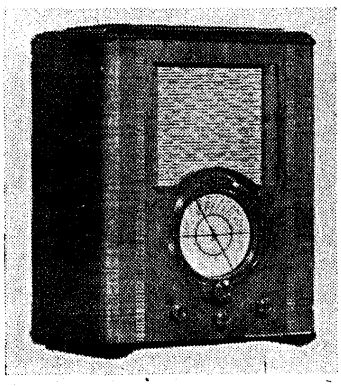
'TRADER' SERVICE SHEET

299

PILOT U357,

CU357, LM357, RGU357 AND RGAU357



The Pilot U357 table receiver.

THE chassis used in the Pilot U357 receiver is identical to that in the CU357 console and LM357 armchair console, and is very similar to that in the RGU357 radiogram and RGAU357 automatic radiogram.

This *Service Sheet* was prepared on a U357 and the differences in the radiograms are explained under "General Notes."

CIRCUIT DESCRIPTION

Aerial input via isolating condenser **C1** and coupling coils **L2** (SW), **L3** (MW) and **L4** (LW) to single-tuned circuits **L5, C35** (SW), **L6, C35** (MW) and **L7, C35** (LW). 261 m filter **L1, C31** across aerial circuit on LW only. On MW aerial circuit is shunted by **C3** to remove a resonance.

First valve (**V1, Brimar 6A8G**) is a heptode operating as frequency changer with electron coupling. Oscillator grid coils **L8** (SW), **L9** (MW) and **L10** (LW) are tuned by **C36**; parallel trimming by **C37** (SW), **C38** (MW) and **C9, C39** (LW); series tracking by **C10** (SW), **C40** (MW) and **C41** (LW). Reaction by coils **L11** (SW), **L12** (MW) and **L13** (LW).

Second valve (**V2, Brimar 6U7G**) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C42, L14, L15, C43** and **C44, L16, L17, C45.**

Intermediate frequency 456 KC/S.

Diode second detector is part of double diode triode valve (**V3, Brimar 6Q7G**), the two diodes being strapped together. Audio frequency component in rectified output is developed across load resistance **R13** and passed via AF coupling condenser **C17** and manual volume control to CG of triode section, which operates as AF amplifier. IF filtering by **R11, C18, C21.** Provision for connection of gramophone pick-up by jack between **C17** and, via mains isolating condenser **C16,** chassis. Upon insertion of PU plug, the feed from **R11** is broken, thus muting radio.

The DC potential developed across **R11, R13** is fed back through decoupling circuits as GB to FC and IF valves, giving AVC.

Resistance-capacity coupling by **R16, C22, R17** between **V3** triode and pentode output valve (**V4, Brimar 25A6G**). Fixed tone correction by **C25** and variable tone control by **R19, C26** in anode circuit. Provision for connection of high impedance external speaker across primary of **T1.**

When the receiver is used with AC mains, HT current is supplied by rectifying valve (**V5, Brimar 25Z6G**) having both anodes and both cathodes strapped to operate as a half-wave rectifier, which, with DC supplies, behaves as a low resistance. Smoothing by iron-cored choke **L21** and electrolytic condensers **C27, C28.** Speaker field coil **L20** is connected across rectifier output.

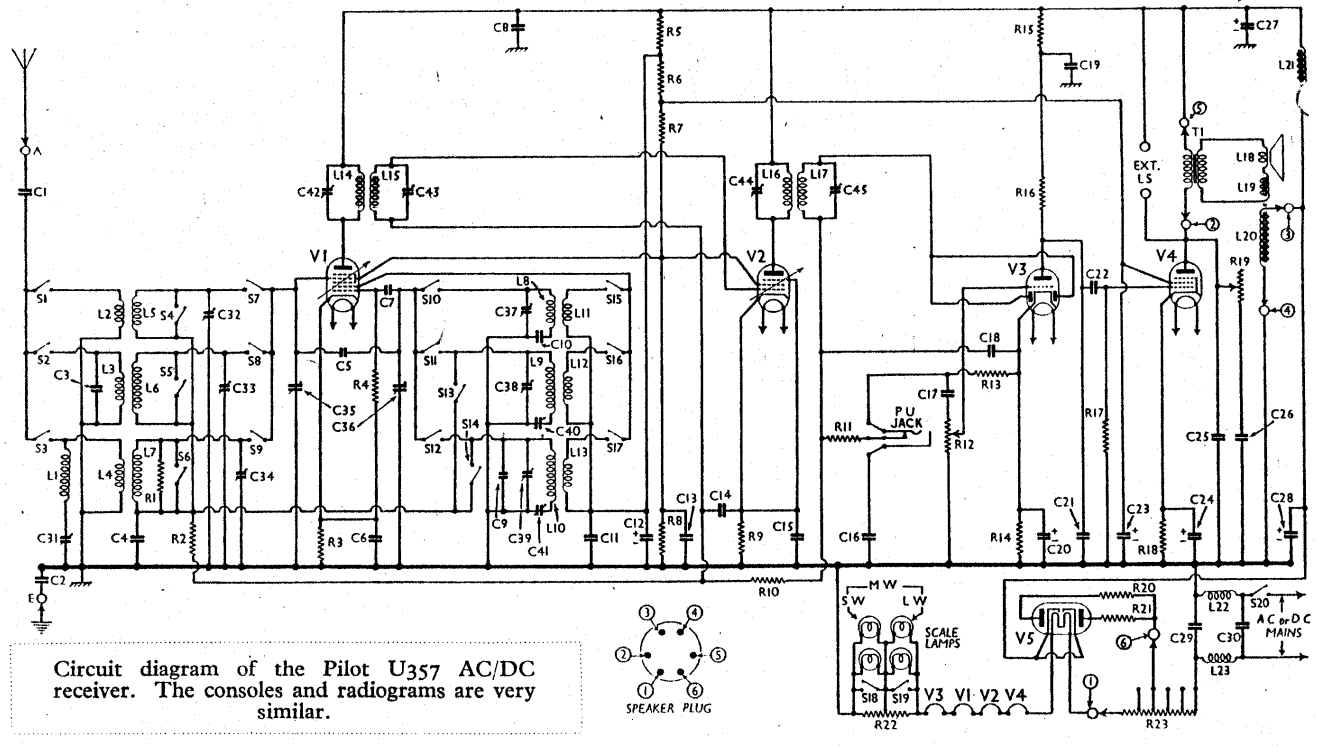
Valve heaters are connected in series together with voltage adjustment ballast resistance **R23** and scale lamps, with shunt resistance **R22,** across mains input. Filter comprising chokes **L22, L23** and condensers **C29, C30** suppresses mains borne interference.

COMPONENTS AND VALUES

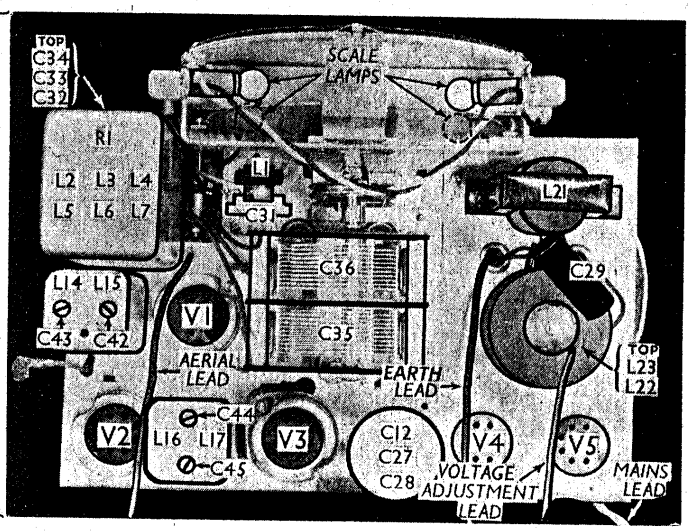
	RESISTANCES	Values (ohms)
R1	Aerial circuit LW damping ..	500,000
R2	V1 tetrode CG decoupling ..	100,000
R3	V1 fixed GB resistance ..	400
R4	V1 osc. CG resistance ..	50,000
R5	V1 oscillator anode and V1, V2, V3 SG HT feed potential divider	2,000
R6		2,000
R7		7,000
R8		30,000
R9	V2 fixed GB resistance ..	800
R10	AVC line decoupling	1,000,000
R11	IF stopper	50,000
R12	Manual volume control ..	750,000
R13	V3 signal diode load	300,000
R14	V3 GB resistance	10,000
R15	V3 triode anode decoupling ..	100,000
R16	V3 triode anode load	250,000
R17	V4 CG resistance	500,000
R18	V4 GB resistance	450
R19	Variable tone control ..	100,000
R20	V5 anodes current limiting resistances	100
R21		100
R22	Part heater circuit ballast and scale lamps shunt, total ..	100*
R23	Mains voltage adjustment and heater circuit ballast resistance, total	525†

* Centre-tapped.
† Tapped at 425 O + 30 O + 20 O + 25 O + 25 O

	CONDENSERS	Values (μF)
C1	Aerial isolating condenser ..	0·0005
C2	Earth isolating condenser ..	0·005
C3	MW aerial circuit shunt ..	0·0001
C4	V1 tetrode CG decoupling ..	0·05
C5	Small coupling	Very low
C6	V1 cathode by-pass	0·1
C7	V1 osc. CG condenser ..	0·00005
C8	HT circuit RF by-pass ..	0·1
C9	Osc. circuit LW fixed trimmer	0·000025
C10	Osc. circuit SW tracker ..	0·006



Circuit diagram of the Pilot U357 AC/DC receiver. The consoles and radiograms are very similar.



Plan view of the chassis. Note the filter **L1, C31.** The trimmers **C32-C34** are reached through holes in the front of the **L2-L7** coil can.

	CONDENSERS (*Continued*)	Values (μF)
C11	V1 osc. anode RF by-pass	0·05
C12*	V1 osc. anode decoupling	10·0
C13	V1, V2 SG s RF by-pass	0·05
C14	V2 CG decoupling	0·05
C15	V2 cathode by-pass	0·1
C16	Pick-up isolating condenser	0·5
C17	AF coupling to V3 triode	0·01
C18	IF by-pass	0·00025
C19	V3 triode anode decoupling	0·1
C20*	V3 cathode by-pass	10·0
C21	IF by-pass	0·00025
C22	V3 triode to V4 AF coupling	0·01
C23*	V4 SG decoupling	4·0
C24*	V4 cathode by-pass	10·0
C25	Fixed tone corrector	0·005
C26	Part of variable TC filter	0·05
C27*	HT smoothing	12·0
C28*	HT smoothing	16·0
C29	Mains circuit RF filter condensers	0·01
C30	Mains circuit RF filter condensers	0·1
C31‡	Aerial 261 m filter tuning	0·00015
C32‡	Aerial circuit SW trimmer	—
C33‡	Aerial circuit MW trimmer	—
C34‡	Aerial circuit LW trimmer	—
C35†	Aerial circuit tuning	0·00044
C36†	Oscillator circuit tuning	0·00044
C37‡	Osc. circuit SW trimmer	—
C38‡	Osc. circuit MW trimmer	—
C39‡	Osc. circuit LW trimmer	—
C40‡	Osc. circuit MW tracker	0·0006
C41‡	Osc. circuit LW tracker	0·00015
C42‡	1st IF trans. pri. tuning	—
C43‡	1st IF trans. sec. tuning	—
C44‡	2nd IF trans. pri. tuning	—
C45‡	2nd IF trans. sec. tuning	—

* Electrolytic. † Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	LW aerial 261 m filter coil	1·8
L2	Aerial SW coupling coil	1·2
L3	Aerial MW coupling coil	21·0
L4	Aerial LW coupling coil	80·0
L5	Aerial SW tuning coil	0·05
L6	Aerial MW tuning coil	3·5
L7	Aerial LW tuning coil	18·0
L8	Oscillator SW tuning coil	0·05
L9	Oscillator MW tuning coil	6·8
L10	Oscillator LW tuning coil	15·0
L11	Oscillator SW reaction	0·25
L12	Oscillator MW reaction	2·2
L13	Oscillator LW reaction	5·2
L14	1st IF trans. Pri...	7·0
L15	1st IF trans. Sec...	7·0
L16	2nd IF trans. Pri...	11·0
L17	2nd IF trans. Sec...	11·0
L18	Speaker speech coil	1·6
L19	Hum neutralising coil	0·1
L20	Speaker field coil	5,000·0
L21	HT smoothing choke	450·0
L22	Mains filter chokes	0·35
L23	Mains filter chokes	0·35
T1	Speaker input trans. Pri...	300·0
	Speaker input trans. Sec...	0·2
S1-S17	Waveband switches	—
S18, 19	Scale lamp switches	—
S20	Mains switch, ganged R12	—

DISMANTLING THE SET

Removing Chassis.—Remove the knob (recessed grub screw) and felt washer from the tuning control, then the knobs and washers from the other three controls. Remove the four screws (with washers and spring washers) holding the chassis to the bottom of the cabinet, when the chassis may be withdrawn to the extent of the leads. *When replacing*, do not forget to replace the felt washers on the control spindles.

To free the chassis entirely, unsolder the mains voltage adjustment lead and unplug the speaker leads from the socket at the rear of the chassis. *When replacing*, connect the mains voltage adjustment lead in accordance with the mains supply as follows, numbering the tags from top to bottom :—250-240 V 1; 240-230 V, 2; 230-220V, 3; 220-210 V, 4; 210-200 V, 5.

Removing Speaker.—Unsolder the mains voltage adjustment lead, unplug the speaker leads from the socket at the rear of the chassis, and slacken the four clamps (nuts). *When replacing*, see that the mains resistance is on the right and connect the mains voltage adjustment lead as above.

VALVE ANALYSIS

Valve voltages and currents given below were measured in our receiver when it was operating on AC mains of 226 V, using the 220-230 V tapping on the mains resistance. The receiver was tuned to the lowest wavelength on the medium band, and the volume control was at maximum, but there was no signal input.

Voltages were measured on the 400 V scale of a model 7 Universal Avometer, chassis being negative.

If, as in our case, **V2** should become unstable when its anode or screen current is being measured, it can be stabilised by connecting a non-inductive condenser of about 0·1 μF from grid (top cap) to chassis.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 6A8G	185	2·4	80	3·0
	Oscillator			
	150	4·8		
V2 6U7G	185	4·2	80	1·1
V3 6Q7G	53	0·2	—	—
V4 25A6G	176	28·7	128	4·8
V5 25Z6G†	—	—	—	—

† Cathode to chassis 208 V, DC.

GENERAL NOTES

Switches.—**S1-S17** are the waveband switches and **S18, S19** the scale lamp switches, in two rotary units beneath the chassis. They are indicated in our under-chassis view, and shown in detail in the diagrams on page IV.

The table (page IV) gives the switch positions for the three control settings, starting from fully anti-clockwise.

S20 is the OMB mains switch, ganged with the manual volume control, **R12.** There is also a pick-up jack switch at the rear of the chassis, which is shown in the circuit in diagrammatic form.

Coils.—**L1** is mounted on a bracket attached to the gang condenser, with **C31. L2-L7; L14, L15** and **L16, L17** are in three screened units on the chassis deck. The first of these also contains **R1** and the trimmers **C32-C34,** which are numbered in our plan chassis view from top to bottom. The other two units contain their associated trimmers. The oscillator unit, **L8-L13** is unscreened, and is on a tubular former beneath the chassis.

Scale Lamps.—These are four miniature bayonet cap types, rated at 6·3 V, 0·15 A. They are switched in or out of circuit by **S18** and **S19** in the main switch assembly.

External Speaker.—Two sockets are provided at the rear of the chassis for a high impedance (10,000 Ω) external speaker. Note that the sockets are live.

Condensers C12, C27, C28.—These are three dry electrolytics in a single metal can on the chassis deck, the can forming the common negative connection. The yellow lead is the positive of **C12** (10μF), the green the positive of **C27** (12μF) and the red the positive of **C28** (16μF).

Condenser C5.—This is a very small fixed condenser, formed of two tags riveted to a fibre strip, and connected across two tags on one of the switch units.

Speaker Connections.—A 6-pin plug and socket is used for connecting the speaker to the chassis. The plugs and sockets are indicated by numbered arrows and circles in the circuit diagram, at the bottom of which a diagram of the plug, looking from the free ends of the pins, is given.

Resistance R23.—The ballast resistor, tapped for

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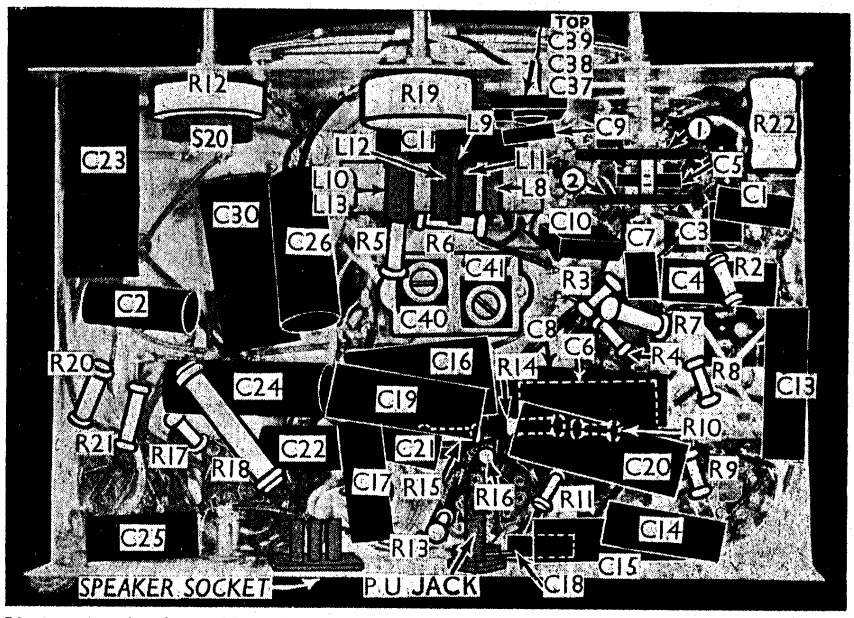

Under-chassis view. Note the small fixed condenser **C5,** and the pick-up jack switch.

AUTOMATIC TUNING—2

Continued from page I

the condenser shaft to give the various settings needed, and this time they can be fixed in position by a split collar and screw clamping device. Adjustment is carried out as for the heart-shaped cam system, and as before there is a spring return on the lever.

It may be pointed out that this system should be very free from the effects of wear, since maximum wear will take place on the curved part of the control bar and on the portion of the lever which presses on it, and this will not affect the final setting in the slightest.

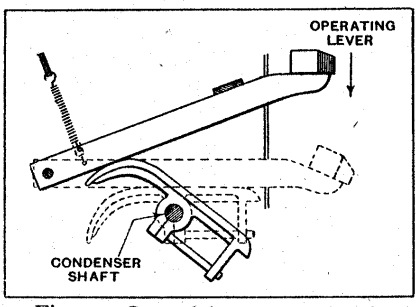

Fig. 3.—Control bar operated unit.

A view of a unit using this system is shown on the left of Fig. 2.

The Cossor Teledial

The Cossor Teledial, as used on their model 3952 receiver, is an even simpler form of mechanical tuning device, utilising a "telephone" dial to pull the gang condenser round to the pre-set position. Such dials are used largely in America, many of them being fairly elaborate, but the Cossor is a simple version, capable of tuning in ten different stations.

A perspective sketch of its selector plate is given in Fig. 4. In this illustration, the moulded front plate, with its ten finger holes, which also forms the manual tuning knob, has been removed. It is held to the boss of the selector plate by a set screw, and a moulded projection on the dial normally fits in the slot which will be seen in one of the tongues of the selector plate, to the left of the hole (5).

In all there are eleven tongues on the plate, made of springy metal, and ten of them carry buttons as shown at (1). These buttons are riveted to the tongues but can be rotated for station setting by means of the key (6), which engages in slots in the raised rims of the buttons. The riveting of the buttons is fairly stiff, so that once adjusted they do not move out of position.

Each button, after adjustment, is fitted with a disc carrying the station name. In use, one selects a station by pressing on the appropriate button through its finger hole in the dial, and by drawing it round towards an indicating stud near the base of the set. Each button has a tapered peg on a flat arm behind it (2), and the dial is pulled round until it can be felt that the peg has dropped into the slot (3) in the metal back plate. When this is so, the finger is withdrawn, taking care not to shift the dial, and the station can then be heard.

A muting system is fitted so that as long as a button is depressed so that its peg touches the back plate, the set is silent. On releasing the button, muting is removed.

Adjustment of buttons for particular stations is achieved by virtue of the fact that the pegs on their arms are off-set from the centres of the buttons, and on rotating a button on its axis by means of the key, the peg can take up any position, within the limits of its off-setting, relative to the axis of the button. Each button by adjustment can cover a distance of about $\frac{5}{8}$ in. round the dial.

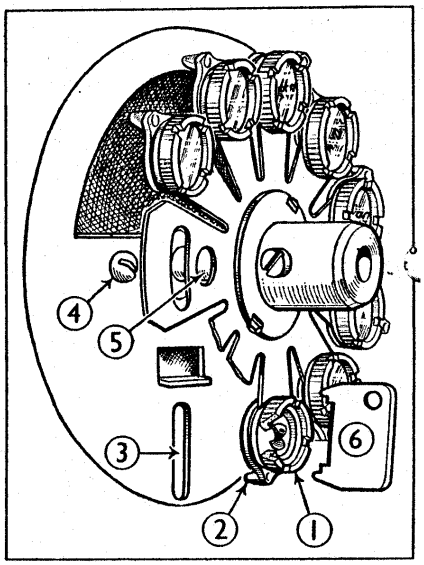

Fig. 4.—Perspective sketch of the Cossor Teledial with the moulded dial removed and two of the control plate tongues cut away.

It should be pointed out that with this system the buttons must be in the order of wavelength of the stations chosen, since each button only covers a certain section of the tuning range.

When initially adjusting a button for a given station, it is essential that the set should not be muted. Provision is therefore made for cutting out the muting when a button is depressed, by means of the screw (4). This is reached by first rotating the selector plate (with the dial removed) until the hole (5) comes over screw (4). The screw is then turned anti-clockwise until, with a button depressed, the set remains alive.

To select a station, tune it in roughly by turning the centre boss. Press the button nearest to the indicating stud, and move it to the right or left until the peg (2) drops into the slot (3). Then by means of the key (6), rotate the button, keeping the peg in the slot, until the station is correctly tuned in.

Next screw up the muting screw (4) until the muting circuit is in action again, insert the disc carrying the name of the station selected into the recess in the button, and replace the moulded dial, seeing that the projection behind it fits into the slot in the tongue of the selector plate on the left of hole (5). Tighten the dial set screw.

The Philco dial, which is a more elaborate type, will be described in the next article.

PILOT U357—*Continued*

mains voltage adjustment, is mounted on the speaker assembly.

Radiogram Models.—These have a similar chassis, but the pick-up jack is replaced by a single-pole changeover switch, fitted on the motor board.

CIRCUIT ALIGNMENT

IF Stages.—Switch set to MW, and turn gang to maximum. Connect signal generator to control grid (top cap) of **V2** through a 0·1 μF condenser, and to chassis. Feed in a 456 KC/S signal, and adjust **C44** and **C45** for maximum output. Transfer signal generator to top cap of **V1**, and similarly adjust **C42** and **C43**. Repeat the adjustment of all trimmers with the signal generator connected to **V1** top cap.

RF and Oscillator Stages.—Connect generator to **A** and **E** leads through a 0·0002 μF condenser. Switch set to M.W., and tune to 200 m. on scale. Feed in a 200m signal, and adjust **C38**, then **C33**, for maximum output. Feed in a 500 m signal, tune it in on receiver then adjust **C40** for maximum output, rocking the gang for optimum results. Repeat the 200 m adjustments.

Switch set to SW, tune to 16·6 m on scale, feed in a 16·6 m (18MC/S) signal and adjust **C37** and **C32** for maximum output. Fixed tracking is used on this band, so there is no adjustment at the top of the band.

Switch set to LW, tune to 800 m on scale, feed in an 800 m signal, and adjust **C39** and **C34** for maximum output. Feed in a 2,000 m signal, tune it in, and adjust **C41** for maximum output, rocking the gang for optimum results. Repeat the 800 m adjustments.

261 m Filter.—This is used to eliminate a whistle on Luxembourg, due to London National, which is sometimes encountered. It is best to adjust **C31** when listening to the actual whistle, if this is present.

TABLE AND DIAGRAMS OF SWITCH UNITS

Switch	LW	MW	SW
S1	—	—	C
S2	—	C	—
S3	C	—	—
S4	C	C	—
S5	C	—	C
S6	—	C	—
S7	—	—	C
S8	—	C	—
S9	C	—	—
S10	—	—	C
S11	—	C	—
S12	C	—	—
S13	—	—	C
S14	—	C	C
S15	—	—	C
S16	—	C	—
S17	C	—	—
S18	C	—	—
S19	—	—	C

Switch diagrams, as seen looking from the underside of the chassis in the directions of the arrows in the under-chassis view.