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USER'S/COMMISSIONING HANDBOOK FOR JTM DIMMER RACKS

RANK STRAND ELECTRIC

29 King Street London WC2
Telephone 01-836 4444 Telegrams Spotlite London WC2

A DIVISION OF

RANK AUDIO VISUAL LIMITED

SCOPE

This handbook contains information normally required for installation and commissioning of the equipment. Maintenance information, where relevant, is covered in the associated Maintenance Handbook.

SERVICE ASSISTANCE

For assistance with servicing or maintenance, please contact the nearest branch office, agent or associate company (see list attached at the end of this handbook) and state the Order Reference, Equipment Reference or other relevant information as well as an indication of the fault-symptom encountered.

Revision/amendment since last issue of document:

◄ or ► on margin denotes minor changes.

◄ or ► against headings or illustration numbers denotes major revisions.

USER'S/COMMISSIONING HANDBOOK

JTM 10/20-way DIMMER RACKS

CONTENTS

SUPPLEMENTS

Publication 1-014: List of Regional Offices, Agents and Associate Companies. ◄

1. GENERAL INFORMATION

JTM Dimmer Racks are designed for use with the standard range of Rank Strand Control Desks and other Control Panels, to provide a lighting-control installation for stage or studio use. This handbook deals primarily with the Dimmer Racks.

Each Rack houses a set of Dimmer Modules with the associated fuses/ circuit-breakers, fan and other electrical items.

1. 1. EQUIPMENT

1. 1. 1. RACKS

The standard range of JTM Dimmer Racks is available in the following variations:

Number of channels per rack: 10-way or 20-way.
Supply voltage requirements: 110-120V or 200-250V; 1-phase or 3-phase 4-wire, and earth.
Supply frequency: 50 or 60 Hz.
Total KW rating of Dimmers:

Rack JTM-20 (20-way racks): 100KW max. (200-250V supply); 60KW max. (110-120V supply).
Rack JTM-10 (10-way racks): 50KW max. (200-250V supply); 30KW max. (110-120V supply).

A suppressor Unit is supplied with each rack or groups of racks.

1. 1. 2. DIMMER MODULES

The following table lists the range of Dimmer Modules. The Ref. Number is shown on a label fixed to the Module base-plate.

		VOLTAGE RATING			
		200-250V		110-120V	
		*	**	*	**
KW RATING	1KW	JTM10	JTM10C	-	-
	2KW	JTM20	JTM20C	JTM20L	JTM20 LC
	3KW	-	-	JTM30L	JTM30 LC
	5KW	-	JTM50C	-	-
	6KW	-	-	JTM60L (see Note 1)	-

* : With laminated-core filter unit.

** : With C-core filter unit.

Note 1: The filter unit is mounted on a separate base-plate.

2. CONSTRUCTION AND LAY-OUT

2.1. RACKS

See Figures 2.1.1 and 2.1.2 on page 10, and figures 2.1.3 and 2.1.4 on page 4.

The racks are of totally enclosed construction designed for installation as free-standing units. An integral bracket with holes is provided at the top of each rack to enable securing to a wall or vertical surface: alternatively two similar racks may be mounted back-to-back and secured to each other. The fuse-panel on 200-250V racks or the circuit-breaker panel on 110-120V racks is hinged to provide access to the terminal compartment. The Dimmer Modules are mounted in the remaining part of the rack in columns (of 3 and 7 in JTM-10 racks, and 4, 8 and 8 in JTM-20 racks), and metal panels secured by screws provide access for maintenance purposes.

The interior of the rack is force-ventilated by an expeller fan mounted on top; air-entry is via a grill at bottom front of the rack.

Each rack or group of racks is supplied with a totally enclosed Suppressor Unit to prevent transmission of switching transients into the mains-supply wiring.

2.2. DIMMER MODULES

Fig. 2.2 (page 11) shows the lay-out and construction of a typical 2 - to - 5 KW Module.

The Ref. No. for the module is shown on a label affixed to the base-plate. Letter-suffix C to the Ref. No. indicates that the filter unit is of C-core design; letter-suffix L denotes that the module is designed for 110-120V supply.

On Modules with plug-in Trigger cards, the plug-in connector is mounted on top of the heat-sinks.

On 110-120V (L) modules, a fuse is mounted across studs F1 and F2 (Fig. 2.2) for protection over-riding the circuit-breaker for the channel.

2.3. TRIGGER UNITS

See Fig. 2.3 (page 11) for the component lay-out which is identical for the wired-in and the plug-in boards.

3. INSTALLATION AND CONNECTIONS

NOTE: Each rack or group of racks is supplied with a Ref. 855 Suppressor Unit consisting of four capacitors. Mount this Unit close to

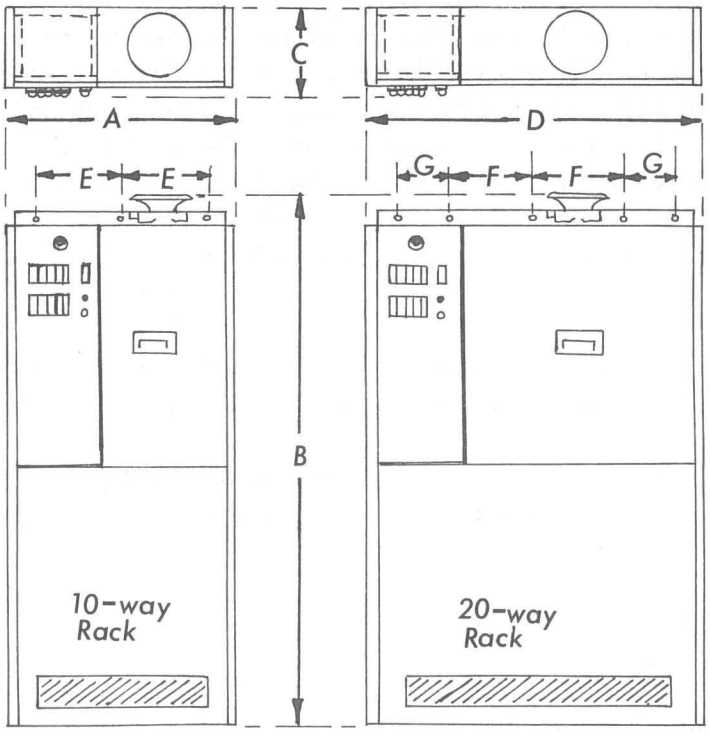


Fig.2.1.3-Racks.

Overall Dimensions: A=660mm (26"); B=1570mm (61.75"); C=280mm (11");
D=965mm (38").
Fixing Dimensions: E=267mm (10.5"); F=241mm (9.5"); G=178mm (7").

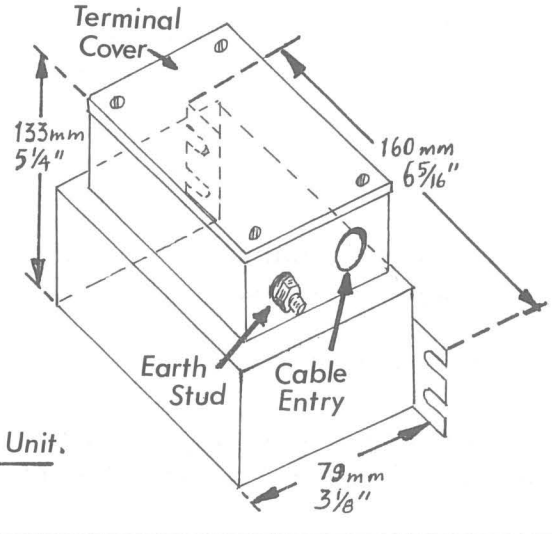
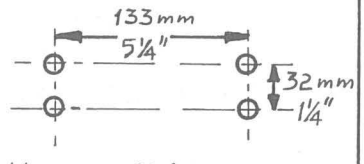


Fig.2.1.4-Suppressor Unit.



Mounting Holes

the incoming mains-supply busbars; see Fig. 2.1.4 for dimensions and para. 3.4.below for connections.

3.1. INSTALLATION

To minimise expensive cable-runs to the lamp loads, site the racks as near to the loads as practicable. Where possible, group two or more racks together at one location. Avoid any acoustically 'live' position in the acting or audience area.

An adequately fused isolator for the incoming mains-supply must be provided near to each rack or group of racks.

In choosing the location for individual or grouped racks, ensure that free flow of air through each rack (air-inlet at bottom and outlet at top) is not impeded in any way. Also allow enough clearance to the left of the rack to allow the fuse or contact-breaker panels to be hinged open more than 90° and permit free access to the terminals.

3.2. VENTILATION

The force-vent fan in each rack is adequate to disperse the heat dissipated in the rack (less than $2\frac{1}{2}\%$ of maximum load or supply KW rating, whichever the smaller), so long as the ambient (environment) temperature does not exceed 35°C (95°F). Assisted ventilation for the environment may be necessary in some locations to maintain ambient temperature below 35°C.

3.3. MOUNTING

See Figures 2.1.3 & 2.1.4 for fixing-hole dimensions.

Where racks are grouped, it will be found convenient to arrange them in the correct sequence. Each Dimmer channel is numerically identified, the numbers running in sequence throughout the installation.

3.4. CONNECTIONS

The channel identification numbering (see above) is the key for all connections to lamp loads, associated Desk/Panel, etc., and also for plotting cues and aiding maintenance.

NOTE: Do not use high-voltage insulation testers to check wiring associated with and connected to Dimmer Racks.

3.4.1. ACCESS TO TERMINALS IN THE RACK

Hinge open the fuse (or circuit-breaker) panel to gain access to incoming-supply busbars and the terminals for lamp-load and control-wiring connections. A removable panel is provided on top of the rack to facilitate cable-entry.

NOTE: Do not remove the panels covering the rest of the cabinet-front except for access to Dimmer Modules for maintenance.

3.4.2. INCOMING-SUPPLY CONNECTIONS

See Figure 2.1.2. on page 10.

3.4.2.1. SUPPRESSOR UNIT

See Fig. 3.4.2.1.

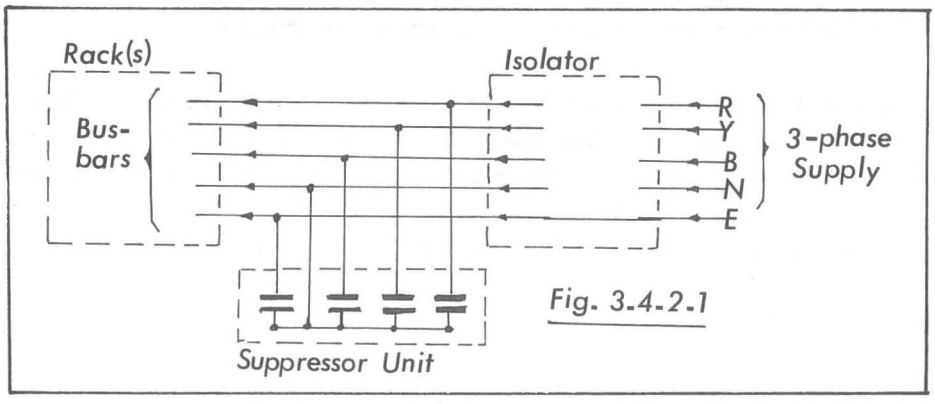


Fig. 3.4.2.1

Note that the common terminal of the Suppressor Unit capacitors is taken to the Neutral line. Local electricity-authority regulations may require the Suppressor Unit to be separately fused on each phase.

On single-phase systems (Phase, Neutral & Earth only), two of the capacitors in the Suppressor Unit are not used.

3.4.2.2. RACKS

The busbars inside the fuse or circuit-breaker panel are designed and adequately rated for the appropriate cable-sizes to be used.

In the case of 3-phase applications, the Dimmer module input supplies are internally connected in phase sequence (Red -A- to 1, 4, 7, etc; Yellow -B- to 2, 5, 8, etc; Blue -C- to 3, 6, 9, etc.) unless otherwise specified by the user. 3-phase racks may be used on single-phase supplies by shorting busbars B and C to A, and connecting the phase-supply to A.

It is imperative to provide an adequate earth/ground conductor for the external wiring and connect it to the earth/ground busbar E in the rack; do not rely on earthing via the conduit or trunking of other conductors.

3.4.3. LOAD CONNECTIONS

'Load' and 'Neutral' terminals are numbered to correspond with the Dimmer Modules. Since the control of output to load involves waveform-switching of voltage, the two conductors to each channel-load must be run as a pair of adjacent and equal-length conductors; this will ensure that each conductor in the pair carries equal and opposite current components. If a patching panel or other form of load-selection unit is used, divert the conductors as a pair to and from this unit. Lack of care in this respect may result in strong induced fields tending to vibrate the cable-trunking or radiate interference.

If armoured or conduited cables with adequate earthing of the sheaths are not used, separate earth conductors are necessary and should be connected to earth-bar E in the racks. ◄

3.4.4. 'CONTROL' CONNECTIONS: These are made primarily to the associated Desk or Panel.

3.4.4.1. A-C SUPPLY CONNECTIONS: A suitable cable (Rank Strand Electric Ref. 604) is a 3-conductor 2.5 sq.mm., 50/0.25 (or, in the Imperial size, 0.003 sq.inch, 70/0.0076) cable. ◄

Note that in some installations, the associated desks or panels may require to be fed separately from the mains-supply. Where the desk-supply is specifically to be taken from the rack, use the ABE terminals on the 'Control' terminal block in the rack. Note that terminal A is connected in the rack to the 'Blue' phase (bar C) of a-c input supply to rack; terminal B is the neutral line (bar N), and terminal E is earth/ground (bar E). Where the Desk requires more than one supply from a group of racks, use the ABE terminals of the second rack also.

On grouped racks, spare ABE terminals can be used to power auxiliary circuits so long as the circuit-rating of the 'Control' fuse is not exceeded.

3.4.4.2. CONTROL-SIGNAL CONNECTIONS

Use terminals 1 to 10 (or 20) and C on the 'Control' terminal block. Since the wiring has to carry less than 24V at a few mA, any suitable multi-conductor cable can be used subject to local authority regulations. A suitable cable (Rank Strand Electric Ref. 601) is a 12-conductor 0.5 sq.mm., 16/0.2 (or, in the Imperial size, 0.0006 sq.inch, 14/0.0076) PVC-insulated and sheathed cable, to be used one cable per each 10-channel rack and two cables per each 20-channel rack; this cable has the advantage of 250V-grade insulation and does not have to be segregated from mains-voltage conductors. ◄

Connect each numbered terminal to the appropriate numbered terminal (off the channel-lever potentiometer circuits) on the associated Desk or Panel; connect the common return line to terminal C.

Using the above Ref. 601 cable, a consistent sequence of connecting conductors to numbered terminals (e.g., white, slate, brown, red, red/blue, red/white, pink, orange, yellow, blue, violet, and black) will facilitate channel identification for maintenance purposes at a later date.

3.4.5. OTHER INFORMATION

3.4.5.1. When all connections have been made to a rack, remove all cable-ends and other debris from the terminal compartment; check all connections carefully, especially to ensure that insulation is not trapped in the pressure-pad terminals: close the fuse (or circuit-breaker) panel.

3.4.5.2. LAMP-LOADS: The Dimmers are designed to control tungsten-load lamps of the same voltage rating as the mains-supply. Each channel-dimmer requires a minimum load of 60W for satisfactory operation; hence smaller test-lamps or neon indicators should not be used as entire loads.

The Dimmers can be used to control hot-cathode fluorescent lamps but specified control equipment must be used and the dimmer-ratings halved for such applications.

The Dimmers can be used to feed low-voltage lamps via step-down transformers providing a dummy-load (resistive or preferably tungsten) of at least 100W rating is connected permanently across the primary of the transformer, to protect the transformer in the event of open-circuit of its secondary load circuit.

3.4.5.3. LOAD-LINE TERMINATIONS

These should preferably be to socket outlets numbered to correspond with the channel identification numbers and for the flexibility usually required of stage and studio lighting, a standard socket outlet should be adopted where possible.

In the United Kingdom, 15Amp 3-pin BS546 outlets are used in all installations except small installations using dimmers rated at not more than 1KW; in these latter cases, 5A outlets are suitable. For high-voltage loads requiring outlets of more than 15A rating, suitably rated receptacles must be used.

For applications in countries other than the UK, local practices or regulations must prevail.

3.4.5.4. ASSOCIATED SOUND-SYSTEM INSTALLATIONS

Waveform switching, such as provided by these Dimmers, can reveal, in the form of spurious interference, previously unsuspected earth-loops in the associated sound-system installations. Careful inspection of sound-system earthing, screening, etc. may be necessary to remedy any earth-loops.

High-impedance microphone lines are also susceptible to pick-up of switching 'noise' from lamp-circuits; low impedance lines such as those used for moving-coil microphones are most suitable, especially if long audio cable-runs are necessary.

3.4.5.5. OTHER CONNECTIONS

Do not connect or operate flash-boxes, similar pyrotechnic devices (or any appliance liable to absorb surges of excessive power from the mains-supply) from the Dimmer or associated load circuits; operate such devices separately from the mains-supply, under local (not remote) control by someone near the device and with a direct view of it.

4. SETTING-UP INFORMATION

NOTE: Only a qualified electrician familiar with the equipment should undertake setting-up as detailed below. Switch off the rack supply before removing the panels to gain access to the Dimmer Modules. Remember that high-voltages are present at thyristor heat-sinks and associated wiring/components and take suitable precautions when measuring or testing with the supply switched on.

4.1. DIMMER MODULES

Connect a dynamometer voltmeter (or other instrument giving true RMS voltage reading) across the load; use terminals L and N on the Dimmer Module or use the Neutral line and the thyristor heat-sink connected to terminal L.

Switch the channel on; set the associated Master Fader (if any) to full; set the channel-lever to 1; adjust VR1 on the Trigger Unit (see Fig. 2.3) for an output voltage of about 5% of nominal supply voltage. Set the channel-lever to 9; adjust VR2 for an output of about 96% of nominal supply voltage. Repeat the two adjustments alternately till no further adjustment is required. ◄

NOTE: The above data for setting up may need to be amended on site to suit individual lighting requirements; it is advisable to keep a record of the finalised setting up (outputs against the two lever-positions) for future maintenance purposes.

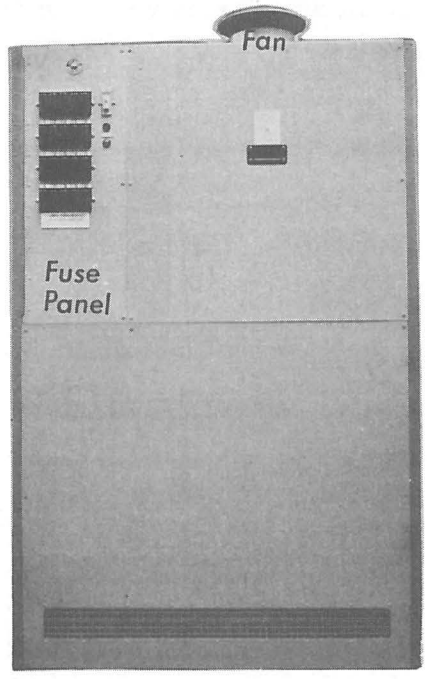


Fig. 2.1.1. 20-way 200-250V Rack

(Note: The layout is similar in 10-way and other variations of Racks)

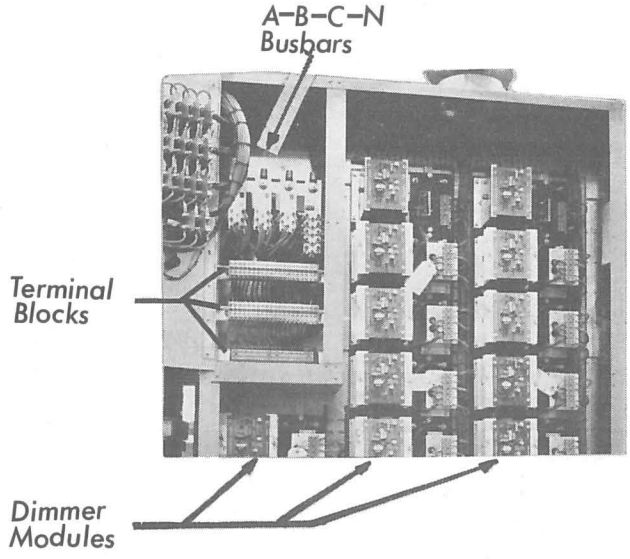


Fig. 2.1.2. Terminal Compartment & Dimmer Modules

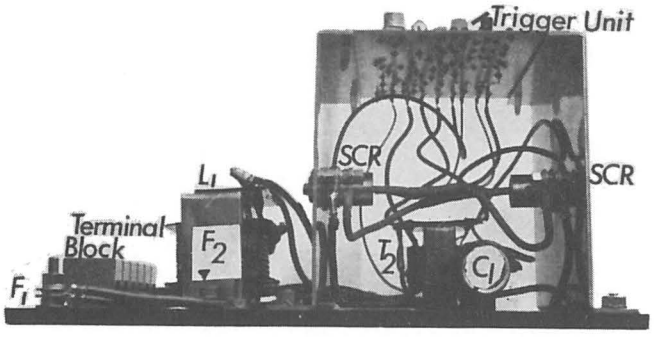


Fig.2-2.
(View from top)

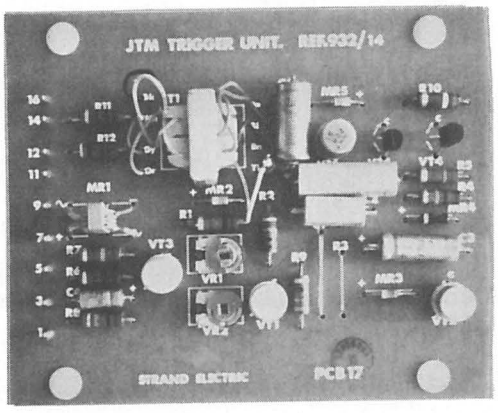


Fig.2.3.