILL N° 30
E	4	DRILL N° 54

REVISIONS REDRAWN FROM 31754 — EXTRA COMPONENTS FITTED.

TITLE DRILLING DETAILS ETS FOR P.C.1852 MK III OPTO-SENSOR.

P.C.B. FOR SYNTELECT.

### FIXING DETAILS.

1. "HIGH" OPTO:- 2-off M3 x 12mm C.H. SCREWS WITH 4 BA NUTS AS SPACERS. SECURED WITH PLASTIC NUTS.
2. "LOW" OPTO:- 2-off M3 x 10mm C.H. SCREWS & PLASTIC NUTS.
3. P.C.B.:- FIT TO BRACKET WITH 2 off 4 BA SCREWS AND SHAKEPROOF WASHERS.

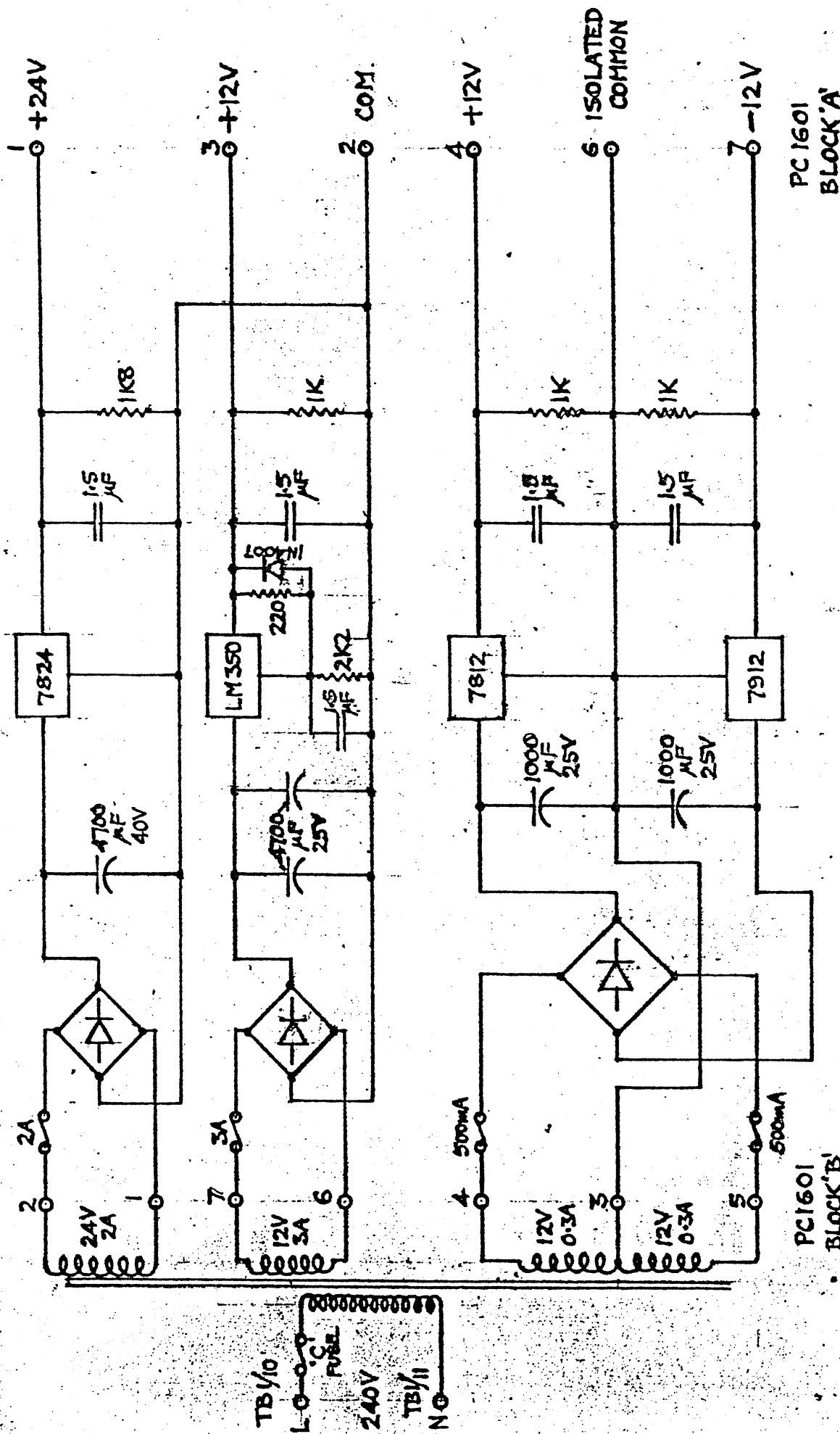
GSB-SYNTTEL LTD.

DRG. No.

VICTORIA WORKS,  
QUEENS MILL ROAD,  
HUDDERSFIELD,  
W. YORKS. HD1 3PG  
Phone: 0484 35101/2

S1853





REVISIONS

TITLE

'ORAC' POWER SUPPLY REGULATOR BOARD

JOB

CODE

DRN.

CKD.

DATE

GSM ELECTRICAL CONTROLS LTD.

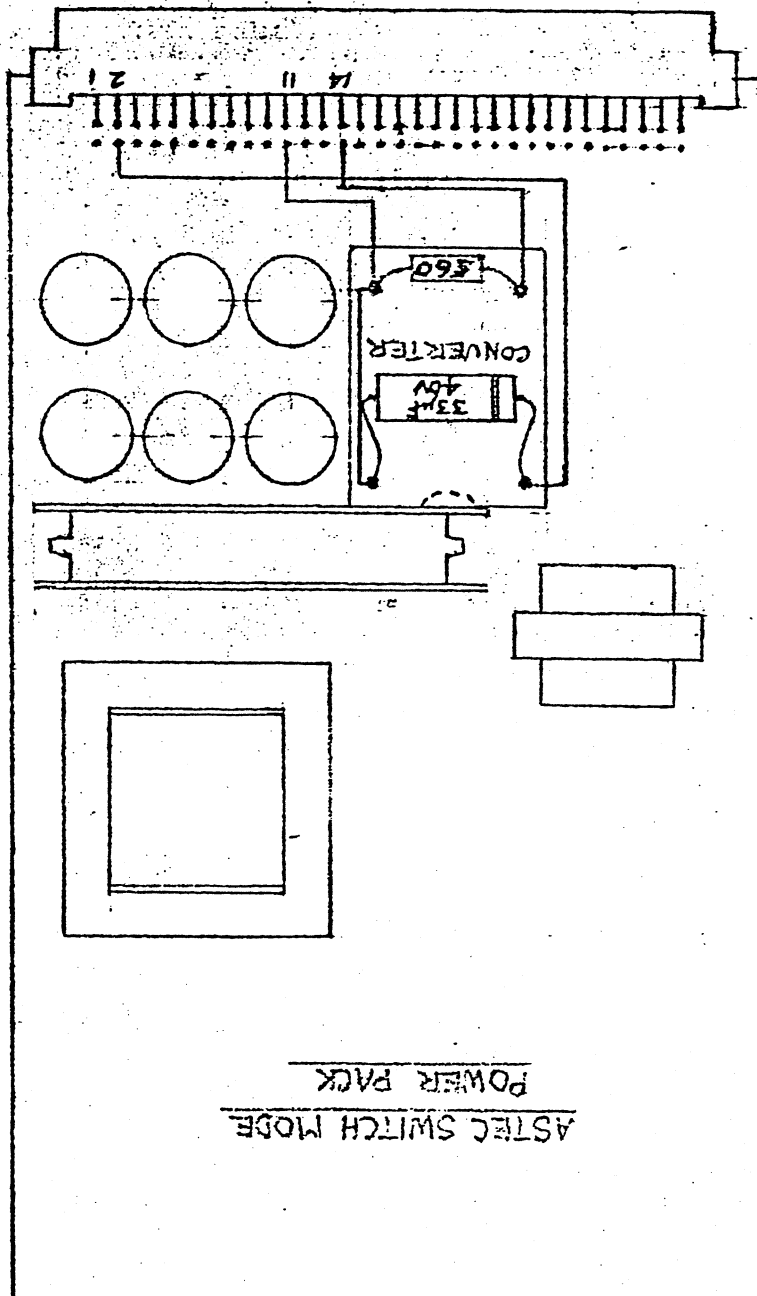
VICTORIA WORKS,  
QUEENS MILL ROAD,  
HUDDERSFIELD,  
W. YORKS. HD1 3PH  
PHONE 0484 35101/2

DRG. No.

S1645

PC 1601  
BLOCK 'A'

PC1601  
BLOCK 'B'



12V 10A -12V CONVERTER  
MOUNTED ON HEAT SINK  
WITH SUPERGLUE

ASTEC SWITCH MODE  
POWER PACK

REVISIONS

TITLE

DETAIL OF -12V CONVERTER MOUNTING & CONNECTIONS  
TO ASTEC POWER PACK FOR 'DRAC' MACHINE

GSM ELECTRICAL CONTROLS LTD.

VICTORIA WORKS,  
QUEENS MILL ROAD,  
HUDDERSFIELD,  
W. YORKS. HD1 3JH  
PHONE 0484 351012



DRG. No.

S1649

JOB

CODE

DRN.

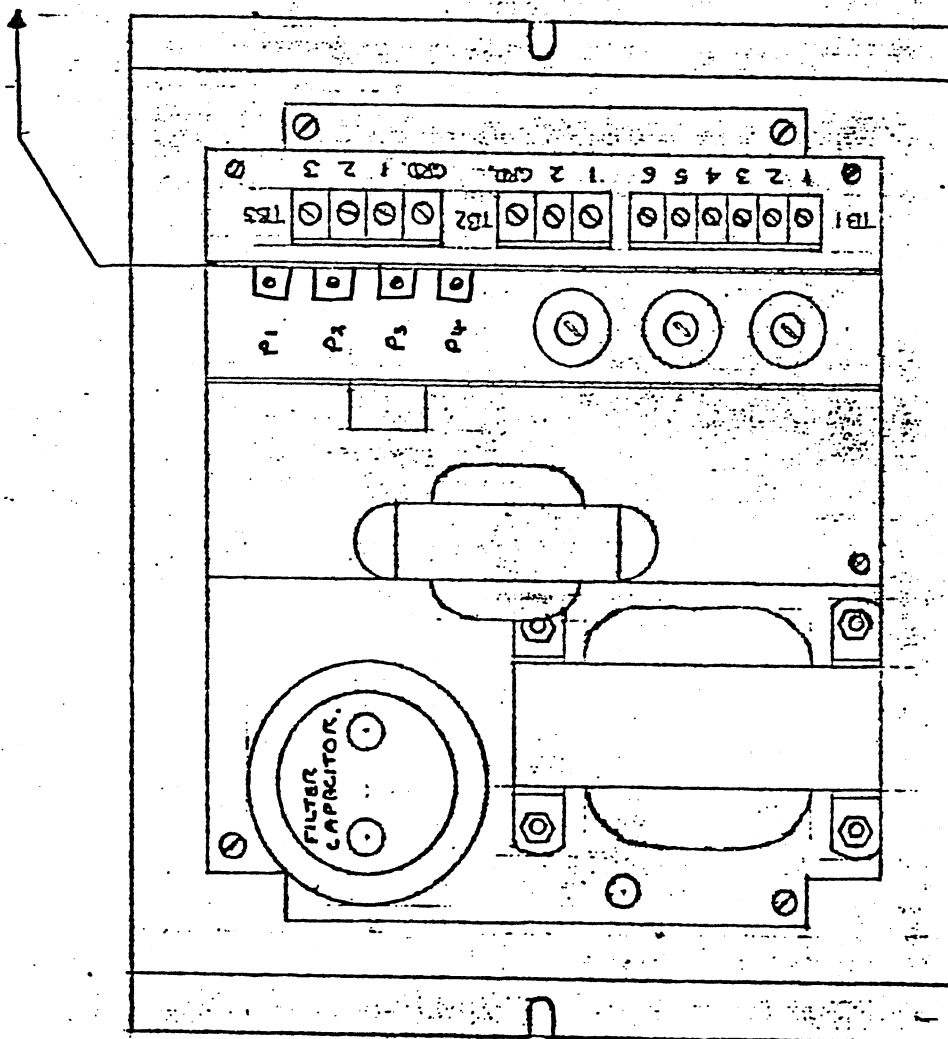
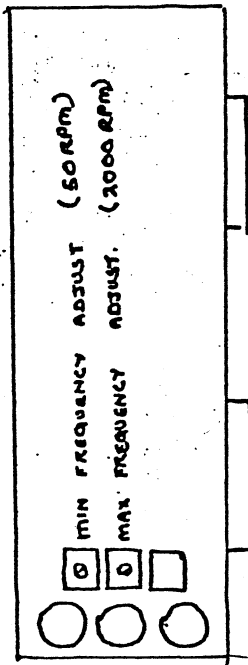
CKD.

DATE

S163

10. 1. 83





REVISIONS PARAJUST UNIT TURNED  
ON CHASSIS-10.8.83

HALF SCALE

TITLE  
GENERAL ARRANGEMENT OF FHP PARAJUST.  
'ORAC' CHASSIS.

JOB CODE  
DRN. 9/3  
CKD.  
DATE 7.9.82

GSM ELECTRICAL CONTROLS LTD.  
VICTORIA WORKS,  
QUEENS MILL ROAD,  
HUDDERSFIELD,  
W. YORKS. HD1 3PJ  
PHONE 0484 351012

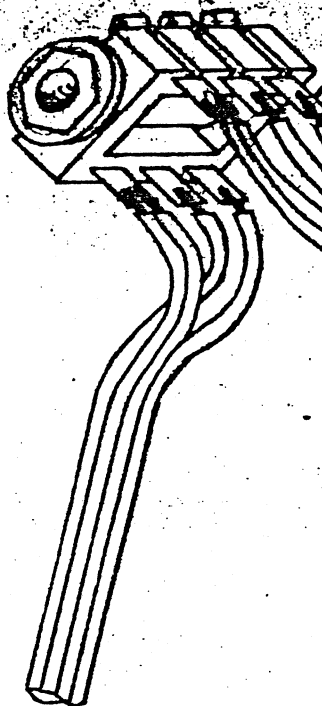
DWG. No.

S1609

Cable length  
1200 mm

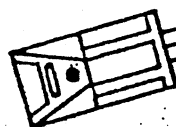


CABLE SUPPLIED  
WITH SHARP  
CASSETTE



Sleeve all  
connections

Cable length  
450 mm



DWG. No.

S1632

GSM ELECTRICAL CONTROLS LTD.

VICTORIA WORKS,  
QUEENS MILL ROAD,  
HUDDERSFIELD.  
W. YORKS. HD1 3PJ  
PHONE 0484 35101/2

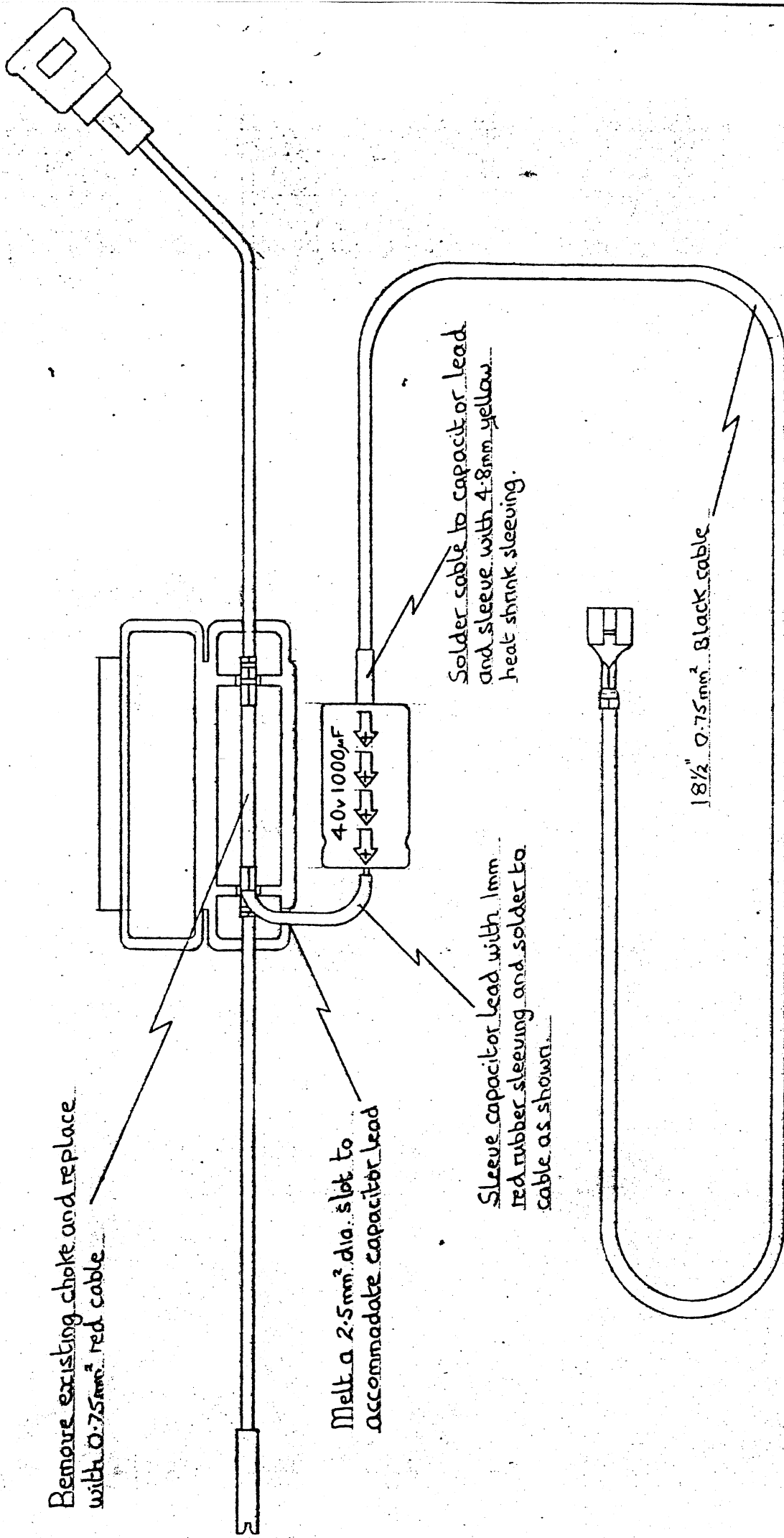


JOB	
CODE	
DRN.	A. C. H.
CKD.	
DATE	18.11.82

REVISIONS

TITLE

JACK SOCKET CONNECTION DETAILS



REVISIONS

JOB

CODE

DRN.

CKD.

A.C.H.

GSM ELECTRICAL CONTROLS LTD.

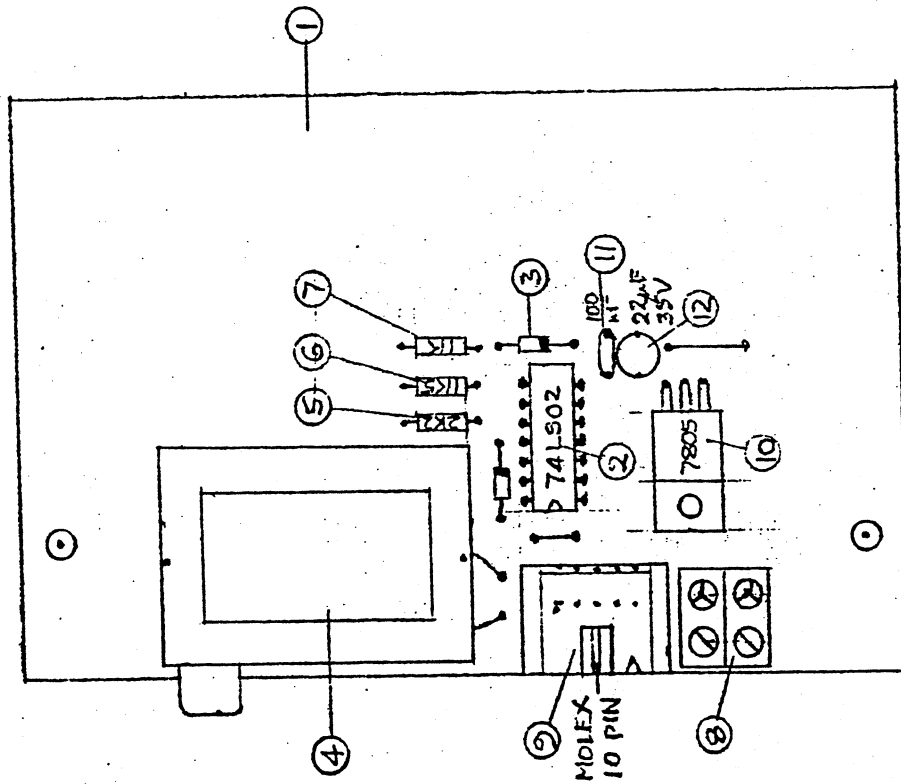
VICTORIA WORKS,  
QUEENS MILL ROAD,  
HUDDERSFIELD.  
W. YORKS. H.M. 124

DRG. No.

S1741

TITLE

AUDIO CASSETTE SUPPLY CABLE



ITEM No	DESCRIPTION	G.S.M. PART No	No OFF	REMARK
1	P.C. BOARD.	PC1626	1	
2	N74LS02N.	91C46	1	
3	BAX1301 DIODE	SDD20	2	
4	UM1111E36 MODULATOR.	GH197	1	
5	2K2. 1/4W. RES.	XR222	1	
6	1K5. " "	XR152	1	
7	1K. " "	XR102	1	
8	3WAY TERM.BLOCK	TS107	1	CUT TO 2 WAY
9	10WAY RIBBON CABLE CONNECTOR	TS212	1	
10	7805 REGULATOR	SIC26	1	
11	0.1µF CAPACITOR.	C.144	1	
12	22µF 35V "	C.225	1	

REVISIONS

TITLE  
COMPONENT LAYOUT OF  
MODULATOR BOARD-PC1626

JOB  
CODE  
DRN. *JS.*  
CKD.  
DATE 17. 3. 85

GSM ELECTRICAL CONTROLS LTD.  
VICTORIA WORKS,  
QUEENS MILL ROAD,  
HUDDERSFIELD.  
W. YORKS. HD1 3PJ  
PHONE 0484 35101/2

DRG. No.

S1668

MK 2

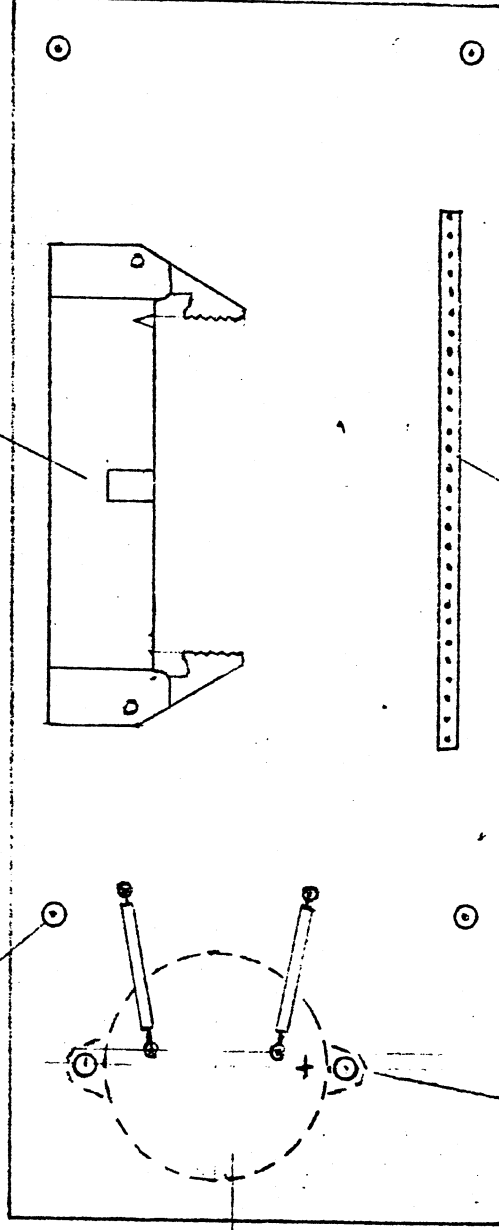
34 WAY MOLEX RIGHT-ANGLE  
CONNECTOR - TYPE 5340-24BG1

TERMINAL PINS (2 OFF)

BEEPER  
MOUNTED ON  
TRACK SIDE

8BA FIXING SETSCREWS  
AND NUTS

28 WAY MOLEX SINGLE ROW  
CONNECTOR - TYPE 4030-28AG



REVISIONS

TITLE

COMPONENT LAYOUT FOR PC1693 - SYNTELECT MKII.  
KEYBOARD CONNECTOR & BEEPER

GSM ELECTRICAL CONTROLS LTD.

VICTORIA WORKS,  
QUEENS MILL ROAD,  
HUDDERSFIELD,  
W. YORKS. HD1 3PJ  
PHONE 0484 35101/2

DRG. No.

S1698

JOB

CODE

DRN.

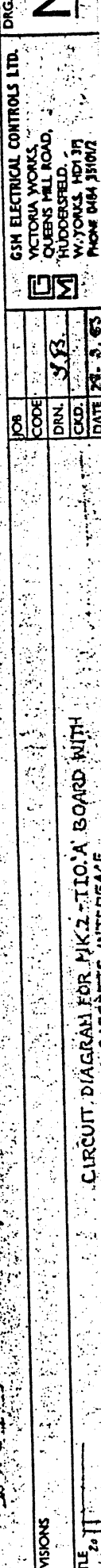
CKD.

DATE

4.7.83

JOHN H. WARD



$+12V$  32a?

FILE 20

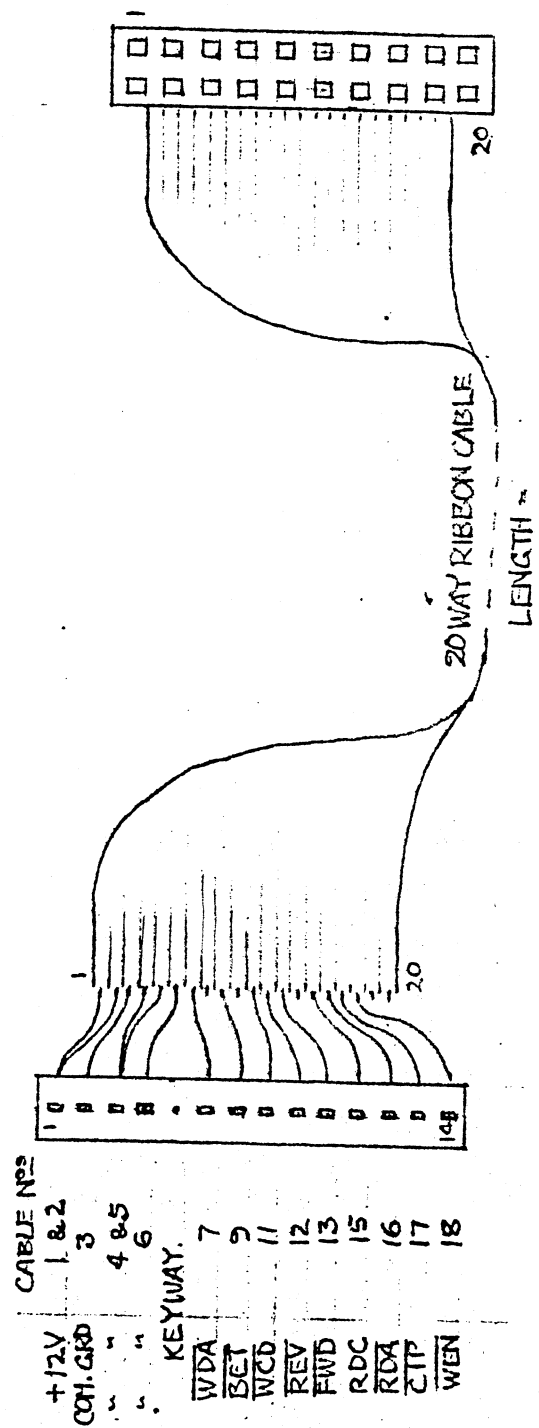
**CGSM ELECTRICAL CONTROLS LTD.**  
VICTORIA WORKS,  
QUEENS MILL ROAD,  
HUDDERSFIELD.  
W. YORKS. HD1 3JF  
PHONE 0484 351012

JOB	
CODE	
DRN.	YB.
CKD.	
DATE	11-3-63

## REVISIONS

CABLE CONNECTIONS  
CASSETTE END  
CON. 8, 10, 14, 19 & 20 CUT-SHORT

CABLE CONNECTIONS  
TIO 'A' END  
NUMBER TO NUMBER



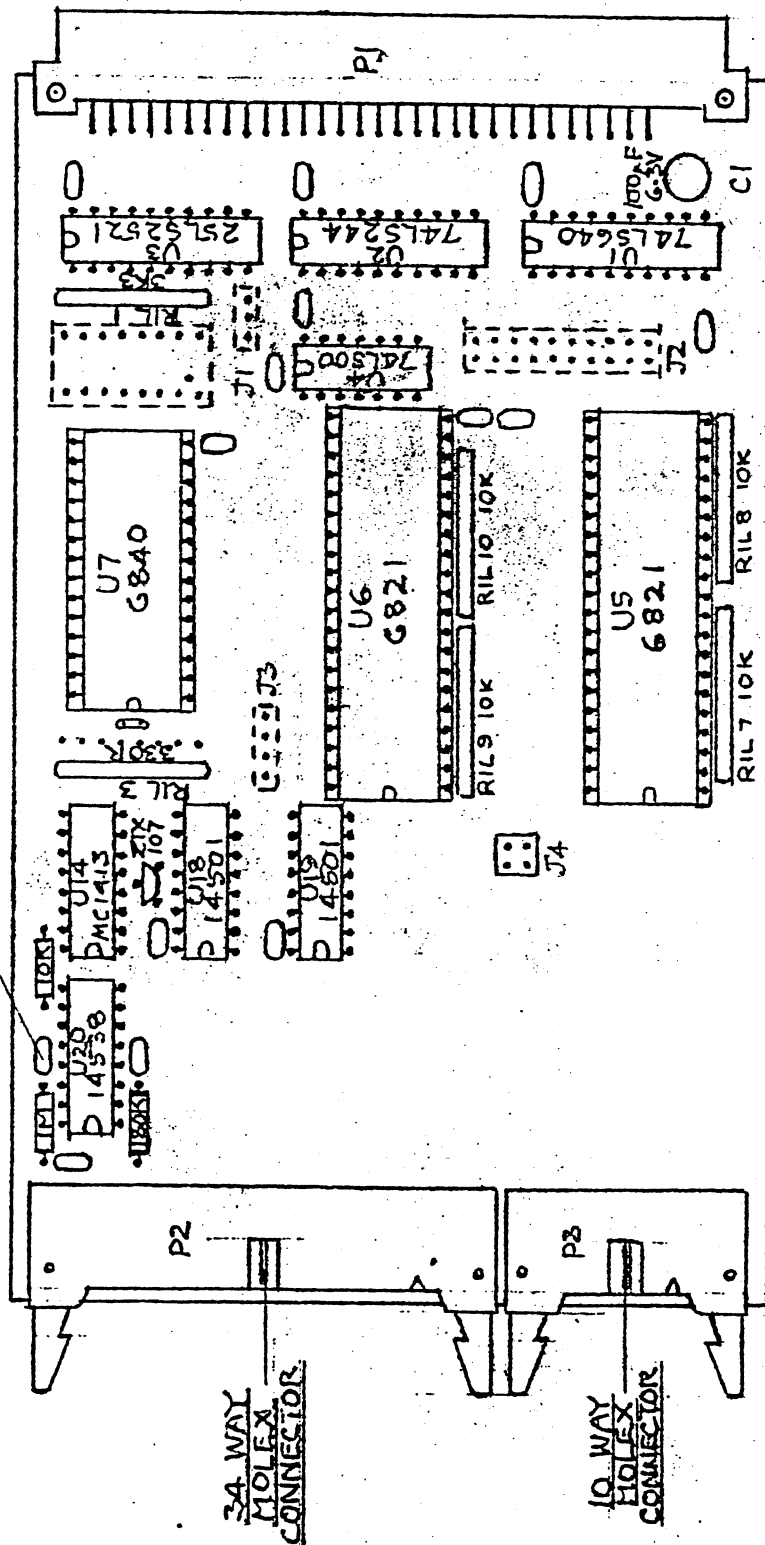
20 WAY MOLEX  
SOCKET

14 WAY IN-LINE PLUG  
PIN 5 OMITTED.

REVIEWS	JOB		GSM ELECTRICAL CONTROLS LTD. VICTORIA WORKS, QUEENS MILL ROAD, HUDDERSFIELD. W. YORKS. HD1 3PJ PHONE 0484 35101/2	DRG. No. <b>S1682</b>
	CODE			
	DRN.	J.B.		
	CKD.			
	DATE	21. 4. 83.		
TITLE DATA CASSETTE RIBBON CABLE TO TIO 'A' MODULE CONNECTION DETAILS				
JOHN H. WARD				



ALL SMALL CAPACITORS 0.1µF



REVISIONS

TITLE

COMPONENT LAYOUT FOR  
TIO-3 TIMER MODULE

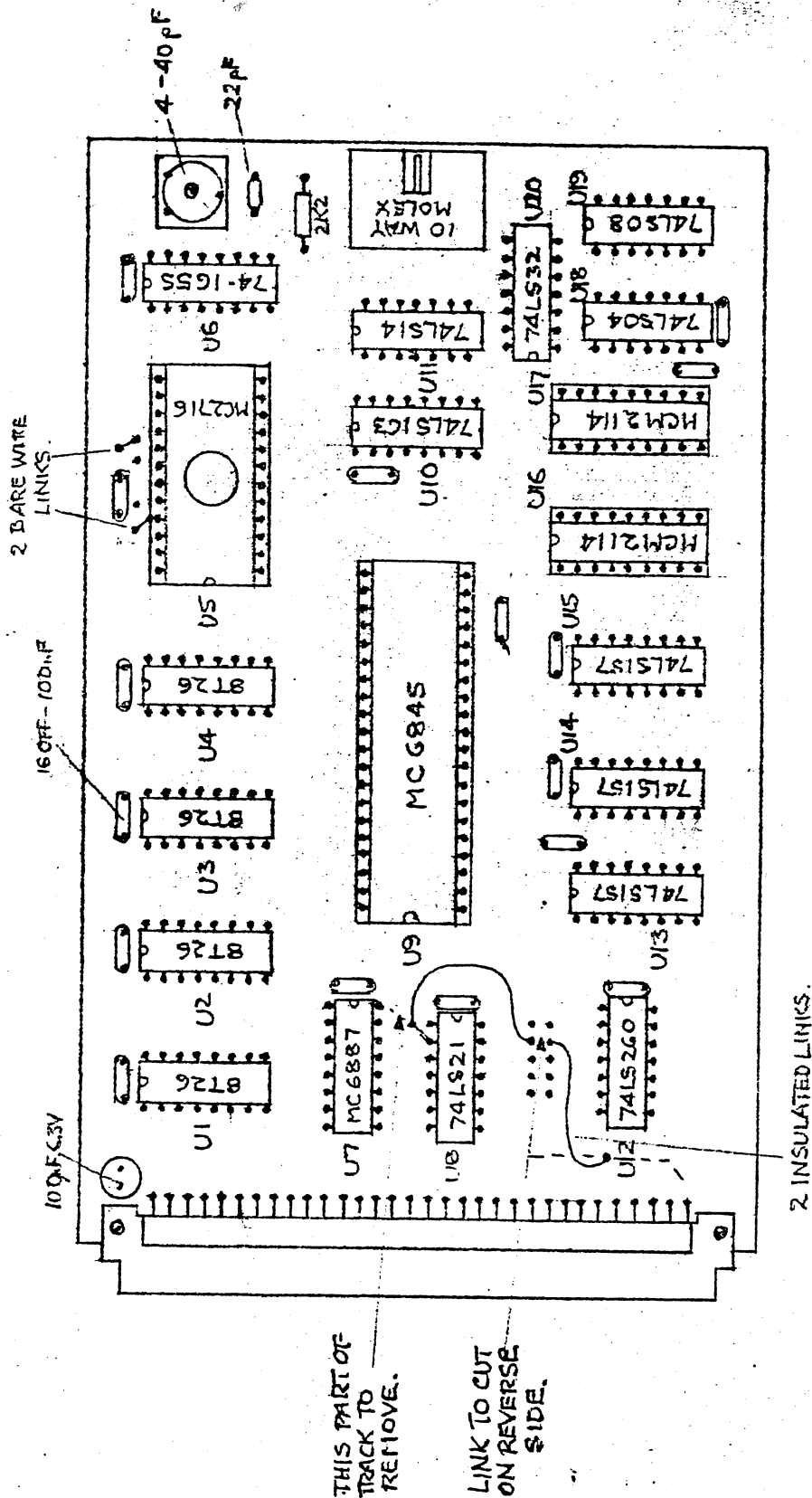
JOB	
CODE	
DRN.	553
CKD.	
DATE	30. 8. 83



GSM ELECTRICAL CONTROLS LTD.  
VICTORIA WORKS,  
QUEENS MILL ROAD,  
HUDDERSFIELD,  
W. YORKS. HD1 3PJ  
PHONE 0484 351012

DRG. No.

S1738



REVISIONS

JOB CODE  
DRN. 993  
CKD.  
DATE G. 12. 82

GSM ELECTRICAL CONTROLS LTD.

VICTORIA WORKS,  
QUEENS MILL ROAD,  
HUDDERSFIELD,  
W. YORKS. HD1 3PJ  
PHONE 0484 35101/2

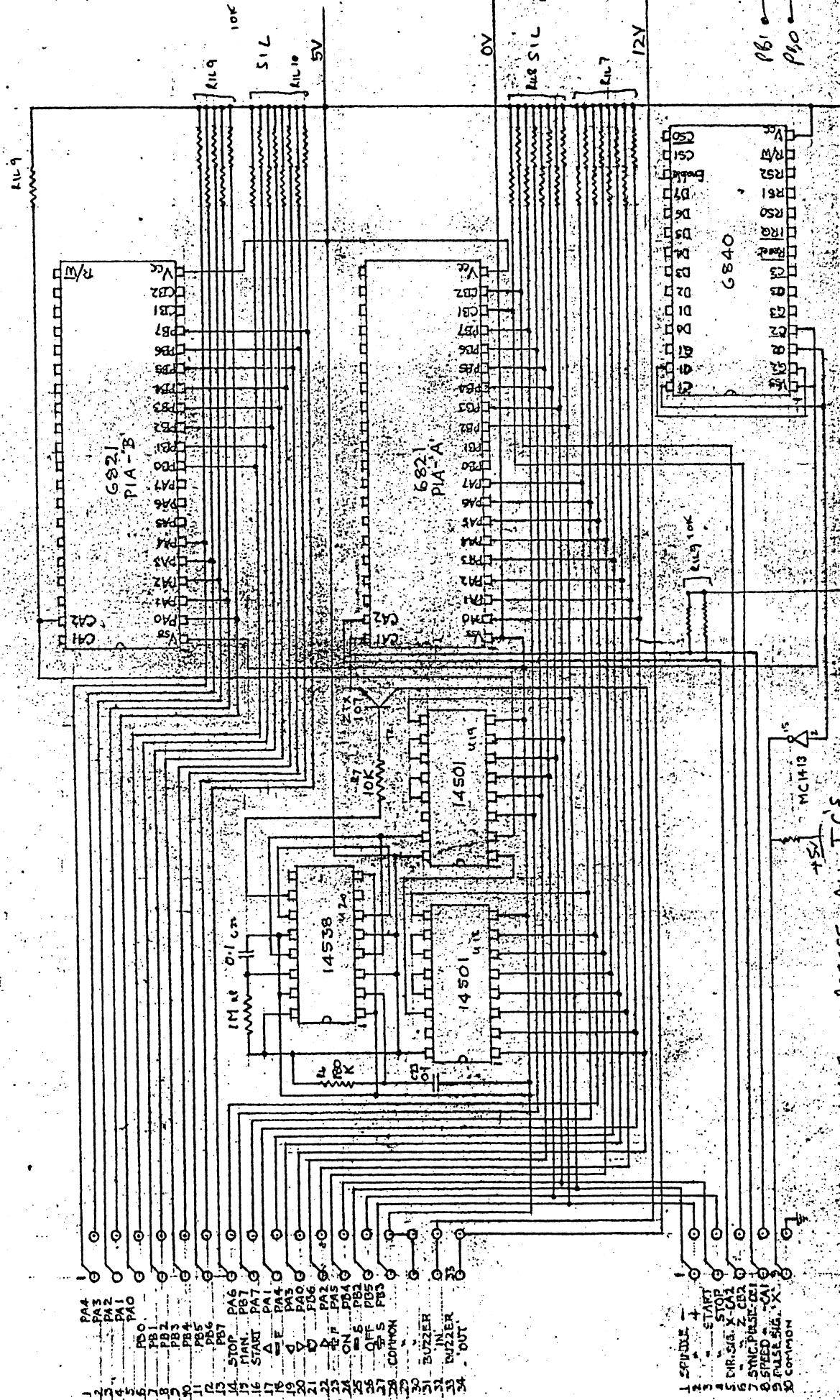


DRG. No.

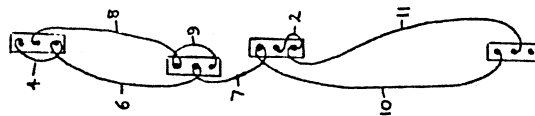
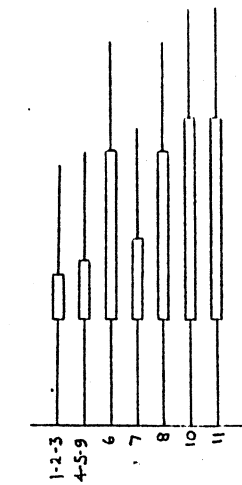
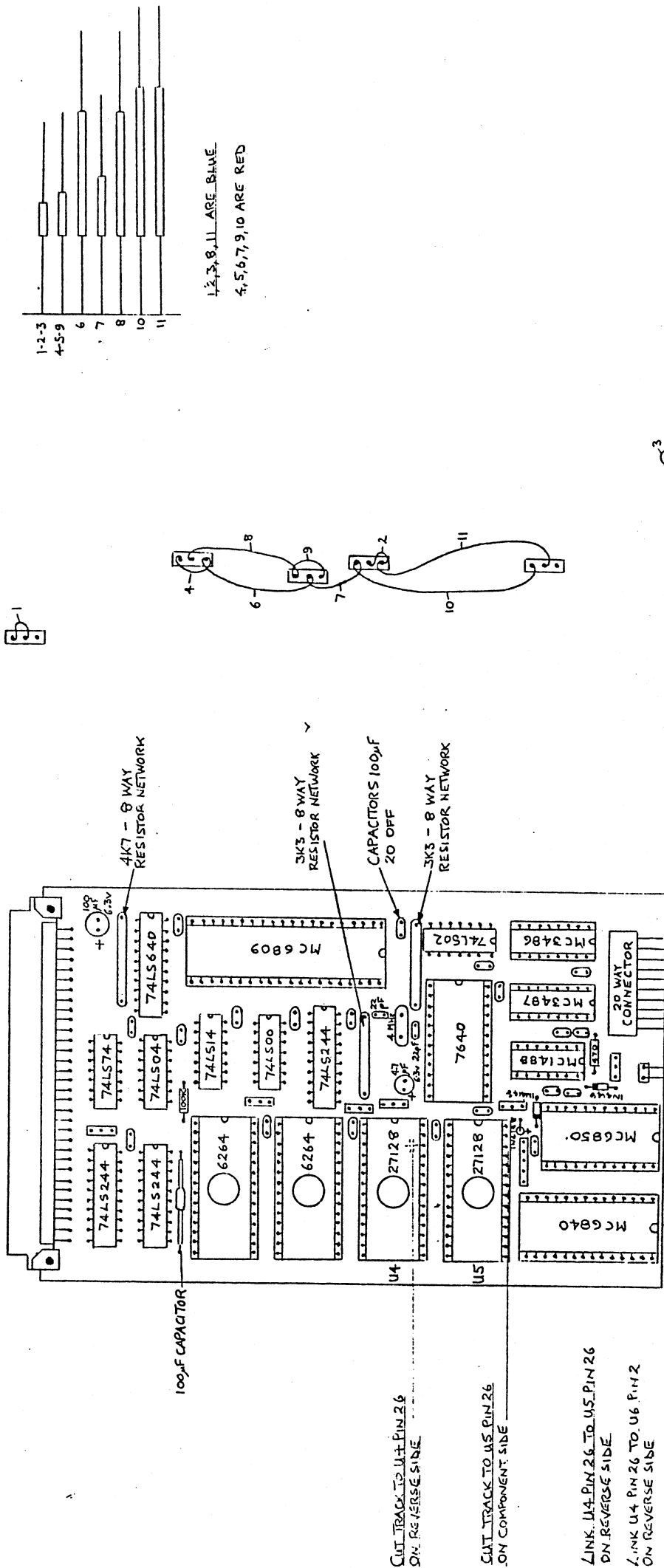
S1639

COMPONENT LAYOUT FOR VME CARD.

TITLE



D.I.Y. CAPS ACROSS ALL I.C.'S



DETAILS OF WIRE WRAP LINKS ON  
PCB CONNECTION PINS

REVISIONS

TITLE

COMPONENT LAYOUT FOR MP09 CARD FOR ORAC MK III

GSM ELECTRICAL CONTROLS LTD.

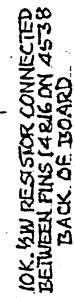
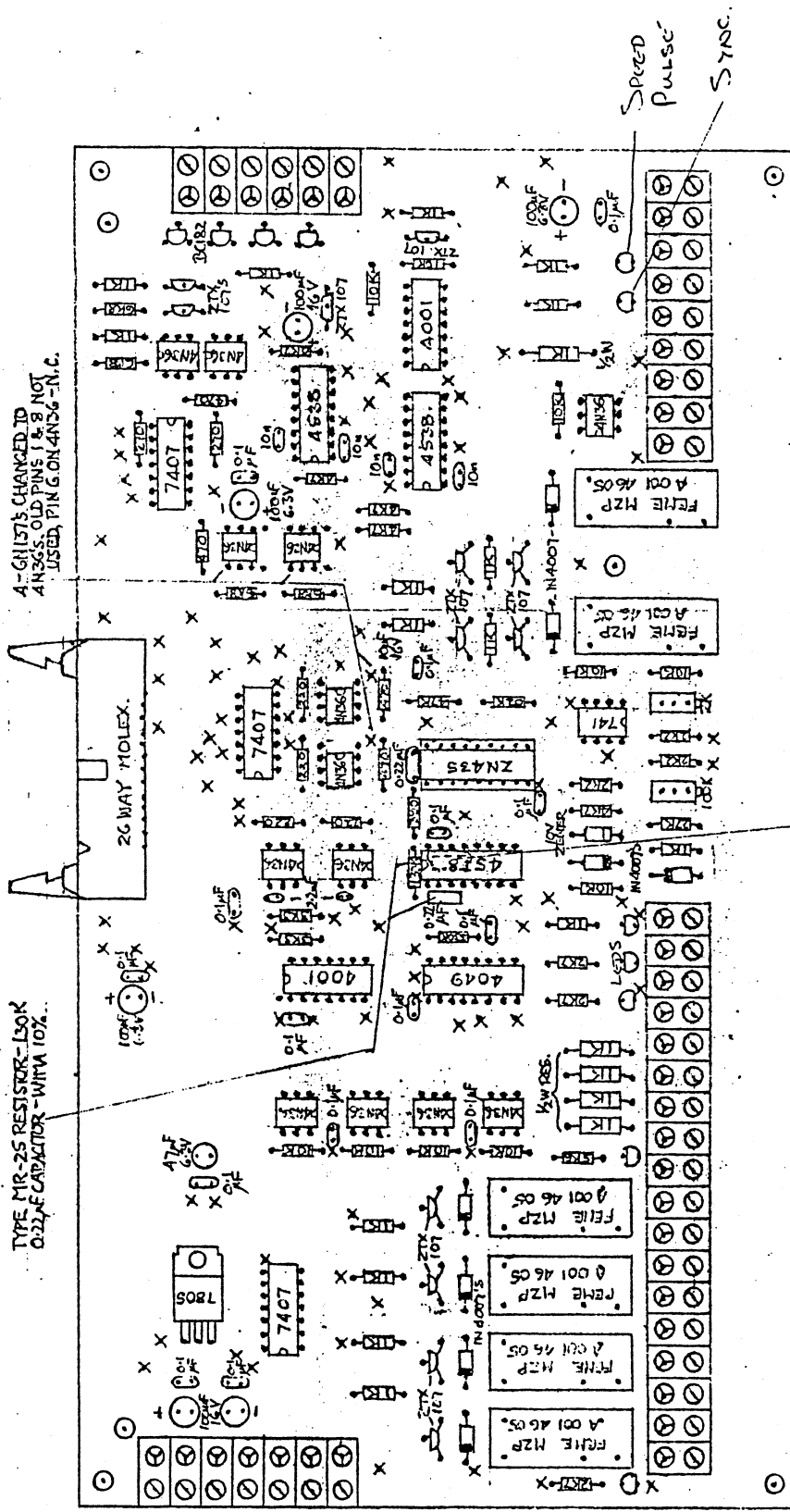
VICTORIA WORKS,  
QUEENS HILL ROAD,  
HUDDERSFIELD,  
W. YORKS. HD1 3JH



JOB CODE  
DRL A C H  
CKD.

DRG. No.

M1768



LEDS

$$+12v \quad +24v \quad -12v \quad +5v \quad +12v$$
[illegible]

REVISIONS	VARIOUS DELETIONS & ALTERATIONS	30, 8. 83
	TO BOARD.	

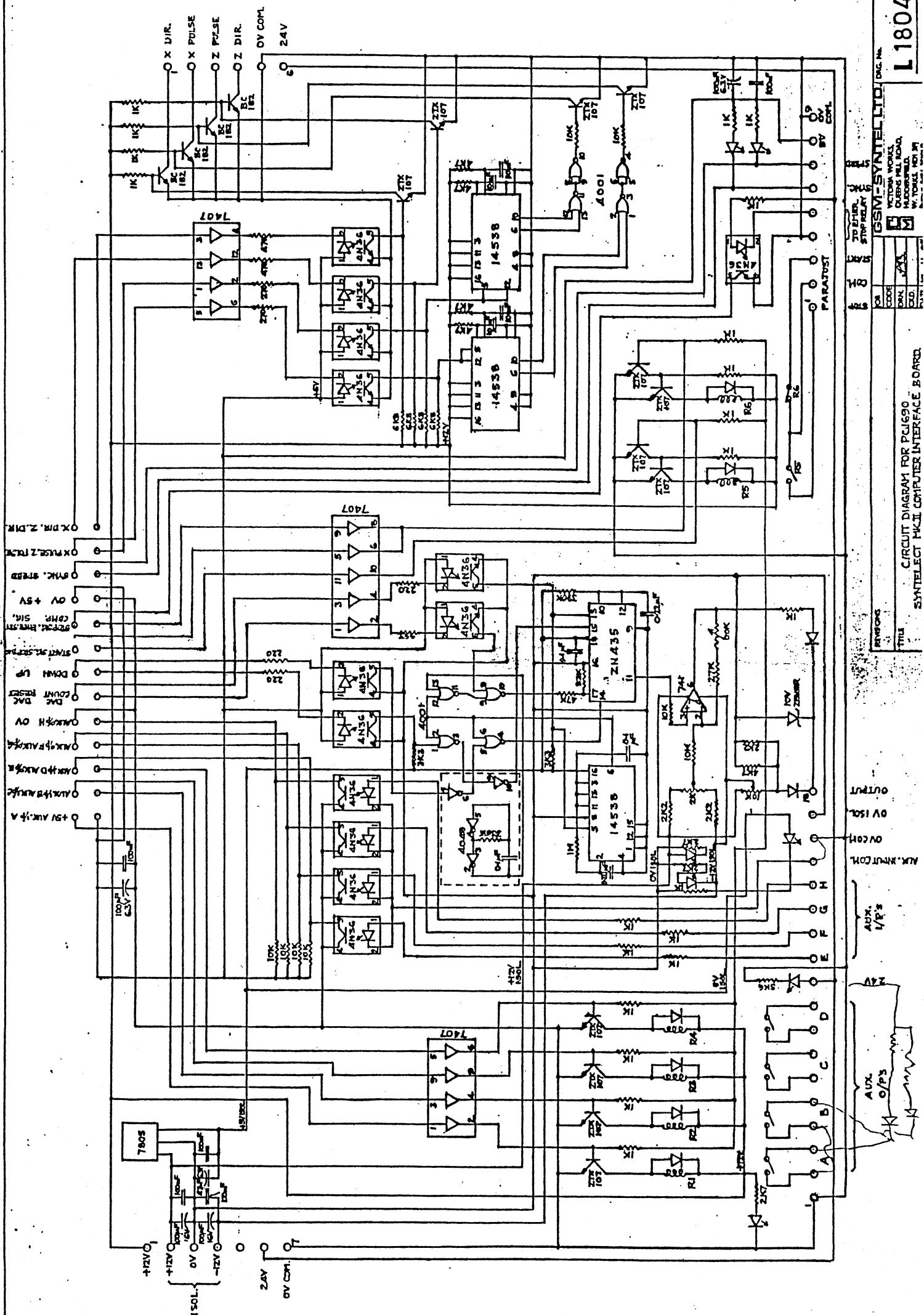
COMPONENT LAYOUT FOR THE 1680  
SYNTELECT MKII COMPUTER INTERFACE BOARD.

**GSM ELECTRICAL CONTROLS LTD.**

**GSM ELECTRICAL CONTRACTORS**  
VICTORIA WORKS,  
QUEENS MILL ROAD,  
HUDDERSFIELD.  
W. YORKS. HD1 3PJ  
PHONE 0484 35101/2

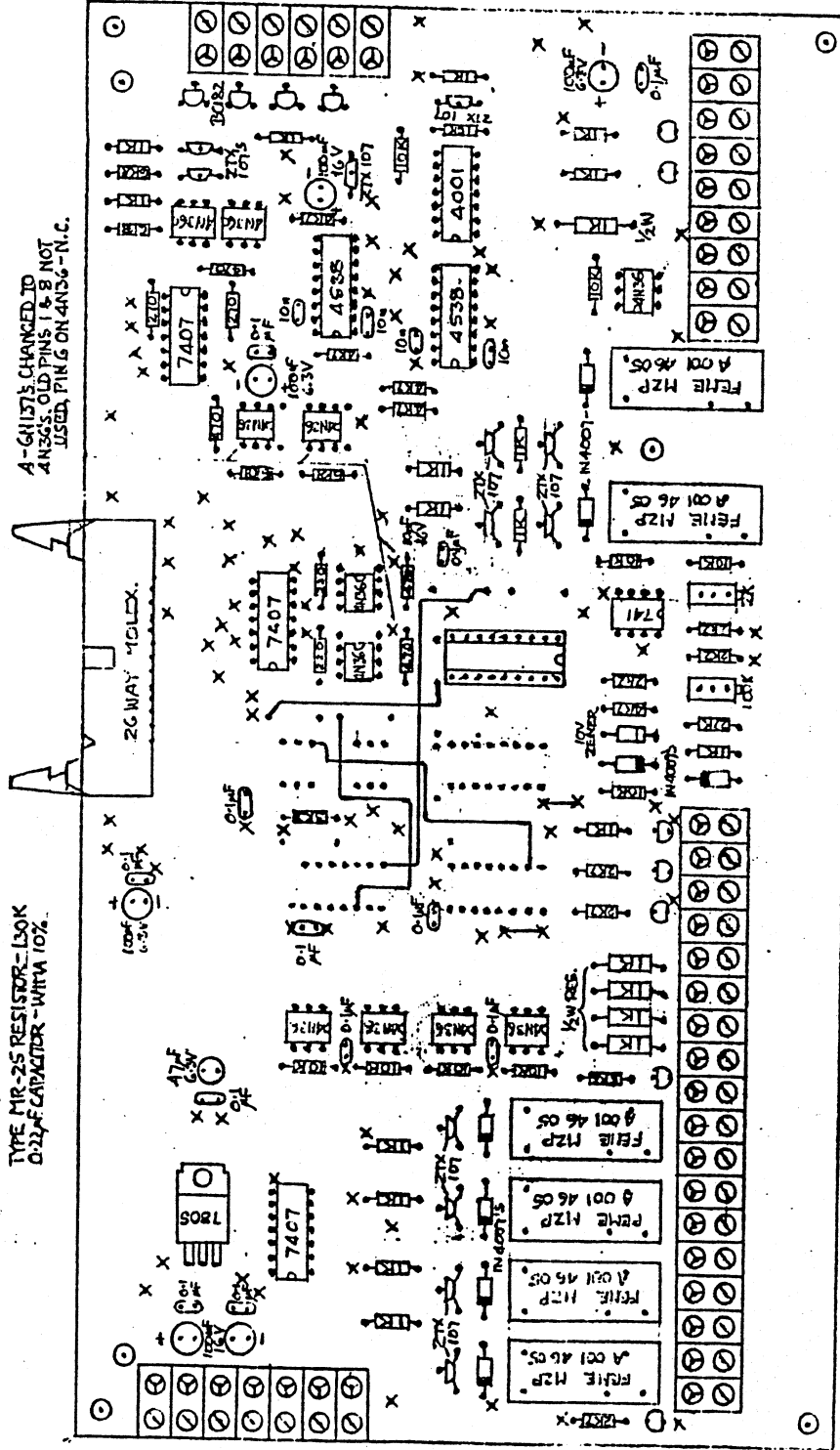
DRG. No.

M 1714



TYPE MR-25 RESISTOR-150K  
0.22-FCAPACITOR-WATT 10%

A-6H1575 CHANGED TO  
4N36S. OLD PINS 1 & 8 NOT  
USED. PIN 6 ON 4N36-N.C.



1 2 3	10MΩ-40Ω	OR SILVER	4N36
COLOUR CODE	RESISTOR	VALUE	UNIT
2 7 0	R	V	BR
4 7 0	Y	V	BR
1 K	BR	BK	R
2 K	R	R	R
2 K 7	R	V	R
3 K 3	O	O	R
4 K 7	Y	V	R
5 K 6	G	BL	R
6 K 8	BL	GY	R
10 K	BR	BK	O
27 K	R	V	O
47 K	Y	V	O
82 K	GY	R	O

LINK WIRES TO BE FITTED AS SHOWN

THIS BOARD USED IN CONJUNCTION  
WITH MODIFIED PC 1623-SEE M.1849

REVISIONS  
TO BOARD.

VARIOUS DELETIONS & ALTERATIONS  
30. 5. 83 & 2. 84  
COMPONENT LAYOUT FOR MODIFIED PC 1690  
SYNTEFT MKT COMPUTER INTERFACE BOARD

JOB  
CODE  
DNL  
CKD.

Y.B.

GSM-SYNTTEL LTD.

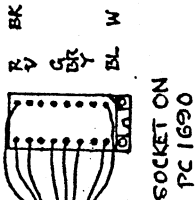
DRG. No.

VICTORIA WORKS  
QUEENS MILL ROAD,  
HUDDERSFIELD,  
W. YORKS. HD 1 1TH

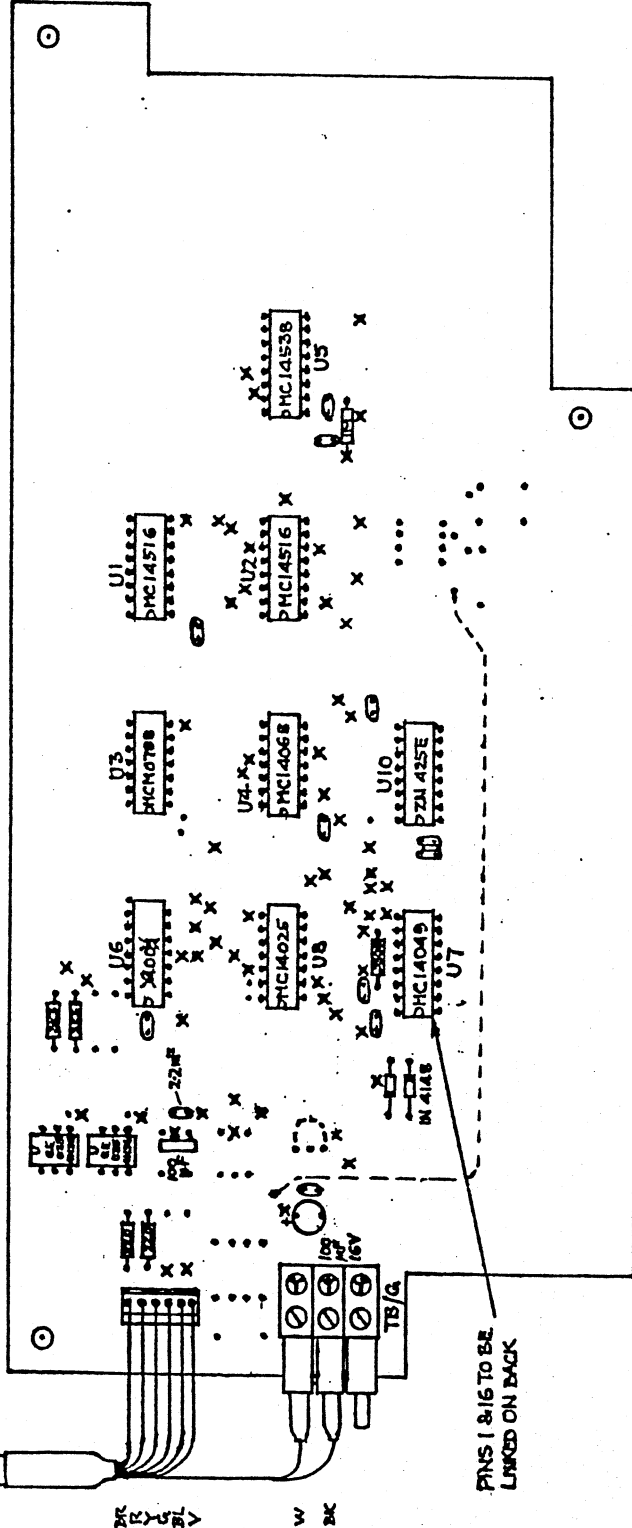
M1848







26" LENGTH OF 8 CORE 7/8-24 CABLE



PINS 1 & 16 TO BE LINKED ON BACK

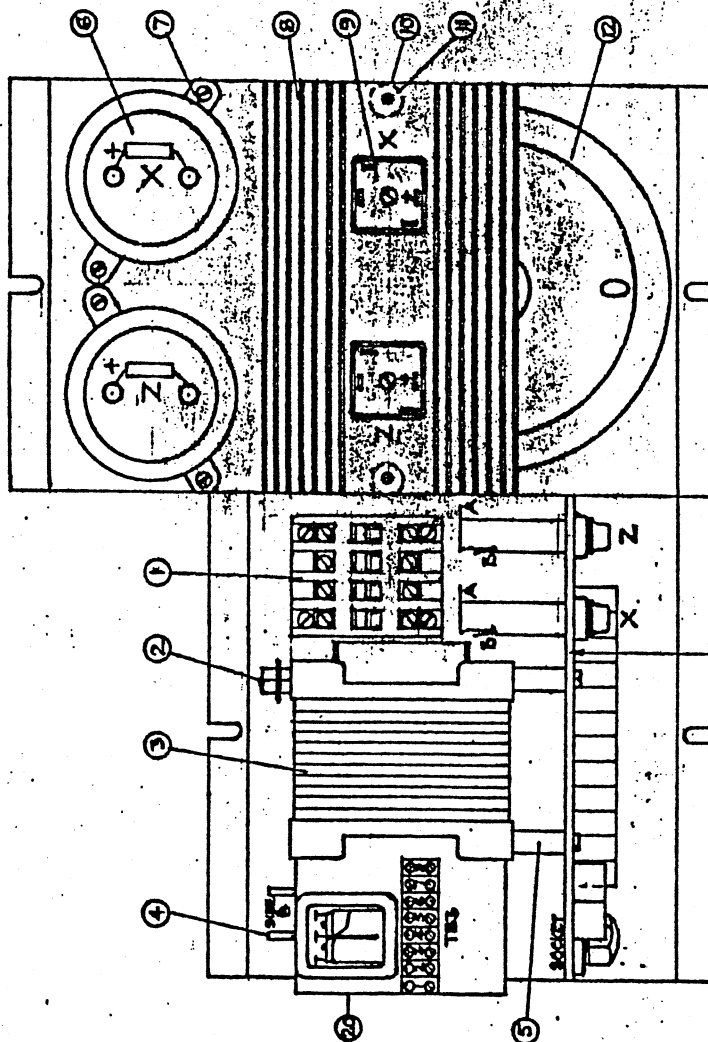
1	2	3	IGNORE GOLD OR SILVER HERE
COLOUR CODE			
RESISTOR	1	2	3
VALUE	10	10	10
220	R	R	BR
3K3	0	0	R
330K	0	0	Y
1M	BR	BK	G

THIS VERSION USED ONLY WITH MODIFIED PC 1690 - SEE M. 184B

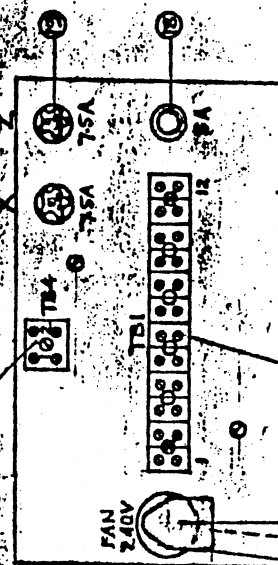
- 0 - 100μF CAPACITORS UNLESS MARKED OTHERWISE.
- x - THROUGH BOARD CONNECTING PINS.
- ALL RESISTORS 1/4 W. 5% TOLERANCE.
- BACK OF BOARD CABLE LINKS SHOWN DOTTED.

REVIEWS		GSM ELECTRICAL CONTROLS LTD.		DRG. No.	M1849
TITLE		VICTORIA WORKS QUEEN'S MILL ROAD, HUDDERSFIELD, W. YORKS. HD1 3J PHONE 0484 351012			
JOA	CODE	DRAWN	DATE		
		9/3	9.2.84		
COMPONENT LAYOUT FOR MODIFIED PC 1623 ORAC SPINDLE SPEED OVERDR BOARD.					

ITEM NO.	DESCRIPTION	QTY.	REMARKS
1	REAR PANEL & JACK	1	200VAC COM.
2	25A 5% EARTH STOD.	1	TYPE 25A 5% EARTH STOD.
3	CONTROL TRANSFORMER	1	TYPE 25A 5% EARTH STOD.
4	MAIN FUSE	1	TYPE 25A 5% EARTH STOD.
5	48A 5% NIS. PILLARS	4	TYPE 48A 5% NIS. PILLARS
6	1000F 50VDC CAPACITOR	2	TYPE 1000F 50VDC CAPACITOR
7	2 1/2" CAPACITOR CLIP	2	TYPE 2 1/2" CAPACITOR CLIP
8	GM-1 HEATSHINK	1	TYPE GM-1 HEATSHINK
9	500 250V 1000F RECTIFIER	2	TYPE 500 250V 1000F RECTIFIER
10	1/2" DIA. NIS. TUBE PILLARS	2	TYPE 1/2" DIA. NIS. TUBE PILLARS
11	25A SCREWED ROD	2	TYPE 25A SCREWED ROD
12	DC SUPPLY POWER TRANSFORMER	1	TYPE DC SUPPLY POWER TRANSFORMER
13			
14	L1436 B3 SOCKET	1	BELLING LEE
15	L1436 4P PLUG	1	
16	HK3 12WAY T.B.	1	
17	TRANSFORMER FUSE 1.0	1	TYPE TRANSFORMER FUSE 1.0
18	FUSE HOLDER	1	TYPE FUSE HOLDER
19	FUSE HOLDER	2	TYPE FUSE HOLDER
20	PC1619 COMPLETE	1	
21	HK3 1/2 WAY T.B.	1	CUT TO 2 WAY



FOR DETAILS OF TRANSFORMER  
MOUNTING PANEL, SEE ON RIGHT



FRONT VIEW OF TRANSFORMER  
FUSE & T.B. MOUNTING PANEL

REVISIONS: PC 1419 ADDED, FUSES  
ALtered, TBA ADDED - 12.11.82.

TS2 (ITEM 13) REMOVED  
10.8.83

RED. SCALE

GENERAL ARRANGEMENT OF ORAC POWER SUPPLIES

DRG. NO.

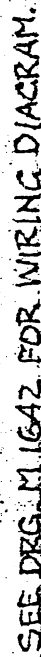
ESH ELECTRICAL CONTROLS LTD.

VICTORIA WORKS  
QUEEN HILL ROAD  
HUDDESFIELD, W. YORKS. HO 1 3T

CODE  
DIN 3/8

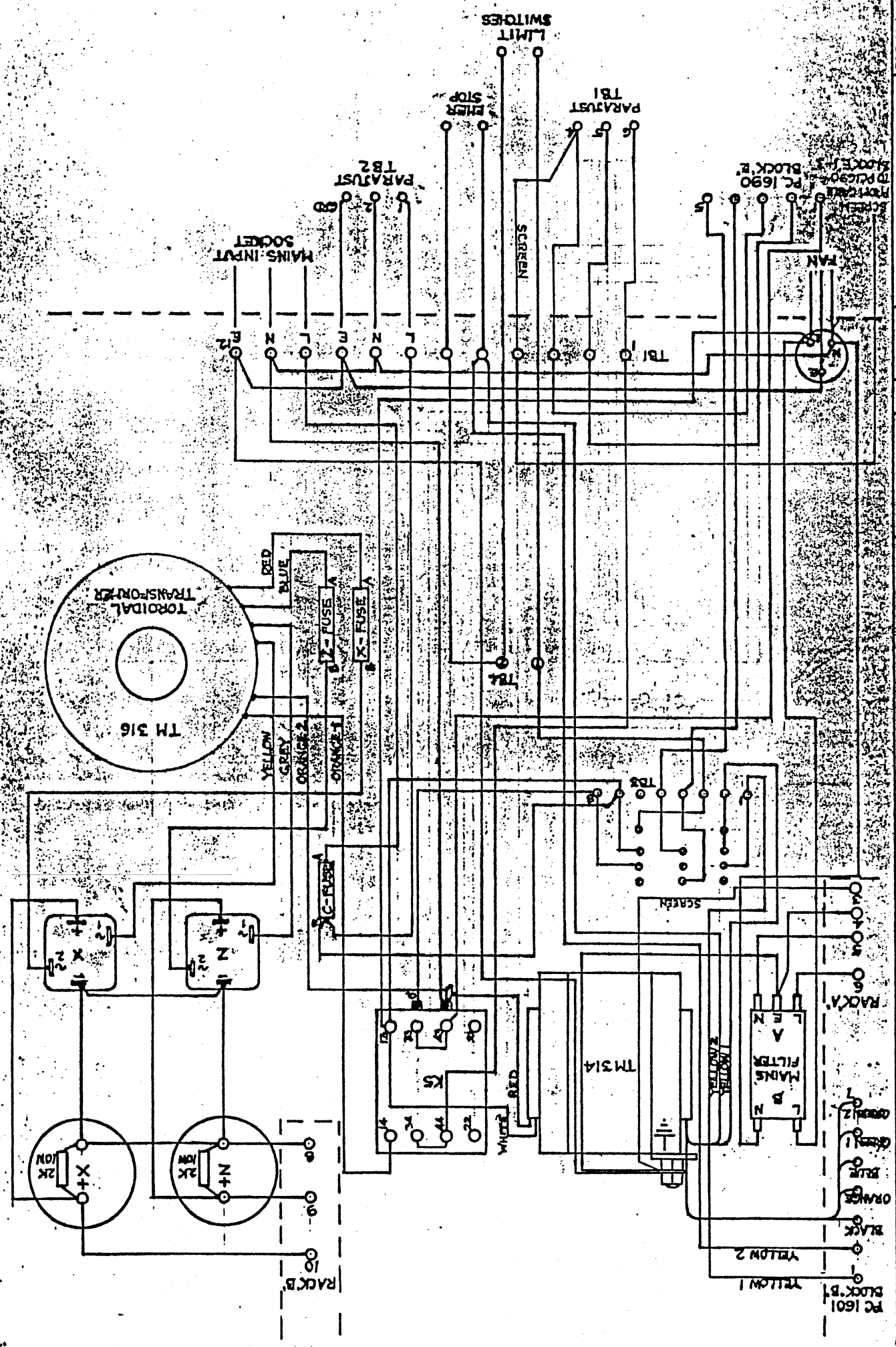
CLD

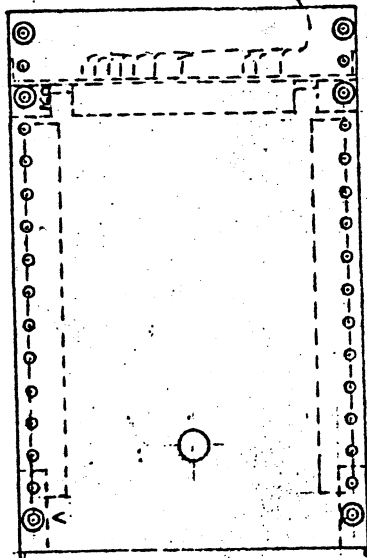
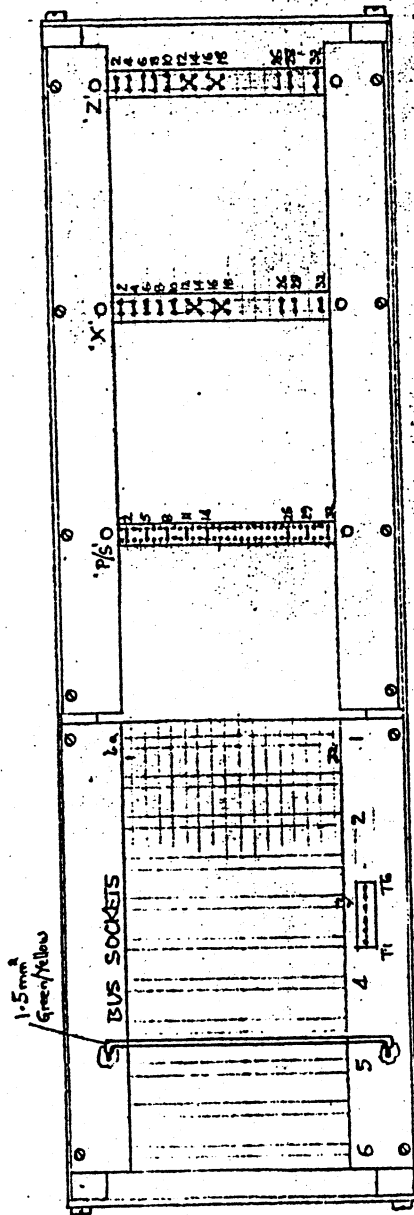
M1718



S1719

SEE DRG. 51636 FOR CIRCUIT DIAGRAM.

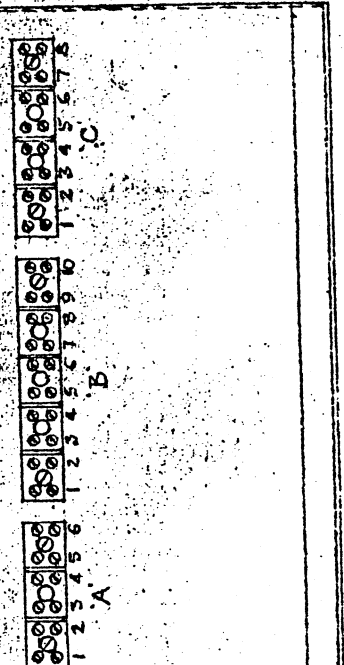


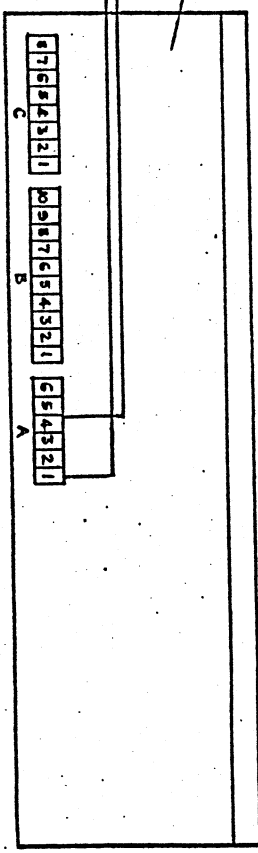
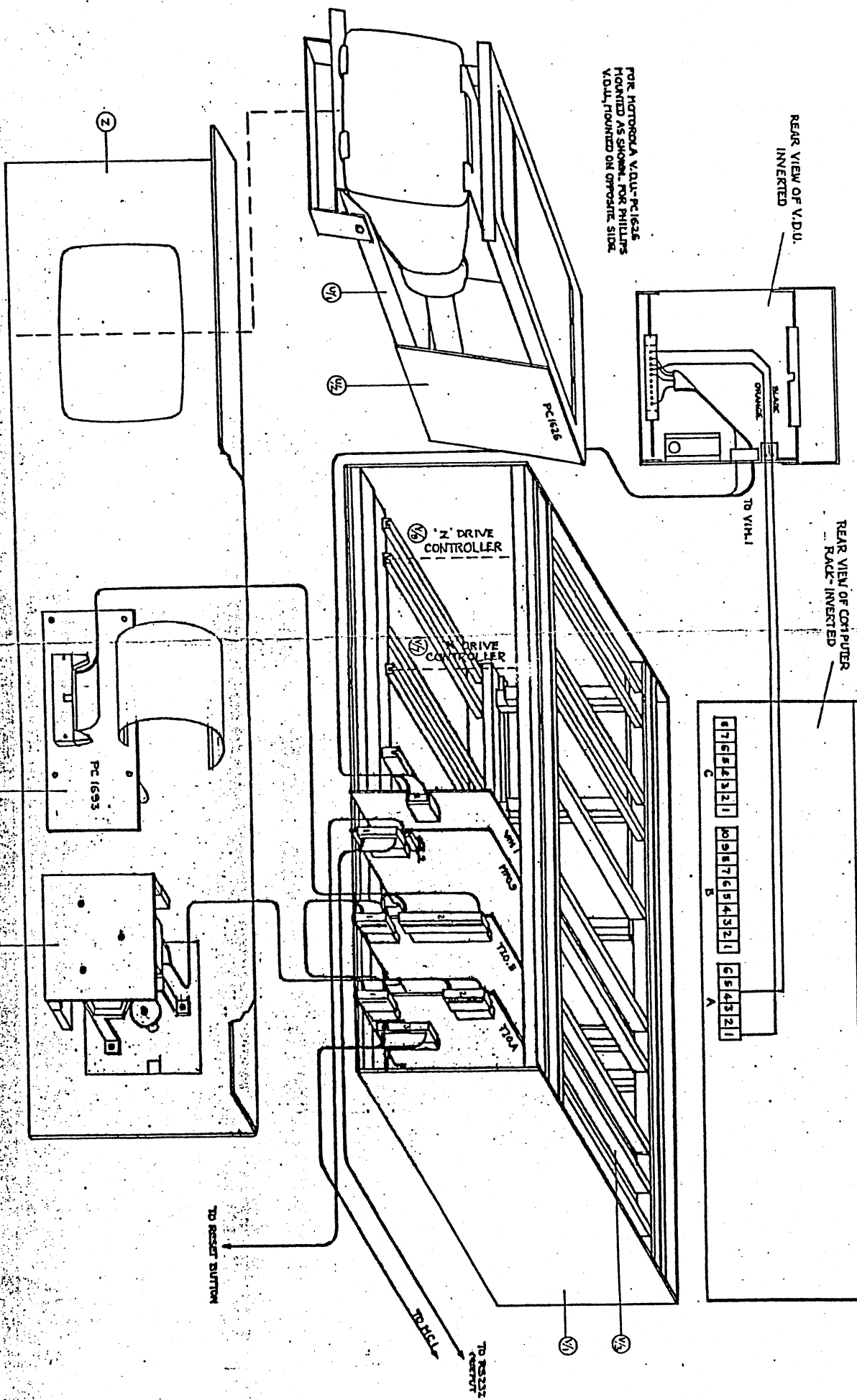


# PACK CONNECTIONS

A1 - P/55	(ORANGE 0.75)	B1 - X26	(RED 2 CORE SCREENED)
P/56 - BUS T3		B2 - X28	(BLUE "
A2 - P/52	(RED "	B3 - Z28	(BLUE "
P/52 - BUS T6		B4 - Z26	(RED "
A3 - P/51	(GREEN/YELLOW "	B5 - BOTH EARTH SCREENS	
P/51 - P/58		B6 - Z10	(RED 0.75)
A3 - SCREEN FROM 4 CORES BELOW		B8 - X10	
P/58 - BUS T1	(GREEN/YELLOW 1.5)	B8 - X32	(BLACK 1.5)
P/54 - BUS T4	(YELLOW 0.75)	B8 - Z32	
P/53 - AA	(GREEN 4 CORE)	X32 - X16&18	
A5 - P/52&18	(BLUE "	Z32 - Z16&18	
A6 - P/52&18	(RED "	X16 - Z16	(RED "
C1 - Z4	(PURPLE 0.75)	B9 - Z12&14	(BROWN "
C2 - Z2	(BLUE "	B10 - X12&14	
C3 - Z6	(GREEN "		
C4 - Z8	(YELLOW "		
C5 - X4	(ORANGE "		
C6 - X2	(RED "		
C7 - X6	(BROWN "		
C8 - X8	(BLACK "		

BUS EARTH LINK ACROSS MOTHER BOARD AS ABOVE  
 ON X 9, Z, CUT OFF PINS 20, 22, 24, 30 (8 PINS)  
 CUT REMAINING PINS HALF-WAY DOWN  
 JOIN TOGETHER BOTH PINS AT 2, 4, 6, 8, 10, 26, 28  
 JOIN TOGETHER 4 PINS AT 12, 14, 3, 16, 18  
 AS SHOWN ABOVE



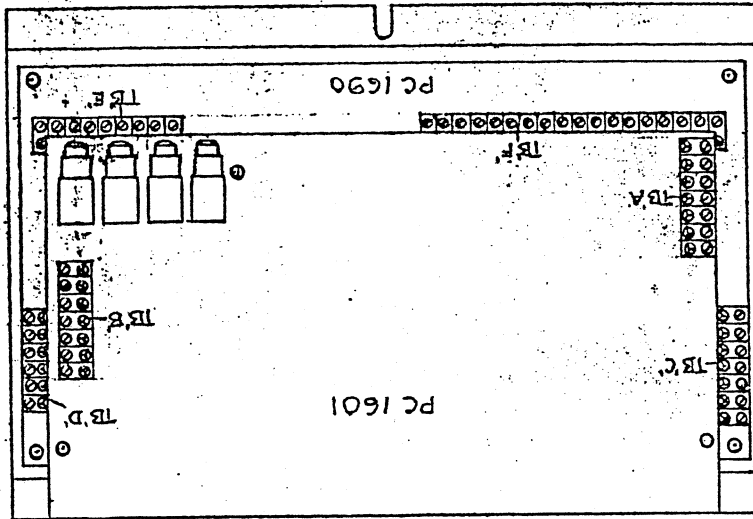


REVISIONS		RED. SCALE		DATE	
NO.	DATE	NO.	DATE	NO.	DATE
1	16.8.83	2	16.8.83	3	16.8.83
RIBBON CABLE INTERCONNECTIONS ON ORAC CHASSIS, MK.5					
GUN ELECTRICAL CONTROLS LTD. ACTON WORKS ACTON, MIDDLESEX W.10 4LQ PHONE 0181 750000					
DMC No. <b>L1723</b>					

NOTE  
 C7 HAS A 5GTY EARTH LEAD FROM P.S.U.  
 C1 HAS AN ORANGE LEAD FROM INSR LAMP  
 A3 HAS A RED LEAD FROM CASSETTE

D1 - RED 2 CORE SCREENED  
 D2 - BLUE 2 CORE SCREENED  
 D3 - BLUE 2 CORE SCREENED  
 D4 - RED  
 D5 - BOTH SCREENS FROM ABOVE  
 D6 - RED 0.75

D1 - BLACK BOTTOM  
 D2 - B2  
 D3 - B3  
 D4 - B4  
 D5 - B5  
 D6 - B6  
 B1 - YELLOW  
 B2 - YELLOW  
 B3 - BLACK  
 B4 - ORANGE  
 B5 - BLUE  
 B6 - GREEN  
 B7 - GREEN



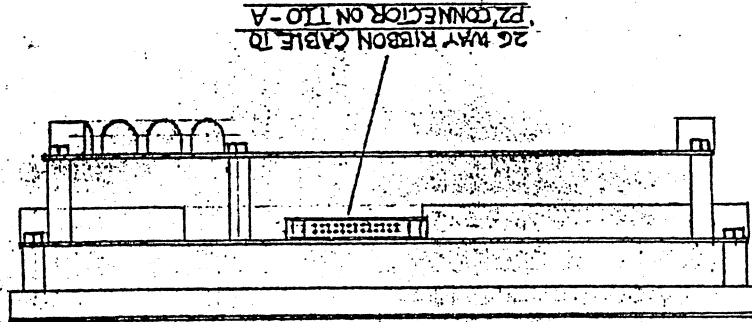
BLACK 0.75 - C1  
 C2 - C7  
 A1 - C6  
 A2 - C7  
 A3 - C1  
 A4 - C7  
 A5 - C5  
 A6 - C3  
 A7 - C4

4 CORE SCREENED  
 TO SENSOR BOARD  
 PC 1685

9 - PC 1685 TB1/1 (G & S)  
 8 - PC 1685 TB1/2 (R)  
 7 - PC 1685 TB1/3 (BL)  
 6 - PC 1685 TB1/4 (Y)  
 5 - P.S.U. - TB3/5  
 4 - P.S.U. - TB3/4  
 3 - P.S.U. - TB1/3 4 CORE (BL)  
 2 - P.S.U. - TB1/2 2 CORE (Y)  
 1 - P.S.U. - C 43 TERMINALS (R)

18 - P/USL TB1/2 (R) 4 CORE  
 17 - TB1/1 (G) SCREENED

1 - COMMON



26 WAY RIBBON CABLE TO  
 P2 CONNECTOR ON T10-A

DRAWING No S.1610 - COMPONENT LAYOUT OF PC1601  
 M.1714 - PC1690

REVISIONS

TITLE

GENERAL ARRANGEMENT AND CONNECTIONS FOR PC1690 & PC1601  
 "ORAC" COMPUTER P.S.U. & INTERFACE BOARDS

GSN ELECTRICAL CONTROLS LTD.  
 VICTORIA WORKS  
 QUEENS MILL ROAD,  
 HUDDESFIELD,  
 W. YORKS. HD1 3J

DRG. No.

M1739