

SECTION 8

SYNC SWITCH PANEL PA18/508

Introduction

The PA18/508 accepts up to eight feeds of separated mixed-sync pulses and a feed of station mixed-sync pulses and from these selects the appropriate sync pulses for use in the stabilising amplifiers¹ of a 2-bank mixer². The panel also accepts trigger signals which are derived from the mixer control circuits². Other outputs from the panel are gating pulses³ and switching pulses^{2,4}.

The panel comprises a number of sync-switch units, arranged to form two 8-input and two 2-input switch systems, and switching-pulse generators. It operates on the 405, 525 or 625 line-standards without adjustment. Power supplies at +12 volts and -6 volts are obtained from two PS2/20 Stabilised Power Suppliers⁵ external to the panel.

The panel consists of the following plug-in sub-units (described in the Instructions indicated) mounted on a double PN3/23 chassis:

- 8 Sync Pulse Switch Units UN9/516 (V.14)
- 4 Sync Pulse Amplifiers AM1/509 (V.7)
- 2 Gating Pulse Generators GE2/510 (V.10)
- 2 Switching Pulse Generators GE2/511 (V.10)

General Specification

Inputs

| | |
|--|-----------------------------|
| Separated syncs (channels 1 to 8) (channels A and B) | 2 volts p-p \pm 1 dB |
| Mixed syncs | 2 volts p-p \pm 1 dB |
| Trigger | 12 volts p-p positive-going |

Outputs

| | |
|---|---|
| Sync (sides A and B) (groups 1 and 2) | 2 volts p-p across 75 ohms |
| Gating pulse (A and B) | 2 volts p-p across 75 ohms |
| Switching pulse | 12 volts positive-going 1 line-pulse duration once per picture during field blanking |

Input Impedances

| | |
|-----------------|-------------|
| Separated syncs | 75 ohms |
| Mixed syncs | 7.5 kilohms |

Output Impedances

| | |
|--------------|---------|
| Sync | 75 ohms |
| Gating Pulse | 75 ohms |

Isolation

| | |
|---------------------------------------|--|
| (one unselected channel to output) | 100 kHz: more than 80 dB 5 MHz: more than 54 dB |
|---------------------------------------|--|

Noise

less than 2 mV p-p

Max Ambient Temperature 45 degrees C

Power Inputs

Two of +12 volts \pm 4% at 300 mA d.c.
Two of -6 volts \pm 4% at 20 mA d.c.

Weight

32 lbs. (fully equipped)

General Description

A block diagram showing interconnections between the sub-units is given in Fig. 8.1 and a circuit of the panel wiring of one PN3/23, the one containing the A-side and Group-1 sub-units, is given in Fig. 8.2.

The switching operations are carried out by eight UN9/516 sync switch units, each of which contains three identical switching circuits. The A and B (8-channel) sides of the panel each consist of three sync switch units; the Group-1 and Group-2 sides each consist of a single switch unit. The following description is based on the operation of the A-side and Group-1 switches. The B-sides and Group-2 switches function in the same manner.

The inputs to the first eight switching circuits are fed with separate mixed-sync pulses, derived from the video signal inputs to the mixer, and the ninth input is fed with pulses derived from station syncs by a GE2/510 gating-pulse generator. The switches are operated by the application of trigger pulses. Each sync switch unit has four trigger connections; three *On* and one *Off*. The *Off* circuits of all three units are joined together and this common *Off* connection is also applied to the associated AM1/509 sync pulse amplifier. The mixer control system, shown dotted in Fig. 8.1, is arranged so

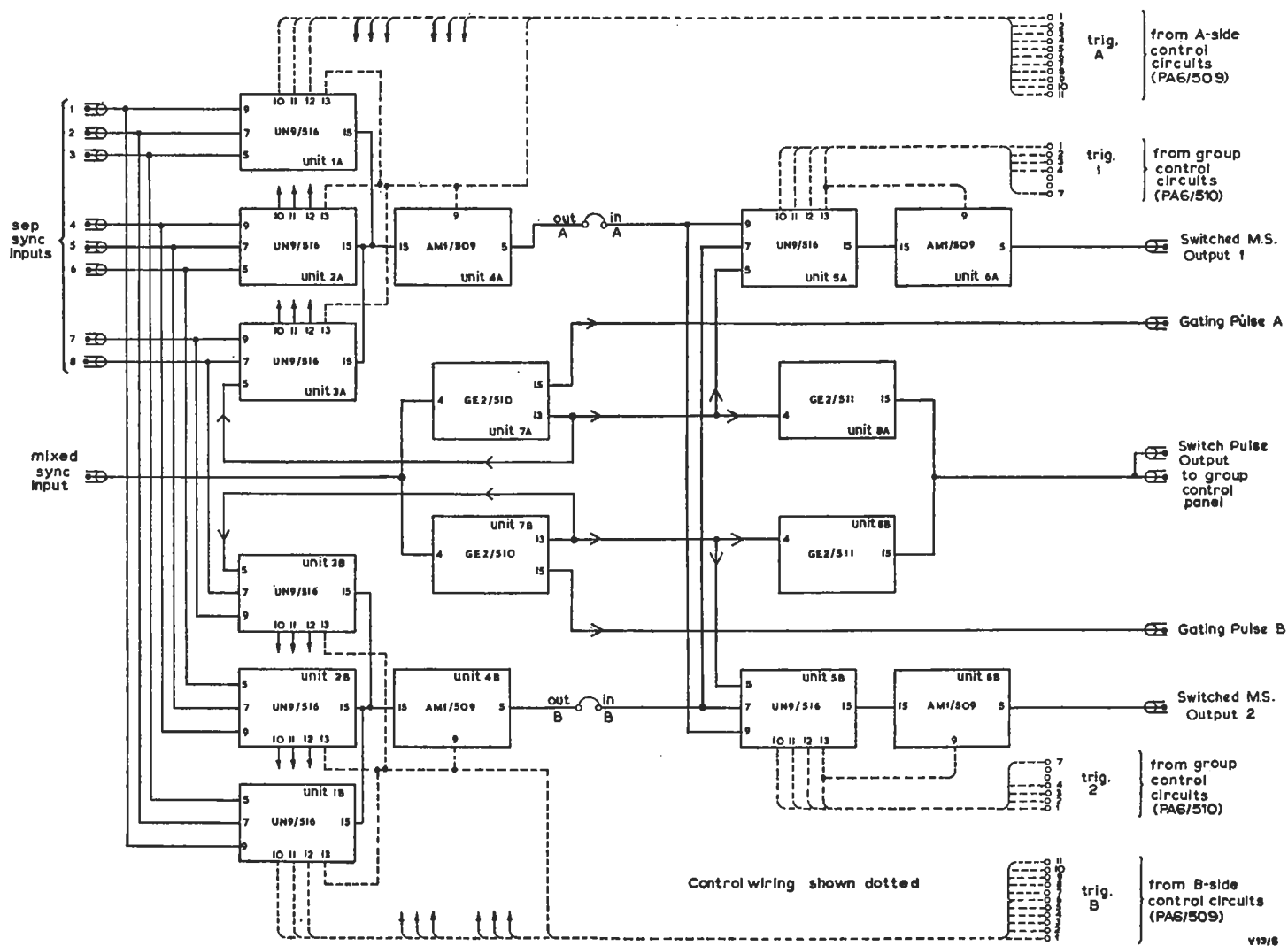


Fig. 8.1 Block Diagram of the PA18/508

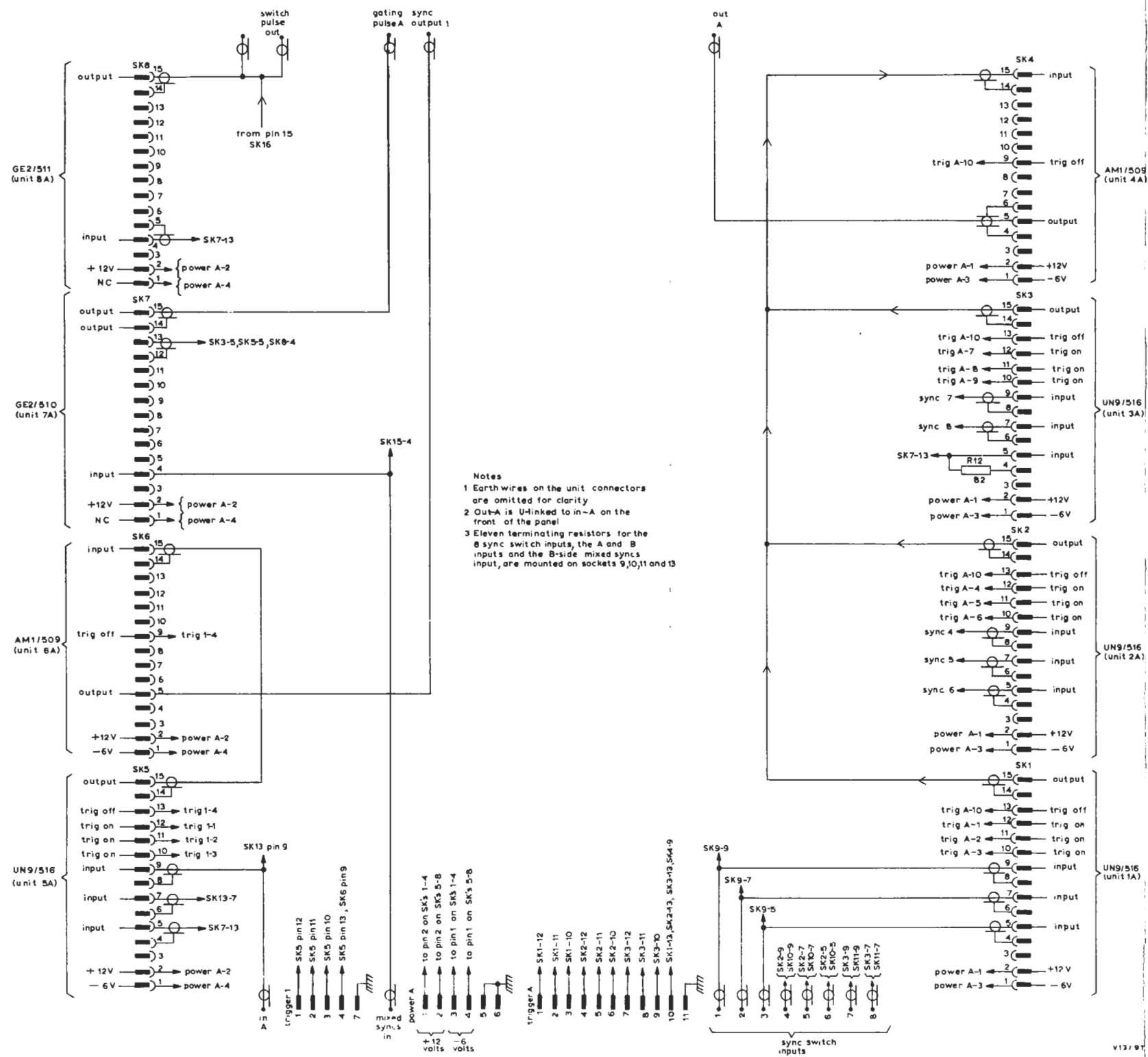


Fig. 8.2 Panel Wiring of the PA18/508 (A-side and Group-1 only)

that a trigger pulse is applied to only one switch at a time and, when any switch input is turned *On*, an *Off* signal is generated at the common *Off* connection thus turning *Off* any switches that were on. A trigger guard circuit, in the sync pulse amplifier, provides additional protection against more than one switch being triggered *On* at a time.

The paralleled outputs of the sync-switch units are applied to the A-side sync-pulse amplifier. The output from this unit is applied, via the *Out A—In A* connector to the first input of the Group-1 sync switch; the second input to this unit is derived from the B-side sync pulse amplifier and the third input consists of station syncs. The output from this unit feeds the selected sync pulses, via the Group-1 sync-pulse amplifier, to the Group-1 stabilising amplifier.

Station syncs are applied to the inputs of the two GE2/510 gating pulse generators. These units each provide two outputs of clipped and delayed sync pulses. The unit associated with the A-side feeds: the ninth input of the A-side sync switch the third input of the Group-1 sync switch a GE2/511 switching-pulse generator a number of MN2/501 sync-pulse monitor units³ (via the *Gating Pulse A* connector).

The other GE2/510 unit provides the same facilities for the B and Group-2 sections of the sync-switch panel.

The GE2/511 switching-pulse generators each produce a 12-volt positive-going pulse once per picture during the field-blanking period. The outputs of the two generators are paralleled and the switching pulse is applied, via the *Switch Pulse Out* connectors, to the mixer control circuits.

Maintenance

The following two tests can be used to detect incipient failure of the equipment.

1. Connect the output of one of the GE2/511 switching pulse generators to a d.c. oscilloscope and terminate the oscilloscope input in 75 ohms. Unplug the GE2/511 unit not under test. Examine the output of the GE2/511. This should consist of a positive-going pulse, occurring once per picture, about 12 volts in amplitude and at least one line-pulse in duration. If necessary re-align the associated PS2/20 power supplier and/or the GE2/511 unit as described later.

2. Repeat this test for the second GE2/511 unit. Set the oscilloscope timebase to a slow sweep speed and examine the outputs of each of the sync switches in turn while triggering between

sync-switch inputs. Low-frequency exponential transients should be less than 0.2 volts in amplitude and of the same polarity, irrespective of the direction of switching. If this is not so re-align the sync-switch units.

Failure of one or more switches can usually be localised to a unit by checking the monitor points or by interchanging units. When the fault has been traced the units should be returned to their original positions; if this is not done the units must be realigned.

If the fault is a switching one the following points should be noted.

- (a) The system is d.c. controlled and pulses of insufficient amplitude may not initiate switching. Switching is initiated by the positive peak of a pulse and this should be 11.5 volts \pm 1.0 volt.
- (b) Owing to the presence of series diodes in the pulse-routing circuits the fall times of pulses may be very long.
- (c) Between pulses the voltages on the switching lines may have any value between +3 volts and -14 volts.

Note that the A and B sides of the sync-switch panel are fed from separate power supplies. This prevents complete failure of the panel in the event of a power-supplier fault.

Alignment

It is not practical to align the component sub-units of a PA18/508 in isolation. Alignment instructions, for those sub-units requiring them, are given below.

Apparatus Required

Avometer model 8

Oscilloscope with dual-trace and delayed-sweep facilities (Tektronix 535 or 545 and a 53/54C plug-in unit).

Two Chassis Extenders CH1A/1

Stabilised Power Supplier PS2/20

1. Mount the unit on a chassis extender and leave it on load for 5 minutes to warm up.
2. Connect the Avometer, set to the 25-volt range, between the +12-volt monitor point and earth. Adjust R9 until the meter reads exactly 12 volts.
3. Connect the meter between the -6 volt monitor point and earth and adjust R12 until the meter reads exactly 6 volts.
4. Replace the unit in the main assembly.

Instruction V.13
Part 18, Section 8

Switching Pulse Generator GE2/511

1. Connect a feed of 625-line mixed-sync pulses to the mixed-syncs input of the main assembly.
2. Mount the unit on a chassis extender.
3. Trigger the oscilloscope internally and connect the oscilloscope probe to the emitter of TR18. Adjust R51 to give the displayed waveform a pulse width of 30 μ s.
4. Connect the probe to the collector of TR16 and adjust R41 to give a pulse width of 325 μ s. (R40 is normally strapped out of circuit.)
5. Trigger the delayed sweep of the oscilloscope from a feed of 625-line field-drive pulses. Connect one probe to the *M. S. Input* monitor point and adjust the delayed timebase to run at 25 Hz (i.e. more than one field should be displayed).
6. Switch the oscilloscope to *Alternate* and connect the other probe to the emitter of TR18. Adjust the sweep delay to display the even field after the equalising pulses. (The even field can be recognised by the presence of a half-line between the last equalising pulse and the first line-sync pulse.)
7. Adjust R41 to bring the fourth line-sync pulse to the centre of the gating pulse.
8. Replace the input with a feed of either 525-line or 405-line mixed-sync pulses and check that, without further adjustment of R41, one pulse only lies well within the gating pulse.
9. Replace the unit in the main assembly.
10. Unplug the GE2/511 not under test and, with the oscilloscope set on *D.C.* and terminated in 75 ohms, examine the *Switch Pulse Output* of the panel. Check that there is only one pulse per picture on each line-standard and check that the positive peak of each pulse is 12 volts \pm 0.6 volts.

Sync Pulse Switch Units UN9/516

For a channel sync-switch proceed as follows:

1. Mount the AM1/509 unit and the UN9/516 unit associated with channels 7 to 9, on chassis extenders. Connect the Avometer, set to the 10-volt range, between the collector of TR1

in the AM1/509 unit and earth.

2. Remove the inputs to channels 1 to 8. Trigger on channel 9 and remove the mixed sync input.
3. On the UN9/516 unit adjust RV1 (C) to give a reading of -3.2 volts on the Avometer.
4. Replace the mixed sync input and trigger on channel 8. Adjust RVI (B) to give exactly the same meter reading as that given for channel 9.
5. Adjust RV1 (C), as detailed above, for channel 7.
6. Replace the UN9/516 unit associated with channels 7 to 9 in the main assembly and place the UN9/516 unit associated with channels 4 to 6 on the chassis extender. Adjust the RVI controls for channels 4 to 6.
7. Change UN9/516 units and repeat for channels 1 to 3.
8. Remove the meter.
Replace the inputs to channels 1 to 8.
Connect an oscilloscope terminated in 75 ohms to the sync switch output. With the oscilloscope set to a slow sweep speed (say one sweep per second) observe the waveform while triggering between sync-switch channels. Any low-frequency exponential transients should be less than 0.2 volts in amplitude and of the same polarity, irrespective of the direction of switching. If this is not so make further small adjustments to the channel controls. Do *not* alter the adjustment of channel 9.
9. Replace all units in the main assembly.
A group sync-switch is aligned in a similar way to that detailed above but channels A to C are substituted for channels 1 to 9.

References to Typical Associated Equipment

1. Sync Pulse Stabilising Amplifier AM18/513, Instruction V.7.
2. Studio Video Mixing Equipment EP5/502, Instruction V.15.
3. Sync Pulse Separation and Monitoring Panel PA1/513.
4. Studio Video Mixer MX1/503, Instruction V.9.
5. Stabilised Power Supplier PS2/20, Instruction G.2.

TES 1/67