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GEMINI

COMMISSIONING PROCEDURE

AND

CHECKLIST

TECHNICAL INFORMATION

GEMINI COMMISSIONING PROCEDURE AND CHECKLIST

CONTENTS

GEMINI COMMISSIONING PROCEDURE & CHECKLIST

1. Pre-Requisites

Generally the site should be ready for the equipment to be installed and the equipment should be available.

1.1 Environment:

Temperature: the absolute limit for operation of the Gemini range of equipment is 0^{o} to 35^{o}C. In practice we recommend that the temperature of the control room is maintained in the range 15^{o}C to 25^{o}C, which will prove comfortable for the operator and add to the reliability of the equipment.

Humidity: the absolute limit is 90% non-condensing, and will not normally be a problem in the U.K. and Europe. Should any condensation occur, this will directly affect the operation of the equipment; in practice we recommend 60 - 70% non-condensing, which should avoid the generation of static electricity (this is not dangerous but a discharge to the Gemini could lead to a momentary 'glitch' or even system lock-up).

Cleanliness: although dust and dirt will not affect the operation of the Gemini it will eventually accumulate and, as it will probably be carbon loaded and grease bearing, could cause a low resistance connection within the equipment, thus causing a fault. Also the same dust could collect on the fader tracks, interferring with the wipers as they are moved. This would result in flashing any lighting controlled by the fader. In practice we recommend office level cleanliness, which is regular cleaning of the room(s) and no accumulation of general rubbish. To further prevent problems caused by dirt, it is recommended that the equipment is covered when not in use.

1.2 Mains:

The Gemini console has 2 single phase mains power inputs: one for the main system, and one for the back-up system (if this is fitted). A 4-way mains distribution block is fitted on the rear of the console to allow direct connection of a monitor, a printer, or other peripheral equipment, via the main console ON/OFF switch.

Although it is possible to use the same mains supply for both main system and back-up, this is not a good idea as failure of this supply would leave no means of controlling lighting. Two separate mains supplies are therefore recommended.

These mains supplies should be as 'clean' as possible, i.e. care should be taken as to where, in the site's mains distribution system, the Gemini feeds are connected - power circuits which feed thyristor dimmers, large electric motors, or other large inductive loads are likely to carry interference which could cause unpredictable problems with a Gemini system.

Power Requirements:

110V +/- 10% or 220 - 240 +/- 10% 47-63Hz
Main system 5A
Back-up system 2A

Fig 1.2 details the mains power connections to the system.

1.3 Earthing:

Unless this matter is allowed careful consideration, there is always a possibility of creating earth loops, by leaving too many Dimmer Common/Mains Earth connections throughout the system. This could induce current into system signal paths, thereby leading to peculiar and probably random faults. Also, unless the earth is common to all of the equipment, differing voltages might have the same effect.

All metalwork must be adequately bonded to earth for reasons of safety. This bonding is built into each piece of equipment, which must therefore be solidly earthed.

The Dimmer Common/Technical Earth is connected to mains earth inside the Gemini console via a removeable link. For safety reasons this link should always be in position.

The Dimmer Common is not directly connected to the mains earth at the demultiplex units (either M24 demultiplex boxes, Permux, or ACT 6 mux) Depending on the date of manufacture of these units, the connection is either via a 100 ohm resistor, a varistor (a device which conducts when the voltage across it reaches a certain value, or a high impedance 'floating' input. In either case any additional connection to earth would cause a 'loop' and should not be made.

The other places where a Dimmer Common/Mains Earth link can occur are in the Dimmers and Manual Control Desk.

For Dimmers such as STM, Permus, and MCM which are all intended for fixed installations, it is a simple matter to remove the Dimmer Common/Mains Earth link and this should be done in each rack.

For manual desks, such as SP, Threeset, and AMC which are also intended for fixed installations, the same rule applies. In these cases, the equipment should be clearly laelled to the effect that this operation has been done.

On portable equipment the dimmer common is normally tied to Earth. This connection must be broken and a varistor fitted for protection.
n.b.: replacement connectors may be required in some cases for Tempus equipment.

1.3.1 **GENERAL REQUIREMENTS ON THE POWER SUPPLY AND EARTHING REQUIREMENTS FOR CONTROL AND DIMMING EQUIPMENT**

Unless otherwise stated in the specification, all equipment shall be powered by a single phase 3 wire, supply or 3 phase, 5 wire supply consisting of Live(s), Neutral and Protective Earth. The Live and Neutral circuits shall be adequately rated for the equipment's power requirements.

The Protective Earth shall be rated to ensure reliable operation of the circuit protection devices, and should preferably be the same rating as the Live and Neutral conductors.

The Protective Earth shall be joined to Neutral at one point only and bonded to the station ground. This connection is normally made in the supply substation. A common conductor shall not be used for Neutral and Earth on any part of the supply to any part of the equipment.

If the above conditions can not be met, the precise conditions shall be advised before the installation is planned, so that any measures Rank Strand may require to ensure reliable operation can be incorporated.

1.4 Connection to Dimmers:

Where will the demultiplex units be installed?

For an existing installation or one which is having a non-multiplex (e.g. manual wing) back-up, they could be installed in either the control or the dimmer room. In this case, we would suggest the control room as its environment is likely to be preferable.

In a new installation with a multiplex back-up the obvious position is the dimmer room thus reducing the cost of control line cables.

Wherever the interfaces are finally installed, they should be securely mounted and cabled to reduce the possibility of accidental disconnection of any of their connecting cables.

1.5 Connection to existing Manual Systems:

Assuming that the Manual Wing is one with a regular DC output, rather than halfwave rectified AC (e.g. SP Mk I), this connection is simply a question of mounting additional terminals in the most convenient space.

To make full use of the Gemini capabilities, M24 multiplex boxes are wired between the Manual Wing and the Dimmers. This will require additional terminal blocks for the dimmer lines from the multiplex boxes, leaving the original blocks to connect the manual lines into the multiplex boxes.

Figure 1.5.1. details the control line connections from the Manual Wing.

1.6 Installation:

Place the Gemini in its final position - preferably with a good view of the stage, or studio monitors - such that the VDU does not obscure the operator's vision.

Check that the demultiplex units are set to respond to the correct dimmer numbers. Place all power and interconnecting cables in position and check that they are of sufficient length - leave some slack to allow the console to be moved for maintenance purposes.

Do not make any connections at this point.

2. Connection and Testing

With the Gemini now installed, testing can begin.

Figure 2.0.1. details the system interconnections.
Figure 2.0.2. details the leads used for system interconnection.

2.1 Mains Supply:

Connect each section of the installation in turn to the mains supply and check that it is displaying outward signs of basic operation.

Gemini main system	-Should operate normally.
Gemini Back-Up	-Should operate normally.
V.D.U.	-Should show a 'raster' with the 'brightness' turned up.
Printer	-Power on indicator should light.
Designers Control Receivers	-'Power On' indicator should light.
M24 Multiplex Boxes	-'Power On' LED should light.
ACT 6 mux dimmers	-'-15V' indicator and channel indicators should light.
Permux units	-No visual indication.

Full operation checks need not be done at this stage.

2.2 Demultiplex Units:

For M24 multiplex boxes and Permux units fitted to already existing dimmers: connect each unit to the dimmers with the power off. Connect dimmer power and demultiplex power and check that all dimmers are OFF and that no noticable flash-up occurs during power on/power off.

2.3 Gemini Console:

Connect the multiplex output cable to the Gemini, connect the V.D.U. lead between the V.D.U. and the Gemini. Apply mains power to the Gemini and V.D.U. Connect the demultiplex units, one at a time, to the Gemini, apply power and check that each unit drives its allocated dimmer numbers, and that no interaction occurs between units.

Apply power to the Back-Up unit and check that this will control dimmers when the 'Back-Up' switch is ON.

Check that the Gemini output can be used to load the Back-Up with the 'Load Output' function.

If a manual system is part of the installation, check that with the Gemini ON, the manual system will control dimmers and that the Gemini master fader acts as a master also over the manual system. Check that the manual system still drives dimmers when the Gemini is OFF or disconnected.

The basic installation should now be complete, with all interconnections made. Cables can now be tidied and any excess length neatly coiled and tied. (Adhesive tape is not recommended for fixing cables as it usually degrades after a few months leaving a sticky mess).

2.4 Designers' Control

If this is to be used with a wire link, connect the cables as required by the customer (it is a good idea to place one outlet box in the Control Room for testing purposes) and switch on the Designers' Control. Check that the control operates correctly from each 'outstation'.

If infra-red receivers are to be used, install these in position and connect them both to the Gemini and to the mains. Verify that the control operates and that all receivers are capable of correct reception up to a range of 30 metres. (Ambient lighting may have to be reduced for optimum operation).

Verify that the mains adaptor/battery charger functions - it may be necessary to leave the control switched on for some time to flatten the batteries before this test can be made.

2.4.1 Riggers' Control

This can only be used with a wire link. After making the relevant connections, check that the control will operate lighting channels correctly. Also, check the battery charger.

2.5 Printer.

Connect the printer to the Gemini and to the mains - usually from the Gemini power outlets. Feed in the end of the paper and 'request' a printout from the Gemini. Check that print quality and alignment are of an acceptable standard.

2.6 Adjustments:

As part of the commissioning procedure, Gemini adjustments should be checked and option switches set correctly.

Gemini adjustments are set up prior to despatch from Rank Strand, but it is always possible that mechanical vibration in transit has caused movement of the alignment controls.

Adjustments which should be checked are:

1. Main system power supply.
2. System multiplexed output level.
3. Manual Wing multiplexed input level - if manual wing fitted.
4. Alarm Bleeper sound intensity.
5. Wheel sensor gain.

2.6.1 Power Supply:

The Gould Econoflex power supply has one potentiometer which sets the internal reference from which all output voltages are derived. This potentiometer is situated to the right of the output terminals. A thin screwdriver is required to make any necessary adjustment. The voltage should be checked between pins 1(Ov) and 7(+5V) on the front panel microprocessor on the submaster/memory panel p.c.b. This check should be made with a good quality voltmeter (better than 2% accuracy) and can be performed with the panel in situ (See figure 2.6.1). The voltage read should be +5.0V +/- 2%.

2.6.2 System Multiplexed Output Level:

This is set by a potentiometer (RV1) marked as 'DMX' on the reference 1751 Multiplex Channel Processor P.C.B. The only accurate method of checking the adjustment is by means of an oscilloscope. Set the timebase to 50us per division, the input attenuator to 1v per division in D.C. mode, and trigger off a negative edge going below Ov. Observe the multiplex output w.r.t. Ov. Set channel 1 to full and verify that the multiplex output level is +5.0V. Adjust only if required. If the oscilloscope is not of known calibration, check its display with a known +5V D.C. level before making any measurements. (See figure 2.6.2.).

Also, check the Back-Up output level. Set the 'Back-Up' switch on. Set the Back-Up to give output levels of 100%. Observe the multiplex output waveform on an oscilloscope, and adjust if necessary using RV1 on the Back-up P.C.B. (See figure 2.6.2.).

2.6.3 Manual Wing Input Level:

This should only be checked if levels from a manual wing are being multiplexed in M24 multiplex boxes, and fed into the Gemini. The manual input must be enabled - see section on option switches.

First check that the multiplexed input signal is approximately +5V for a fader at full. If possible, adjust the manual wing reference voltage to obtain the correct level. (See section 2.6.6.). Then, observe the resulting level display on the V.D.U. and adjust potentiometer RV2 marked as 'MAN' on the reference 1751 Multiplex Channel Processor P.C.B. such that the level on the V.D.U. just reaches 'F' for a manual wing fader at full.

2.6.4 Alarm Bleeper:

Using a fine screwdriver, adjust the Alarm level potentiometer via the hole in the front panel above the 'A-H' fader. The customer should indicate what level he requires, and should be made aware of the adjustment procedure.

2.6.5 Wheel Sensors:

Two potentiometers (RV1, RV2) on the wheel P.C.B. control the gain of the opto-couplers which sense wheel movement.

Checking of the adjustment is done using an oscilloscope.

First set the timebase to 2ms per division, and the input attenuators to 100mV per division. Connect a scope input to TPIA with TP3 as earth. Rotate the wheel very slowly until a minimum voltage is found. Adjust RV1 until this voltage is between 200mV and 300mV. Rotate the wheel further, when the voltage should rise to approximately 600mV. Repeat the procedure for TP2A, RV2.

Next, connect scope input 1 to TPI and scope input 2 to TP2 with TP3 as earth. Set the timebase to 2ms per division and the input attenuators to 2V per division. Set the scope controls to add input 1 and input 2. Move the wheel by hand -the resulting trace should look like that in figure 2.6.5. If it is not, display each scope input in turn and check for an equal mark-space ratio in the waveform when the wheel is turned. Adjust the corresponding potentiometer until the correct waveform is seen. Then, repeat the 'addition' check.

2.6.6. Manual Desks:

The Manual Wing might have its own internal adjustments e.g. SP Mark 2, Threeset, AMC, or might have to be internally modified to conform with the Gemini output, should the customer require any degree of accuracy in back-up. If the desk is fitted with the original Ref. 940 Master Amplifier, this may have to be replaced with the Mk 2 version before an accurate adjustment to -10V maximum can be achieved.

If the Manual Wing is designed to generate an offset on its output voltage to improve the performance of the dimmers, this level will be displayed on the Gemini and may cause confusion. If the Wing is an AMC, R132 on each of the channel modules should be reduced to 8K2.

2.6.7 Designers' Receiver Adjustment:

Details of adjustment for the Designers' Control receivers are laid out in the Users Handbook which should be consulted if adjustment is required.

2.6.8 Dimmers Adjustment:

After checking the Gemini adjustments, the dimmers should be set to give the correct output profile. As the method of adjustment varies with the dimmer type, it is suggested that the relevant dimmer handbook be consulted if there is doubt about the adjustment method.

2.7 Option Switches:

Two sets of switches within a Gemini are used to set up system parameters. The settings should be checked, but altered only if necessary.

A summary of switch functions is given below:

2.7.1 Serial, Memory, Terminator P.C.B. Ref 1752.

SW0	-Bits 1-7	Number of 4K pages of memory fitted to system.
SW1	-Bits 7,8	Number of V.D.U.s controlled by console.
SW3	-Bit 1	V.D.U. fixed/free format.
	-Bit 2	Debug message enable.
	-Bit 3	50/60 Hz. V.D.U. synchronisation.
	-Bits 4,5	Number of V.D.U.s
	-Bits 6-8	Aux. V.D.U. enable
SW4	-Bits 1-4	Number of Channels

2.7.2 Multiplexed Channel Processor Reference 1751.

SW1	-Bit 1	Delay before re-output of MUX.
	-Bit 5	Enable effects panel.
	-Bit 6	Disable proportional patch.
	-Bit 7	Enable fader wing input.
	-Bit 8	Main program/test programs.

Unspecified switch bits are not used and should be set in the open position.

2.7.3 Switch Settings:

Ref 1752

SW0 -Memory pages - 8, bit 4 set.

SW1 -V.D.U.s - 1, bit 7 set.

SW3 -V.D.U. format - fixed, bit 1 open
-De-bug messages - disabled, bit 2 open.
-50/60Hz - bit 3 open for 50Hz, set for 60Hz.
-V.D.U.s - 1, bit 4 set.
-Aux V.D.U. - disabled, bits 6-8 open.

SW4 -Number of Channels - set bits as required.

Bit	4	3	2	1	No of Channels
	0	0	0	0	48
	0	0	0	1	80
	0	0	1	0	96
	0	0	1	1	100
	0	1	0	0	120
	0	1	0	1	140
	0	1	1	0	144
	0	1	1	1	160
	1	0	0	0	180

0 = Switch bit open, 1 = switch bit set.

Ref 1751

SW1 -Delay before re-output - off, bit 1 open
-FX panel - bit 5 set if FX panel fitted.
-Proportional Patch - bit 6 set if patch not required.
-Fader Wing - bit 7 set if fader wing connected.
-Test programs - off, bit 8 open.

N.B. If the Manual input is enabled, the proportional patch is automatically restricted - only channel numbers between 1 and 180 are permitted.

Once adjustments have been checked, fully check each operational function on the system. Should any spare parts (other than faders, fuses etc.) have been supplied with the system, these must be fitted and checked (and adjusted if necessary).

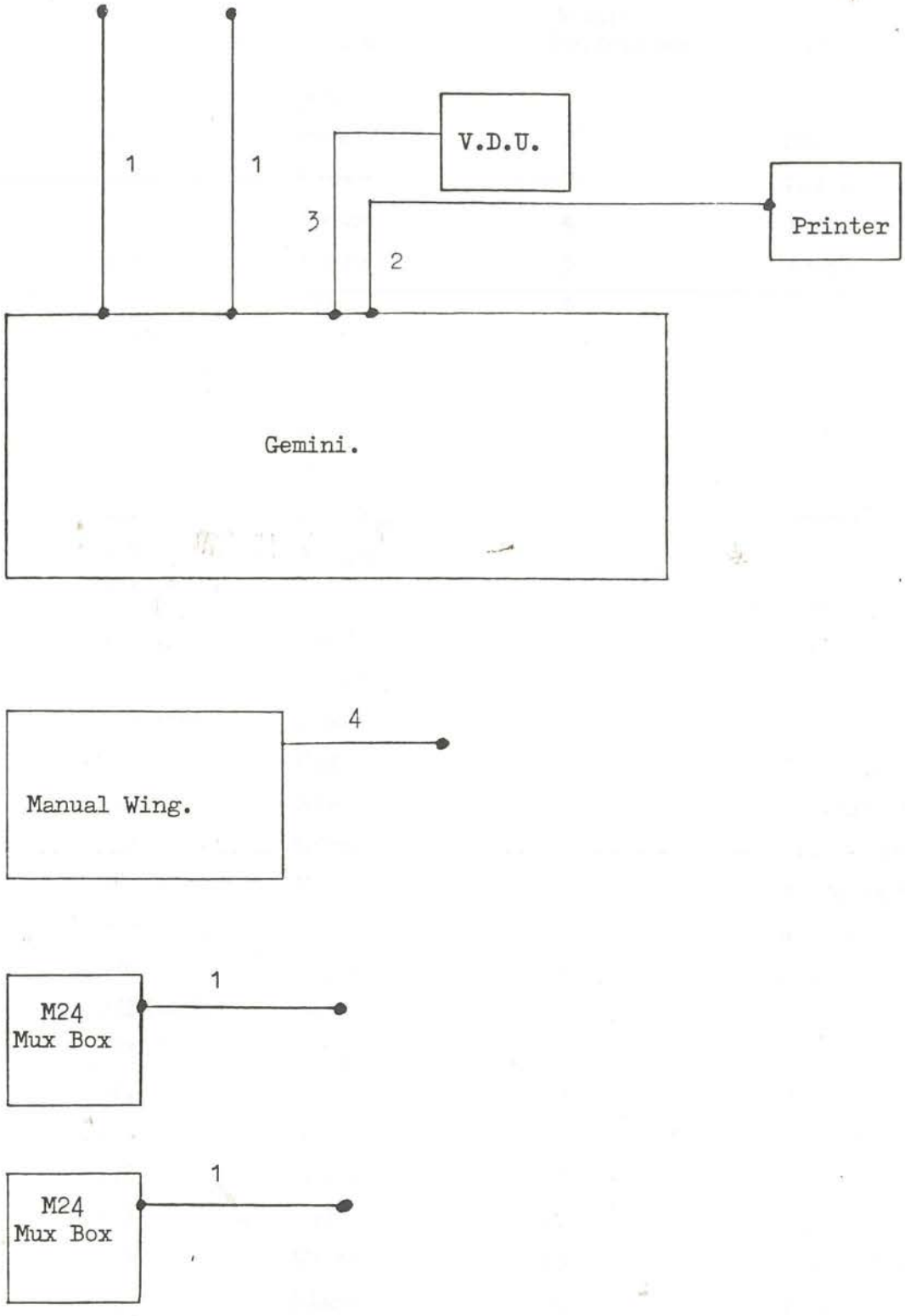
3. Handover:

The equipment is installed, connected and working. The final task is to prove this to the customer (or their nominated representative) and obtain a signature that all is correct.

The customer should be shown that all operational functions are working correctly - this may well take the form of an operators' training session.

Once the customer is satisfied that all is working properly, and that all contractual requirements have been met, he should sign an acceptance document.

Figure 1.2 Mains Power Connections.

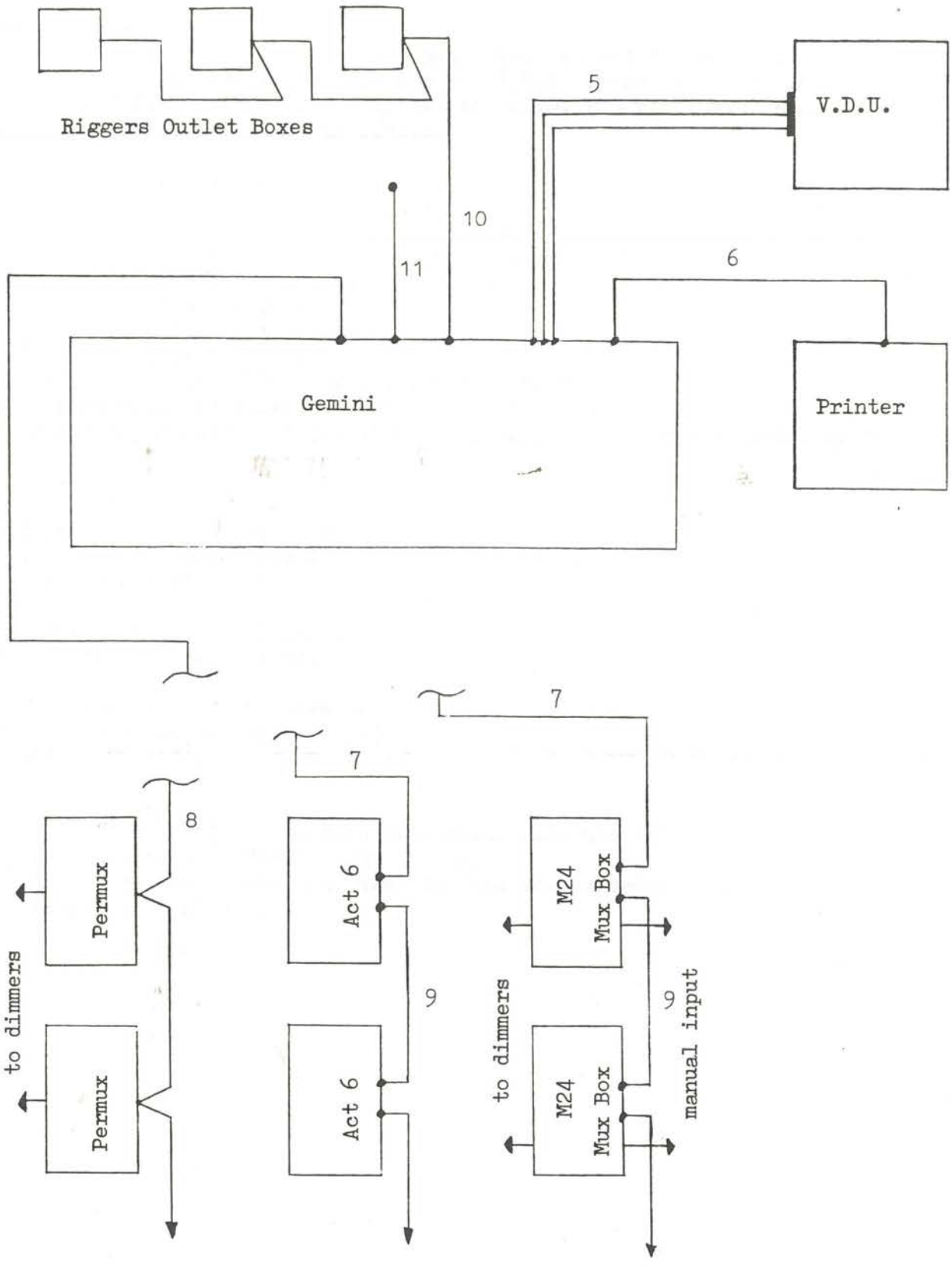


For cable details - see Fig. 2.0.2 Schedule of Leads.

Figure 1.5.1: Control line connections to Manual Wing

Dimmer Number	Bleecon Pin Number	Colour	'Min D' Pin Number	Colour
1	1/1	Red	1	Red
2	1/2	Blue	2	Blue
3	1/3	Green	3	Green
4	1/4	Yellow	4	Yellow
5	1/5	White	5	White
6	1/6	Black	6	Black
-	1/7 (-15V)	Brown	-	-
-	1/8 (OV)	Violet	-	-
7	2/1	Red	7	Brown
8	2/2	Blue	8	Violet
9	2/3	Green	9	Orange
10	2/4	Yellow	10	Pink
11	2/5	White	11	Cyan
12	2/6	Black	12	Slate
-	2/7 (-15V)	Brown	-	-
-	2/8 (OV)	Violet	-	-
13	3/1	Red	13	Red/Blue
14	3/2	Blue	14	Green/Red
15	3/3	Green	15	Yellow/Red
16	3/4	Yellow	16	White/Red
17	3/5	White	17	Red/Black
18	3/6	Black	18	Red/Brown
-	3/2 (-15V)	Brown	-	-
-	3/8 (OV)	Violet	-	-
19	4/1	Red	19	Yellow/Blue
20	4/2	Blue	20	White/Blue
21	4/3	Green	21	Blue/Black
22	4/4	Yellow	22	Orange/Blue
23	4/5	White	23	Yellow/Green
24	4/6	Black	24	White/Green
-	4/7 (-15V)	Brown	-	-
Dimmer Common	4/8 (OV)	Violet	25	Orange/Green

Figure 2.0.1 System Interconnections.



For cable details - see Fig. 2.0.2 Schedule of Leads.

Figure 2.0.2 Schedule of Leads.

Mains Leads

1. 2m 3 core mains input cable - 3 pin I.E.C. socket / bare ends.
2. 2m 3 core printer mains cable - 3 pin I.E.C. socket / 3 pin I.E.C. plug.
3. 3 core V.D.U. mains cable - fitted to V.D.U. / 3 pin I.E.C. plug.
4. Manual wing mains cable as fitted.

Interconnecting Cables

5. 2.5m triple co-axial V.D.U. cable -
   25 pin Min D plug / 3 off BNC. 75 ohm plug.
6. 5m 4 core printer cable - 25 pin Min D plug / 9 pin Min D plug.
7. 20/5m 2 core screened multiplex cable -
   3 pin XLR. plug / 3 pin XLR. socket.
8. 2 core screened multiplex cable - 3 pin XLR. plug / bare ends.
9. ½m 2 core screened multiplex cable -
   3 pin XLR. plug / 3 pin XLR. socket.
10. 2 core screened riggers cable - 6 pin Hypertac plug / bare ends.
11. Audio input cable - 5 pin 180° DIN plug / as required at audio source.

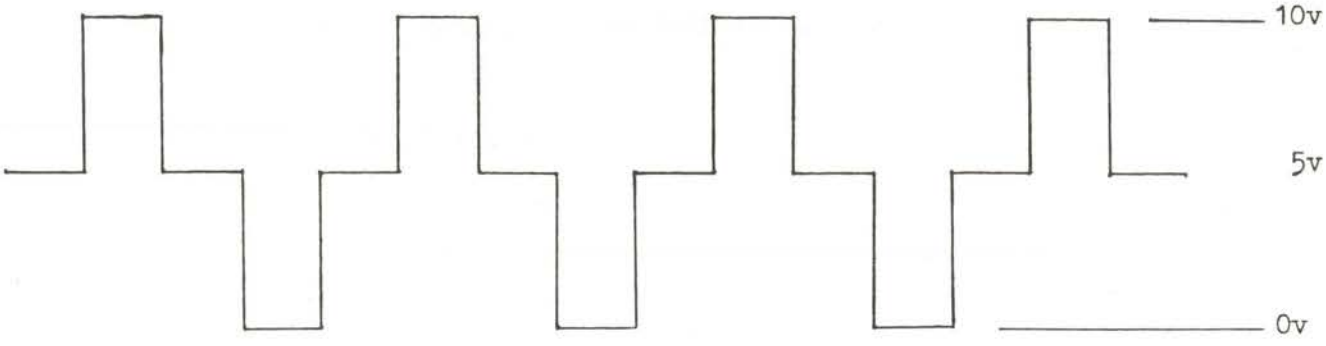
Each Gemini console includes :-
1 off mains input cable (1.) + 1 for Back-up unit.
1 off 5m multiplex cable (7.)

Each Gemini V.D.U. includes :-
1 off triple V.D.U. lead.

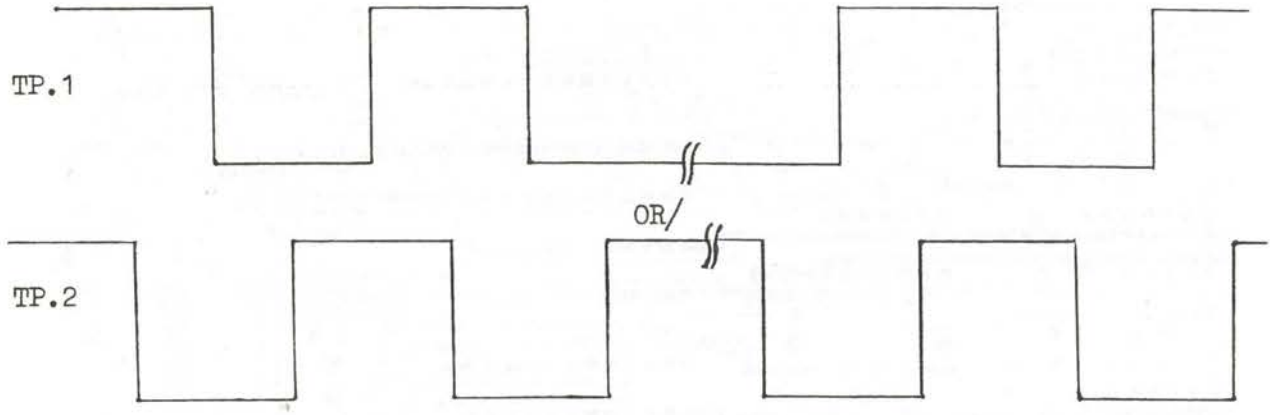
Each Gemini printer includes :-
1 off mains input cable (2.)
1 off printer data cable (6.)

Multiplex line cable - standard twin axial screened cable (approx. 300 pF/m). Maximum run - 300m.
For longer runs, use high quality data transmission cable (approx. 50 pF/m).

Figure 2.6.5 Wheel Adjustment Waveforms.



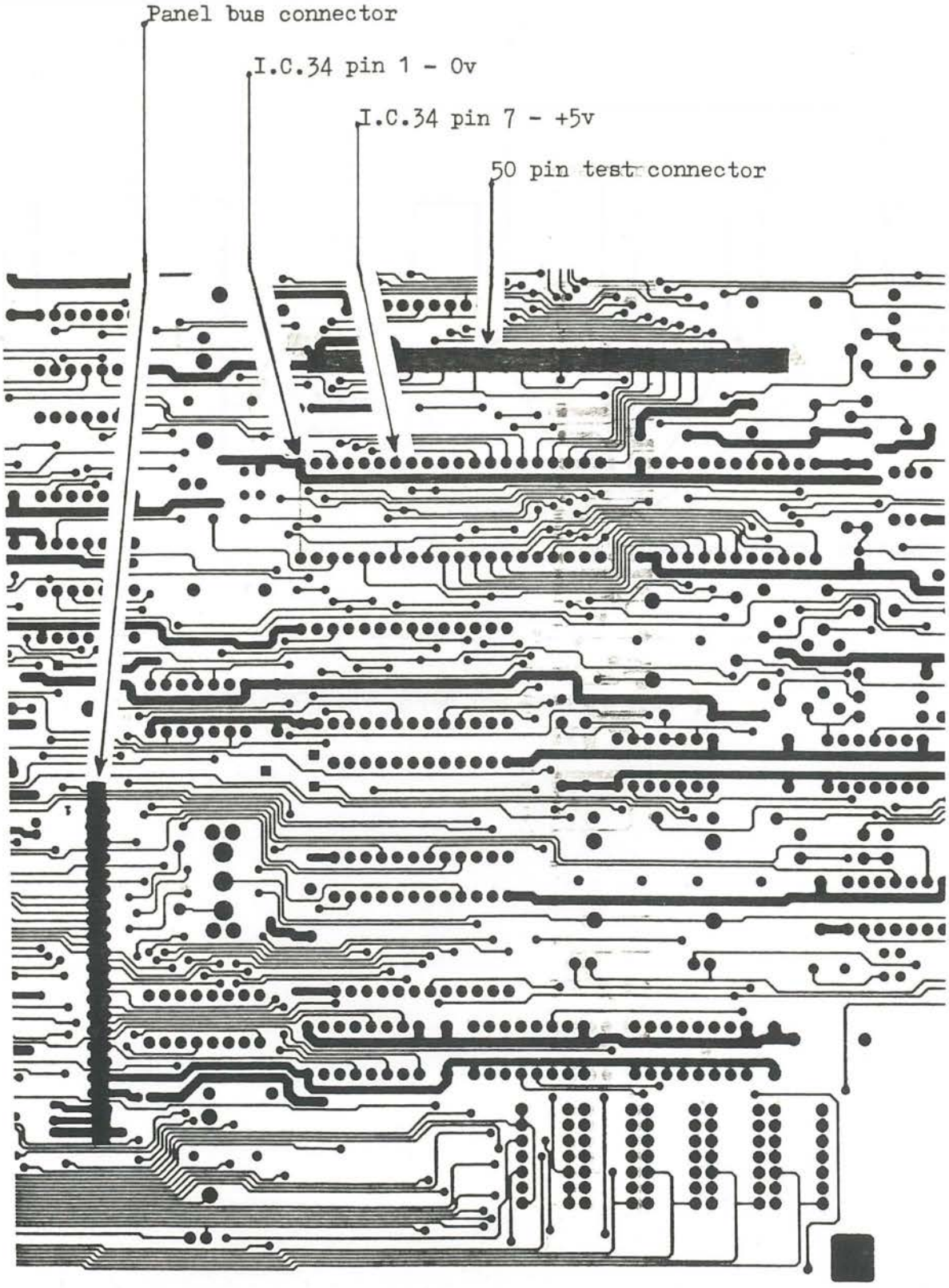
If waveform with TP.1 voltage added to TP.2 voltage is not as shown above then check that individual waveforms from the test points are as shown below.



The exact phase relationship between the two sensor outputs depends on the direction of wheel movement, but a 'quadrature' phasing will always be observed if the wheel is set up correctly.
Each sensor gain must be set such that the output waveform has a unity mark:space ratio.

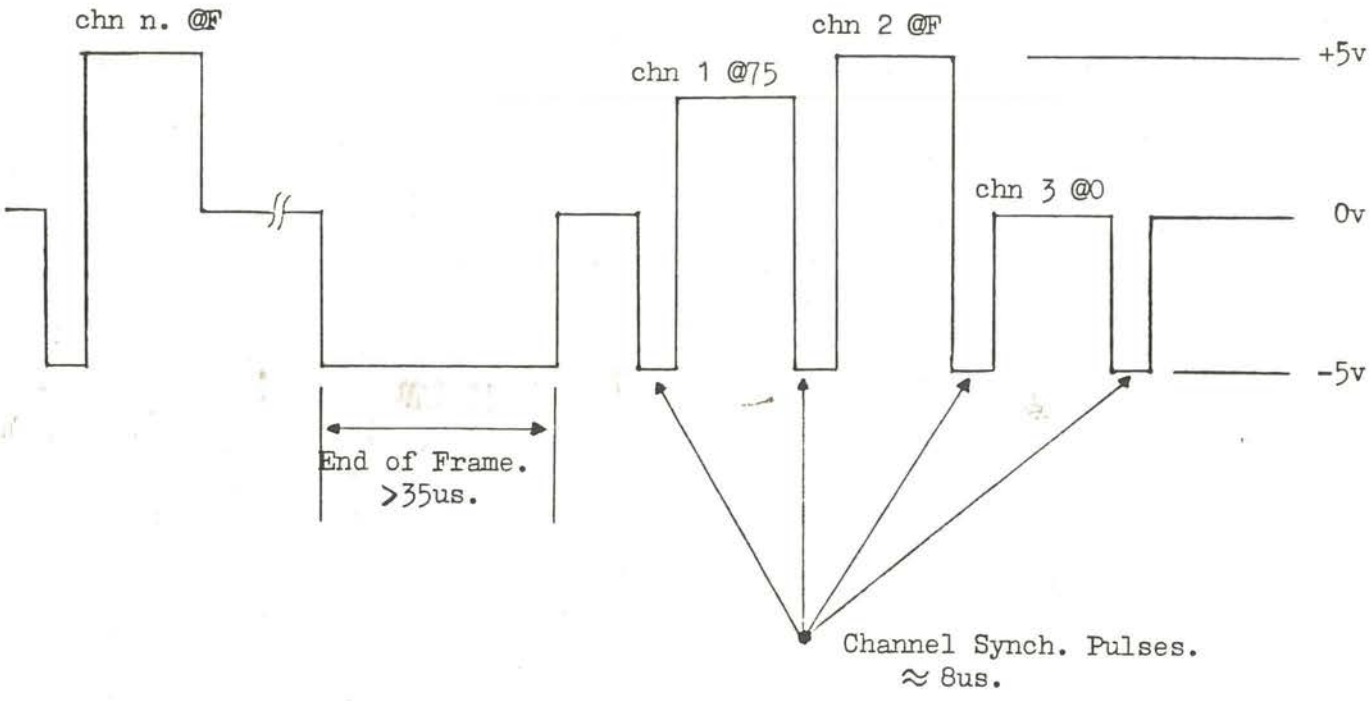
Figure 2.6.1 Power Supply Measurement Points

Power supply (+5v) should be checked on pins 1 and 7 of I.C.34 (microprocessor) on the Memory and Submasters Panel.



Part view of track layout for Memory and Submasters panel - viewed from back.

Figure 2.6.2 Multiplexed Output Waveform.



(Channel levels are given for example only)