grass valley

# 7510

## RECEIVE VIDEO PROCESSING AMPLIFIER

Instruction Manual

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## RECEIVE VIDEO PROCESSING AMPLIFIER

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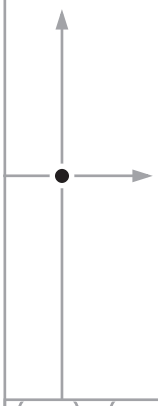

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## WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits of a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules and Class B of VDE 0871 rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user, at his/her expense, will be required to take whatever means necessary to correct the interference.

# TABLE OF CONTENTS

## ISSUE STATEMENT

This is Issue A1 of this manual.

## MANUAL ORGANIZATION

This is an Instructional Manual for the 7510N (NTSC) and 7510P (PAL) Receive Processor Amplifier systems. All information can be used by both operator and service personnel.

The manual is organized into seven main sections. The contents of each section are listed below.

GENERAL INFORMATION

- Manual Organization
- System Overview
- Features
- Applications
- Mounting Tray
- Standard Equipment
- Optional Equipment
- Specifications
- Repair and Return Instructions

INSTALLATION INSTRUCTIONS

- Overview
- Rack Mounting
- Module Locations
- Signal Connections
- AC Power Connections
- Tray Power Connections
- Remote Control Panel Connections

OPERATING INSTRUCTIONS

- Controls and Indicators
- Tables of Operation
- Operational Modes

MAINTENANCE INSTRUCTIONS

- Introduction
- Adjustment Information
- Repair and Return Instructions
- Troubleshooting Guide
- Replacement Parts Information

The last three sections contain service and maintenance information for the modules and trays used in this system. Each section contains information as described below.

7510 RECEIVE PROCESSOR AMPLIFIER MODULE
9500A POWER SUPPLY MODULE
7510 1RU and 2RU TRAY

- Overview
- Adjustments
- Functional/Circuit Description
- Replacement Parts List
- Drawings

## SYSTEM OVERVIEW

The 7510 is a single module Receive Video Processor amplifier system designed to improve or recondition an input video signal. One rack-unit and two rack-unit trays are available to accommodate 2 or 4 modules respectively for multichannel processing. Remote control panels, one per module in the tray, may be assembled and attached to connectors on the rear of the trays.

The 7510 module is used for both NTSC, National Television System Committee, and PAL, Phase Alternation by Line, color television transmission system standards. Minor changes are made to the module at the factory, before shipment, to allow for differences in the two standards. Definitions for both transmission standards are included in the functional/circuit description section of the 7510 Module Package located toward the back of this manual.

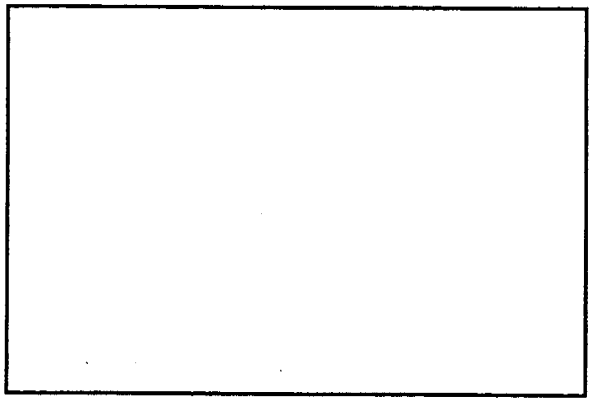


Figure 1-1 7510 1RU/2RU Receive Video Processing Amplifier Systems

## FEATURES

- Video Gain control over a 12dB range (Local or Remote)
- Chroma Gain control over a 12dB range (Local or Remote)
- Chroma Phase control over a ±10 degree range (Local or Remote)
- Set Up control, NTSC only; over a ±15 IRE range (Local or Remote)
- Black Level, ±110mV range, or AGC, ±2dB range, PAL only (Local or Remote)
- Input Cable Equalization for up to 150 meters/500 feet of appropriate cable
- Common Mode and Differential Mode Hum rejection
- Output Video AGC using sync tip and peak video as a reference (Local or Remote)
- Hard and Soft Clipping of the input video
- Sync, Burst and Blanking regenerated for output reinsertion
- Vertical Blanking is line selectable
- Horizontal Blanking adjustable
- Video Presence indicator, ON when present (Local or Remote)
- Sync to the output upon loss of input video
- Auto Bypass circuitry will automatically switch input to the Bypass output if power is removed from the tray or module
- Clamp window that allows clamping only during backporch

## APPLICATIONS

The Model 7510 is designed for multichannel processing in areas where several satellite or microwave receivers are in use. The one rack-unit tray will hold up to two receive processor modules and the two rack-unit tray will hold up to four modules. Each module has four outputs. One output is connected to an automatic bypass relay located in the tray, see **CAUTION** note below. In the event of a system power failure, this relay will route the input video directly to an output connector.

**CAUTION**
**RELAY BYPASS OPERATION**

When using the Relay Bypass Mode, ensure that the Bypass output signal shield is **not** connected to ground. If the Bypass output signal shield is connected to ground and ground currents are present in the cable shield, damage to the controlling relay in the tray may occur. To guard against damage to the relay, connect the output signal from the Bypass output connector to an amplifier that provides common mode rejection, i.e. GVG 8501DA.

## MOUNTING TRAY (See Tray section at the back of this manual)

The 7510 NTSC/PAL Receive Processing Amplifier system may be ordered in either a one rack-unit or two rack-unit tray. The one rack-unit tray will hold two 7510 Receive Processing Amplifier modules and one 9500A power supply module. The two rack-unit tray will hold four 7510 Receive Processing Amplifier modules and two 9500A power supply modules. A one rack-unit tray measures 1.75" high by 19" wide by 15.75" deep (4.45cm x 48.26cm x 40.0cm). A two rack-unit tray measures 3.5" high by 19" wide by 15.75" deep (8.89cm x 48.26 m x 40.0cm).

### Mother Board

A Mother Board, one for the 1RU tray and two for the 2RU tray, is internal to the tray but accessible for maintenance by removing the rear connector channel.

### AC Power Module

An AC Power Module, also internal to the tray, provides the interface between the AC line and the 9500A Power Supply Module. The 1RU tray contains one AC Power Module and the 2RU tray contains two AC Power Modules.

Each power module includes a voltage select switch, accessible at the rear of the tray, that enables the unit to operate with either 115VAC (nominal) or 230VAC (nominal) input line voltages. Each power module also includes a fuse, again accessible at the rear of the tray, that provides short circuit protection for the transformer primaries of the 9500A Power Supply Modules.

The AC receptacles accept the standard three prong IEC line plug. The receptacles are attached to an AC line filter on the AC Power Modules which minimize EMI (Electro Magnetic Interference) from the 7510 tray.

A 36 pin female connector and a 12 pin female connector provide a route for the AC and DC traces from the AC Power Modules to the tray Mother Board and 9500A Power Supply Module.

## STANDARD EQUIPMENT (See module sections at the back of this manual)

### 7510 Receive Processor Amplifier Module (066714, NTSC or PAL)

All video processing is accomplished on this single printed-circuit-board module which is a complete video processing amplifier.

### Power Supply Module (066710-XX)

One power supply module is standard with either the 1 rack-unit or 2 rack-unit tray. A single power supply module will support the power requirements for up to four processing modules.

## OPTIONAL EQUIPMENT

### Module Extender (066605-XX)

The 9500 series module extender is compatible with this product line and may be ordered as an option. This extender is used primarily when troubleshooting active circuits or adjusting the internal controls of the Video Processing Module.

### Redundant Power Supply (066710-XX)

The two rack-unit tray will accept two 9500A Power Supply Modules. The second power supply module serves as a back-up power source in the event the main power supply module should fail.

### Remote Control Panel Parts Kit (7500-CPK)

Remote control connectors, one per tray cell, are provided on both 7510 trays. GVG control panel parts kits are available for on-site construction of remote control panels (order number 7500-CPK). Assembly information is included in the Installation section of this manual and in each parts kit.

## SPECIFICATIONS

### VIDEO PROCESSING AMPLIFIER MODULE

**Input**

| | |
|---|---|
| Quantity | One |
| Impedance | 75 Ohms terminating |
| Signal Type | Composite Video |
| Signal Level | 1 Volt p-p nominal |
| Signal Level Range | -9dB to +6dB |
| Return Loss | >40dB to 5.5MHz |
| Common Mode Range | ± 10 Volts relative to chassis ground |
| Maximum Differential Hum | 5.0 Vp-p |

**Output**

| | |
|---|---|
| Quantity | Four (one for the bypass output) |
| Impedance | 75 Ohms |
| Return Loss | >40dB to 5.5Mhz |
| Output to Output Isolation | >46dB to 5.5Mhz |
| DC on Output | 0.0 Volts ±50mV |

**Local Controls (Front Panel)**

| | |
|---|---|
| Video Gain | ±6dB or -3dB, +9dB |
| Chroma Gain | ±6dB |
| Set up (NTSC only) | ±15 IRE |
| Black Level | ±110mV |
| AGC ±2dB with modification, see 7510 module package | |
| Burst (Chroma) Phase | ±10 degrees |
| Input Cable Equalization | 0 to 500ft/150m of various cable types (see schematics in 7510 Module section for additional information) |
| Local/Remote Control Switch | LOCal/REMote |
| Normal/Direct Mode Switch | NORmal/DIRect |
| AGC Switch | ON/OFF |

**Local Indicator (Front Panel)**

| | |
|---|---|
| Video Presence LED | ON when input video is present |

## Internal Controls

| | |
|---|---|
| Coarse Gain (signal) Switch | Input (LOW, -9dB to +3dB) (NORMal, ±6dB) |
| Clamp Loop Gain | jumper selectable to follow NORMal/LOW signal (NORMal doubles LOW feedback gain) |
| Inserted Sync Level | adjustable 286mV (NTSC), 300mV (PAL) |
| Inserted Burst Level | adjustable to 286mV (NTSC), 300mV (PAL) |
| Horizontal Phase | fine phase adjustment of ±150nSec coarse switch selectable to ±450nSec |
| Horizontal Blanking (NTSC) | 10.9µSec; leading/trailing edge adjustable<br>(leading edge adjustable from 1.2µS to 2.0µS ahead of leading edge of sync, factory set to 1.5µS)<br>(trailing edge adjustable from 9.0µS to 9.8µS behind leading edge of sync, factory set to 9.4µS) |
| Horizontal Blanking (PAL) | 12.05µSec; leading/trailing edge adjustable<br>(leading edge adjustable from 1.2µS to 2.0µS ahead of leading edge of sync, factory set to 1.55µS)<br>(trailing edge adjustable from 10.1µS to 10.9µS behind leading edge of sync, factory set to 10.5µS) |
| Horizontal Lock Speed | NORMal/FAST jumper selectable (NORMal will correct a 6µS Horizontal shift in approx. 10 lines. FAST doubles the NORMal gain) |
| Vertical Blanking | NTSC - selectable blanking width, lines 9 - 24.<br>PAL - selectable blanking end, line 6 (316) thru line 21 (334); line 22 (335) and first half of line 23, are separately switch selectable. |
| Luminance Black Clip | adjustable -300mV to +100mV |
| Hard Black Clip | adjustable -300mV to +100mV |
| Hard White Clip | adjustable +600mV to +800mV |
| Automatic DIRECT mode | jumper selectable (AUTO/OFF) |
| "No Video" Modes | switch selectable (MONO BLACK ONLY or MONO BLACK + VIDEO) |
| Clamp Window | jumper selectable (ON/OFF) |

## Remote Controls

| | |
|---|---|
| Video Gain | -3dB, +9dB or ±6dB |
| Chroma Gain | ±6dB |
| Set up (NTSC only) | ±15IRE |
| Black Level<br>AGC ±2dB with modification, see 7510 module package | ±110mV |
| Burst (Chroma) Phase | ±10 degrees |
| AGC Mode Switch | ON/OFF |
| Video Bypass Mode Switch | Activates Bypass Relay |

## Remote Indicators

| | |
|---|---|
| Video Presence LED | ON when input video is present |
| Panel Active LED | ON when remote panel is active |
| Bypass LED | ON when the processor circuitry is bypassed and input video is sent directly to the output |

## Performance

| | |
|---|---|
| Common Mode Rejection | >60dB at 50/60Hz |
| Differential Hum Rejection | >60dB at 50/60Hz |
| Frequency Response | ±0.2dB from 10Hz to 6MHz<br>+0.2dB, -0.8dB from 6MHz to 9MHz |
| Equalization Accuracy | ±0.1dB/dB of cable loss to 8MHz |
| Group Delay | <± 5nSec to 4.5MHz at flat frequency response setting |
| Differential Gain | <0.25%, 10 to 90% APL 1.0Vp-p input<br><0.5%, 10 to 90% APL 2.0Vp-p input |
| Differential Phase | <0.35 deg, 10 to 90% APL 1.0Vp-p input<br><0.5 deg, 10 to 90% APL 2.0Vp-p input |
| 2T Pulse to Bar | <1.0% (0.25%K) |
| Noise | >60dB below 1.0Vp-p 5.5MHz bandwidth |
| Horizontal Stability | <15nSec change from 15-35 degrees C |

| | |
|---|---|
| Sync Time Base Error | <5nSec |
| Burst Phase Jitter | <0.5 degrees |
| Subcarrier Frequency | NTSC: 3.579545MHz / PAL: 4.433618MHz |
| Subcarrier Lock Range | >±50Hz |
| Subcarrier Phase Stability | <2 degrees change from 15-35 degrees C |
| Burst Width | NTSC: 9 cycles ±1 / PAL: 10 cycles ±1 |
| Sync Rise Time | NTSC: 140nS ±20nS / PAL: 250nS ±50nS |
| Blanking Rise Time (NTSC) | 140nSec ± 20nSec |
| Blanking Rise Time (PAL) | 250nSec ± 50nSec |
| Burst Envelope Rise Time (NTSC/PAL) | 300nSec ± 100nSec |
| Color Black (NTSC) | 40IRE Sync & Burst (7.5IRE, ±5%, Set Up ) |
| Color Black (PAL) | 300mVolts Sync and Burst |
| AGC Reference | sync tip is normal reference (if video exceeds peak AGC setting, then peak is the reference) |
| AGC Range | -3dB, +9dB or ± 6dB of video gain |
| AGC Accuracy | ±1% for a ±6dB input change |
| AGC Attack Time (input up) | <1 Sec to 90% for a 6dB change |
| AGC Decay Time (input down) | <2 Sec to 90% for a 6dB change |

**Mechanical/Power/Environmental**

| | |
|---|---|
| Module Weight | 1.0 lb. / .46 Kg. |
| Module Dimensions | 6.25"W x 13.94"D (15.85cm x 35.4cm) |
| Module Input Power | ±12VDC to ±20VDC per module |
| Module Power Consumption | <11 watts per module |
| Temperature Range | For specifications listed from 15° to 35°C<br>Operational from 0° to 40°C |
| Relative Humidity | Up to 95%, non-condensing |

## VIDEO PROCESSING TRAY and POWER SUPPLY MODULE

### Mechanical/Power/Environmental

| | |
|---|---|
| Tray Dimensions | 1RU (1.75"H x 19"W x 15.75"D)<br>(4.45cm x 48.26cm x 40.0cm)<br><br>2RU (3.5"H x 19"W x 15.75"D)<br>(8.89cm x 48.26cm x 40.0cm) |
| Tray Capacity | 1RU (2 modules and 1 power supply)<br>2RU (4 modules and 2 power supplies) |
| Tray Weight (empty) | 1RU (9.2 lbs. / 4.22 Kg.)<br>2RU (12.3 lbs. / 5.64 Kg.) |
| Tray Weight (all modules installed) | 1RU (14.15 lbs. / 6.49 Kg.)<br>2RU (22.2 lbs. / 10.18 Kg.) |
| Tray Input Power (1RU and 2RU) | 105 to 125 VAC, (50-60 Hz)<br>210 to 250 VAC, (50-60 Hz) |
| Tray Power Consumption | 1RU (32 watts maximum)<br>2RU (65 watts maximum) |
| Power Supply Module Weight | 2.95 lbs. / 1.35 Kg. |
| Temperature Range | For specifications listed from 15° to 35°C<br>Operational from 0° to 40°C |
| Relative Humudity | Up to 95%, non-condensing |

## REPAIR AND RETURN INSTRUCTIONS

For information regarding repair and return, refer to the Maintenance section of this manual.

## OVERVIEW

After carefully unpacking this unit and checking the box for power cord and other hardware, examine the box and unit for damage. Any damage should be promptly reported to the carrier.

## RACK MOUNTING

Refer to Figure 2-1.

There are two mounting trays for the 7510 Receive Processing Amplifier: a one rack-unit (1RU) tray and a two rack-unit (2RU) tray. The trays install in a standard 19-inch (48.26 centimeters) equipment rack. A vertical space of 1.75 inches/4.45 centimeters for a 1RU tray, or 3.5 inches/8.9 centimeters for a 2RU tray, and a depth of approximately 19 inches/48.3 centimeters is required for installing a tray. Install the unit where it can be kept cool. Use of the rear support hardware is strongly recommended.

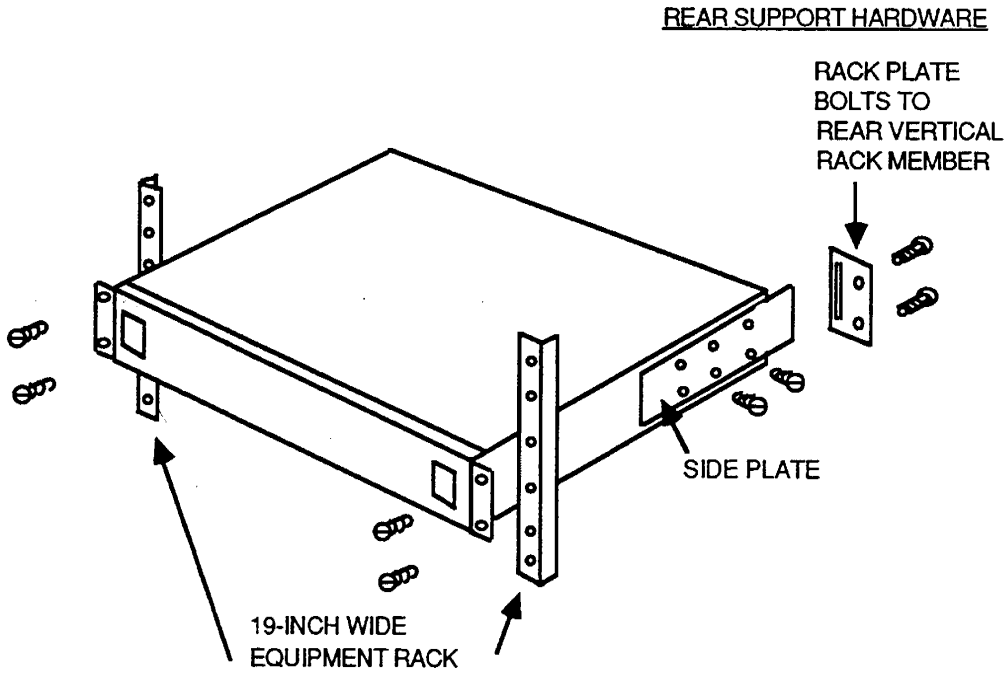
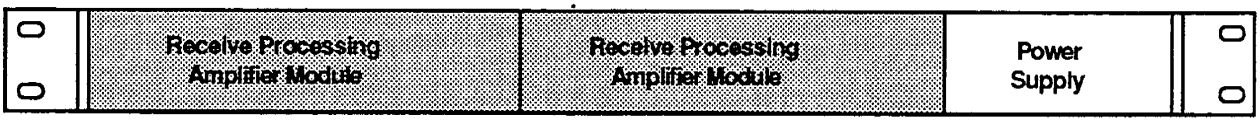


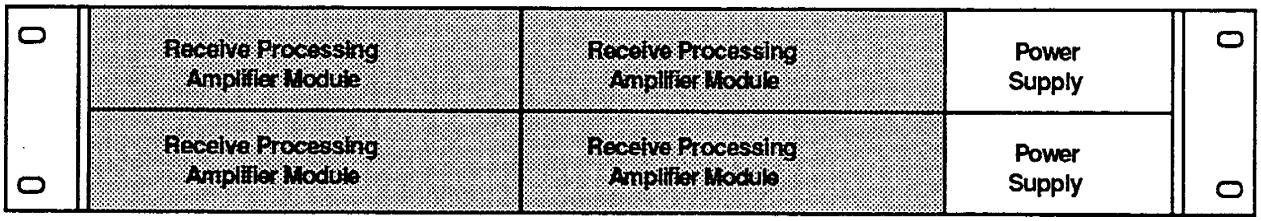

Figure 2-1 Rack Mounting

## MODULE LOCATIONS (Refer to Figure 2-2)

The 7510 modules are located in the one rack-unit and two rack-unit trays as shown below. The one rack-unit tray will hold two 7510 modules and one power supply module. The two rack-unit tray will hold four 7510 modules and two power supply modules.




One Rack-Unit




Two Rack-Unit

Figure 2-2 Module Locations

## SIGNAL CONNECTIONS (Refer to Figure 2-3)

Input and output signal routing is through the rear panel connectors. Connectors are identified by jack number and designator.

All input connectors are 75Ω terminated by the corresponding 7510 module installed in the tray.

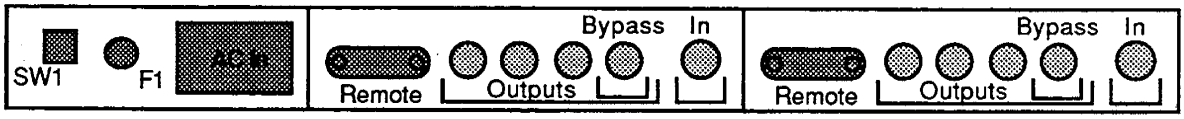
Each 7510 module has four outputs. One output, designated as Bypass on the rear of the tray, is connected to a bypass relay located within the tray. See **CAUTION** note below.

**CAUTION**
**RELAY BYPASS OPERATION**

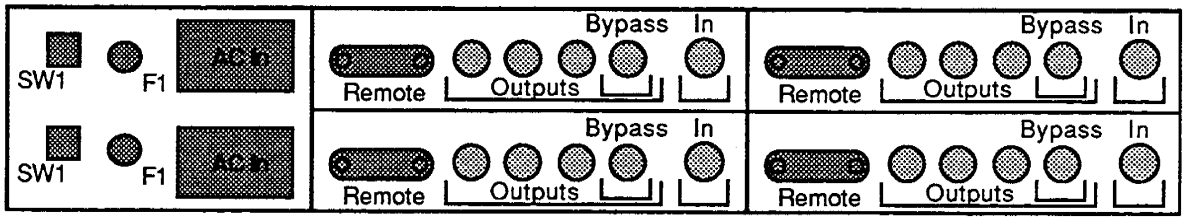
When using the Relay Bypass Mode, ensure that the Bypass output signal shield is **not** connected to ground. If the Bypass output signal shield is connected to ground and ground currents are present in the cable shield, damage to the controlling relay in the tray may occur. To guard against damage to the relay, connect the output signal from the Bypass output connector to an amplifier that provides common mode rejection, i.e. GVG 8501DA.

**NOTE**
**REMOTE CONTROL PANEL**

If a Remote Control Panel is connected to the tray and Remote Control mode is selected with front panel local remote switch S700, several of the Local controls will be inoperative. **(Remote Panel BYPASS switch is always operational when panel is connected, independent of the position of local remote switch S700.)** Consider this information when connecting a Remote Control Panel to the tray and when routing your output signals. Refer to the Table of Operation located in the Operating Instructions section of this manual for additional information regarding 7510 local and remote controls.




**One Rack-Unit**




**Two Rack-Unit**

Figure 2-3 Signal Connections

## SET UP CONTROL MODIFICATION

SET UP control R702 may be converted from Set Up Black Level to AGC Reference Level operation. For modification instructions, refer to the Adjustment Procedure section of the 7510 Module package located at the back of this manual.

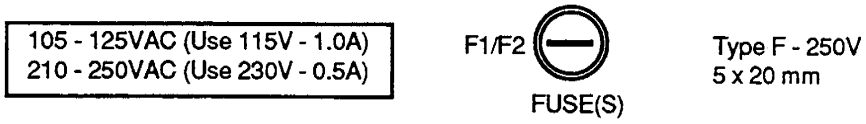
## AC POWER CONNECTIONS

For optimum protection when dual power supplies are used in the two rack-unit tray, external AC power should be supplied to the tray from AC outlets that are protected by different circuit breakers.

## TRAY POWER SELECTIONS (Refer to Figures 2-4 and 2-5 and CAUTION note)

### Tray Fuse

The 7510 trays are shipped with a 1.0A/115V fuse installed in the fuse holder of each AC Power Module. Additional fuses are located in the accessory package shipped with this system. To check or replace the fuse, insert a slotted screwdriver in the fuse slot (F1/F2) on the rear of the tray and twist counter-clockwise (CCW).




(Please note: There are two fuseholders on the 7510-2RU tray.)

Figure 2-4. Tray (AC Power Module) Fuse

### Line Voltage

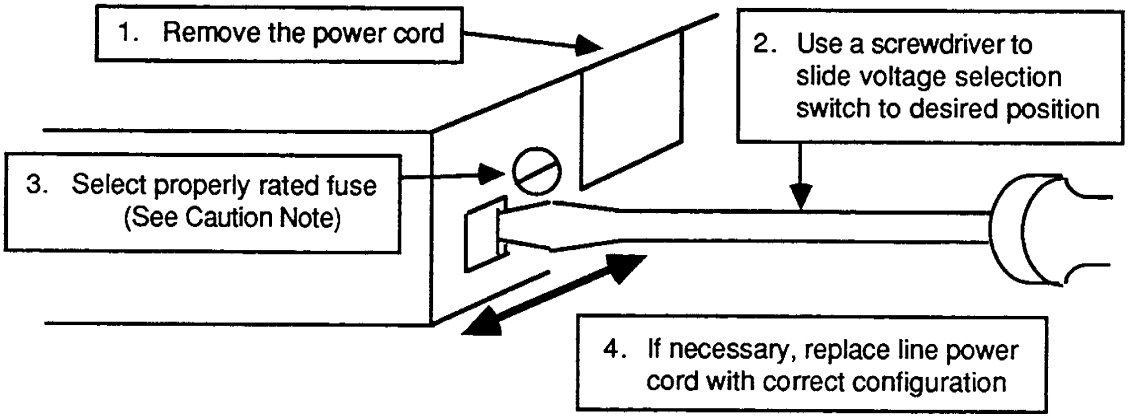
The line voltage selection slide switch(es) at the rear of the tray must be set to the appropriate position for the 115V or 230V (nominal) AC input line.

**CAUTION**

Fuses and Line Voltage

Use a 1.0A T (time delay fuse) for 105 -125VAC line voltage operation.

Use a 0.5A T (time delay fuse) for 210 - 250VAC line voltage operation.




(Please note for step #2: There are two switches and two fuses on the 7510-2RU tray.)

Figure 2-5. Line Voltage Selection

**REMOTE CONTROL PANEL CONNECTIONS** (Refer to Figure 2-6, wiring diagrams E10-096398-XX, 096399-XX and NTSC/PALschematics 066714-XX for additional information.)

Remote control connectors are located on the rear of the 7510 trays, They accept 15 pin male D type connectors. A Remote Control Panel parts kit (order # 7500 - CPK) is available from the Grass Valley Group. A self adhesive Remote Control Panel label is included in the parts kit. Remote capabilities when using the GVG Remote parts kit, include:

- Panel Active indication, LED ON when active
- Video Present indication, LED ON when present
- Video and Chroma Gain controls, 12dB range
- Burst (Chroma) Phase control, ±10 degree range
- Setup Level control, NTSC only, ±15IRE range
- PAL Black Level ±110mV (AGC, ±2dB range, with minor modifications. Refer to the Adjustment section in the 7510 Module package located at the back of this manual).
- AGC ON/OFF selection (AGC of Output Video, sync tip reference)
- Bypass switch will route the input to the Bypass output

**NOTE**

**THE REMOTE BYPASS SWITCH IS ALWAYS OPERATIONAL WHEN PANEL IS CONNECTED**

Front panel LOCal/REMote switch S700 must be in the REMote position for the Remote Control Panel to be active. The remote control panel PANEL ACTIVE indicator will be lit at this time.

The Remote Control Panel parts kit (order # 7500 - CPK) contains:

- four 10K potentiometers
- four control knobs
- three LED's (one red, one yellow, and one green)
- two SPDT toggle switches
- one 15 pin male type D connector with pins
- one self adhesive Remote Control Panel label

Customer supplied hardware to complete the assembly includes:

- fabricated panel
- 18 to 24 gauge wire
- 15 conductor cable (note: for ease in connecting and disconnecting panel and cable, 15 pin type D connectors, two male and one female, could be purchased and used here.)

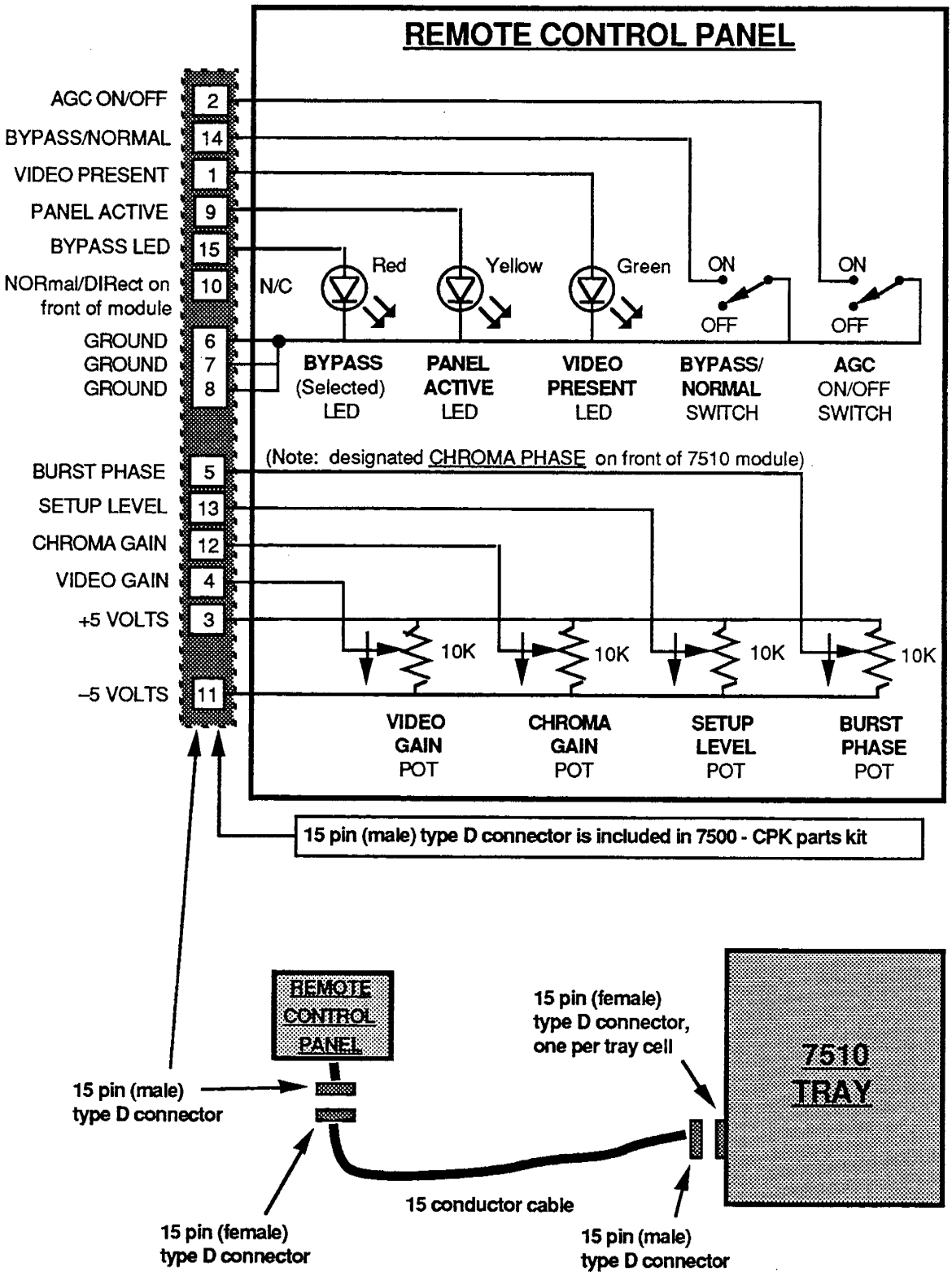



Figure 2-6. Suggested Wiring Diagram for 7510 Remote Control Panel

## CONTROLS and INDICATORS

### Introduction

The 7510 Receive Processing Amplifier is a single module system. All local controls and indicators for video processing are located on the 7510 Receive Processor Amplifier module. Remote control and indicator operation is available by Remote Control Panel. Additional information on the Remote Control Panel is located in the Installation Section of this manual.

Figures in this section illustrate the location of each control and indicator on the 7510 module.

The Tables of operation contained in this section explain the function of each control and indicator for both local and remote operation. The first table describes the front panel controls while the second table describes the internal controls. The **Bolded** words and initials in the tables denote the final settings made to the controls at the factory before shipment. (Note: these tables may also be helpful during maintenance adjustments.)

Also included in this section is a list of typical operational modes for the 7510 Video Processor.

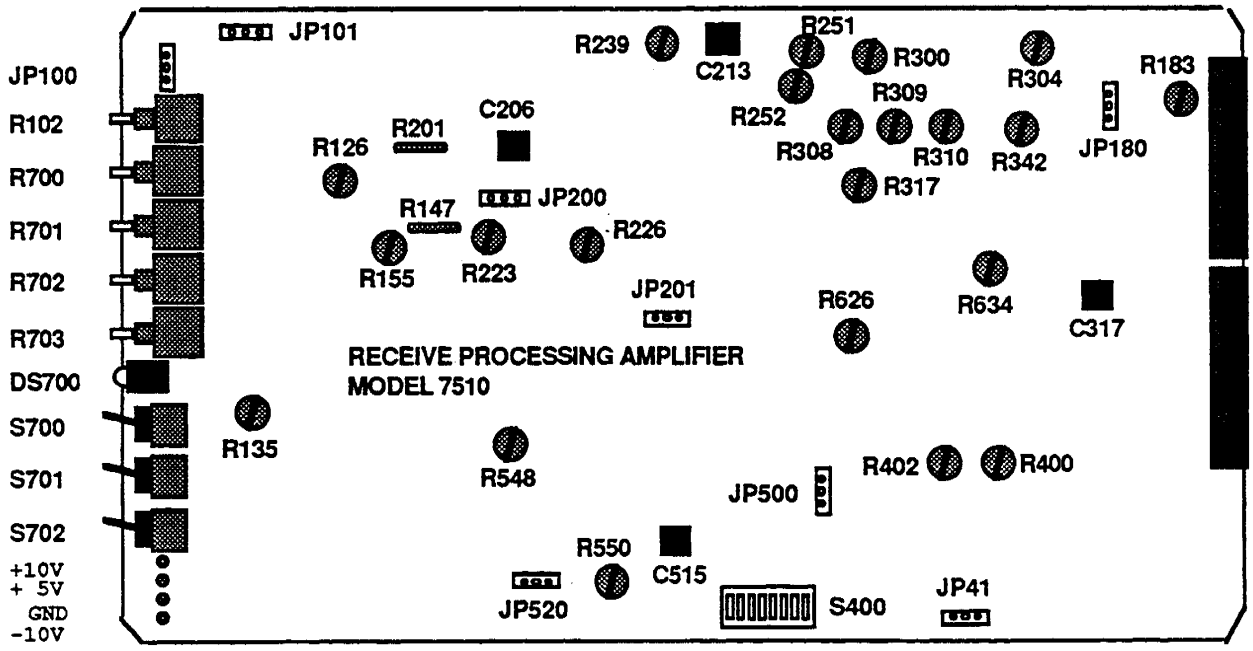



Figure 3 - 1. 7510 Module Controls and Indicator

Table O-1. Front Panel Controls And Indicator

| Control/ Indicator | Adj | Function |
|---|---|---|
| Coarse Gain (LOW/**NORMal**) | JP101 | Use to select the range of expected input signals. Low setting range is –9dB to +3dB. NORMal setting range is ±6dB. |
| Input Cable Equalization (ON/**OFF**) | JP100 | Allows equalizer to be linked during calibration or for short cable runs. When ON allows equalization of cable lengths from 60ft. to 500ft. (Note: ensure equalizer matches cable type.) |
| Equalizer (**CCW**) | R102 | Allows correction for cable loss for up to 500ft. of cable. |
| Video Gain (Local and Remote) | R700 | Allows adjustment of output level over a ±6dB range. |
| Chroma Gain (Local and Remote) | R701 | Allows adjustment of chroma amplitude over a ±6dB range. |
| Set Up (Local and Remote) | R702 | NTSC: Allows adjustment of Set Up over a ±15IRE range. PAL: Allows adjustment of Black Level over a ± 100mV range. AGC ±2dB adjustment with modification, see 7510 module package. |
| Chroma Phase (Local and Remote) | R703 | Allows adjustment of re-inserted burst phase over a ±10° range. |
| Video Present LED (Local and Remote) | DS700 | Indicates that a vertical interval sequence has been detected on the input video signal. |
| **LOCal**/REMote | S700 | Delegates control/indication of the following: Video Gain, Chroma Gain, Set-up, Chroma Phase, AGC ON/OFF, and Video Presence. |
| **DIRect**/NORmal (Local and Remote) | S701 | Allows selection of either DIRect video or NORmal video mode:<br><br>DIRect mode, sync and burst are not re-inserted into output video. Input video is passed to the outputs.<br>NORmal mode, locally generated sync and burst are inserted into the output video. |
| AGC ON/**OFF** (Local and Remote) | S702 | When ON, allows the sync amplitude and/or peak video level to control the video gain. |

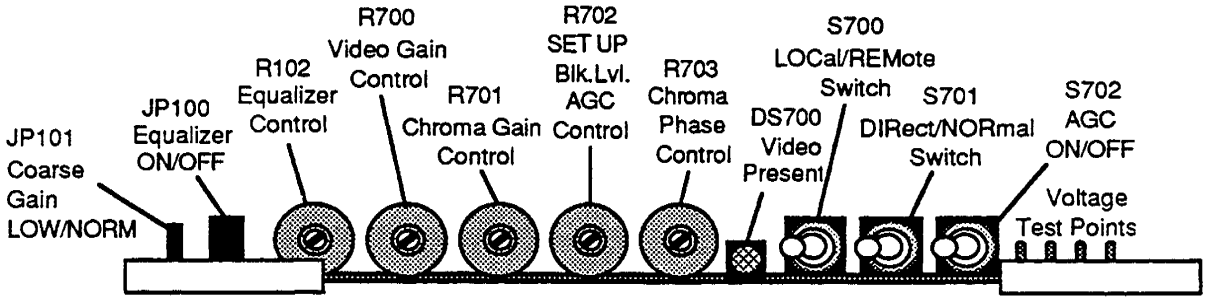



Figure 3 - 2. 7510 Front Panel Controls and Indicator

Table O-2. Internal Controls (continued on next page)

| Control | Adj | Function |
|---|---|---|
| Common Mode Rejection | R183 | Cancellation of common mode hum. Adjusted to null out common mode hum at TP18. |
| Clamp Gain (**Normal** /Low) | JP180 | Cancellation of differential hum. Selects the clamp feedback gain. Set to the same position as JP101. |
| Clamp Pick Off | R135 | For optimum sync separation with low amplitude input signals. Adjusted, with no input signal, so that the clamp just turns ON. |
| Pick Off Hum Null | R126 | Provides accurate sync separation when differential hum is present. Adjusted to cancel hum at TP12. |
| AGC Level | R155 | With AGC ON, adjusted for **1V p-p** video output signal. |
| Hum Null | R223 | Adjusted to null out differential hum at TP22. |
| Clamp **ON**/OFF | JP200 | Allows clamp to be disabled for test purposes. Normally ON. |
| Chroma Filter | C206 | Allows luminance clipping of the video signal. Adjusted to null out chroma at TP22. |
| Soft Black Clip (**CCW**) | R239 | Allows removal of luminance signals below black level. Adjusted to the desired clip level. |
| Delay Balance | C213 | Adjusted to optimize frequency response to 6Mhz. |
| Peak AGC Level | R226 | With AGC ON, adjusted for **1.05V p-p** video output signal (with sync tip AGC defeated). |
| Black Clip (**CCW**) | R252 | Clips the black portion of the composite video signal. Adjusted to the desired clip level. |
| White Clip (**CCW**) | R251 | Clips the white portion of the composite video signal. Adjusted to the desired clip level. |
| Direct DC Out | R300 | In the DIRect mode, adjusted for a back porch level of **0.0 Volts** at the output. |
| Black DC Out | R310 | In the NORmal mode, adjusted for a back porch level of **0.0 Volts** at the output. |
| Trans. Balance | R304 | In the NORmal mode, adjusted to minimize the blanking transition spike at the output. |
| HF Response | C317 | Adjusted to optimize high frequency response. |

Table O-2. Internal Controls

| Control | Adj | Function |
|---|---|---|
| Clamp Window | JP201 | In the ON mode a window signal from the internal sync generator disables clamping except during back porch. |
| Sync Amplitude | R317 | In the NORmal mode, adjusted for the correct sync amplitude on the video signal at the output. **NTSC 286mV/PAL 300mV.** |
| Burst Axis | R309 | In the NORmal mode, adjusted to set the burst envelope symmetrically about the back porch level. |
| **MONO/** MONO+VIDEO | JP41 | MONO: In the NORmal mode, and no video present, the output will be freerunning sync pulses. MONO+VIDEO: NORmal mode, no video present, the output will be free running sync pulses added to any incoming signal present. |
| Burst Amplitude | R308 | In the NORmal mode, adjusted for the correct burst amplitude on the video signal at the output. **NTSC 286mV/PAL 300mV.** |
| Burst Width | R342 | In the NORmal mode, adjusted for the correct burst width on the video signal at the output. **NTSC 2.5uS / PAL 2.25uS** |
| Horizontal Sync Position (**0nS**) | S400-1/2/3 | Coarse positioning relative to input signal ±450nS, factory adjusted to match input. See table on sheet #4 of drawing D10-066714. |
| PAL Vert. Blanking Noise Line | S400-4 | Blanks or passes the noise line, line 22(335) and first half of line 23. |
| Vertical Blanking | S400-5/6/7/8 | NTSC: blanking width selectable, lines 9 - 24. PAL: blanking end selectable, line 6 (316) thru line 21 (334). Factory set for **NTSC 21 and PAL 25**. See table - sheet #4 of drawing D10-066714. |
| Horiz. Blanking Leading Edge | R402 | Advances the leading edge of horizontal blanking relative to the leading edge of sync, factory adjusted to **NTSC 1.5µS/PAL 1.55µS.** |
| Horiz. Blanking Trailing Edge | R400 | Delays the trailing edge of horizontal blanking relative to the leading edge of sync, factory adjusted to **NTSC 9.4µS/PAL 10.5µS.** |
| Auto Direct AUTO/**OFF** | JP500 | AUTO: While In the NORmal mode, provides automatic switching to the DIRect mode when the loop speed switch detects a large time base error that lasts for more than 3 seconds. OFF: While in the NORmal mode, the module will remain in the NORmal mode regardless of any timebase error. |
| Freerun Frequency | C515 | Matches the horizontal freerun frequency to the lock frequency. |

Table O-2. Internal Controls

| Control | Adj | Function |
|---|---|---|
| Horiz. Lock Loop Speed (FAST/**NORmal**) | JP520 | FAST: doubles NORmal speed. FAST loop will aid in recovery from the U-MATIC horizontal sync shifts. NORmal: will correct a 6µS horizontal shift in approx. 10 lines. |
| Horiz. Phase (**0nS**) | R548 | Fine horizontal positioning of the regenerated sync, ±150nS. |
| PAL Quad Amplitude Balance | R626 | Matches the PAL burst vector amplitudes at the output. |
| PAL Quad Phase | R634 | Sets the PAL burst vectors in quadature |

## OPERATIONAL MODES

**(*) The remote BYPASS switch bypasses the Processor Amplifier and overrides all other controls if the Remote Control Panel is connected.**

**CAUTION**
**RELAY BYPASS OPERATION**

When using the Relay Bypass Mode, ensure that the Bypass output signal sheild is **not** connected to ground. If the Bypass signal output shield is connected to ground and ground currents are present in the cable shield, damage to the controlling relay in the tray may occur. To guard against damage to the relay, connect the output signal from the Bypass output connector to an amplifier that provides common mode rejection, i.e. GVG 8501DA.

### LOCal Mode, Local AGC OFF, Normal Selected (*)

LOCal/REMote switch S700 is in the LOCal position, AGC switch S702 is OFF, NORmalL/DIRect switch S701 is in NORmal position. Coarse gain JP101 is in the low, -9dB to +3dB, position.

All local controls are operational. Video Gain and Chroma Gain are set for 1V p-p at the output. Remote controls, with the exception of BYPASS, are disabled. Local and remote VIDEO PRESENT LEDs are active.

With a video input of at least 0.35V p-p, the horizontal and subcarrier oscillators will lock to the incoming video and force regenerated sync and burst to be inserted on the output video.

With a video input of less than 0.35V p-p, the horizontal oscillator will free run and a regenerated MONO Black will be sent to the output, refer to module specification for modes.

### Local Mode, Local AGC ON (*)

LOCal/REMote switch S700 is in the LOCal position, AGC switch S702 is ON, NORmalL/DIRect switch S701 is in NORmal position. Coarse gain JP101 is in the low, -9dB to +3dB, position.

All local controls are operational with the exception of VIDEO GAIN R700. Remote controls, with the exception of BYPASS, are disabled. Local and Remote VIDEO PRESENT LEDs are lit.

With a video input of at least 0.35V p-p, the horizontal and subcarrier oscillators will lock to the incoming video and force regenerated sync and burst to be inserted at the output.

With a video input of at least 0.35V p-p, the AGC circuit will use the input video sync as a reference and automatically adjust the video gain at the output to 1V p-p.

With a video input below 0.35V p-p, the AGC will be forced to maximum gain and may not be able to compensate for further losses. If the sync level on the incoming signal is small relative to peak white, the PEAK AGC will take over control of the gain.

With a video input of less than 0.35V p-p, the horizontal oscillator will free run and a regenerated MONO Black will be sent to the output, refer to module specification for modes.

### Remote Mode, Remote AGC OFF (*)

LOCal/REMote switch S700 is in the REMote position, AGC switch S702 is OFF, NORmalL/DIRect switch S701 is in NORmal position.

All Remote controls are operational, remote PANEL ACTIVE LED is lit. Local controls: Video gain; Chroma gain; Set Up; Burst Phase and AGC ON/OFF are disabled. All other local controls are operational. Local and Remote VIDEO PRESENT LEDs are active.

### Remote Mode, Remote AGC ON (*)

LOCal/REMote switch S700 is in REMote position, NORmalL/DIRect switch S701 is in NORmal position. The REMOTE AGC switch is ON

With the exception of Video Gain, all remote controls are operational. Local controls: Video gain; Chroma gain; Set Up; Burst Phase and AGC ON/OFF are disabled. Local and Remote VIDEO PRESENT LEDs are active. Remote "Panel Active" LED is on. All other local controls are operational.

(Note: Video operation is the same as in "Local Mode, Local AGC ON" condition.)

### Local or Remote Mode selected with BYPASS selected on the Remote control panel (See CAUTION BYPASS note on previous page)

The input is routed directly to the bypass output by means of the Bypass Relay located in the tray, and no video is fed to the Processor Amplifier Module input. All remote controls, with the exception of the remote BYPASS switch, are defeated when LOCal/REMote switch S700 is in the LOCAL position. Refer to module specification for modes.

### Sync / Subcarrier Locking and Output Modes

NORmal/DIRect switch S701 is in NORmal position.

If the horizontal timebase error is less than approximately 1uSec, the horizontal and subcarrier oscillators will lock to the incoming video and regenerated Color Black will be gated in to replace the input signal blanking intervals. If the error is greater than 1uSec over a period of >1Sec and AUTO DIRECT ON/OFF jumper J500 is in the ON position, insertion is inhibited and the input signal is passed to the output without timing modification. With AUTO DIRECT ON/OFF jumper J500 in the OFF position, the regenerated signal will be inserted regardless of the timebase error.

## INTRODUCTION

This section contains information and instructions regarding maintenance and troubleshooting of the 7510 Receive Processor Amplifier system.

## ADJUSTMENT INFORMATION

All adjustments for the 7510 system are performed at the module level. Refer to the 7510 Receive Processor Amplifier module package located at the rear of this manual for adjustment information.

## REPAIR AND RETURN INSTRUCTIONS

Your Grass Valley Group equipment was designed to be very reliable. However, the following instructions are provided in case repairs are needed.

**If you did not obtain your equipment directly from GVG,** please contact the distributor from whom your equipment was purchased (in countries other than the United States, always contact your distributor).

**If you obtained your equipment directly from GVG,** contact the GVG central operator at (916) 478-3000 and ask to be connected to the Modular Products Division Customer Service Center. Our service representative will direct you in returning the equipment. Request a return authorization number (RA#) which will permit the factory to accept your equipment when it arrives.

### SERVICE NOTES

If you service equipment that is still under warranty, the warranty may be voided.

Out-of-warranty repairs cannot begin until a valid purchase order number has been provided.

**Service orders** for all Modular Products Division equipment are processed within 24-hours upon receipt of request.

**Return packaging** should be the original shipping carton or another container which will provide adequate protection against shipping damage.

**Shipping related charges** are paid by the customer except when GVG returns equipment after warranty-covered repairs have been made.

## TROUBLESHOOTING GUIDE

The General Troubleshooting Guide below lists from the general to the specific (system to frame to module to circuit to component) the typical troubleshooting procedures used for GVG equipment. Initial steps ensure proper connections, power, and operation. If the problem is not located by these checks, the remaining steps should aid in locating a defective cable, frame, module, or component.

The second Maintenance troubleshooting subsection, Module/Circuit Troubleshooting Guide, describes specific steps to be used in troubleshooting at the module, circuit, and component level.

### Module Interconnections

All frame to module interconnections are shown on the 7510 (1RU and 2RU) Motherboard wiring diagrams E10-096398 and E10-096399. Both diagrams are located in the Tray section of this manual.

### General Troubleshooting Guide

#### Analyze System

Visually check the portion of the system frame in which the trouble appears to be located. Many problems (such as modules not seated, modules installed in the wrong cells or loose external connector cables) can be located by visible indications.

Before proceeding with troubleshooting, check that the equipment that supplies signals to or receives signals from the system is operating correctly. This includes verifying that the input/output connection cables are not defective and are properly connected.

#### Basic System Operation

Review all Installation and Operation sections of this manual that may pertain to the problem area. Preliminary operating procedures, such as Initial Installation Tests, serve as an excellent operator's checklist prior to actual on-line operation or maintenance of the equipment.

#### Substitute Cables, Modules, or Frames

Isolate the trouble by substituting a known good cable, module, or frame (if available). This should localize the trouble to a specific section of the system in most situations.

#### Analyze Module/Circuit

To isolate complex problems to a specific section of a module in a system, refer to the Functional/Circuit Description section in the manual for that module. A frame wiring diagram of module and frame interconnections is located in the Tray section of this manual.

#### Test Points, Controls, and Adjustments

Locations and functions of the test points, controls, and adjustments for all modules are shown and described in each module section of this manual.

### Check Voltages And Waveforms

Often a defective component can be located by checking for the correct voltage or waveform in a circuit. Voltages and waveforms can also be compared between operational and defective modules of a similar type. The schematic and component location drawings for each module show the locations of test points and adjustments.

### Check Individual Components

Components which are soldered in place are best checked by disconnecting one end. This isolates the measurements from the effects of surrounding circuitry. Be aware of the possibility of damage to components due to electrostatic discharge (ESD) and guard against it while troubleshooting.

### Repair and Re-adjust The Circuit

If any defective parts are located, follow standard component replacement procedures then refer to the appropriate alignment section for final adjustments to the module and/or system.

## Module/Circuit Troubleshooting Guide

The troubleshooting approach used here is to first isolate the faulty section and then check the few remaining components to pinpoint the problem.

### Check the voltage test point

Check the voltage test points on the front of the module to ensure the voltage regulator is operating correctly. If incorrect, check the test points on the frames power supply before proceeding.

### When a faulty section has been isolated

Check that correct voltages are present at the appropriate pins on any active components.

### Are supply voltages OK?

Always ensure the regulator is operating correctly; if not, check the system power supply or suspect a current limit condition.

### Is there a current limit condition?

If the regulator is not operating, isolate it from the main circuitry. Isolation can be achieved by cutting power traces from the voltage regulator. If the regulator is still not working, troubleshoot the regulator. If the regulator is OK, check for shorts on the power rails.

### Regulator OK; which section is causing current limit?

If there are no direct shorts, one of the stages is drawing too much current. One easy method for locating the problem area is to feel for hot components, indicating excessive current draw.

Once the current limit condition is removed, use normal troubleshooting procedures to check the signal flow through the circuitry.

If any defective parts are located, refer to the appropriate replacement parts list for detailed

information. Follow standard component replacement procedures, then make any necessary adjustments to the circuit/module as described in the adjustment procedure for that piece of equipment.

## REPLACEMENT PARTS INFORMATION

### NOTE

If you service equipment that is still under warranty, the warranty may be voided.

Replacement parts list for each piece of equipment used in this system are located in their respective module or tray section found at the back of this manual.

Many electronic components used in this equipment are standard parts which may be purchased locally. Electronic descriptions of the components are included in the Replacement Parts List. Any locally purchased replacement parts should meet or exceed the specifications of the parts being replaced. (Note: some parts, such as precision resistor networks and hybrid integrated circuits, must be ordered directly from the Grass Valley Group.)

Some components may be specially selected to optimize circuit electrical characteristics. Before replacing parts, always check the appropriate schematic diagram and replacement parts list to determine whether or not a component is specially selected. Order these specially selected components from the Grass Valley Group.

When requesting parts from GVG, identify the part by the part number or type number given in the parts list. If possible, also include the full assembly number of the module or assembly in which the part is to be used.

### Parts Substitution

Because of universal parts procurement problems, and the use of multiple quality suppliers, some parts in your equipment may be different from those described in the replacement parts list. The parts used will in no way alter or compromise the performance or reliability of this equipment. They are installed to ensure prompt delivery.

To order electronic and/or mechanical replacement parts from the Grass Valley Group, contact the GVG central operator at (916) 478-3000 and ask to be connected to the Modular Products Division Customer Service Center. Our service representative will assist you in placing your order.

If outside the United States, contact the Grass Valley Group distributor for your country or locality.

<<MPD MANUFACTURING>>

R E P L A C E M E N T  P A R T S  L I S T

RECV PROC AMP 1RU VIDEO,7510T1
ASSEMBLY NUMBER: 086435-00 ISSUE: B ECN: S508

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 001 | | TP7017-02 | MANUAL,7510 VID PROCESSING AMP | 1 |
| 005 | | 096398-00 | RECV PROC AMP 1RU VIDEO,7510T1 | 1 |
| 010 | | 076340-00 | FRONT COV RECV PROC AMP 1RU,7510T1 | 1 |
| 015 | | 066710-10 | 9500 A-PSM 120/240 POWER SUPPLY | 1 |
| 025 | | 053681-00 | ACCESSORY PACK 9500 SERIES | 1 |

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<<MPD MANUFACTURING>>

R E P L A C E M E N T  P A R T S  L I S T

RECV PROC AMP 2RU VIDEO,7510T2
ASSEMBLY NUMBER: 086436-00 ISSUE: C ECN: S508

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 001 | | TP7017-02 | MANUAL,7510 VID PROCESSING AMP | 1 |
| 005 | | 096399-01 | RECV PROC AMP 2RU VIDEO,7510T2 | 1 |
| 010 | | 076341-00 | FRONT COV RECV PROC AMP 2RU,7510T2 | 1 |
| 015 | | 066710-10 | 9500 A-PSM 120/240 POWER SUPPLY | 1 |
| 025 | | 053681-00 | ACCESSORY PACK 9500 SERIES | 1 |

<<MPD MANUFACTURING>>

R E P L A C E M E N T  P A R T S  L I S T

RECV PROC AMP 1RU PAL, 7510T1
ASSEMBLY NUMBER: 086493-00 ISSUE:A ECN:

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 001 | | TP7017-02 | MANUAL,7510 VID PROCESSING AMP | 1 |
| 005 | | 096398-00 | RECV PROC AMP 1RU VIDEO,7510T1 | 1 |
| 010 | | 076340-00 | FRONT COV RECV PROC AMP 1RU,7510T1 | 1 |
| 015 | | 066710-10 | 9500 A-PSM 120/240 POWER SUPPLY | 1 |
| 025 | | 053732-00 | ACCESSORY PACK,PAL 9500 SERIES | 1 |

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<<MPD MANUFACTURING>>

R E P L A C E M E N T  P A R T S  L I S T

RECV PROC AMP 2RU PAL,7510T2
ASSEMBLY NUMBER: 086494-00 ISSUE: A ECN:

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 001 | | TP7017-02 | MANUAL,7510 VID PROCESSING AMP | 1 |
| 005 | | 096399-01 | RECV PROC AMP 2RU VIDEO,7510T2 | 1 |
| 010 | | 076341-00 | FRONT COV RECV PROC AMP 2RU,7510T2 | 1 |
| 015 | | 066710-10 | 9500 A-PSM 120/240 POWER SUPPLY | 1 |
| 025 | | 053732-00 | ACCESSORY PACK,PAL 9500 SERIES | 1 |

# MANUFACTURERS ABBREVIATION LIST

| | |
|---|---|
| AB | Allen Bradley Co. |
| ACE | Ace Radio Control, Inc. |
| ADC | ADC Products |
| AEH | Amatom Electronic Hardware Co. |
| AHA | Aham Heat Sink |
| AIR | Airpax Electronics |
| ALC | Allied Control Co., Inc. |
| ALD | Allied Devices |
| ALE | Alco Electronic Products |
| ALL | Allen Mfg. Co. |
| ALP | Alpha Wire Corp. |
| ALT | Altec Lansing |
| AMA | Amatron |
| AMC | Amperex Electronic Corp. |
| AMD | Advanced Micro Devices Inc. |
| AMP | AMP, Inc. |
| ANA | Analog Devices |
| ANL | Anderson Laboratories |
| APH | Amphenol |
| ARC | Arco Electronics |
| ARH | Arrow Hart |
| ASC | Associated Spring Co. |
| ATC | Atlee Corp. |
| ATL | Atlas |
| AUE | Automatic Electric Co. |
| AUG | Augat, Inc. |
| AVT | The Avtel Corp. |
| BAR | Barnes Corp. |
| BC | Burroughs Corp. |
| BDR | Brand Rex Div. Am. Enka Corp. |
| BEF | Bel Fuse, Inc. |
| BEI | Bussco Engineering, Inc. |
| BEK | Beckman Insts., Helipot Div. |
| BEL | Beldon Corp. |
| BER | Berkley |
| BEY | Beyer Dynamic |
| BIR | Birtcher Corp., Industrial Div. |
| BIS | Bishop Graphics |
| BOR | Bourns |
| BOY | Boyd Industrial Rubber |
| BRN | Birnbach Co., Inc. |
| BUC | Buchanan Electrical Prod. |
| BUR | Burndy Corp. |
| BUS | Bussman Mfg. |
| CAC | Camcar Screw & Mfg. |
| CAK | Calmark Corp. |
| CAL | Callins Capacitors |
| CAM | Cambridge Therm. (Cambion) |
| CAN | Cannon, ITT |
| CAP | Caplugs |
| CAR | Carling Electric, Inc. |
| CDC | Continental Device Corp. |
| CEN | Centralab |
| CHE | Cherry Electrical Products |
| CHM | Chicago Miniature Lamp Works |
| CHS | Chicago Switch |
| CIN | Cinch Mfg. Co. |
| CIR | Circuit Structures Lab |
| CKC | C & K Components, Inc. |
| CLA | Clarostat Mfg. Co. |
| CLE | Clevite |
| CLR | C.P. Clare |
| CLX | Clairex |
| CNW | Continental Wirt Electronics |
| COD | Cornell-Dubilier Electronics |
| COM | Components, Inc. |
| CON | Connor Spring & Mfg. Co. |
| COR | Corning Glass Works |
| CPC | Clare Pendar Co. |
| CRM | Corcom Inc. |
| CTD | Chassis-Trak Division |
| CTK | CTS Knights, Inc. |
| CTS | CTS Corp. |
| CUT | Cutler-Hammer, Inc. |
| DAB | Daburn Electronics & Cable |
| DAC | Datel |
| DAG | Dage Electric Co. |
| DAL | Dale Electronics, Inc. |
| DAT | Datron Systems |
| DCE | D - Cemco Inc. |
| DDD | Data Delay Devices |
| DEC | Digital Equipment Corp. |
| DEL | Delevan Electronics |
| DEU | Deutsch Fasteners |
| DIA | Dialight Corp. |
| DIG | Digitran |
| DIX | Dixon, Inc. |
| DKY | Dow-Key |
| DRL | Driv-Loc |
| DSI | Datel Systems Inc. |
| DUN | Duncan |
| EA | Electronic Arrays Inc. |
| ECC | Engineering Components Co. |
| EEC | Electronic Engineering Co. |
| EHU | Electronics Hardware Unlimited |
| ELC | Elco Corp. |
| ELD | Eldema |
| ERI | Erie Technological Products |
| EYT | Eaton Yale & Towne |
| FAI | Fairchild Semiconductor |
| FER | Ferroxcube Corp. |
| FPC | Fiar-Rite Products Corp. |
| FSP | Federal Screw Products, Inc. |
| GCE | GC Electronics |
| GE | General Electric Co. |
| GEP | Gates Energy Prods. Inc. |
| GLO | Globe-Union Inc. |
| GOR | W.L. Gore & Assocs. Corp. |
| GOU | Gould National Batteries, Inc. |
| GOW | Gowanda |
| GRA | Grayhill, Inc. |
| GRE | Gremar, ITT |
| GRL | Greenline |
| GRO | Groov-Pin Corp. |
| GSC | Gudebrod Bros. Silk Co., Inc. |
| GUA | Guardian Electric Mfg. Co. |
| GUD | Gudeman |
| GVG | Grass Valley Group, Inc. |
| HAM | Hamlin Inc. |
| HAR | Harris |
| HEI | Heinemann |
| HEY | Heyman Mfg. Co. |
| HIG | Hi-G Inc. |
| HOY | Hoyt Elec. Instr. Works |
| HP | Hewlett-Packard - Paeco |
| HRL | Hartwell Corp. |
| HSP | Hardware Specialties |
| HUB | Harvey Hubbel, Inc. |
| HUD | Hudson Tool & Die Co. |
| ICO | ICO/Rally |
| IEE | Industrial Electronic Engrs. |
| IMB | IMB Electronic Products Inc. |
| INR | International Resistor Co. |
| INT | International Electro Exc. |
| IRC | International Rectifier |
| IRR | Industrial Retaining Ring Co. |
| ISC | Instrument Specialty Co. |
| IT | Information Terminals Corp. |
| ITM | Intermec |
| ITL | Intel Corp. |
| ITS | Intersil |
| ITT | International Tel. & Tel. |
| JBT | J-B-T Instruments, Inc. |
| JOH | Johanson |
| JON | E.F. Johnson Co. |
| KAH | Kahgan |
| KEM | Kemet, Union Carbide |
| KEY | Keystone Electronics Corp. |
| KIN | Kings Electronics Co., Inc. |
| KLI | Kilixon |
| KUL | Kulka Electronics Corp. |
| LAD | La Deau Mfg. Co. |
| LAM | Lambda Electronics Corp. |
| LAN | Lansco Die Casting |
| LED | Ledex |
| LEE | Leecraft Mfg. Co., Inc. |
| LFI | Littlefuse, Inc. |
| LIC | Licon, ITW |
| LIT | Litronix |
| LSC | Lee Spring Co. |
| LYN | Lyn-Tron, Inc. |
| MAG | Magnecraft Electric Co. |
| MAL | Mallory & Co., Inc. |
| MAR | Marco-Oak Industries |
| MAS | Magnet Sales |
| MAT | Matthey Printed Products LTD. |
| McC | McCoy Electronics Co. |
| McG | McGraw Edison Co. |
| McM | McMasters Carr |
| MEC | Mechanical Enterprises Inc. |
| MIC | Microsonics Div. |
| MID | Midwec Corp. |
| MIL | J.W. Miller Co. |
| MIS | Micro Switch Div. |
| 3M | Minnesota Mining & Mfg. |
| MN | Marshall Newell |
| MOM | Monolithic Memories |
| MON | Monsanto |
| MOS | Mostek Corp. |
| MOT | Motorola Semiconductor |
| MSP | Master Specialties |
| NAP | North American Phillips |
| NAT | National Radio Co. |
| NCC | Nippon Chemi Con |
| NDI | N-D Industries |
| NEI | Northern Engineering Labs, Inc. |
| NEC | Nippon Co. of America |
| NIC | Nichicon (America) Corp. |
| NLE | North Lake Eng., Inc. |
| NSE | National Semiconductor |
| NWC | National Wire & Cable Corp. |
| NYT | Nytronics |
| OAK | Oak Switch |
| OHM | Ohmite Mfg. Co. |
| OSH | Oshino Electric Lampworks Ltd. |
| PAK | Paktron Div. |
| PAM | Pamotor, Inc. |
| PAN | Panduit Corp. |
| PB | Potter & Brumfield |
| PEM | Pem Engr. & Mfg. |
| PHN | Phoenix Transformer |
| POL | Polaroid Corp. |
| POM | Pomona Electronics Co. |
| POW | Power Mate |

| | |
|---|---|
| RAY | Raytheon |
| RCA | RCA Corp. |
| RCL | RCL Electrónics, Inc. |
| REI | Robison Electronics Inc. |
| REL | Reliance Universal Inc. Cal |
| ROB | Robinson Nugent |
| ROG | Rogan Corp. |
| ROS | Ross Co., Milton |
| ROT | Rotron |
| ROY | Royal Industries, El Segundo |
| RTS | Ried Tool Supply Co. |
| SAE | Stanford Applied Engineering |
| SAN | Sangamo Electric Co. |
| SAV | Sava Industries Inc., N.J. |
| SCA | Scanbe Mfg. Corp. |
| SCF | South Co. Fasteners |
| SEA | Sealectro Corp. |
| SEM | Seastom Mfg. Co. |
| SFE | San Fernando Electric |
| SIG | Signetics Corp. |
| SII | Sigma Instruments Inc. |
| SIL | Siliconix, Inc. |
| SIM | Simpson Electric Co. |
| SLF | Sloss Fasteners |
| SLO | Sloan Co. |
| SMI | Smith, Inc., Herman |
| SOR | Sorensen |
| SPE | Spectrol Electronics |
| SPR | Sprague Electronic Co. |
| SPS | Standard Power Supply Co. |
| SPY | Sperry |
| SSC | Spectra Strip Corp. |
| STC | Signal Transformer Co. |
| STH | Southco Inc. |
| STI | Sarkes Tarzian Inc. |
| STM | S.T.M. Corp. |
| STY | Stanley Tools |
| SWI | Switchcraft, Inc. |
| SYK | Sykes Datatronics Inc. |
| SYL | Sylvania Electric |
| TDK | TDK Ferrites Co , Ltd. |
| TEC | TEC Inc. |
| TEK | Tektronix |
| THB | Thomas & Betts Co. |
| THE | Thermalloy Inc. |
| TIN | Tinnerman |
| TI | Texas Instruments, Inc. |
| TPL | Triplett Corp. |
| TRI | Triad Transformer Corp. |
| TRO | Trompeter Electronics Inc. |
| TRW | TRW Inc. |
| TTE | TT Electronics Inc. |
| USE | USECO Div. |
| UTC | TRW/UTC Transformers |
| VAC | Vactec Inc. |
| VEC | Vector Electronic Co. Inc. |
| VER | Vero Electronics, Inc. |
| VIK | Viking Industries |
| VRY | Varadyne Industries Inc. |
| WAK | Wakefield Engineering |
| WDC | Western Digital Corp. |
| WEC | Weckesser Co., Inc. |
| WES | Weston Components & Controls |
| WHE | Westinghouse Electric |
| WIN | Winchester Electronics |
| WIR | The Wire Mold Co. |
| WLC | Ward Leonard Electric |
| WMS | Western Mach. Screw Prod. |
| WTA | Waldes Tru Arc |

Assembly Number: 066714-02, 53, 60, 65, 70, 75, 80 Issue Number: 5

## OVERVIEW

This section contains Adjustments, Functional/Circuit Description, Replacement Parts Lists, and Drawings for the 7510 NTSC and PAL Receive Processor Amplifier Module. A definition of the NTSC and PAL color television transmission standards is located in the Functional/Circuit Description section of this module package.

## ADJUSTMENTS

An Adjustment Table covering all adjustment steps, but in a convenient tabular format, is located at the end of this Adjustments section. A Table of Operation, describing the functions of each front panel and internal control, is located in the Operating Instructions section.

**NOTE**

The 7510 has been fully adjusted at the factory. If the module is not operating correctly, ensure that all operator controls have been properly set, cables are properly connected, and power is applied before proceeding with any adjustments.

### Test Equipment Required

The following equipment is required to align this module to factory specifications. Other equipment may be substituted but must be of equal or greater performance.

| | |
|---|---|
| Digital Voltmeter (DVM) | Fluke 8000 Series |
| Waveform Monitor | Tektronix 1485/1481 |
| Test Signal Generator | Tektronix 1410/1411 |
| Oscilloscope | Tektronix 465B/2000 |
| Vectorscope | Tektronix 520A/521A |
| 9500 Module Extender | GVG part number 066605 |
| Frequency counter | HP 5384A (with option 004) |
| Audio oscillator | HP 200C/D |
| or low voltage transformer | |
| and variac (20.0Vp-p/50-60hz) | |

### Controls, Jumpers, Test Points and Equalizer Hybrids

All module controls, jumpers, and test points, along with their designations and functions, are shown on the following 7510 module drawings: NTSC schematic E10-066714-02, PAL schematic E10-066714-53, and component location drawing B07-066714-53 which is used for both NTSC and PAL units. Equalizer hybrids for equalization of up to 150 meters/500 feet of cable are installed at the factory as ordered. See the table labeled (assembly/cable type/revision) located on schematic drawing E10-066714-02 for NTSC, E10-66714-53 for PAL, and the specific module replacement parts list for additional information.

Operation of SET UP control R702 may be converted from SET UP Black Level to AGC Reference Level by installing and deleting certain resistors. See the table immediately preceding Figure 1-1 or the same table on component location drawing B07-066714-53.

**Adjustment Procedure** (Refer to Figure 1-1 for location of adjustment controls)

**NOTE 1**

The following procedure describes adjustments necessary for a complete alignment of the 7510 Module. Any adjustment steps listed under a **Bold** major heading may be completed independently of other steps unless otherwise noted. If a complete alignment is performed, it should be completed in the order listed here.

**NOTE 2**

The table below shows which resistor to install and which resistor to delete to convert operation of SET UP control R702 from SET UP Black Level to AGC Reference Level.

| OPERATION OF SET UP CONTROL R702 | INSTALL | REMOVE |
|---|---|---|
| AGC REF. LEVEL | R147 | R201 |
| SET UP (BLACK) LEVEL | R201 | R147 |

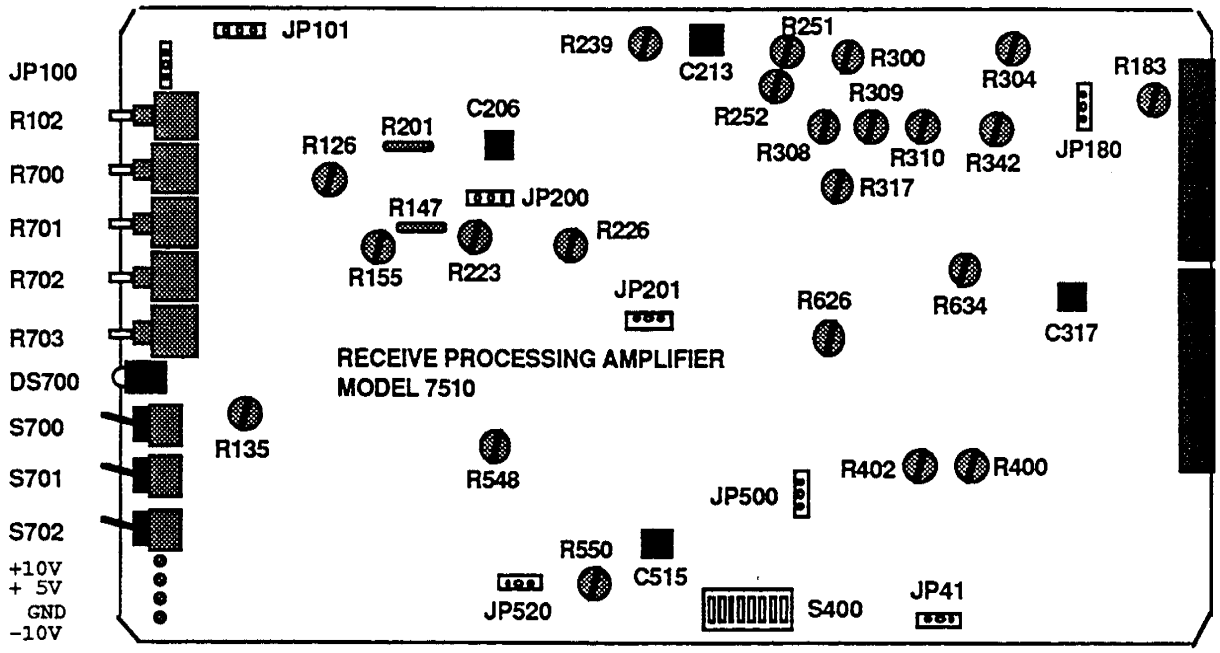



Figure 1-1. 7510 Module Adjustment Controls

## Preliminary Setup

1. Remove the 7510 Module from the tray and place the module on the test extender. Return the extender and module to the correct tray cell. Final measurements must be done with the module in the tray, not on an extender.

**NOTE**

If the preliminary settings for the internal controls are completed as described below, then a full alignment will become necessary for this module. If only a specific adjustment is necessary, review the jumper and switch settings below then proceed directly to the **Bolded** adjustment heading required and/or refer to the Adjustment Table in this section.

2. Set the Soft Black Clip, Black Clip, and White Clip internal control trim potentiometers (R239, R252, and R251) fully counterclockwise (CCW).

3. Set all other internal control trim potentiometers to the center of their range.

4. Set Equalizer ON/OFF jumper JP100 to the OFF postiion.

5. Set Clamp ON/OFF jumper JP200 to the ON position.

6. Set Horizontal Loop Speed NORmal/FAST jumper JP200 to the NORmal position.

7. Set Force Direct AUTO/OFF jumper JP200 to the AUTO position.

8. Set Coarse Gain jumper JP101 and Clamp Gain jumper JP180 to the NORMal position.

9. Set all mini-dip switches on switch S400 to ON.

10. Set the front panel switches to the following positions:
    - LOCal/REMote switch S700 to LOCal
    - DIRect/NORmal switch S701 to DIRect
    - AGC ON/OFF switch S702 to OFF

11. Set front panel EQ control R102 fully counterclockwise (CCW).

12. Set all other front panel controls to the center of their ranges.

13. Set Clamp Window JP201 to OFF.

**Voltage Regulators (no adjustments)**

1. Verify ±10.0VDC, ±200mV, at the ±10V test points.
2. Verify +5.0VDC, ±250mV, at the +5V test point.

**Common Mode Rejection (R183)**

(Ensure that **NO CABLE** is connected to the Bypass Output.)

1. Remove the Video Input from the frame.
2. Connect the oscillator or transformer to the input as shown in Figure 1-2.
3. Adjust the voltage at the input for 8V p-p of common mode.

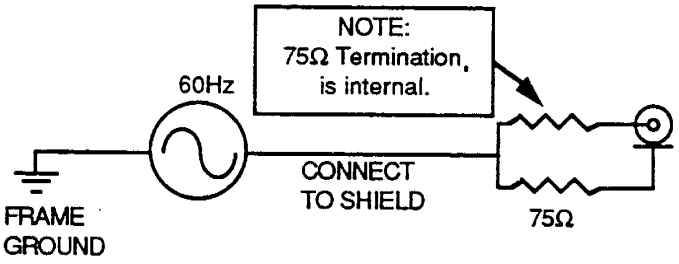



Figure 1-2. Common Mode Adjustment Connection

4. Observe the output at TP18 and adjust R183 for <4mV p-p.

**Clamp/Video Hum Null Pick-off (R135 and R126)**

1. Place DIRect/NORmal switch S701 in the DIRect position.
2. Remove the Video Input from the frame.
3. Adjust R135 fully clockwise (CW).
4. Measure the voltage at TP14 and adjust R135 counterclockwise (CCW) until the voltage increases from approximately -0.5V to +7.0V. An additional 1/20th of a turn will ensure proper threshold operation of the clamp.
5. Verify that no pulses are present at TP14.
6. Place Coarse Gain jumper JP101 and Clamp Gain jumper JP180 in the NORMal position.

7. Turn Video Gain control R700 fully counterclockwise (CCW).

8. Connect a video signal, summed with 5V p-p of differential hum,to the input.

9. Monitor the waveform at TP12 and adjust Pick Off Hum Null control R126 for minimum hum on the sync tip. Any remaining hum should be less than 5mV p-p.

10. Monitor the luminance waveform at TP22 and adjust Hum Null control R223 for minimum hum on the sync tip. Any remaining hum should be less than 5mV p-p.

11. Turn the Video Gain control R700 fully clockwise (CW) and verify that the hum level is less than 5mV p-p.

12. Remove the hum signal and replace with a 1V p-p video signal.

13. Adjust Video Gain control R700 for unity gain.

**Chroma Filter, Set Up, and Soft Black Clip (C206, S702, R239)**

1. Change DIRect/NORmal switch S701 to DIRect.

2. Move Clamp ON/OFF jumper J200 to the ON position.

3. Turn the Soft Black Clip, Black Clip, and White Clip controls (R239, R252, and R251) fully counterclockwise (CCW).

4. Connect a 1V p-p color bars signal to the input.

5. Monitor the output of the 7510 and adjust Video Gain control R700 for a 1V p-p signal level between sync tip and peak white.

6. Monitor the luminance waveform at TP22 and adjust Chroma Filter control C206 for minimum chroma.

7. Change DIRect/NORmal switch S701 to NORmal.

8. Adjust SET UP (R702) for a back porch level of 0.0V at TP22.

9. Monitor the soft clipper output at TP24. Adjust Soft Black Clip control R239 fully clockwise (CW), verify that video is clipped below +100mV. Adjust R239 fully counterclockwise (CCW) and verify that sync clipping does not occur. Set as desired.

**Black and White Clip (R252 and R251)**

1. Place DIRect/NORmal switch S701 in the NORmal position.

2. Set Black Clip and White Clip controls (R252 and R251) fully counterclockwise (CCW).

3. Connect a 1V p-p color bars signal to the input.

4. Adjust Set UP S702 for a back porch level of 0.0V at TP22.

5. Verify that no clipping occurs on the waveform at TP26.

6. Adjust Black Clip control R252 fully clockwise (CW) and verify that sync and black level are clipped.

7. Momentarily set DIRect/NORmal switch S701 to DIRect. Verify that no clipping occurs. Return switch to NORmal.

8. Adjust Black Clip control R252 toward fully counterclockwise (CCW) and set for desired clip level.

9. Adjust White Clip control R251 fully clockwise (CW) and verify that white clipping occurs. Set for desired clip level.

**FREQUENCY RESPONSE (HF RESP C317, DELAY BAL C213, and CHROMA GAIN R701)**

1. Change DIRect/NORmal switch S701 to DIRect.

2. Move Clamp ON/OFF jumper JP200 to ON.

3. Verify that Coarse Gain LOW/NORMal jumper JP101 is in the NORMal, ±6dB position.

4. Verify that EQ ON/OFF jumper JP100 is OFF.

5. Short the positive (+) leads of C186 and C187 together.

6. Connect network analyzer to input and output. Set the analyzer to sweep from 100KHz to 20MHz at .25dB per division.

7. Adjust VIDEO GAIN control R700 for 0dB at 100KHz.

8. Adjust CHROMA GAIN control R701 for flattest response.

9. Adjust DELAY BAL control C213 in conjunction with CHROMA GAIN control R701 for the flattest response to 6MHz. Verify that the response meets the specification.

10. Adjust HF RESP control C317 for the flattest response to 8MHz. Verify that the response meets the specification.

11. Set Coarse Gain NORMal/LOW jumper JP101 to desired position.

12. Remove the short between the positive leads of C186 and C187.

## CABLE EQUALIZATION (JP100 and R102)

(Frequency Response adjustment steps must be completed first.)

1. Connect cable between the Analyzer and the 7510 input.
2. Set EQ jumper JP100 to the ON position.
3. Adjust EQ CONTROL R102 clockwise (CW) until the response is flat to 5.5MHz. Note: When not in use, set EQ CONTROL R102 fully counterclockwise (CCW) and EQ jumper JP100 to the OFF position.

## SYNC GENERATOR (C515, R317, S400, and R548)

1. Place DIRect/NORmal switch S701 in the NORmal position.
2. Monitor the output on a waveform monitor or oscilloscope.
3. Apply Sync, attenuated to approximately 300mV, or a Color Black signal to the input connector.
4. Adjust FREQ control C515 for +2.5V, +/- 250mV at TP50.
5. Momentarily remove the input signal and verify that the voltage at TP50 remains at +2.5V, +/-250mV.
6. Adjust SYNC AMP (R317) for 286mV/NTSC or 300mV/PAL.
7. Set switches 5 - 8 of S400 for desired Vertical Blanking width following the sequence listed below.

| | 5 | 6 | 7 | 8 | (NTSC) Blanking Width | (PAL/FIELD) Last Line Blanked | |
|---|---|---|---|---|---|---|---|
| | | | | | | Odd | Even |
| | ON | ON | ON | ON | 9 lines | line 6 | 319 |
| | ON | ON | ON | OFF | 10 lines | line 7 | 320 |
| | ON | ON | OFF | ON | 11 lines | line 8 | 321 |
| | ON | ON | OFF | OFF | 12 lines | line 9 | 322 |
| | ON | OFF | ON | ON | 13 lines | line 10 | 323 |
| | ON | OFF | ON | OFF | 14 lines | line 11 | 324 |
| | ON | OFF | OFF | ON | 15 lines | line 12 | 325 |
| | ON | OFF | OFF | OFF | 16 lines | line 13 | 326 |
| | OFF | ON | ON | ON | 17 lines | line 14 | 327 |
| | OFF | ON | ON | OFF | 18 lines | line 15 | 328 |
| | OFF | ON | OFF | ON | 19 lines | line 16 | 329 |
| | OFF | ON | OFF | OFF | 20 lines | line 17 | 330 |
| NTSC | **OFF** | **OFF** | **ON** | **ON** | **21 lines** | line 18 | 331 |
| | OFF | OFF | ON | OFF | 22 lines | line 19 | 332 |

Continued on next page.

| | 5 | 6 | 7 | 8 | (NTSC) Blanking Width | (PAL/FIELD) Last Line Blanked | |
|---|---|---|---|---|---|---|---|
| | OFF | OFF | OFF | ON | 23 lines | line 20 | 333 |
| **PAL** | **OFF** | **OFF** | **OFF** | **OFF** | 24 lines | **line 21** | **334** |

NOTE

PAL ONLY: S400 (4) -- line 22 (335) BLANKING (inoperative for NTSC)
ON -- lines 22, 1/2 of 23 and 335 blanked
OFF -- lines 22, 1/2 of 23 and 335 unblanked

**Factory set** **NTSC -- 21 lines**
**PAL -- line 21 (334) last line blanked and line 22 (335) first half of line 23 blanked.**

8. Set S400 (1-3) as follows: 1/OFF, 2/ON, 3/ON. This represents a 0nSec advance/delay between DIRect and NORmal.

9. Observe the horizontal sync portion of the output signal on a waveform monitor using external sync.

10. Toggle switch S701 from DIRect to NORmal while adjusting HORizontal PHASE control R548 for exact alignment of the horizontal sync leading edge. The range of R548 is > ±150nSec.

11. Set switches 1 - 3 of S400 for desired Horizontal Sync positioning following the sequence listed below.

| 1 | 2 | 3 | HORIZONTAL POSITION | |
|---|---|---|---|---|
| ON | ON | ON | DELay | 450nSec |
| ON | ON | OFF | DEL | 450 |
| ON | OFF | ON | DEL | 300 |
| ON | OFF | OFF | DEL | 150 |
| **OFF** | **ON** | **ON** | — | **0** |
| OFF | ON | OFF | ADVance | 150 |
| OFF | OFF | ON | ADV | 300 |
| OFF | OFF | OFF | ADV | 450 |

(**Factory set** for 0nSec advance/delay between DIRect and NORmal.)

**HORIZONTAL BLANKING WIDTH (R402 and R400)**

1. Place DIRect/NORmal switch S701 in the NORmal position.

2. Connect a 1V p-p video signal to the input.

3. Monitor the horizontal blanking period on a waveform monitor.

4. Adjust BLANKING LEADING EDGE control R402 so leading edge of blanking measures 1.5uS (NTSC) or 1.55uS (PAL) in advance of sync.

5. Adjust BLANKING TRAILING EDGE (R400) so trailing edge of blanking measures 9.4uSec (NTSC) or 10.5uSec (PAL) from leading edge of sync.

**DIRECT DC OUTPUT (R300)**

1. Place DIRect/NORmal switch S701 in the DIRect position.
2. Remove the input signal.
3. Monitor the output and adjust DIRect DC OUT control R300 for an output DC level of 0.0V, ±10mV.

**TRANSITION BAL (R304)**

1. Place DIRect/NORmal switch S701 in the NORmal position.
2. Switch JP41 to the MONO BLACK + VIDEO position and lock the oscilloscope to the output sync.
3. Remove the input signal.
4. Monitor the Horizontal Blanking period and adjust R702 for NTSC/PAL 0.0VDC at blanking, no setup.
5. Adjust R304 TRANS BAL for minimum spikes during the blanking transition.
6. Set JP41 to the MONO position.

**REGENERATED BLACK DC OUTPUT (R310)**

1. Place DIRect/NORmal switch S701 in the NORmal position.
2. Switch JP41 to the MONO BLACK + VIDEO position and lock the oscilloscope to the output sync.
3. Remove the input signal.
4. Monitor the Horizontal Blanking period and adjust R310 for NTSC/PAL 0.0VDC at blanking.
5. Adjust Set Up control R702 for (NTSC 54mV/PAL 0.0V)
6. Set JP41 to the ON (MONO) position.

**AGC and PEAK AGC (R155 and R226)**

1. Place DIRect/NORmal switch S701 in the DIRect position.
2. Place AGC ON/OFF switch S702 in the OFF position.
3. Connect a Window signal to the input.
4. Monitor the output and adjust VIDEO GAIN control R700 for a 1V p-p signal.
5. Ground U106 pin 7.

6. Place AGC ON/OFF switch S702 in the ON position.

7. Monitor the output and adjust AGC LEVEL control R155 for a 1V p-p signal.

8. Move the ground from pin 7 to pin 14 of U106.

9. Monitor output and adjust PEAK AGC (R226) for 1.05Vp-p.

10. Remove the ground from U106 pin 14.

11. AGC ON/OFF switch S702 is factory set to the OFF position.

**COLOR LOCK, SUBCARRIER, and BURST (R308, R309, R634, R626, and R703)**

1. Connect one output to an externally locked Vectorscope and one output to a calibrated waveform monitor.

2. Connect a modulated ramp signal to the input and adjust VIDEO GAIN control R700 for a 1V p-p output signal.

3. Place DIRect/NORmal switch S701 in the DIRect position and set the vectorscope to correctly place the burst on the graticule.

4. Return DIRect/NORmal switch S701 to the NORmal position and verify that the burst is locked on the vectorscope.

5. The voltage at TP61 should be between -5VDC and +2VDC.

6. Adjust R342 for proper burst width. 2.5 uS (9 cycles) for NTSC or 2.25 uS (10 cycles) for PAL.

7. Adjust BURST AMP control R308 for 286mV p-p (NTSC) or 300mV p-p (PAL) of burst as seen on the waveform monitor.

8. Switch the waveform monitor to the IRE/LUM position.

9. Adjust BURST AXIS R309 for a minimum disturbance during burst as viewed on the waveform monitor.

**CLAMP WINDOW (R550)**

1. Connect a scope probe to the cathode of D206.

2. Connect a second scope probe to the collector of Q201.

3. Insure that the clamp window jumper is in the OFF position.

4. Adjust R550 until the pulse on the cathode of D206 is centered around the pulse on the collector of Q201.

5. Set JP201 to desired position.

### NTSC and PAL system phase adjustments (R703, R634, and R626)

**NTSC**: Toggle switch S701 from DIRect to NORmal while adjusting CHROMA PHASE control R703 for exact alignment of the chroma phase of the direct and normal signal. (Note: The range of control R703 from end to end is ±10 degrees.)

**PAL**: Adjust the vectorscope to move the displayed lower burst vector to the horizontal axis while adjusting the gain control on the vectorscope until vectors reach the outer circle.

Adjust PAL QUAD PHASE R634 to align the displayed upper burst vector to the vertical axis (90 degrees difference from the displayed lower burst vector).

Adjust PAL QUAD PHASE BALANCE R626 for equal amplitude of both burst vectors. (Note: May need to repeat PAL sequence to ensure accuracy.)

For exact alignment of the chroma phase, perform the NTSC adjustment above for CHROMA PHASE control R703.

If necessary, refer to Adjustment Table A-1 for a tabular formatted adjustment procedure.

Prior to shipment, the module's front panel and internal controls are set to the following positions:

- Coarse Gain JP101 and Clamp Gain JP180 jumpers set to NORMAL
- Input Cable Equalization jumper JP100 set to OFF
- Equalizer control R102 set full CCW
- LOCal/REMote switch S700 set to LOCal
- DIRect/NORmal switch S701 set to DIRect
- AGC ON/OFF switch S702 set to OFF
- Clamp ON/OFF jumper JP200 set to ON
- Clip controls R239, R252, and R251 set full CCW
- MONO/MONO + VIDEO jumper JP41 set to MONO
- Horizontal Sync Position switch S400 (1/2/3) set to 0nS
- Vertical Blanking Width switch S400 (4/5/6/7/8) set to: (21lines for NTSC, last line blanked is line 21(334) with line 22(334) and first 1/2 line of 23 is blanked for PAL.)
- Horizontal Blanking Leading Edge control R402 set to: (1.5µS for NTSC or 1.55µS for PAL)
- Horizontal Blanking Trailing Edge control R400 set to: (9.4µS for NTSC or 10.5µS for PAL)
- Horizontal Phase control R548 set to 0nS advance/delay referenced to DIRect/NORmal
- Horizontal Lock Loop Speed NORmal/FAST jumper JP520 set to NORmal
- Auto Direct AUTO/OFF jumper JP500 set to OFF
- Clamp Window ON/OFF jumper JP201 set to OFF

Table A-1. Adjustment Table (Part 1 of 2)

(part 1 continued on next page)

| Test Parameter | Equipment Required | Control Settings | |
|---|---|---|---|
| Common Mode Rejection | Common Mode transformer or 60Hz generator | Local; Direct; AGC OFF; unity gain | |
| Clamp Pick Off | Oscilloscope | Local; Direct; AGC OFF; unity gain | |
| Clamp Hum Null | 50/60Hz Generator, Oscilloscope | Local; Direct; AGC OFF; unity gain; JP180 HIGH | |
| Video Hum Null | 50/60Hz Generator, Oscilloscope | Local; Direct; AGC OFF; unity gain; JP180 HIGH | |
| Chroma Separation | Color Bars Generator, Oscilloscope | Local; Direct; AGC OFF; unity gain | |
| Soft Black Clip | Color Bars Generator, Oscilloscope | Local; Direct; AGC OFF; unity gain | |
| White Clip | Color Bars Generator, Oscilloscope | Local; Direct; AGC OFF; unity gain | |
| Black Clip | Color Bars Generator, Oscilloscope | Local; Direct; AGC OFF; unity gain | |
| Frequency Response | Sweep Generator or Network Analyzer | Local; Direct; AGC OFF; unity gain | |
| Cable Equalization | Sweep Generator or Network Analyzer | Local; Direct; AGC off; unity gain; JP101 ON; Short (+ leads of) C186 to C187 ; Short U104-8 to GND | |
| Horiz.Free Run Freq. | Oscilloscope | Local; Normal; AGC OFF | |
| Vertical Blanking Width (see E10-066714/sheet 4) | Oscilloscope or Waveform Monitor | Local; Normal; AGC OFF | |
| Horizontal Position (see E10-066714/sheet 4) | Oscilloscope or Waveform Monitor | Local; Normal; AGC OFF | |
| Horizontal Phase | Oscilloscope or Waveform Monitor | Local; Normal; AGC OFF | |
| Horizontal Blanking, Leading Edge Width | Oscilloscope or Waveform Monitor | Local; Normal; AGC OFF | |

| | Input Signal | Test Point And Signal | Adjustment Procedure |
|---|---|---|---|
| | Video with 8Vp-p of Common Mode | TP18 - Video with attenuated hum | Adjust R183 for minimum hum. (Note: Remove bypass BNC cable if connected.) |
| | Remove video from input | TP 14 - DC Voltage | Adjust R135 fully CCW then CW until voltage increases from approximately -.5V to +7.0V. |
| | Video with +5Vp-p of differential hum | TP 12 - Video with attenuated hum | Adjust R126 for minimum hum at the sync tip. |
| | Video with +5Vp-p of differential hum | TP22 - Video with attenuated hum | Adjust R223 for minimum hum at sync tip. |
| | Color bars signal 1Vp-p | TP22 - Luminance signal | Adjust C206 for minimum chroma. |
| | Color bars signal 1Vp-p | TP24 - Clipped luminance | Adjust R239 for desired soft black clip level. |
| | Color bars signal 1Vp-p | TP26 - Clipped Color Bars | Adjust R251 for desired white clip level. |
| | Color bars signal 1Vp-p | TP26 - Clipped Color Bars | Adjust R252 for desired black clip level. |
| | 300mVp-p sweep, 100KHz to 20 MHz | Output - Sweep set to 0.25dB/division | Adjust all for flattest response: Chroma Gain R701 and C213 to 6MHz, C317 to 8MHz. |
| | 300mVp-p sweep, 100KHz to 20 MHz | Output - Sweep set to 0.25dB/division | Connect cable to be equalized from analyzer to input. Adjust EQ control R102 for flat response. |
| | Color bars or ramp signal | TP50 - DC level | Adjust C515 for +2.5V. |
| | Color bars or ramp signal | Output - Composite video signal | Monitor vertical blanking interval. Adjust switch S400-5,6,7,8 for the desired width. |
| | Color bars or ramp signal | Output - Composite video signal | Monitor horizontal sync on output. Adjust switch S400-2,3,4 for 150nS of the desired position. |
| | Color bars or ramp signal | Output - Composite video signal | Monitor horiz. sync output. Adjust R548 to the desired position relative to the direct path video. |
| | Color bars or ramp signal | Output - Composite video signal | Monitor horizontal blanking interval, and adjust R402 for the desired width. |

Table A-1. Adjustment Table (part 2 of 2)

(part 2 continued on next page)

| Test Parameter | Equipment Required | Control Settings | |
|---|---|---|---|
| Horizontal Blanking, Trailing Edge Width | Oscilloscope or Waveform Monitor | Local; Normal; AGC OFF | |
| Output DC in Direct Mode | Oscilloscope | Local; Direct; AGC OFF | |
| Regen. Black DC Output | Oscilloscope | Local; Normal; AGC OFF; S400 -1 OFF | |
| Transition Balance | Oscilloscope | Local; Normal; AGC OFF S400-1 OFF | |
| AGC Level | Oscilloscope or Waveform Monitor | Local; Direct; AGC ON | |
| Peak AGC Level | Oscilloscope or Waveform Monitor | Local; Direct; AGC ON | |
| PAL Quad Phase | PAL Vectorscope | Local; Normal; AGC OFF | |
| PAL Quadrature Amplitude Balance | PAL Vectorscope | Local; Normal; AGC OFF | |
| Burst Width | Oscilloscope or Waveform Monitor | Local; Normal; AGC OFF | |
| Burst Amplitude | Oscilloscope or Waveform Monitor | Local; Normal; AGC OFF | |
| Burst Axis | Oscilloscope or Waveform Monitor | Local; Normal; AGC OFF | |
| Sync Amplitude | Oscilloscope or Waveform Monitor | Local; Normal; AGC OFF | |
| Clamp Window Pulse | Oscilloscope and two scope probes | Local; Normal; AGC OFF JP201 OFF | |

| | Input Signal | Test Point And Signal | Adjustment Procedure |
|---|---|---|---|
| | Color Bars or ramp signal | Output - Composite video signal | Monitor horizontal blanking interval, and adjust R400 for the desired width. |
| | Remove input | Output - DC level | Adjust R300 for 0.0VDC. |
| | Remove input | Output - Freerunning Mono Black + Video | Lock scope to output. Adjust R310 for 0.0mV |
| | Remove input | Output - Freerunning Mono Black + Video | Adjust R304 for minimum spikes during a blanking transition. |
| | 1V p-p Video signal | Output - 1Vp-p Video signal | Short U106-7 to ground. Adjust R155 for a 1Vp-p Video signal. |
| | 1V p--p Window signal | Output - 1.05Vp-p Video signal | Link U106-14 to ground. Adjust R226 for a 1.05Vp-p Video signal. |
| | Color Bars | Output - Color Bars | Adjust R634 for quadrature of the burst vector. |
| | Color Bars | Output - Color Bars | Adjust R626 for equal bust vector amplitudes. |
| | Color Bars | Output - Color Bars | Adjust R342 full CW then CCW until burst amplitude decreases 2mV. Check burst width , readjusting slightly if necessary. |
| | Color Bars | Output - Color Bars | Adjust R308 for correct burst amplitude. |
| | Color Bars | Output - Color Bars | Adjust R309 for burst symmetry about blanking. |
| | Color Bars | Output - Color Bars | Adjust R320 for the correct sync amplitude. |
| | Color Bars | Collector of Q201, Cathode of D206 | Adjust R550 so that the two pulses overlap. |

This concludes the adjustments for the 7510 Module.

## FUNCTIONAL/CIRCUIT DESCRIPTION

### Introduction

This section of the 7510 module package contains a basic description of the module, a list of the module's functions, and a functional as well as circuit description of the module. The circuit description immediately follows the functional description. In addition, a glossary of common signal terms used in the descriptions is located at the end of this section.

The 7510 module is used for both NTSC, National Television System Committee, and PAL, Phase Alternation by Line, color television transmission system standards. Minor changes are made to the module at the factory before shipment to allow for differences in the two standards. The functional and circuit descriptions in this section are for both standards, with any differences noted. Two sets of schematic drawings, one for the NTSC configured module and one for the PAL configured module, are located at the back of this section. One component location diagram, covering both configurations, is included. A brief description of both transmission standards follows below.

NTSC: National Television System Committee. The American system of color television transmission used mainly in North America, Japan, and parts of South America. A 525 lines per frame, 60 fields per second, 3.579545MHz subcarrier frequency signal. The phase of the subcarrier with respect to the color burst varies with the instantaneous hue of the televised color, and the amplitude of the subcarrier is varied with the instantaneous saturation of the color - as specified by the National Television System Committee.

PAL: Phase Alternation by Line. The colour television transmission standard used in Europe and other parts of the world. A 625 lines per frame, 50 fields per second, 4.43361875MHz subcarrier frequency signal.

The 7510N/7510P Receive Video Processing Amplifier system consists of a video processing amplifier module, a power supply module, and a system tray. All processing, signal generation and regeneration is accomplished by a single video processing amplifier module.

The 7510 Receive Video Processing Amplifier module performs the following functions:

- Video Gain control over a 12dB range (Local or Remote)
- Chroma Gain control over a 12dB range (Local or Remote)
- Chroma Phase control over a ±10 degree range (Local or Remote)
- Set Up control, NTSC only, over a ±15 IRE range (Local or Remote)
- Black Level ±110mV or AGC ±2dB, PAL only (Local or Remote)
- Input Cable Equalization for up to 500 feet/150 meters of appropriate cable
- Common Mode and Differential Mode Hum rejection
- Output Video AGC using sync tip and peak video as a reference (Local or Remote)
- Hard and Soft Clipping of the input video
- Sync, Burst and Blanking regenerated for output reinsertion
- Vertical Blanking selectable
- Horizontal Blanking adjustable
- Video Presence indicator, ON when present (Local or Remote)
- Sync to the output upon loss of input video
- Auto Bypass circuitry will automatically switch input to the Bypass output if power is removed from the tray or module
- Clamp Window that allows clamping only during backporch

**Functional Description** (Refer to Figure 1-3 and the appropriate version of schematic diagram E10-066714, NTSC -02 or PAL -53)

The following **Bolded** text refers to the functional blocks and circuit names as shown on Figure 1-3 as well as on both NTSC and PAL versions of schematic diagram E10-066714.

The **Input Amplifier** stage provides common mode rejection and drives the coarse gain and equalizing amplifier circuitry.

The **Cable Equalizer** stage provides local adjustment to compensate for losses of up to 500 feet of input cable. Equalization may be switched ON or OFF and is adjustable from zero, meaning no equalization, to the maximum allowable length of input cable.

The **Video Gain** stage allows local and remote gain control of the output video over a ±6dB range.

The **Sync Separator/Clamp** stage receives input from the video gain stage. Sync tip clamping, with a sample and hold stage, provides a correction signal which is fed back to the input stage to cancel incoming hum, and fed forward to the luminance stage to further reduce the residual hum. A back porch sample and hold circuit measures the sync amplitude to use as a reference for the AGC and sync pick-off level. The separated sync then drives the sync generator section and the clamp pulse generator on the luminance amplifier.

The **Chroma/Luminance Separator and Luminance Amplifier** stages provide separation of luminance and chrominance, acts as a summing point for the feed forward signal from the sync separator/clamp and clamps the luminance back porch at the level pre-determined by the set-up control.

The **Peak AGC** circuitry becomes active if the video exceeds a preset level, excessive video overrides the sync AGC reducing the peak video to the preset level.

The **Soft Clip** section allows black clipping of the luminance signal.

The **Chroma Gain** stage provides local and remote control of the chrominance amplitude.

The **Summing Amplifier** circuitry combines the luminance and chrominance signals.

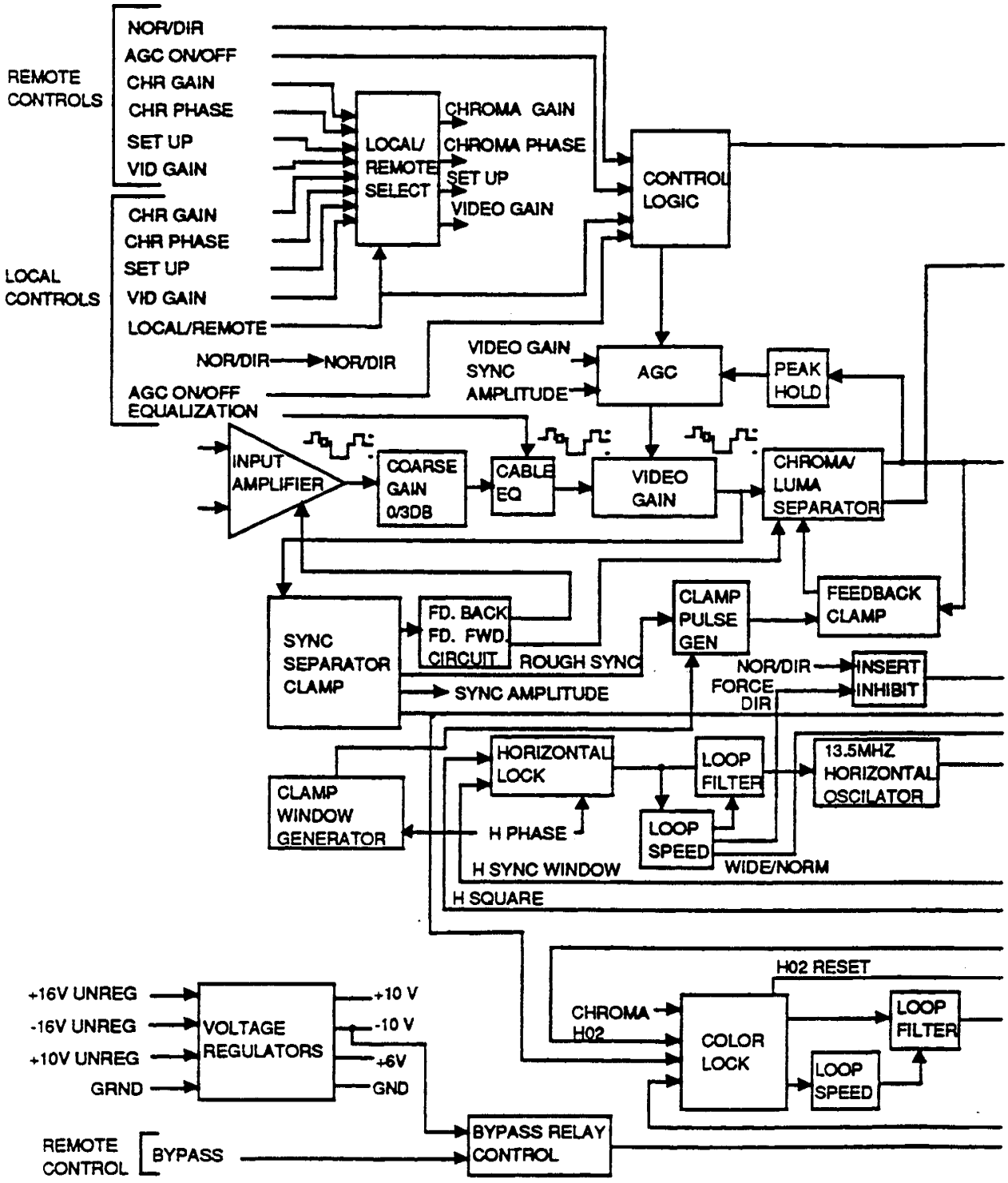
The **Black and White Clip** stage clips the composite video signal if it exceeds preset limits.

The **Blanking Switch** switches between direct video and regenerated Color Black. Control is from the Horizontal SPG which determines the control signal based on the mode selected and the presence of an input signal. No reinsertion takes place in the DIRect mode; in the NORmal mode regenerated Color Black is inserted; if video is not present in the NORmal mode, a Mono Black signal is output.

The **Output Amplifier** provides additional gain and drive capability for the four outputs.

The **Vertical Detector** checks for the correct PAL or NTSC vertical synchronizing pulse sequence and outputs a vertical load pulse to the Vertical SPG. If a non standard sequence is found, the detector applies a series of decisions to make a "best guess" at where the vertical interval is. If it decides that there is no vertical interval it does not provide an output.

# 7510 RECEIVE PROCESSOR AMPLIFIER MODULE



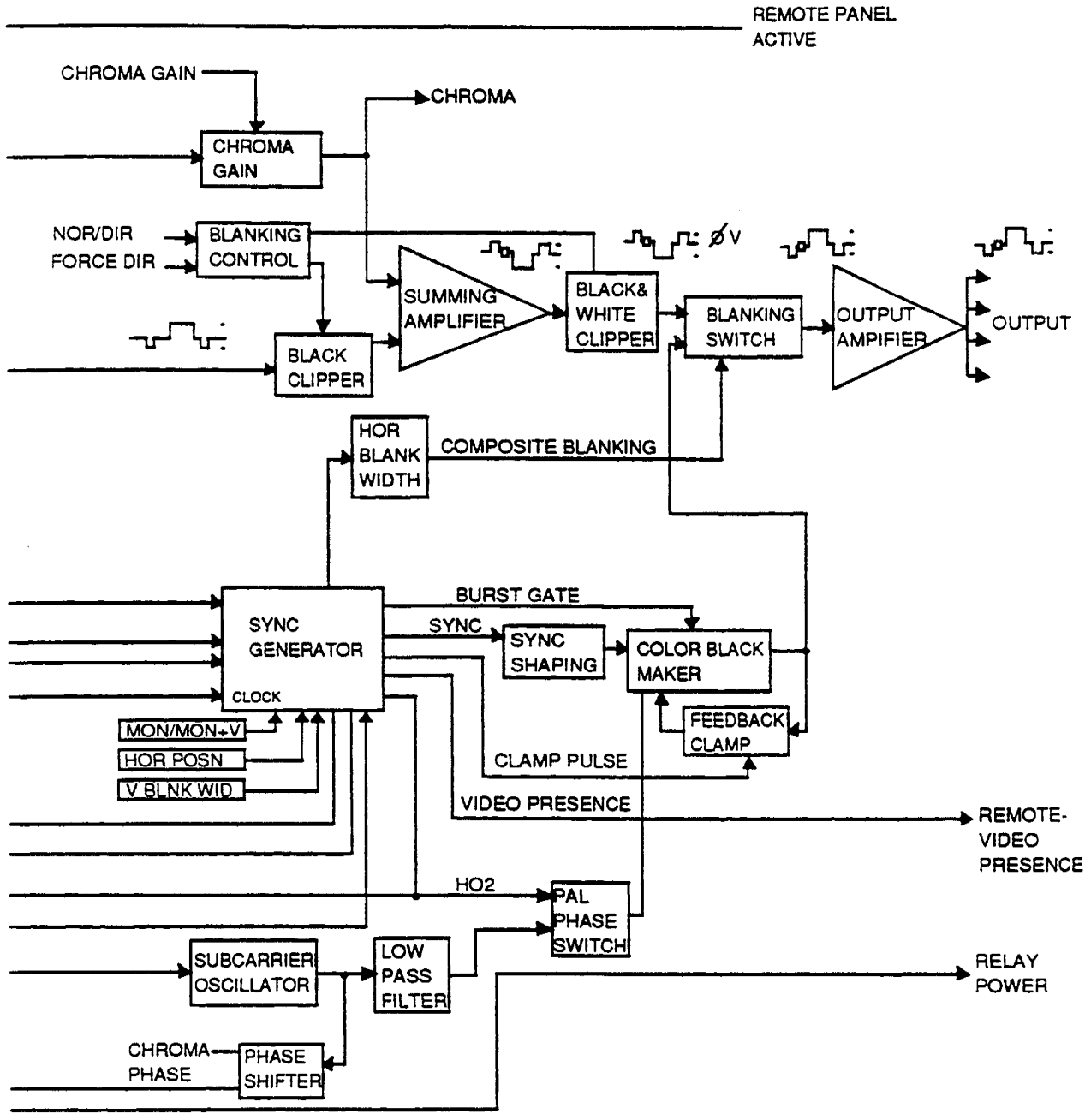



Figure 1 - 3. 7510 Receive Processor Amplifier Module Functional Block Diagram

The **Horizontal SPG** uses a 13.5MHz clock, mode control, and horizontal position input to determine the output conditions. Output pulses drive the Blanking Switch, Color Black Maker, Color Lock, and the Vertical SPG. It also provides reference pulses for the Horizontal Phase Lock.

The **Vertical SPG** receives input from the Horizontal SPG, the Vertical Detector, and vertical blanking width information to determine its output conditions. Outputs are synchronizing and blanking pulses for the Horizontal SPG, a PAL/NTSC level, and video presence indication.

The **Color Lock** stage receives chroma from the chroma gain stage, sync from the sync separator, subcarrier from the oscillator and phase shift stage, along with H/2 and PAL/NTSC input from the Sync Pulse Generator. It samples the burst phase then compares it with the subcarrier frequency and provides an error output to control the phase of the subcarrier oscillator via the loop filter.

The **Subcarrier Oscillator** is driven by the loop filter, it provides a locked subcarrier frequency to the subcarrier filter and phase shifter.

The **Low Pass Filter and PAL Switch** shape the subcarrier and provide the correct PAL alternating phase. The output drives the Color Black Maker.

The **Color Black Maker** takes in shaped sync, burst gate, and subcarrier. It gates the burst into the sync signal in order to generate Color Black. In the event that chroma is not present on the input signal, the burst gate pulse is inhibited and a Mono Black signal is output.

The **Horizontal Lock** stages take in a horizontal window signal (sync sample pulse) and a Horizontal phasing signal (sync generator pulse). These two pulses are compared in phase and the error voltage is fed via the loop filter to the 13.5 MHz oscillator.

The **Horizontal Oscillator** is driven by the Loop Filter. It provides clock pulses to the Sync Pulse Generator stage.

The **Local/Remote Control** section receives input from all Local and Remote controls and routes it to the appropriate sections on the module. In addition, information on video presence and mode selection is routed back to the LED indicators.

The **Clamp Window Generator** creates a pulse from H Phase that only allows the feedback clamp to clamp during backporch.

## Circuit Description

Refer to Figure 1-3 and the appropriate version of schematic diagram E10-066714, NTSC -02 or PAL -53, while reviewing this text.

## Introduction

This text will follow the main flow of the functional block diagram. Video flow will be described first, with ancillary functions being discussed afterwards. To locate the drawing sheet number and co-ordinates for each functional block, refer to the numbers and letters in parenthesis following each **Bold** functional block subheading.

### **Input Amplifier** (sheet 1, D/7)

U180 and RN180 form a unity gain inverting input amplifier. R183 adjusts the common mode rejection. RN180 pin 4 receives feedback from the sync separator/clamp stage, this provides partial cancellation of any incoming differential hum right at the input stage.

### **Coarse Gain and Cable Equalization** (sheet 1, D/5)

JP101 allows selection of the gain range. In the LOW signal position, the incoming signal must be between -9dB and +3dB. In the NORMAL signal position, the signal must be between -6dB and +6dB. U101 is the equalizing amplifier with U100 the equalizer network. Jumper JP100 allows equalization to be IN or OUT, with R102 controlling the amount of equalization when IN.

### **Video Gain** (sheet 1, D/4)

The signal from the equalizer is fed directly to port Y, and attenuated by approximately 12dB before being fed to port Z, of the multiplier U102. Port X is the control input which is fed from the gain control circuit (sheet 7) and from the AGC circuit. Q100 and Q101 buffer the signal and drive Sync Separator filter DL100.

### **Chrominance/Luminance Separator** (sheet 2, C/7)

Inverted video from the gain stage is fed to parallel tuned circuit R216, L200, C206, C205. The Chroma appearing across the LC circuit is fed to pin 1 of chroma amplifier U201. The luminance is fed as a current to pin 3 of U202 and appears as an output voltage at pin 7. Feedback Clamp U104A holds U202's output back porch at the same voltage as pin 3. This voltage is controlled by the SET UP control when the unit is in the NORmal mode and is held at ground when Q103 is turned OFF in the DIRect mode. Q201 generates the clamp pulses with FET Q200 charging hold capacitor C201. To ensure that the output of the luminance amplifier stage remains centered around ground even with no video present, FET Q202 is switched in if video is not present. This forms a long time constant integrator around U104 forcing the average DC level to be the same as U202 pin 3. When the clamp window is on, Q210 disables the clamp, except during back porch time .

### **Soft Black Clip** (sheet 2, B/5)

U203 is a NON ADDITIVE mixer stage which clips any signal that goes below the level set by SOFT BLACK CLIP R239. This allows clipping of Sync, negative spikes, or Super Black signals. If the DIRect mode is selected, then diode D202 pulls the CLIP out of the circuit. The output drives a delay balance circuit. DELAY BAL control C213 is adjusted to compensate for the delay through the Chroma Gain stages.

**Chroma Gain** (sheet 2, D/5)

Amplifier U201 provides approximately 6dB of gain to drive the Chroma Gain stage U200. Internal resistors provide feedback and in conjunction with external resistors the correct gain ratio for approximately 12dB of gain range. The Chroma Gain control is fed from circuitry on sheet 7.

**Summing Amplifier** (sheet 2, C/3)

Inverting amplifier U204 sums the clipped luminance and gain controlled chrominance signals.

**Black and White Clip** (sheet 2, C/2)

The inverted output of U204 drives NON ADDITIVE mixer stage U205. Clipping levels are adjusted by WHITE CLIP control R251 and BLACK CLIP control R252. If DIRect mode is selected, diode D204 pulls the black clip out of circuit.

**Blanking Switch** (sheet 3, D/6)

The clipped video is fed to the A input of blanking switch U300. The B input is fed with regenerated color black. Blanking, which drives the control port, is shaped by internal circuitry in conjunction with C302. The blanking signal is controlled by the mode selected and the input signal. The transition balance is controlled by R304. Blanking level DC is set by R310 with R300 setting the DC level of the active video portion.

**Output Amplifier** (sheet 3, D/3)

U304 is a non inverting amplifier which drives the four video outputs. The output resistors form a 75Ω impedance and provides high output to output isolation.

**Sync Separator/Clamp** (sheet 1, B/5)

The sync separator/clamp main function is to provide a clean sync signal to use as a reference for the sync generator. It also provides sync for the Luminance Clamp and for the Color Lock Burst Gate. From gain stage U102, the output is buffered by Q100 and Q101 before driving lowpass filter DL100. The output is inverted by AMP 1 in ASIC U105 which in turn drives: a 250nSec delay section of DL100; 1uSec delay line DL101; and CLAMP 1 of U105.

CLAMP 1 DC restores the sync tip of the incoming signal with the DC restored signal appearing at the pin 38 side of C115. C114 stores a charge when pulses are present. If sync pulses are missing, then C114 discharges and forces a higher pull down current through C115 resulting in a fast recovery from missing pulses. The DC restored signal drives the ROUGH SYNC SEPARATOR section where C113 delays the leading edge of sync. Rough sync from U105 pin 4 is used to drive the colorlock ASIC. C112 differentiates the rough sync generating a sample pulse from the trailing edge of sync. C111 delays the pulse before it drives the SAMPLE PULSE GENERATOR.

Internal pulses drive sample and hold circuits SH 1 and SH 2 which sample the sync tip and back porch respectively. C110 times out in the event that the input is missing and holds SH 2 ON. The output of SH 1 is summed with the 1uSec delayed signal from DL101 at AMP 2. This output is a clamped signal with input hum removed from the leading edge of sync.

Pick Off Hum Null control R126 is adjusted for minimum hum, providing a clean signal for feeding to the internal comparator COMP. SH 2 samples the back porch, since the sync tip is held on ground the output of SH 2 is a true measure of the sync amplitude. This voltage is attenuated

and fed to COMP to enable sync pick off at the 50% point of sync. This signal is also fed back to CLAMP 1 to aid in recovery from missing pulses and via U106C to offset the signal out of AMP 1 and thus shift the DC point of the incoming video. U106A inverts the sampled signal before driving feedback integrator U301B.

Clamp Feedback NORMal/LOW jumper JP180 allows selection of the integrator time constant to match the coarse gain NORMal/LOW setting of jumper JP101. This allows a high degree of hum rejection at the input. Feed forward via U104C cancels any residual hum at the output of gain stage U102.

**AGC** (sheet 1, B/2)

When the AGC control is turned ON, U103 is turned OFF. This isolates it from the feedback circuit across U104B. When the AGC control is turned OFF, U103 is turned ON. This places it in the feedback loop of U104B and forces the output at U104 pin 7 to ground potential. This action overrides any inputs and allows manual control of the gain. Transistors Q104 and Q102 control the AGC. Video must be present and the AGC control must be in the ON position before the AGC operates.

The output of U105 on SH 2 is a measure of the sync amplitude after the Video Gain stage. This level is applied to peak hold circuit U106D which stores the amplitude in C117. U104D amplifies this signal and drives AGC loop filter U104B. The integrated output is fed back to the Video Gain stage to adjust the gain to ensure that the sync amplitude at U104D pin 14 matches the reference level at U104B pin 5.

**Peak AGC** (sheet 2, B/2)

Output of the Soft Black Clip (U203 pin 9) is fed by SET PEAK AGC control R226 to the peak hold circuit differential input. Peak white level is stored in hold capacitor C210, buffered by FET Q207, and fed back to the the differential input. When the input level drops below a stored level, the differential input turns OFF the charge current to C210 and peak is held at Q207-source. Peak AGC level drives U106B, which forms a diode OR circuit with U106D. The highest level charges C117 and controls the gain. In normal operation, sync level controls the amplitude and the Peak AGC control would be set to take over if the video level exceeded the normal 700mV amplitude.

**Color Lock** (sheet 6, B/7)

The Color Lock circuit locks the subcarrier oscillator to the incoming burst. U600 is a custom ASIC containing most of the circuitry required to accomplish the color lock function. Rough sync is applied to the WIDE BURST GATE via C601. Internal pulses are generated and fed to the BURST AMP DET & BURST PHASE DET. Incoming chroma is sampled by the wide burst gate pulse and filtered before being fed to the PEAK DET. This circuit stores the peak and applies half the level to the COMP (comparator) circuit which produces a pulse equal to the half amplitude duration of burst.

A second output of the PEAK DET is fed to the PRESC DET (presence detector) which determines if burst is above the required amplitude. If the amplitude is too LOW, the MONO output goes HIGH which turns OFF the SAMPLE PULSE GEN. The MONO level is also applied to the Horizontal SPG to turn OFF burst gate pulses, ensuring that burst is not inserted into the output if incoming burst is not present. If burst is present, sample pulses are fed to the STEER LOGIC (steering logic) circuitry that, based on PAL/NTSC and HO2 inputs, determines whether sample and hold circuits SH 1 and SH 2 sample on alternate lines (PAL) or simultaneously on all lines (NTSC).

The BURST PHASE DET circuit compares the incoming burst phase with the subcarrier being fed back from the voltage controlled oscillator. The output is then filtered before being fed to SH 1 and SH 2 where it is sampled and the level stored in capacitors C603 and C604 respectively. When the inputs to the BURST PHASE DET are 90 degrees out of phase, the outputs will be 0.0 Volts. The outputs of the sample and hold circuits are fed to loop filter U690A. Any error voltage causes the output to change the bias on variable capacitance diode D603, pulling the oscillator frequency until the loop again has the correct phase relationship. The LOOP SPEED SWITCH determines when the phase error is above a preset level. When this occurs, the output goes HIGH and turns Q601 ON which reduces the time constant of the loop and speeds up the recovery.

The H/2 RESET circuit operates in PAL only, monitoring the polarity of the sampled voltages and staying LOW if the polarity is correct, going HIGH if it is not. A HIGH level causes the Sync Generator to change its HO2 polarity and corrects the relationship.

**Subcarrier Oscillator** (sheet 6, C/3)

The subcarrier oscillator is used to generate the regenerated burst signal. Q602 is configured as a Colpitts oscillator, with Y600 as its main frequency determining component. Variable capacitance diode D603 is controlled to pull the crystal into lock with the incoming burst. The output of the oscillator is buffered by U691C and U691A before driving the subcarrier filter and Phase Shift circuitry. U690B ensures that the driving signal is maintained at a 50% duty cycle.

**Chroma Phase** (sheet 6, D/8)

The Chroma Phase circuit forms a delay section in the oscillator feedback path to the Burst Phase Detector. The first stage of the delay is a fixed low pass filter. The second stage is comprised of C618, L602, D601, and D602 forming a variable delay stage. Voltage from the Chroma Phase control varies the capacitance of the variable capacitance diodes and changes the delay of the signal to the Colorlock circuit forcing the oscillator to change phase with respect to incoming burst accordingly.

**PAL Phase Switch** (sheet 6, D/4)

The subcarrier square wave is low pass filtered to form a sine wave before being applied to the base of Q604. In NTSC mode; the signal on the emitter is coupled to Q603, which drives the subcarrier signal to the Color Black circuit. In PAL mode, transistor Q605 is switched by the HO2 square wave such that when ON the signal at the emitter of Q604 is coupled to the base of Q603 and when OFF the signal is delayed by R637, R634 and C629. The delay provides the alternate line 90 degree phase shift for the burst signal. PAL QUAD AMP Balance control R626 is used to adjust the alternate line amplitude balance.

**Sync Generator Section** (all of sheet 4)

Subsections are **Bolded** below. Designator, function, and description immediately follow.

The Sync Generator Section consists of:

- **Vertical Detector** U403
- **Vertical SPG** (Sync Pulse Generator) U402
- **Horizontal SPG** (Sync Pulse Generator) U401

The major components previously listed, along with associated circuitry and controls, are used to make coarse adjustments of timing and to select blanking widths.

The Sync Generator section receives timing input from separated sync and clock input from the 13.5MHz oscillator. It determines where the vertical interval is and regenerates the required sync, blanking and clamp pulses for driving the Color Black Maker and Blanking Switch.

The **Vertical Detector** (U403 @ coordinates B/6) is a dual standard (PAL/NTSC) vertical detector. The main function of this EPLD (Electrically Programmable Logic Device) is to look for and detect the correct vertical sync (broad pulse) sequence. A reference clock at 843KHz, derived from the Horizontal SPG, is used to clock the input sync through the detector.

The **Vertical SPG** (U402 @ coordinates B/4) performs the following functions:

- determines that video is present
- generates vertical reference pulses
- generates vertical signals to control the Horizontal SPG
- allows vertical blanking adjustment of the VIB (Vertical Interval Blanking) output

The Vertical SPG is clocked from the 2H clock. The VBP (vertical broad pulse) signal is used as a reference for the start of the vertical sequence. Sync, Horizontal Drive, and HO2 are used to generate the following output pulses:

- BRD (Broad Pulses)
- VIB (Vertical Interval Blanking)
- VERT DRIVE (Vertical Drive)
- VPD (Vertical Presence Detector)

The pulses are then fed to the Horizontal SPG circuitry.

The **Horizontal SPG** (U401 @ coordinates C/4) performs the following functions:

- windows incoming Sync
- generates and controls Composite Blanking dependent on input and mode conditions
- allows Horizontal position adjustment relative to the input Sync
- generates Sync, Burst Gate, and clamp pulses for use in Color Black generation

The Horizontal SPG U401 is clocked by the 13.5MHz oscillator and referenced from the separated sync signal. The horizontal oscillator is locked to the incoming sync by means of a phase lock circuit (see Horizontal Phase Lock section) that uses the Hor Phase and the Hor Window output pulses in the phase comparison process. Both pulses are derived from the sync input with the Hor Window pulse being controlled by the Wide/Norm input (see timing diagram for detailed relationships). Other outputs of the Horizontal SPG are referenced to the Vertical SPG.

**Clamp Window Generator** (sheet 5, B/6-7)

The Horizontal SPG provides the H Phase pulse which clocks U523. U523 delays and creates the proper pulse width from the H Phase clock so the generated window pulse lands on back porch.

**Clamp Window** (sheet 2, A/4)

The window signal from the Clamp Window Generator drives one input of the diode switch matrix. The second input to the matrix is the vertical signal from U402, pin 28. This input insures normal clamping during vertical sync. The third input is from JP201 and provides the ON/OFF function. The diode matrix drives Q210 which disables the clamp in the ON mode.

**Pulse Shaper and Color Black Maker** (sheet 3, B/4)

This circuits main function is: to combine sync and gated subcarrier to form a color black signal. The burst gate gate pulse is applied to Pulse Shaper U303, the output is a trapeziod with the edge rise time determined by C309. Subcarrier from the Oscillator is applied to one input of U302, shaped sync is applied to the other input. When the burst gate is LOW, sync is passed to the output, when HIGH burst is gated through. The output of U302 is clamped to ground to ensure that the black level does not vary over temperature, clamping occurs in the active video portion ahead of sync. The color black signal is applied to the Blanking Switch, where it is gated into the video signal by controlled blanking from the Horizontal SPG.

**Horizontal Phase Lock circuitry** (sheet 5, C/7 )

The function of the Horizontal Phase Lock section is to lock the Horizontal Oscillator to sync on the incoming video signal. To accomplish this, the following circuits must be working:

- Sync Separation
- Noise Windowing of the sync signal
- Phase Comparison
- Sample Phase Error
- Loop Filter
- Loop Speed Switching
- Voltage Controlled Oscillator

Sync separation and noise windowing have been previously described within this section, see the Sync Separator and Horizontal SPG sections. The remaining circuits, from Phase Comparison through Voltage Controlled Oscillator, are described in the text that follows.

**Phase Comparator/Ramp Generator** (sheet 5, D/7)

Phase comparison is accomplished by starting a ramp with a locally generated horizontal pulse and sampling it with a horizontal pulse generated from the incoming sync. U522A and associated circuitry cause a current to flow from Q524. When the Hor Phase pulse and the Hor Window pulse are HIGH, Q523 is ON, causing C529 to be held LOW. As soon as the Hor Phase pulse goes LOW, C529 starts to charge, generating a ramp input to Sample and Hold U521. When Hor Window goes LOW, it turns OFF the current to C529. This action simultaneously turns off Q526, causing sample current to flow into U521 and storing the level in C526. The buffered output appears at TP51 where it drives the Loop Speed Switch and the Loop Filter. Horizontal phase adjustment is achieved by adding an offset to the sample and hold which forces the sample level to be higher or lower than the loop filter reference voltage of 2.5V and moves the signal horizontally.

**Loop Filter and Horizontal Oscillator** (sheet 5, D/1-4)

Loop filter U522B integrates the error voltage before applying it as a control voltage to the Horizontal Oscillator. FET Q510 and associated components form a Colpitts oscillator which has as its frequency control element varicap D511. U520D monitors the video present line. If video is not present, Q527 is ON. This forces the voltage applied to D511 to be held at 2.5V. Under this

condition, variable capacitor C515 is adjusted for the correct freerun frequency. When video is present, Q527 is OFF. This allows U522B to integrate the sample and hold voltage. The voltage is applied to D511, adjusting the tuning, to pull the oscillator into lock with the incoming sync.

**Loop Speed Switch and Force Direct Logic** (sheet 5, B/1-5)

The decision to switch between fast and slow lock modes is made by the loop speed switch. U520A and U520B monitor the voltage from the sample & hold circuit, the voltage is compared to the loop filter reference of 2.5V, if the voltage goes above or below the reference, the input to U520C is pulled LOW. This causes the output of U520C to go HIGH, allowing FET Q520 to shunt R529 reducing the loop time constant and speeding up the loop.

Invertor U400 converts the analog loop speed control to a logic level, this drives the Sync generator Norm/Wide input which changes the sync window width from its normal width of 500nSec to approximately 20 uSec allowing the circuit to more readily lock up after a large time base error.

U400C and associated components provide a user selectable option of automatically switching to DIRect Mode if a large time base error is present for more than 60 fields. Although the horizontal lock circuitry will closely follow any small horizontal shifts, there may be some source material where the user determines that the performance would be better in the DIRect Mode. In this case, they can elect to either manually select DIRect or to leave the setting at NORmal, with the Force Direct jumper in the AUTO position.

**Voltage Regulators and References** (sheet 7)

The three main supply voltages are regulated from the three unregulated input voltages (+10V,+15V, and -15V). U755 is a three terminal +5V regulator. U700 regulates the ±10V supplies. Each regulator has internal current limiting and foldback to reduce dissipation in the case of an output short. U700 is paralleled by two 75Ω resistors to reduce dissipation on high line inputs. The -15V output is also used to derive -11.2V necessary for the Bypass Relay.

Three separate references are generated from the regulated ±10V supplies. They include: ±5V used for the LOCal and REMote control potentiometers and +2.5V used as a reference throughout the 7510 Processing Amplifier Module.

**Control Circuitry** (sheet 7)

LOCal and REMote controls are supplied voltage by LOCal/REMote switch S700. This switch removes the voltage from the controls not selected and supplies the selected controls. Amplifiers U752A–D receive a current drive through the input resistors. This current drive is converted to a voltage drive at their outputs. U752B and U752C have nonlinear networks across them to approximately center the unity gain setting of the controls.

NORmal/DIRect control current is driven into the inverting node of U751D, this is inverted by U751C with both outputs driving ±10V to the internal logic and non-add circuitry. Video Presence information is used to drive the local and remote LEDs.

Panel Active information is combined with AGC selection in U754 to ensure that control of the AGC circuitry comes from the selected location.

This completes the Functional/Circuit Description section.

## GLOSSARY of OUTPUT SIGNALS

The following glossary describes the function of each output signal relative to the module circuitry:

- CCB (controlled Composite Blanking): Output is forced LOW when DIRect Mode is selected and forced HIGH if input is in NORmal Mode and if MONO Black Mode is selected on S400-1. The blanking is advanced to allow fine position adjustment.
- BURST GATE: Gates burst onto sync in Color Black Maker. Pulses are defeated when the MONO input goes HIGH.
- COMP SYNC (Composite Sync)
- HOR PHASE (Horizontal pulse): Resets the ramp generator on horizontal phase lock.
- HOR DRIVE (Horizontal drive): Provides drive to the Vertical SPG.
- HOR WINDOW (Horizontal pulse): Windows sync to allow only sync pulses, that occur after the window, to activate the horizontal sample and hold.
- HO2 (Horizontal square wave): For PAL used as a phase switch for the Color Lock and the PAL switch.
- 2H (twice Horizontal rate): Used as reference pulses for the Vertical SPG.
- H3 (clock pulses): Used for the Vertical SPG. Frequency is 13.5MHz divided by 8.

## REPAIR AND RETURN INSTRUCTIONS

For repair and return instructions, refer to the Maintenance Instructions section of this manual.

## REPLACEMENT PARTS INFORMATION

Replacement parts lists for this module are located on the following pages.

### NOTE

This manual supports the NTSC and PAL versions of the 7510 Receive Processor Amplifier Module.

Please make note of this when viewing and using the 7510 module drawings and replacement parts lists located in this manual.

# R E P L A C E M E N T  P A R T S  L I S T

RCVE PROC AMP 7510N 8281
ASSEMBLY NUMBER: 066714-02 ISSUE: A ECN: S345

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION<br>MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 003 | E051 | 033869-00 | SHIELD,OSCILLATOR LOW PROFILE | 1 |
| 006 | PC | 046714-02 | PCB,RECEIVE PROC AMP,7510 | 1 |
| 009 | U401 | 056350-01 | FIRMWARE,NTSC HORIZ SPG 7500 SERIES | 1 |
| 012 | U402 | 056351-01 | FIRMWARE,NTSC VERT SPG,7500 SERIES | 1 |
| 015 | U403 | 056352-00 | FIRMWARE,VERT DETECT,7500 SERIES | 1 |
| 018 | C116,C117,C180,C182, C185,C200,C201, C202,C203,C204,C211, C212,C214,C220, C300,C301,C303,C308, C310,C311,C312, C313,C318,C321,C400, C401,C405,C406, C407,C408,C409,C510, C513,C517,C527, C530,C531,C550,C606, C616,C618,C622, C625,C630,C631,C632, C634,C635,C637, C638,C701,C703,C704, C720,C721,C722, C753,C754,C755,C756, C757,C758,C759, C760 | CB0132-00 | CAP,CER .1UF 20% 50WV Z5U AXIAL<br>GVG/A70-CB0132-00 A1 | 64 |
| 021 | C603,C604 | CB0133-00 | CAP,CER 2200PF 10% 200WV X7R<br>GVG/A70-CB0133-00 A2 | 2 |
| 024 | C101,C181 | CB0135-00 | CAP,CER 2.2PF +/-.5PF 200WV COG<br>GVG/A70-CB0135-00 A2 | 2 |
| 027 | C108,C184 | CB0137-00 | CAP,CER 3.9PF +/-.5PF 200WV COG<br>GVG/A70-CB0137-00 A2 | 2 |
| 030 | C183 | CB0138-00 | CAP,CER 4.7PF +/-.5PF 200WV COG<br>GVG/A70-CB0138-00 A2 | 1 |
| 033 | C105,C551 | CB0140-00 | CAP,CER 470PF 5% 200WV COG<br>GVG/A70-CB0140-00 A1 | 2 |
| 036 | C110,C511,C520,C624 | CB0142-00 | CAP,CER .01UF 10% 100WV X7R .2 SP<br>AVX/SR211C103KAA | 4 |
| 039 | C215,C607,C613,C617 | CB0143-00 | CAP,CER .022UF 10% 100WV X7R .2 SP<br>GVG/A70-CB0143-00 A2 | 4 |
| 042 | C100,C109,C115,C188, C600,C605 | CB0144-00 | CAP,CER .047UF 10% 100WV X7R .2 SP<br>GVG/A70-CB0144-00 A3 | 6 |
| 045 | C107,C210,C552 | CB0145-00 | CAP,CER 1000PF 10% 100WV X7R .2 SP<br>GVG/A70-CB0145-00 A2 | 3 |
| 048 | C700,C702,C705,C706 | CB1094-00 | CAP,ALUM 100UF 20% 25WV<br>COD/201D101P025SP | 4 |
| 051 | C315,C525,C528 | CB2704-00 | CAP,MICA D12 5PF +/-.5PF 500WV | 3 |

# R E P L A C E M E N T  P A R T S  L I S T

RCVE PROC AMP 7510N 8281
ASSEMBLY NUMBER: 066714-02 ISSUE: A ECN: S345

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| | | | COD/CDA15CD050D03 | |
| 054 | C619 | CB2705-00 | CAP,MICA D12 10PF 5% 500WV COD/CDA15CD100J03 | 1 |
| 057 | C316 | CB2706-00 | CAP,MICA D12 12PF 5% 500WV COD/CDA15CD120J03 | 1 |
| 060 | C307 | CB2707-00 | CAP,MICA D12 15PF 5% 500WV COD/CDA15CD150J03 | 1 |
| 063 | C205, | CB2708-00 | CAP,MICA D12 18PF 5% 500WV COD/CDA15CD180J03 | 1 |
| 066 | C113 | CB2711-00 | CAP,MICA D12 24PF 5% 500WV COD/CDA15ED240J03 | 1 |
| 069 | C615 | CB2712-00 | CAP,MICA D12 27PF 5% 500WV COD/CDA15ED270J03 | 1 |
| 072 | C512,C516,C623 | CB2714-00 | CAP,MICA D12 33PF 5% 500WV COD/CDA15ED330J03 | 3 |
| 075 | C111 | CB2716-00 | CAP,MICA D12 39PF 5% 500WV COD/CDA15ED390J03 | 1 |
| 078 | C628 | CB2718-00 | CAP,MICA D12 47PF 5% 500WV COD/CDA15ED470J03 | 1 |
| 081 | C514,C626 | CB2719-00 | CAP,MICA D12 50PF 5% 500WV COD/CDA15ED500J03 | 2 |
| 084 | C314,C402,C403,C611 | CB2721-00 | CAP,MICA D12 56PF 5% 500WV COD/CDA15ED560J03 | 4 |
| 087 | C189,C601 | CB2723-00 | CAP,MICA D12 68PF 5% 500WV COD/CDA15ED680J03 | 2 |
| 090 | C532 | CB2724-00 | CAP,MICA D12 75PF 5% 500WV COD/CDA15ED750J03 | 1 |
| 093 | C112 | CB2725-00 | CAP,MICA D12 82PF 5% 500WV COD/CDA15ED820J03 | 1 |
| 096 | C209,C404 | CB2727-00 | CAP,MICA D12 100PF 5% 500WV COD/CDA15FD101J03 | 2 |
| 099 | C302,C627 | CB2729-00 | CAP,MICA D12 120PF 5% 500WV COD/CDA15FD121J03 | 2 |
| 102 | C608,C614 | CB2731-00 | CAP,MICA D12 150PF 5% 500WV COD/CDA15FD151J03 | 2 |
| 105 | C309 | CB2733-01 | CAP,MICA D12 180PF 1% 500WV COD/CDA15FD181F03 | 1 |
| 108 | C106,C526 | CB2734-00 | CAP,MICA D12 200PF 5% 500WV COD/CDA15FD201J03 | 2 |
| 111 | C304 | CB2738-00 | CAP,MICA D12 270PF 5% 500WV COD/CDA15FD271J03 | 1 |
| 114 | C114,C602 | CB2739-00 | CAP,MICA D12 300PF 5% 500WV COD/CDA15FD301J03 | 2 |
| 117 | C529,C610 | CB2750-00 | CAP,MICA D12 820PF 5% 300WV COD/CDA15FC821J03 | 2 |
| 120 | C322 | CB2751-01 | CAP,MICA D12 910PF 1% 100WV COD/CDA15FA911F03 | 1 |
| 123 | C306 | CB2766-01 | CAP,MICA D12 130PF 1% 500WV COD/CDA15FD131F03 | 1 |
| 126 | C103,C104,C500,C521, | CB4007-00 | CAP,TANT 3.3UF 20% 15WV | 8 |

# R E P L A C E M E N T  P A R T S  L I S T

RCVE PROC AMP 7510N 8281
ASSEMBLY NUMBER: 066714-02 ISSUE: A ECN: S345

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|---|---|---|---|---|
| | C522,C523,C609, C612 | | GVG/A70-CB4007-00 A1 | |
| 129 | C620,C621,C763 | CB4019-00 | CAP,TANT 6.8UF 10% 15WV<br>GVG/A70-CB4019-00 A2 | 3 |
| 132 | C102,C186,C187,C207, C208,C305,C319, C320,C524,C750,C751, C752,C761,C762 | CB4029-00 | CAP,TANT 10UF 10% 20WV<br>GVG/A70-CB4029-00 A1 | 14 |
| 135 | C213 | CB5021-00 | CAP,VAR 2.7-10PF 100WV TOP SEALED<br>GVG/A70-CB5021-00 A2 | 1 |
| 138 | C515 | CB5022-00 | CAP,VAR 7.7-40PF 100WV TOP SEALED<br>GVG/A70-CB5022-00 A1 | 1 |
| 141 | C206,C317,C633 | CB5026-00 | CAP,VAR 4.3-20PF 100WV TOP SEALED<br>GVG/A70-CB5026-00 A1 | 3 |
| 144 | EJ1,EJ2 | CC2048-00 | CARD EJCTR,NYL WHT SNAP ON<br>GVG/A70-CC2048-00 A2 | 2 |
| 147 | JP100,JP101,JP180, JP200,JP201,JP41, JP500,JP520 | CF0676-08 | CONN,PL HDR 3POS 1ROW PCB MNT<br>3M/929647-01-03-10 | 8 |
| 150 | J1,J2 | CF0936-00 | CONN,RCPT 36POS 2ROW PCB MNT<br>AMP/534204-3 | 2 |
| 153 | Y600 | CJ2092-00 | CRYSTAL,3.579545 MHZ HC18/U<br>GVG/A70-CJ2092-00 A3 | 1 |
| 156 | DL101 | DA4022-00 | DLY LN,1000NS Z:500 TR:100NS<br>DDD/2211-1000G | 1 |
| 159 | DL100 | FA6003-00 | FLTR,LO PASS 2 SECT<br>BAL/FA6003-00 | 1 |
| 162 | U304 | HB9003-60 | HYBRID,7MA OUTPUT BIAS<br>GVG/HB9003-60 | 1 |
| 165 | U700 | HB9009-03 | HYBRID,REGULATOR,10 VOLT 400MA<br>GVG/HB9009-03 | 1 |
| 168 | U180,U204 | HB9032-10 | HYBRID,VIDEO BUFFER<br>GVG/HB9032-10 | 2 |
| 171 | U101,U201,U202 | HB9049-00 | HYBRID,EQUALIZING AMP (PNP OUTPUT)<br>GVG/HB9049-00 | 3 |
| 174 | U100 | HB9054-00 | HYBRID,CABLE EQUIL (500' 8281)<br>GVG/HB9054-00 | 1 |
| 177 | U102 | HB9065-00 | HYBRID,SIP MULTIPLIER<br>GVG/HB9065-00 | 1 |
| 180 | U300 | HB9079-01 | HYBRID,COLOR BLACK GENERATOR<br>GVG/10-HB9079-01 | 1 |
| 183 | RN180 | HB9089-00 | HYBRID,RES NET INPUT STAGE<br>GVG/HB9089-00 | 1 |
| 186 | U303 | HB9090-00 | HYBRID,PULSE SHAPER<br>GVG/HB9090-00 | 1 |
| 189 | U302 | HB9091-00 | HYBRID,BLANKING GATE<br>GVG/HB9091-00 | 1 |
| 192 | U203,U205 | HB9104-00 | HYBRID,POS/NEG NAM | 2 |
| 195 | U200 | HB9123-00 | HYBRID,BLANKING GATE LINEARIZED | 1 |

# R E P L A C E M E N T P A R T S L I S T

RCVE PROC AMP 7510N 8281
ASSEMBLY NUMBER: 066714-02 ISSUE: A ECN: S345

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|---|---|---|---|---|
| | | | GVG/HB9123-00 | |
| 198 | JA021,JA100,JA101, JA180,JA200,JA41, JA500,JA520 | JA1009-02 | JACK,SHTG PLSTC 2 CNT<br>3M/929955-06 | 8 |
| 201 | NA1 | NA4002-00 | NUT #4-40 1/16x3/16 H<br>NUT,4-40,.0625X.1875,HEX,ZINC PL | 1 |
| 204 | R102 | PD0073-00 | POT,500 10% LIN .5X.25<br>CLA/CM45137 | 1 |
| 207 | R700,R701,R702,R703 | PD0080-00 | POT,10K 10% LIN .5X.25<br>CLA/392X10K "S" TAPER 0.25 LONG | 4 |
| 210 | R126 | PD2012-00 | POT,TRIM CERMET 1K 10% TOP<br>BOR/3329H-1-102 | 1 |
| 213 | R548 | PD2014-00 | POT,TRIM CERMET 50K 10% TOP<br>BOR/3329H-1-503 | 1 |
| 216 | R183,R342 | PD2025-00 | POT,TRIM CERMET 200 10% TOP<br>BOR/3329H-1-201 | 2 |
| 219 | R223,R226,R308,R317, R550, | PD2027-00 | POT,TRIM CERMET 2K 10% TOP<br>BOR/3329H-1-202 | 5 |
| 222 | R304,R400,R402 | PD2028-00 | POT,TRIM CERMET 20K 10% TOP<br>BOR/3329H-1-203 | 3 |
| 225 | R135,R155,R239,R251, R252,R300,R309, R310 | PD2038-00 | POT,TRIM CERMET 100K 10% TOP<br>BOR/3329H-1-104 | 8 |
| 228 | R635,R709,R710,R777 | RB2000-00 | RES,0 OHM 1/4W MTL FLM<br>COR/0 MA 07 | 4 |
| 231 | R180,R329,R330 | RB2100-00 | RES,10 OHM 2% 1/4W MTL FLM<br>COR/C07 10R 2% | 3 |
| 234 | R105 | RB2680-00 | RES,68 OHM 2% 1/4W MTL FLM<br>COR/C07 68R 2% | 1 |
| 237 | RN400 | RN0042-00 | RES NTWK,22K OHM 9 RES 10 SIP<br>AB/710A223 | 1 |
| 240 | RN750,RN751 | RN0149-00 | RES NTWK,22K OHM 5 RES 10 SIP<br>AB/710B223 | 2 |
| 243 | R704,R708 | RU0055-00 | RES,75 OHM 5% 5W WW<br>DAL/CW-5-2-75 OHM +/-5% | 2 |
| 246 | R140 | RV1000-00 | RES,100 OHM 1% 1/8W MTL FLM<br>COR/CT4 100R 1% | 1 |
| 249 | R334,R337,R339,R340 | RV1000-03 | RES,100 OHM .1% 1/8W MTL FLM<br>COR/RN55C1000B | 4 |
| 252 | R108,R111,R124,R128, R129,R134,R139, R141,R203,R206,R222, R225,R242,R319, R325,R536,R603,R618, R619,R621,R628, R629,R630,R705,R706, R707 | RV1001-00 | RES,1K OHM 1% 1/8W MTL FLM<br>COR/CT4 1.0K 1% | 26 |
| 255 | R104,R110,R116,R119, R154,R156,R181, R210,R211,R218,R219, | RV1002-00 | RES,10K OHM 1% 1/8W MTL FLM<br>COR/CT4 10K 1% | 23 |

# R E P L A C E M E N T P A R T S L I S T

RCVE PROC AMP 7510N 8281
ASSEMBLY NUMBER: 066714-02 ISSUE: A ECN: S345

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 255 | R229,R230,R262, R265,R552,R611,R612, R627,R721,R750, R752,R762 | RV1002-00 | CONTINUED FROM PREVIOUS PAGE COR/CT4 10K 1% | |
| 258 | R133,R149,R157,R182, R200,R224,R248, R301,R311,R327,R401, R514,R521,R523, R526,R527,R528,R530, R553,R609,R613, R614,R616,R617,R620, R622,R623,R755, R756,R758,R769,R776 | RV1003-00 | RES,100K OHM 1% 1/8W MTL FLM COR/CT4 100K 1% | 32 |
| 261 | R153,R158,R204,R501, R510,R520,R525, R533,R607 | RV1004-00 | RES,1 MEG OHM 1% 1/8W MTL FLM COR/CT4 1M 1% | 9 |
| 264 | R228 | RV1005-00 | RES,10 MEG OHM 1% 1/8W MTL FLM DAL/CMF-55 T-1 10 MEG 1% | 1 |
| 267 | R106 | RV1101-00 | RES,1.1K OHM 1% 1/8W MTL FLM COR/CT4 1.10K 1% | 1 |
| 270 | R101,R221,R318,R760 | RV1211-00 | RES,1.21K OHM 1% 1/8W MTL FLM COR/CT4 1.21K 1% | 4 |
| 273 | R113 | RV1212-00 | RES,12.1K OHM 1% 1/8W MTL FLM DAL/CMF-55 T-1 12.1K 1% | 1 |
| 276 | R307 | RV1401-00 | RES,1.4K OHM 1% 1/8W MTL FLM COR/CT4 1.40K 1% | 1 |
| 279 | R215,R263 | RV1502-00 | RES,15K OHM 1% 1/8W MTL FLM COR/CT4 15K 1% | 2 |
| 282 | R127,R235,R529,R604 | RV1503-00 | RES,150K OHM 1% 1/8W MTL FLM COR/CT4 150K 1% | 4 |
| 285 | R137,R633 | RV1581-00 | RES,1.58K OHM 1% 1/8W MTL FLM COR/CT4 1.58K 1% | 2 |
| 288 | R131 | RV1821-00 | RES,1.82K OHM 1% 1/8W MTL FLM COR/CT4 1.82K 1% | 1 |
| 291 | R241,R534,R639,R640, R641 | RV2001-00 | RES,2K OHM 1% 1/8W MTL FLM COR/CT4 2.0K 1% | 5 |
| 294 | R539,R542,R543,R751, R753,R754 | RV2002-00 | RES,20K OHM 1% 1/8W MTL FLM COR/CT4 20K 1% | 6 |
| 297 | R234,R250 | RV2101-00 | RES,2.1K OHM 1% 1/8W MTL FLM COR/CT4 2.1K 1% | 2 |
| 300 | R107,R118,R120 | RV2210-00 | RES,221 OHM 1% 1/8W MTL FLM COR/CT4 221R 1% | 3 |
| 303 | R112,R122,R130,R152, R316,R322,R323 | RV2211-00 | RES,2.21K OHM 1% 1/8W MTL FLM COR/CT4 2.21K 1% | 7 |
| 306 | R143,R150,R232,R233, R246,R247,R403, R511,R522,R600,R757, R763,R764,R765, R766,R767,R770,R772 | RV2212-00 | RES,22.1K OHM 1% 1/8W MTL FLM COR/CT4 22.1K 1% | 18 |
| 309 | R331,R333 | RV2490-00 | RES,249 OHM 1% 1/8W MTL FLM | 2 |

# R E P L A C E M E N T P A R T S L I S T

RCVE PROC AMP 7510N 8281
ASSEMBLY NUMBER: 066714-02 ISSUE: A ECN: S345

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| | | | COR/CT4 249R 1% | |
| 312 | R109,R144,R624,R723 | RV2672-00 | RES,26.7K OHM 1% 1/8W MTL FLM COR/CT4 26.7K 1% | 4 |
| 315 | R186 | RV2741-00 | RES,2.74K OHM 1% 1/8W MTL FLM COR/CT4 2.74K 1% | 1 |
| 318 | R136 | RV2801-00 | RES,2.8K OHM 1% 1/8W MTL FLM COR/CT4 2.8K 1% | 1 |
| 321 | R103 | RV2870-00 | RES,287 OHM 1% 1/8W MTL FLM COR/CT4 287R 1% | 1 |
| 324 | R207,R212,R335,R336, R338,R341 | RV3010-00 | RES,301 OHM 1% 1/8W MTL FLM COR/CT4 301R 1% | 6 |
| 327 | R531,R540,R541 | RV3012-00 | RES,30.1K OHM 1% 1/8W MTL FLM COR/CT4 30.1K 1% | 3 |
| 330 | R123,R321,R405,R515 | RV3320-00 | RES,332 OHM 1% 1/8W MTL FLM COR/CT4 332R 1% | 4 |
| 333 | R184,R185,R202,R243, R324,R544 | RV3321-00 | RES,3.32K OHM 1% 1/8W MTL FLM COR/CT4 3.32K 1% | 6 |
| 336 | R524,R538 | RV3322-00 | RES,33.2K OHM 1% 1/8W MTL FLM COR/CT4 33.2K 1% | 2 |
| 339 | R132 | RV3651-00 | RES,3.65K OHM 1% 1/8W MTL FLM COR/CT4 3.65K 1% | 1 |
| 342 | R722,R768,R771,R774, R775 | RV3920-00 | RES,392 OHM 1% 1/8W MTL FLM COR/CT4 392R 1% | 5 |
| 345 | R245,R313 | RV3921-00 | RES,3.92K OHM 1% 1/8W MTL FLM COR/CT4 3.92K 1% | 2 |
| 348 | R759 | RV3922-00 | RES,39.2K OHM 1% 1/8W MTL FLM DAL/CMF-55 T-1 39.2K 1% | 1 |
| 351 | R606 | RV3923-00 | RES,392K OHM 1% 1/8W MTL FLM COR/CT4 392K 1% | 1 |
| 354 | R312 | RV4320-00 | RES,432 OHM 1% 1/8W MTL FLM COR/CT4 432R 1% | 1 |
| 357 | R328 | RV4750-00 | RES,475 OHM 1% 1/8W MTL FLM COR/CT4 475R 1% | 1 |
| 360 | R117,R121,R146,R151, R205,R261,R264, R302,R314,R404,R407, R532,R632,R720 | RV4751-00 | RES,4.75K OHM 1% 1/8W MTL FLM COR/CT4 4.75K 1% | 14 |
| 363 | R114,R145,R201,R220, R236,R238,R244, R249,R315,R326,R500, R512,R545,R546, R547,R608,R610,R761, R773 | RV4752-00 | RES,47.5K OHM 1% 1/8W MTL FLM COR/CT4 47.5K 1% | 19 |
| 366 | R148 | RV4753-00 | RES,475K OHM 1% 1/8W MTL FLM COR/CT4 475K 1% | 1 |
| 369 | R100,R115,R138,R142, R227,R231,R237, R240,R332,R537,R615, R625 | RV4990-00 | RES,499 OHM 1% 1/8W MTL FLM COR/CT4 499R 1% | 12 |
| 372 | R266 | RV4991-00 | RES,4.99K OHM 1% 1/8W MTL FLM | 1 |

# R E P L A C E M E N T  P A R T S  L I S T

RCVE PROC AMP 7510N 8281
ASSEMBLY NUMBER: 066714-02 ISSUE: A ECN: S345

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION<br>MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| | | | COR/CT4 4.99K 1% | |
| 375 | R320,R513,R535 | RV5621-00 | RES,5.62K OHM 1% 1/8W MTL FLM<br>COR/CT4 5.62K 1% | 3 |
| 378 | R217,R303,R305,R306 | RV6810-00 | RES,681 OHM 1% 1/8W MTL FLM<br>COR/CT4 681R 1% | 4 |
| 381 | R213,R551 | RV7501-00 | RES,7.5K OHM 1% 1/8W MTL FLM<br>COR/CT4 7.5K 1% | 2 |
| 384 | R125 | RV7509-00 | RES,75 OHM 1% 1/8W MTL FLM<br>COR/CT4 75R 1% | 1 |
| 387 | R549 | RV8251-00 | RES,8.25K OHM 1% 1/8W MTL FLM<br>COR/CT4 8.25 1% | 1 |
| 390 | R208,R214,R216,R260 | RV8450-00 | RES,845 OHM 1% 1/8W MTL FLM<br>COR/CT4 845R 1% | 4 |
| 393 | XQ071 | SA1248-00 | SCRW,STUD PRS 4-40X.312<br>CFC/CKFH-440-5 | 1 |
| 396 | DS700 | SB1069-00 | DIODE,LED 550-2206 GRN HIGH-EFF<br>DIA/550-2206 | 1 |
| 399 | D700,D701,D720 | SB2001-00 | DIODE,RECT 1N4002 DO-41 100V@1A<br>GI/1N4002-00 | 3 |
| 402 | D100,D101,D102,D103, D104,D200,D201, D202,D203,D204,D205, D206,D207,D300, D301,D400,D401,D500, D510,D520,D521, D522,D523,D524,D525, D600,D70,D71,D72, D721,D73,D74,D75, D750,D76,D77,D78,D79 | SB3001-00 | DIODE,SIG 1N4148 DO-35 100MA<br>GVG/A70-SB3001-00 A3 | 38 |
| 405 | D722 | SB4005-00 | DIODE,ZENER 1N5234B 6.2V@20MA<br>GVG/A70-SB4005-00 A1 | 1 |
| 408 | D511,D601,D602 | SB5013-00 | DIODE,VARC MV2115 TO-226AC 90-110PF<br>GVG/A70-SB5013-00 A1 | 3 |
| 411 | D603 | SB5014-00 | DIODE,VARC MV2105 TO-226AC 14-16PF<br>GVG/A70-SB5014-00 A1 | 1 |
| 414 | Q103,Q200,Q202,Q207, Q301,Q510,Q520, Q522,Q527,Q529,Q601, Q602 | SB6008-00 | TRANS,NJFET MPF4392 TO-92<br>GVG/A70-SB6008-00 A1 | 12 |
| 417 | Q101,Q203,Q204,Q300, Q303,Q600,Q604, Q751,Q752 | SB8003-00 | TRANS,NPN 2N4124 TO-92 SM-SIG<br>GVG/A70-SB8003-00 A1 | 9 |
| 420 | Q100,Q102,Q104,Q208, Q209,Q211,Q521, Q603,Q720,Q750 | SB8004-00 | TRANS,NPN 2N4126 TO-92 SM-SIG<br>GVG/A70-SB8004-00 A2 | 10 |
| 423 | Q201,Q210,Q302,Q523, Q526 | SB8005-00 | TRANS,NPN 2N4265 TO-92 SM-SIG<br>GVG/A70-SB8005-00 A3 | 5 |
| 426 | Q524,Q525 | SB8023-00 | TRANS,PNP MPS6523 TO-92 SM-SIG<br>GVG/A70-SB8023-00 A1 | 2 |
| 429 | Q205,Q206 | SB8035-00 | TRANS,PNP MPSH81 TO-92 SM-SIG | 2 |

# R E P L A C E M E N T P A R T S L I S T

RCVE PROC AMP 7510N 8281
ASSEMBLY NUMBER: 066714-02 ISSUE: A ECN: S345

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION<br>MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| | | | GVG/A70-SB8035-00 A2 | |
| 432 | U103,U521 | SC0125-01 | IC,LIN CA3080E 8 DIP<br>GVG/A70-SC0125-01 A2 | 2 |
| 435 | U755 | SC0138-00 | IC,LIN MC7805CT TO-220<br>GVG/A70-SC0138-00 A1 | 1 |
| 438 | U523 | SC0197-00 | IC,TTL SN74LS221N 16 DIP<br>GVG/A70-SC0197-00 A1 | 1 |
| 441 | U104 | SC0389-00 | IC,LIN LF347BN 14 DIP<br>GVG/A70-SC0389-00 A1 | 1 |
| 444 | U754 | SC0481-00 | IC,HCMOS MM74HC00N 14 DIP<br>GVG/A70-SC0481-00 A1 | 1 |
| 447 | U400,U510,U691,U753 | SC0612-00 | IC,HCMOS 74HC14N 14 DIP<br>GVG/A70-SC0612-00 A2 | 4 |
| 450 | U301,U522,U690,U750 | SC0628-00 | IC,LIN LF353N 8 DIP<br>ANG/AD642JH | 4 |
| 453 | U106,U520,U751,U752 | SC0728-00 | IC,LIN TL064CN 14 DIP<br>GVG/A70-SC0728-00 A2 | 4 |
| 456 | U105 | SC1410-00 | IC,SPCL CUSTOM 44 PLCC<br>AT&T/LB1174AP | 1 |
| 459 | U600 | SC1411-01 | IC,LIN COLORLOCK 44 PLCC<br>AT&T/LB1182BP | 1 |
| 462 | SU105,SU401,SU402, SU600,XU401 | SE8051-00 | SKT,IC 44 PLCC .9 SQ BLK<br>BUR/QILE44P-410T | 5 |
| 465 | SU403 | SE8079-00 | SKT,IC 24 DIP .3 CB BLK<br>CIA/CA-24SDL-1T-3 | 1 |
| 468 | SU100 | SE8161-02 | SKT,STP 8 POS 1 ROW FOR FLAT LEADS<br>AMP/643108-1 | 1 |
| 471 | S400 | SJ0047-10 | SW,DIP SPST 8POS 16 DIP PREM SEAL<br>EEC/240008GS | 1 |
| 474 | S700,S701,S702 | SJ0110-00 | SW,TGL DPDT SHT HNDL .4VA O/NON/O<br>GVG/A70-SJ0110-00 A2 | 3 |
| 477 | TP75,TP76,TP77,TP78 | TA6059-00 | TUR PN,.06X.1406 POST .0625 PCB<br>GVG/A70-TA6059-00 A1 | 4 |
| 480 | TP73,TP74 | TA6129-00 | TUR,WIRE LOOP TEST PT .067-.08 DIA<br>CMP/TP-102-01 | 2 |
| 483 | WA1 | WA2007-00 | WSHR,#4 SPLIT LOCK<br>WASHER,#4,SPLIT RING,ZINC PL | 1 |
| 486 | L756 | ZB4019-21 | INDCTR,MINI 3.3UH 5% CUT & FORMED<br>GOW/10M331J-1 | 1 |
| 489 | L2O1,L301 | ZB4021-21 | INDCTR,MINI 4.7UH 5% CUT & FORMED<br>GOW/10M471J-1 | 2 |
| 492 | L302,L602,L751,L752, L753,L754,L755 | ZB4030-21 | INDCTR,MINI 27UH 5% CUT & FORMED<br>GOW/10M272J-1 | 7 |
| 495 | L100 | ZB4035-21 | INDCTR,MINI 68UH 5% CUT & FORMED<br>GOW/10M682J-1 | 1 |
| 498 | L604 | ZB4037-21 | INDCTR,MINI 100UH 5% CUT & FORMED<br>GOW/10M103J-1 | 1 |
| 501 | L600 | ZB4038-21 | INDCTR,MINI 120UH 5% CUT & FORMED<br>GOW/10M123J-1 | 1 |
| 504 | L601 | ZB4045-21 | INDCTR,MINI 470UH 5% CUT & FORMED | 1 |

# R E P L A C E M E N T  P A R T S  L I S T

RCVE PROC AMP 7510N 8281
ASSEMBLY NUMBER: 066714-02 ISSUE: A ECN: S345

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION<br>MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| | | | GOW/10M473J-1 | |
| 507 | L200,L300 | ZB4076-01 | INDCTR,MINI 56UH 5% SHIELDED | 2 |
| | | | GOW/17S562J | |
| 510 | L603,L605 | ZB4079-01 | INDCTR,56UH 5% | 2 |
| | | | DAL/1M-4-56UH +/-5% | |
| 513 | L510,L511 | ZB4146-00 | INDCTR,FIXED 4.6UH 5% | 2 |
| | | | CLC/L0831-A | |
| 999 | B10-066714-02<br>SCHEMATIC<br>B07-066714-53<br>COMP. LOC | 000000-00 | REFERENCE DOCUMENTS | 5 |

# R E P L A C E M E N T P A R T S L I S T

RCVE PROC AMP 7510P (VARIOUS CABLE TYPES/150M, SEE ITEM NO 168)
ASSEMBLY NUMBER: 066714-53,60,65,70,75,80 ISSUE: A ECN: S459

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION<br>MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 001 | E051 | 033869-00 | SHIELD,OSCILLATOR LOW PROFILE | 1 |
| 003 | PC | 046714-02 | PCB,RECEIVE PROC AMP,7510 | 1 |
| 006 | U403 | 056352-00 | FIRMWARE,VERT DETECT,7500 SERIES | 1 |
| 009 | U401 | 056353-02 | FIRMWARE,PAL HORIZ SPG 7500 SERIES | 1 |
| 012 | U402 | 056354-03 | FIRMWARE,PAL VERT SPG,7500 SERIES | 1 |
| 018 | C116,C117,C180,C182, C185,C200,C201, C202,C203,C204,C211, C212,C214,C220, C300,C301,C303,C308, C310,C311,C312, C313,C318,C321,C400, C401,C405,C406, C407,C408,C409,C510, C513,C517,C527, C530,C531,C550,C606, C616,C618,C622, C625,C630,C631,C632, C634,C635,C637, C638,C701,C703,C704, C720,C721,C722, C753,C754,C755,C756, C757,C758,C759, C760 | CB0132-00 | CAP,CER .1UF 20% 50WV Z5U AXIAL<br>GVG/A70-CB0132-00 A1 | 64 |
| 021 | C603,C604 | CB0133-00 | CAP,CER 2200PF 10% 200WV X7R<br>GVG/A70-CB0133-00 A2 | 2 |
| 024 | C101,C181 | CB0135-00 | CAP,CER 2.2PF +/-.5PF 200WV COG<br>GVG/A70-CB0135-00 A2 | 2 |
| 027 | C108,C184 | CB0137-00 | CAP,CER 3.9PF +/-.5PF 200WV COG<br>GVG/A70-CB0137-00 A2 | 2 |
| 028 | C183 | CB0138-00 | CAP,CER 4.7PF +/-.5PF 200WV COG<br>GVG/A70-CB0138-00 A2 | 1 |
| 030 | C105,C551 | CB0140-00 | CAP,CER 470PF 5% 200WV COG<br>GVG/A70-CB0140-00 A1 | 2 |
| 033 | C110,C511,C520,C624 | CB0142-00 | CAP,CER .01UF 10% 100WV X7R .2 SP<br>AVX/SR211C103KAA | 4 |
| 036 | C215,C607,C613,C617 | CB0143-00 | CAP,CER .022UF 10% 100WV X7R .2 SP<br>GVG/A70-CB0143-00 A2 | 4 |
| 039 | C100,C109,C115,C188, C600,C605 | CB0144-00 | CAP,CER .047UF 10% 100WV X7R .2 SP<br>GVG/A70-CB0144-00 A3 | 6 |
| 042 | C107,C210,C552 | CB0145-00 | CAP,CER 1000PF 10% 100WV X7R .2 SP<br>GVG/A70-CB0145-00 A2 | 3 |
| 045 | C700,C702,C705,C706 | CB1094-00 | CAP,ALUM 100UF 20% 25WV<br>COD/201D101P025SP | 4 |
| 048 | C216,C525,C528 | CB2704-00 | CAP,MICA D12 5PF +/-.5PF 500WV | 3 |

# R E P L A C E M E N T P A R T S L I S T

RCVE PROC AMP 7510P (VARIOUS CABLE TYPES/150M, SEE ITEM NO 168)
ASSEMBLY NUMBER: 066714-53,60,65,70,75,80 ISSUE: A ECN: S459

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| | | | COD/CDA15CD050D03 | |
| 051 | C205 | CB2707-00 | CAP,MICA D12 15PF 5% 500WV | 1 |
| | | | COD/CDA15CD150J03 | |
| 054 | C619,C629,C636 | CB2708-00 | CAP,MICA D12 18PF 5% 500WV | 3 |
| | | | COD/CDA15CD180J03 | |
| 060 | C113 | CB2711-00 | CAP,MICA D12 24PF 5% 500WV | 1 |
| | | | COD/CDA15ED240J03 | |
| 063 | C615,C628 | CB2712-00 | CAP,MICA D12 27PF 5% 500WV | 2 |
| | | | COD/CDA15ED270J03 | |
| 064 | C307 | CB2713-00 | CAP,MICA D12 30PF 5% 500WV | 1 |
| | | | COD/CDA15ED300J03 | |
| 066 | C512,C516,C623 | CB2714-00 | CAP,MICA D12 33PF 5% 500WV | 3 |
| | | | COD/CDA15ED330J03 | |
| 069 | C111 | CB2716-00 | CAP,MICA D12 39PF 5% 500WV | 1 |
| | | | COD/CDA15ED390J03 | |
| 072 | C514,C626 | CB2719-00 | CAP,MICA D12 50PF 5% 500WV | 2 |
| | | | COD/CDA15ED500J03 | |
| 075 | C314,C402,C403,C611 | CB2721-00 | CAP,MICA D12 56PF 5% 500WV | 4 |
| | | | COD/CDA15ED560J03 | |
| 078 | C189,C601 | CB2723-00 | CAP,MICA D12 68PF 5% 500WV | 2 |
| | | | COD/CDA15ED680J03 | |
| 081 | C532 | CB2724-00 | CAP,MICA D12 75PF 5% 500WV | 1 |
| | | | COD/CDA15ED750J03 | |
| 084 | C112,C627 | CB2725-00 | CAP,MICA D12 82PF 5% 500WV | 2 |
| | | | COD/CDA15ED820J03 | |
| 087 | C209,C404 | CB2727-00 | CAP,MICA D12 100PF 5% 500WV | 2 |
| | | | COD/CDA15FD101J03 | |
| 090 | C304,C608,C614 | CB2731-00 | CAP,MICA D12 150PF 5% 500WV | 3 |
| | | | COD/CDA15FD151J03 | |
| 093 | C309 | CB2733-01 | CAP,MICA D12 180PF 1% 500WV | 1 |
| | | | COD/CDA15FD181F03 | |
| 096 | C106,C526 | CB2734-00 | CAP,MICA D12 200PF 5% 500WV | 2 |
| | | | COD/CDA15FD201J03 | |
| 099 | C302 | CB2735-00 | CAP,MICA D12 220PF 5% 500WV | 1 |
| | | | COD/CDA15FD221J03 | |
| 102 | C306 | CB2735-01 | CAP,MICA D12 220PF 1% 500WV | 1 |
| | | | COD/CDA15FD221F03 | |
| 105 | C114,C602 | CB2739-00 | CAP,MICA D12 300PF 5% 500WV | 2 |
| | | | COD/CDA15FD301J03 | |
| 108 | C529,C610 | CB2750-00 | CAP,MICA D12 820PF 5% 300WV | 2 |
| | | | COD/CDA15FC821J03 | |
| 111 | C322 | CB2751-01 | CAP,MICA D12 910PF 1% 100WV | 1 |
| | | | COD/CDA15FA911F03 | |
| 114 | C315 | CB2758-00 | CAP,MICA D12 8PF +/-.5PF 500WV | 1 |
| | | | COD/CDA15CD080D03 | |
| 117 | C316 | CB2760-00 | CAP,MICA D12 11PF 5% 500WV | 1 |
| | | | COD/CDA15CD110J03 | |
| 120 | C103,C104,C500,C521, C522,C523,C609, C612 | CB4007-00 | CAP,TANT 3.3UF 20% 15WV | 8 |
| | | | GVG/A70-CB4007-00 A1 | |

# R E P L A C E M E N T P A R T S L I S T

RCVE PROC AMP 7510P (VARIOUS CABLE TYPES/150M, SEE ITEM NO 168)
ASSEMBLY NUMBER: 066714-53,60,65,70,75,80 ISSUE: A ECN: S459

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 123 | C620,C621,C763 | CB4019-00 | CAP,TANT 6.8UF 10% 15WV GVG/A70-CB4019-00 A2 | 3 |
| 126 | C102,C186,C187,C207, C208,C305,C319, C320,C524,C750,C751, C752,C761,C762 | CB4029-00 | CAP,TANT 10UF 10% 20WV GVG/A70-CB4029-00 A1 | 14 |
| 129 | C213 | CB5021-00 | CAP,VAR 2.7-10PF 100WV TOP SEALED GVG/A70-CB5021-00 A2 | 1 |
| 132 | C515,C633 | CB5022-00 | CAP,VAR 7.7-40PF 100WV TOP SEALED GVG/A70-CB5022-00 A1 | 2 |
| 135 | C206,C317 | CB5026-00 | CAP,VAR 4.3-20PF 100WV TOP SEALED GVG/A70-CB5026-00 A1 | 2 |
| 138 | EJ1,EJ2 | CC2048-00 | CARD EJCTR,NYL WHT SNAP ON GVG/A70-CC2048-00 A2 | 2 |
| 141 | JP100,JP101,JP180, JP200,JP201,JP41, JP500,JP520 | CF0676-08 | CONN,PL HDR 3POS 1ROW PCB MNT 3M/929647-01-03-10 | 8 |
| 144 | J1,J2 | CF0936-00 | CONN,RCPT 36POS 2ROW PCB MNT AMP/534204-3 | 2 |
| 147 | Y600 | CJ2103-00 | CRYSTAL,4.433619MHZ HC-49/U 16PF ICM/605131 | 1 |
| 150 | DL101 | DA4022-00 | DLY LN,1000NS Z:500 TR:100NS DDD/2211-1000G | 1 |
| 153 | DL100 | FA6003-00 | FLTR,LO PASS 2 SECT BAL/FA6003-00 | 1 |
| 156 | U304 | HB9003-60 | HYBRID,7MA OUTPUT BIAS GVG/HB9003-60 | 1 |
| 159 | U700 | HB9009-03 | HYBRID,REGULATOR,10 VOLT 400MA GVG/HB9009-03 | 1 |
| 162 | U180,U204 | HB9032-10 | HYBRID,VIDEO BUFFER GVG/HB9032-10 | 2 |
| 165 | U101,U201,U202 | HB9049-00 | HYBRID,EQUALIZING AMP (PNP OUTPUT) GVG/HB9049-00 | 3 |
| 168 | U100 | HB9062-15 | HYBRID,CABLE EQ 150M F&G 0.6/3.7 GVG/HB9062-15 | 1 |
| 171 | U102 | HB9065-00 | HYBRID,SIP MULTIPLIER GVG/HB9065-00 | 1 |
| 174 | U300 | HB9079-01 | HYBRID,COLOR BLACK GENERATOR GVG/10-HB9079-01 | 1 |
| 177 | RN180 | HB9089-00 | HYBRID,RES NET INPUT STAGE GVG/HB9089-00 | 1 |
| 180 | U303 | HB9090-00 | HYBRID,PULSE SHAPER GVG/HB9090-00 | 1 |
| 183 | U302 | HB9091-00 | HYBRID,BLANKING GATE GVG/HB9091-00 | 1 |
| 186 | U203,U205 | HB9104-00 | HYBRID,POS/NEG NAM | 2 |
| 189 | U200 | HB9123-00 | HYBRID,BLANKING GATE LINEARIZED GVG/HB9123-00 | 1 |

# R E P L A C E M E N T P A R T S L I S T

RCVE PROC AMP 7510P (VARIOUS CABLE TYPES/150M, SEE ITEM NO 168)
ASSEMBLY NUMBER: 066714-53,60,65,70,75,80 ISSUE: A ECN: S459

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 192 | JA100,JA101,JA180, JA200,JA201,JA41, JA500,JA520 | JA1009-02 | JACK,SHTG PLSTC 2 CNT 3M/929955-06 | 8 |
| 195 | NA1 | NA4002-00 | NUT #4-40 1/16x3/16 H NUT,4-40,.0625X.1875,HEX,ZINC PL | 1 |
| 198 | R102 | PD0073-00 | POT,500 10% LIN .5X.25 CLA/CM45137 | 1 |
| 201 | R700,R701,R702,R703 | PD0080-00 | POT,10K 10% LIN .5X.25 CLA/392X10K "S" TAPER 0.25 LONG | 4 |
| 204 | R126 | PD2012-00 | POT,TRIM CERMET 1K 10% TOP BOR/3329H-1-102 | 1 |
| 207 | R548 | PD2014-00 | POT,TRIM CERMET 50K 10% TOP BOR/3329H-1-503 | 1 |
| 213 | R183,R342 | PD2025-00 | POT,TRIM CERMET 200 10% TOP BOR/3329H-1-201 | 2 |
| 216 | R223,R226,R308,R550, R626,R634,R317 | PD2027-00 | POT,TRIM CERMET 2K 10% TOP BOR/3329H-1-202 | 7 |
| 219 | R304,R400,R402 | PD2028-00 | POT,TRIM CERMET 20K 10% TOP BOR/3329H-1-203 | 3 |
| 222 | R135,R155,R239,R251, R252,R300,R309, R310 | PD2038-00 | POT,TRIM CERMET 100K 10% TOP BOR/3329H-1-104 | 8 |
| 225 | R406,R709,R710,R777 | RB2000-00 | RES,0 OHM 1/4W MTL FLM COR/0 MA 07 | 4 |
| 228 | R180,R329,R330 | RB2100-00 | RES,10 OHM 2% 1/4W MTL FLM COR/C07 10R 2% | 3 |
| 231 | R105 | RB2680-00 | RES,68 OHM 2% 1/4W MTL FLM COR/C07 68R 2% | 1 |
| 234 | RN400 | RN0042-00 | RES NTWK,22K OHM 9 RES 10 SIP AB/710A223 | 1 |
| 237 | RN750,RN751 | RN0149-00 | RES NTWK,22K OHM 5 RES 10 SIP AB/710B223 | 2 |
| 240 | R704,R708 | RU0055-00 | RES,75 OHM 5% 5W WW DAL/CW-5-2-75 OHM +/-5% | 2 |
| 243 | R140 | RV1000-00 | RES,100 OHM 1% 1/8W MTL FLM COR/CT4 100R 1% | 1 |
| 246 | R334,R337,R339,R340 | RV1000-03 | RES,100 OHM .1% 1/8W MTL FLM COR/RN55C1000B | 4 |
| 249 | R108,R111,R124,R128, R129,R134,R139, R141,R203,R206,R222, R225,R242,R319, R325,R536,R603,R618, R619,R621,R628, R629,R630,R637,R705, R706,R707 | RV1001-00 | RES,1K OHM 1% 1/8W MTL FLM COR/CT4 1.0K 1% | 27 |
| 252 | R104,R110,R116,R119, R154,R156,R181, R210,R211,R218,R219, R229,R230,R262, | RV1002-00 | RES,10K OHM 1% 1/8W MTL FLM COR/CT4 10K 1% | 24 |

R E P L A C E M E N T P A R T S L I S T

RCVE PROC AMP 7510P (VARIOUS CABLE TYPES/150M, SEE ITEM NO 168)
ASSEMBLY NUMBER: 066714-53,60,65,70,75,80 ISSUE: A ECN: S459

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 252 | R612,R627,R721, R750,R752,R762 | RV1002-00 | CONTINUED FROM PREVIOUS PAGE COR/CT4 10K 1% | |
| 255 | R133,R149,R157,R182, R200,R224,R248, R301,R311,R327,R401, R514,R521,R523, R526,R527,R528,R530, R553,R609,R613, R614,R616,R617,R620, R622,R623,R755, R756,R758,R769,R776 | RV1003-00 | RES,100K OHM 1% 1/8W MTL FLM COR/CT4 100K 1% | 32 |
| 258 | R153,R158,R204,R501, R510,R520,R525, R533,R607 | RV1004-00 | RES,1 MEG OHM 1% 1/8W MTL FLM COR/CT4 1M 1% | 9 |
| 261 | R228 | RV1005-00 | RES,10 MEG OHM 1% 1/8W MTL FLM DAL/CMF-55 T-1 10 MEG 1% | 1 |
| 264 | R106 | RV1101-00 | RES,1.1K OHM 1% 1/8W MTL FLM COR/CT4 1.10K 1% | 1 |
| 267 | R101,R221,R318,R760 | RV1211-00 | RES,1.21K OHM 1% 1/8W MTL FLM COR/CT4 1.21K 1% | 4 |
| 270 | R113 | RV1212-00 | RES,12.1K OHM 1% 1/8W MTL FLM DAL/CMF-55 T-1 12.1K 1% | 1 |
| 273 | R307 | RV1401-00 | RES,1.4K OHM 1% 1/8W MTL FLM COR/CT4 1.40K 1% | 1 |
| 276 | R215,R263 | RV1502-00 | RES,15K OHM 1% 1/8W MTL FLM COR/CT4 15K 1% | 2 |
| 279 | R127,R235,R529,R604 | RV1503-00 | RES,150K OHM 1% 1/8W MTL FLM COR/CT4 150K 1% | 4 |
| 282 | R137,R633 | RV1581-00 | RES,1.58K OHM 1% 1/8W MTL FLM COR/CT4 1.58K 1% | 2 |
| 285 | R131 | RV1821-00 | RES,1.82K OHM 1% 1/8W MTL FLM COR/CT4 1.82K 1% | 1 |
| 288 | R241,R534,R631,R639, R640,R641 | RV2001-00 | RES,2K OHM 1% 1/8W MTL FLM COR/CT4 2.0K 1% | 6 |
| 291 | R539,R542,R543,R636, R751,R753,R754 | RV2002-00 | RES,20K OHM 1% 1/8W MTL FLM COR/CT4 20K 1% | 7 |
| 294 | R234,R250 | RV2101-00 | RES,2.1K OHM 1% 1/8W MTL FLM COR/CT4 2.1K 1% | 2 |
| 297 | R107,R118,R120 | RV2210-00 | RES,221 OHM 1% 1/8W MTL FLM COR/CT4 221R 1% | 3 |
| 300 | R112,R122,R130,R152, R316,R322,R323 | RV2211-00 | RES,2.21K OHM 1% 1/8W MTL FLM COR/CT4 2.21K 1% | 7 |
| 303 | R143,R150,R232,R233, R246,R247,R403, R511,R522,R600,R757, R763,R764,R765,R766,R767,R770,R772 | RV2212-00 | RES,22.1K OHM 1% 1/8W MTL FLM COR/CT4 22.1K 1% | 18 |
| 306 | R331,R333 | RV2490-00 | RES,249 OHM 1% 1/8W MTL FLM COR/CT4 249R 1% | 2 |

# R E P L A C E M E N T  P A R T S  L I S T

RCVE PROC AMP 7510P (VARIOUS CABLE TYPES/150M, SEE ITEM NO 168)
ASSEMBLY NUMBER: 066714-53,60,65,70,75,80 ISSUE: A ECN: S459

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 309 | R109,R144,R624,R723 | RV2672-00 | RES,26.7K OHM 1% 1/8W MTL FLM COR/CT4 26.7K 1% | 4 |
| 312 | R186 | RV2741-00 | RES,2.74K OHM 1% 1/8W MTL FLM COR/CT4 2.74K 1% | 1 |
| 315 | R136 | RV2801-00 | RES,2.8K OHM 1% 1/8W MTL FLM COR/CT4 2.8K 1% | 1 |
| 318 | R103,R207,R212,R335, R336,R338,R341 | RV3010-00 | RES,301 OHM 1% 1/8W MTL FLM COR/CT4 301R 1% | 7 |
| 321 | R531,R540,R541 | RV3012-00 | RES,30.1K OHM 1% 1/8W MTL FLM COR/CT4 30.1K 1% | 3 |
| 324 | R123,R321,R405,R515 | RV3320-00 | RES,332 OHM 1% 1/8W MTL FLM COR/CT4 332R 1% | 4 |
| 327 | R184,R185,R202,R243, R324,R544 | RV3321-00 | RES,3.32K OHM 1% 1/8W MTL FLM COR/CT4 3.32K 1% | 6 |
| 330 | R524,R538,R547 | RV3322-00 | RES,33.2K OHM 1% 1/8W MTL FLM COR/CT4 33.2K 1% | 3 |
| 333 | R132 | RV3651-00 | RES,3.65K OHM 1% 1/8W MTL FLM COR/CT4 3.65K 1% | 1 |
| 336 | R722,R768,R771,R774, R775 | RV3920-00 | RES,392 OHM 1% 1/8W MTL FLM COR/CT4 392R 1% | 5 |
| 339 | R245,R313 | RV3921-00 | RES,3.92K OHM 1% 1/8W MTL FLM COR/CT4 3.92K 1% | 2 |
| 342 | R759 | RV3922-00 | RES,39.2K OHM 1% 1/8W MTL FLM DAL/CMF-55 T-1 39.2K 1% | 1 |
| 345 | R606 | RV3923-00 | RES,392K OHM 1% 1/8W MTL FLM COR/CT4 392K 1% | 1 |
| 348 | R312 | RV4320-00 | RES,432 OHM 1% 1/8W MTL FLM COR/CT4 432R 1% | 1 |
| 351 | R328 | RV4750-00 | RES,475 OHM 1% 1/8W MTL FLM COR/CT4 475R 1% | 1 |
| 354 | R117,R121,R146,R151, R205,R261,R264, R302,R314,R404 R407,R532,R632, R638,R720 | RV4751-00 | RES,4.75K OHM 1% 1/8W MTL FLM COR/CT4 4.75K 1% | 15 |
| 357 | R114,R145,R201,R220, R236,R238,R244, R249,R315,R326,R500, R512,R545,R546, R608,R610,R761 R773 | RV4752-00 | RES,47.5K OHM 1% 1/8W MTL FLM COR/CT4 47.5K 1% | 18 |
| 360 | R148 | RV4753-00 | RES,475K OHM 1% 1/8W MTL FLM COR/CT4 475K 1% | 1 |
| 363 | R100,R115,R138,R142, R227,R231,R237, R240,R332,R537,R615, R625 | RV4990-00 | RES,499 OHM 1% 1/8W MTL FLM COR/CT4 499R 1% | 12 |
| 366 | R266 | RV4991-00 | RES,4.99K OHM 1% 1/8W MTL FLM COR/CT4 4.99K 1% | 1 |

# R E P L A C E M E N T  P A R T S  L I S T

RCVE PROC AMP 7510P (VARIOUS CABLE TYPES/150M, SEE ITEM NO 168)
ASSEMBLY NUMBER: 066714-53,60,65,70,75,80 ISSUE: A ECN: S459

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 369 | R513,R535,R320 | RV5621-00 | RES,5.62K OHM 1% 1/8W MTL FLM<br>COR/CT4 5.62K 1% | 3 |
| 372 | R217,R303,R305,R306 | RV6810-00 | RES,681 OHM 1% 1/8W MTL FLM<br>COR/CT4 681R 1% | 4 |
| 375 | R213,R551 | RV7501-00 | RES,7.5K OHM 1% 1/8W MTL FLM<br>COR/CT4 7.5K 1% | 2 |
| 378 | R125 | RV7509-00 | RES,75 OHM 1% 1/8W MTL FLM<br>COR/CT4 75R 1% | 1 |
| 381 | R549 | RV8251-00 | RES,8.25K OHM 1% 1/8W MTL FLM<br>COR/CT4 8.25 1% | 1 |
| 384 | R208,R214,R216,R260 | RV8450-00 | RES,845 OHM 1% 1/8W MTL FLM<br>COR/CT4 845R 1% | 4 |
| 387 | XQ071 | SA1248-00 | SCRW,STUD PRS 4-40X.312<br>CFC/CKFH-440-5 | 1 |
| 390 | DS700 | SB1069-00 | DIODE,LED 550-2206 GRN HIGH-EFF<br>DIA/550-2206 | 1 |
| 393 | D700,D701,D720 | SB2001-00 | DIODE,RECT 1N4002 DO-41 100V@1A<br>GI/1N4002-00 | 3 |
| 396 | D100,D101,D102<br>D103,D104,D200,<br>D201,D202,D203,D204,<br>D205,D206,D207,<br>D300,D301,D400,D401,<br>D500,D510,D520,D521<br>D522,D523,D524,D525<br>D600,D70,D71,D72,<br>D721,D73,D74,D75,<br>D750,D76,D77,D78,D79 | SB3001-00 | DIODE,SIG 1N4148 DO-35 100MA<br>GVG/A70-SB3001-00 A3 | 38 |
| 399 | D722 | SB4005-00 | DIODE,ZENER 1N5234B 6.2V@20MA<br>GVG/A70-SB4005-00 A1 | 1 |
| 402 | D511,D601,D602 | SB5013-00 | DIODE,VARC MV2115 TO-226AC 90-110PF<br>GVG/A70-SB5013-00 A1 | 3 |
| 405 | D603 | SB5014-00 | DIODE,VARC MV2105 TO-226AC 14-16PF<br>GVG/A70-SB5014-00 A1 | 1 |
| 408 | Q103,Q200,Q202,Q207,<br>Q301,Q510,Q520,<br>Q522,Q527,Q529,Q601,<br>Q602 | SB6008-00 | TRANS,NJFET MPF4392 TO-92<br>GVG/A70-SB6008-00 A1 | 12 |
| 411 | Q101,Q203,Q204,Q300,<br>Q303,Q600,Q604,<br>Q606,Q751,Q752 | SB8003-00 | TRANS,NPN 2N4124 TO-92 SM-SIG<br>GVG/A70-SB8003-00 A1 | 10 |
| 414 | Q100,Q102,Q104,Q208,<br>Q209,Q211,Q521,<br>Q603,Q720,Q750 | SB8004-00 | TRANS,NPN 2N4126 TO-92 SM-SIG<br>GVG/A70-SB8004-00 A2 | 10 |
| 417 | Q201,Q210,Q302,Q523,<br>Q526 | SB8005-00 | TRANS,NPN 2N4265 TO-92 SM-SIG<br>GVG/A70-SB8005-00 A3 | 5 |
| 420 | Q605 | SB8022-00 | TRANS,NPN SPS7348 TO-92 SM-SIG<br>CSC/CEN625 | 1 |
| 423 | Q524,Q525 | SB8023-00 | TRANS,PNP MPS6523 TO-92 SM-SIG<br>GVG/A70-SB8023-00 A1 | 2 |

# R E P L A C E M E N T P A R T S L I S T

RCVE PROC AMP 7510P (VARIOUS CABLE TYPES/150M, SEE ITEM NO 168)
ASSEMBLY NUMBER: 066714-53,60,65,70,75,80 ISSUE: A ECN: S459

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION<br>MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 426 | Q205,Q206 | SB8035-00 | TRANS,PNP MPSH81 TO-92 SM-SIG<br>GVG/A70-SB8035-00 A2 | 2 |
| 429 | U103,U521 | SC0125-01 | IC,LIN CA3080E 8 DIP<br>GE/CA3080E | 2 |
| 432 | U755 | SC0138-00 | IC,LIN MC7805CT TO-220<br>FAI/UA7805UC | 1 |
| 435 | U523 | SC0197-00 | IC,TTL SN74LS221N 16 DIP<br>GVG/A70-SC0197-00 A1 | 1 |
| 438 | U104 | SC0389-00 | IC,LIN LF347BN 14 DIP<br>GVG/A70-SC0389-00 A1 | 1 |
| 441 | U754 | SC0481-00 | IC,HCMOS MM74HC00N 14 DIP<br>GE/CD74HC00E | 1 |
| 444 | U400,U510,U691,U753 | SC0612-00 | IC,HCMOS 74HC14N 14 DIP<br>GVG/A70-SC0612-00 A2 | 4 |
| 447 | U301,U522,U690,U750 | SC0628-00 | IC,LIN LF353N 8 DIP<br>ANG/AD642JH | 4 |
| 450 | U106,U520,U751,U752 | SC0728-00 | IC,LIN TL064CN 14 DIP<br>GVG/A70-SC0728-00 A2 | 4 |
| 453 | U105 | SC1410-00 | IC,SPCL CUSTOM 44 PLCC<br>AT&T/LB1174AP | 1 |
| 456 | U600 | SC1411-01 | IC,LIN COLORLOCK 44 PLCC<br>AT&T/LB1182BP | 1 |
| 459 | SU105,SU401,SU402, SU600,XU401 | SE8051-00 | SKT,IC 44 LCC .9 SQ BLK<br>BUR/QILE44P-410T | 5 |
| 462 | SU403 | SE8079-00 | SKT,IC 24 DIP .3 CB BLK<br>CIA/CA-24SDL-1T-3 | 1 |
| 465 | S400 | SJ0047-10 | SW,DIP SPST 8POS 16 DIP PREM SEAL<br>EEC/240008GS | 1 |
| 466 | SU100 | SE8161-02 | SKT,STP 8 POS 1 ROW FOR FLAT LEADS<br>AMP/643108-1 | 1 |
| 468 | S700,S701,S702 | SJ0110-00 | SW,TGL DPDT SHT HNDL .4VA O/NON/O<br>GVG/A70-SJ0110-00 A2 | 3 |
| 471 | TP75,TP76,TP77,TP78 | TA6059-00 | TUR PN,.06X.1406 POST .0625 PCB<br>GVG/A70-TA6059-00 A1 | 4 |
| 474 | TP73,TP74 | TA6129-00 | TUR,WIRE LOOP TEST PT .067-.08 DIA<br>CMP/TP-102-01 | 2 |
| 477 | WA1 | WA2007-00 | WSHR,#4 SPLIT LOCK<br>WASHER,#4,SPLIT RING,ZINC PL | 1 |
| 480 | L756 | ZB4019-21 | INDCTR,MINI 3.3UH 5% CUT & FORMED<br>GOW/10M331J-1 | 1 |
| 483 | L201,L301 | ZB4021-21 | INDCTR,MINI 4.7UH 5% CUT & FORMED<br>GOW/10M471J-1 | 2 |
| 489 | L602 | ZB4028-21 | INDCTR,MINI 18UH 5% CUT & FORMED<br>GOW/10M182J-1 | 1 |
| 492 | L302,L751,L752,L753, L754,L755 | ZB4030-21 | INDCTR,MINI 27UH 5% CUT & FORMED<br>GOW/10M272J-1 | 6 |
| 495 | L100,L604 | ZB4035-21 | INDCTR,MINI 68UH 5% CUT & FORMED<br>GOW/10M682J-1 | 2 |
| 498 | L600 | ZB4038-21 | INDCTR,MINI 120UH 5% CUT & FORMED<br>GOW/10M123J-1 | 1 |

# R E P L A C E M E N T  P A R T S  L I S T

RCVE PROC AMP 7510P (VARIOUS CABLE TYPES/150M, SEE ITEM NO 168)
ASSEMBLY NUMBER: 066714-53,60,65,70,75,80 ISSUE: A ECN: S459

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION<br>MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 501 | L601 | ZB4045-21 | INDCTR,MINI 470UH 5% CUT & FORMED<br>GOW/10M473J-1 | 1 |
| 504 | L200 | ZB4076-01 | INDCTR,MINI 56UH 5% SHIELDED<br>GOW/17S562J | 1 |
| 507 | L603,L605 | ZB4079-01 | INDCTR,56UH 5%<br>DAL/1M-4-56UH +/-5% | 2 |
| 510 | L300 | ZB4090-01 | INDCTR,100UH 5%<br>GOW/15M103J | 1 |
| 513 | L510,L511 | ZB4146-00 | INDCTR,FIXED 4.6UH 5%<br>CLC/L0831-A | 2 |
| 999 | B10-066714-53 [SCHEMATIC]<br>B07-066714-53 [COMP.LOC.] | 000000-00 | REFERENCE DOCUMENTS | 0 |

# 9500A POWER SUPPLY MODULE

Assembly Number: 066710-10 Issue Number: 4

## INTRODUCTION

This section contains General Information, Specifications, Adjustment Note, Circuit Description, a Replacement Parts List, and Schematic Drawings for the 9500A Power Supply Module.

## GENERAL INFORMATION

The model 9500A Power Supply Module provides power for the plug-in modules of the 9500 and 7510 series NTSC and PAL systems. The Power Supply furnishes unregulated and filtered ±15V and+10V direct current to a frame Mother Board for distribution to all system modules. Regulation is accomplished by the individual on board regulators for each module within a system.

A single 9500A Power Supply is capable of furnishing enough current to operate all modules, including options, within a system.

## SPECIFICATIONS

| | |
|---|---|
| **Input** | 99-121V or 198-242VAC (50 - 60Hz) |
| **Output** | ±15VDC @850mA and +10VDC @750mA, 40 watts |
| **Fuses** | Three 2.5 ampere slo-blow fuses. One in each supply voltage transformer secondary located on the Power Supply printed circuit module.<br><br>One fuse inside the tray for 99 – 121VAC operation or 198 – 242VAC operation (correct fuse inserted before shipment according to your requirements as listed in the sales order). Fuseholder for this fuse is on the frames (internal) AC Power Module assembly, accessible through the frames rear channel assembly.<br><br>Additional fuses for the AC Power Module are located in the accessory package found in each system. |
| **Environmental** | |
| Temperature range | For operation and specifications, 0-50 degrees C |
| Relative Humidity | Up to 95%, non-condensing |

## ADJUSTMENTS

**NOTE**

There are no adjustments on this module.

## CIRCUIT DESCRIPTION

Refer to schematics D10-066710-XX and B07-066710-XX while reviewing the following text.

The output of dual secondary transformers T1 and T2 are rectified by diodes D7 - D8 and D4 - D5 along with capacitors C1 and C2 to produce the ±15V output. This voltage is delivered to the frame cells and then modules via the system frame's motherboard. Transformer T3, diodes D10-D13, and capacitor C3 serve similar functions for the +10V unregulated supply line.

Indicator DS1, located at the front edge of the power supply, is illuminated by zener diodes D1 - D3 in conjunction with transistors Q1 - Q4. This circuitry senses the +15V, –15V, and +10V and illuminates the LED if all three voltages are present.

Each of the three unregulated supply circuits is protected by a 2.5 amp slo-blow fuse, F1-F3, located on the Power Supply module.

An AC Power Module contains a fuse for 115V or 230V operation. The Power Module is internal to the frame with the fuseholder accessible at the back of the tray.

## SERVICE NOTES (If you service equipment still under warranty, the warranty may be voided.)

### Module Interconnections

All system module interconnections are shown on the system frame schematic diagrams located in the Drawings section of this manual.

## REPAIR and REPLACEMENT PARTS INFORMATION

Refer to the Maintenance section of this manual for important information on troubleshooting, repair, warranty, and return shipping of this equipment.

**NOTE**

If you service equipment that is still under warranty, the warranty may be voided.

# R E P L A C E M E N T  P A R T S  L I S T

9500 A-PSM 120/240 POWER SUPPLY
ASSEMBLY NUMBER: 066710-10 ISSUE: B ECN: J835

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION<br>MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 008 | [C4,C5,C6,C7,C8,C9] | CB0132-00 | CAP,CER .1UF 20% 50WV Z5U AXIAL<br>GVG/A70-CB0132-00 A1 | 6 |
| 010 | [C1,C2,C3] | CB1080-00 | CAP,ALUM 3300UF -10%+30% 25WV<br>COD/255A332M025XX | 3 |
| 015 | [F1,F2,F3] | FB4061-00 | FUSE,TYPE T 2.5 AMP<br>GVG/A70-FB4061-00 A1 | 3 |
| 020 | [F1,F2,F3] | FB4062-00 | FUSE,HLDR 5MM PCB MNT<br>GVG/A70-FB4062-00 A1 | 6 |
| 025 | [R8] | RV6810-00 | RES,681 OHM 1% 1/8W MTL FLM<br>COR/CT4 681R 1% | 1 |
| 030 | [R5,R6,R7] | RV1001-00 | RES,1K OHM 1% 1/8W MTL FLM<br>COR/CT4 1.0K 1% | 3 |
| 035 | [R2] | RV2211-00 | RES,2.21K OHM 1% 1/8W MTL FLM<br>COR/CT4 2.21K 1% | 1 |
| 040 | [R1,R3,R4] | RV1002-00 | RES,10K OHM 1% 1/8W MTL FLM<br>COR/CT4 10K 1% | 3 |
| 045 | [D4,D5,D7,D8,D10,<br>D11,D12,D13] | SB2006-00 | DIODE,RECT MR751 194-04 100V@6A<br>GVG/A70-SB2006-00 A1 | 8 |
| 050 | [D6,D9,D14] | SB2011-00 | DIODE,RECT 805SQ030 DO-204AR<br>GVG/A70-SB2011-00 A1 | 3 |
| 055 | [D1] | SB4005-00 | DIODE,ZENER 1N5234B 6.2V@20MA<br>GVG/A70-SB4005-00 A1 | 1 |
| 060 | [D2,D3] | SB4012-00 | DIODE,ZENER 1N5241B 11V@20MA<br>GVG/A70-SB4012-00 A1 | 2 |
| 065 | [DS1] | SB1069-00 | DIODE,LED 550-2206 GRN HIGH-EFF<br>DIA/550-2206 | 1 |
| 070 | [Q1,Q4] | SB8003-00 | TRANS,NPN 2N4124 TO-92 SM-SIG<br>GVG/A70-SB8003-00 A1 | 2 |
| 075 | [Q2,Q3] | SB8004-00 | TRANS,NPN 2N4126 TO-92 SM-SIG<br>GVG/A70-SB8004-00 A2 | 2 |
| 080 | [+15V,+10V,-15V,GND] | TA6059-00 | TUR PN,.06X.1406 POST .0625 PCB<br>GVG/A70-TA6059-00 A1 | 4 |
| 085 | [T1,T2] | TB6092-00 | XFMR,PWR 110/220 DUAL 6V SEC 18VA<br>GVG/C70-TB6092-XX | 2 |
| 090 | [T3] | TB6092-10 | XFMR,PWR 110/220 DUAL 9V SEC 18VA<br>GVG/C70-TB6092-XX | 1 |
| 095 | [J1] | CF0224-00 | CONN,PL HDR 36POS 2ROW PCB MNT<br>AMP/534965-1 | 1 |
| 100 | | CC2010-00 | CARD EJCTR,RTNR NYL WHT<br>SAE/6101 WHITE | 2 |
| 105 | | 058505-00 | LABEL,WARNING | 1 |
| 110 | | RC2000-00 | RTNR,PWR SPLY BDS SST<br>GVG/B70-RC2000-00 | 1 |

Assembly Number: 096398-00/096399-01 Issue Number: 3

## MOUNTING TRAY

The 7510 Receive Processing Amplifier system utilizes either a one rack-unit or two rack-unit tray. The one rack-unit (1RU) tray will hold two 7510 Receive Processing Amplifier modules and one 9500A power supply module. The two rack-unit (2RU) tray will hold four 7510 Receive Processing Amplifier modules and two 9500A power supply modules.

A 1RU tray measures 1.75" high by 19" wide by 15.75" deep (4.45cm x 48.26cm x 40.0cm). A 2RU tray measures 3.5" high by 19" wide by 15.75" deep (8.89cm x 48.26cm x 40.0cm).

For additional specifications information, refer to the General Information section of this manual.

For installation information, refer to the Installation Instructions section of this manual.

### Mother Board

A Mother Board, one for the 1RU tray and two for the 2 RU tray, is internal to the tray but accessible for maintenance by removing the rear connector channel.

### AC Power Module

An AC Power Module, also internal to the tray, provides the interface between the AC line and the 9500A Power Supply Module. The 1RU tray contains one AC Power Module and the 2RU tray contains two AC Power Modules.

Each power module has a voltage select switch, accessible at the rear of the tray, that enables the unit to operate with either 110VAC (nominal) or 220VAC (nominal) input line voltages. Each power module shipped from the factory contains the fuse necessary for your use as described on your sales order. This fuse provides short circuit protection for the 9500A Power Supply Module transformer primaries. Spare fuses are located in the spare parts kit shipped with each tray.

The AC receptacles accept the standard three prong IEC line plug. The receptacles are attached to an AC line filter on the AC Power Modules which minimize EMI (Electro Magnetic Interference) from the 7510 tray.

A 36 pin female connector and a 12 pin female connector provide a route for the AC and DC traces from the AC Power Modules to the tray Mother Board and 9500A Power Supply Modules.

## REPAIR AND RETURN INSTRUCTIONS

For repair and return instructions, refer to the Maintenance Instructions section of this manual.

## REPLACEMENT PARTS INFORMATION

The parts list included in this section are for the following equipment: 7510 1RU and 2RU systems; 7510 1RU and 2RU Trays; Motherboard Assembly; AC Power Module; and Accessory Package.

<<MPD MANUFACTURING>>

R E P L A C E M E N T  P A R T S  L I S T

RECV PROC AMP 1RU VIDEO,7510T1
ASSEMBLY NUMBER: 086435-00 ISSUE: B ECN: S508

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 001 | | TP7017-02 | MANUAL,7510 VID PROCESSING AMP | 1 |
| 005 | | 096398-00 | RECV PROC AMP 1RU VIDEO,7510T1 | 1 |
| 010 | | 076340-00 | FRONT COV RECV PROC AMP 1RU,7510T1 | 1 |
| 015 | | 066710-10 | 9500 A-PSM 120/240 POWER SUPPLY | 1 |
| 025 | | 053681-00 | ACCESSORY PACK 9500 SERIES | 1 |

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RECV PROC AMP 2RU VIDEO,7510T2
ASSEMBLY NUMBER: 086436-00 ISSUE: C ECN: S508

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 001 | | TP7017-02 | MANUAL,7510 VID PROCESSING AMP | 1 |
| 005 | | 096399-01 | RECV PROC AMP 2RU VIDEO,7510T2 | 1 |
| 010 | | 076341-00 | FRONT COV RECV PROC AMP 2RU,7510T2 | 1 |
| 015 | | 066710-10 | 9500 A-PSM 120/240 POWER SUPPLY | 1 |
| 025 | | 053681-00 | ACCESSORY PACK 9500 SERIES | 1 |

RECV PROC AMP 1RU PAL, 7510T1
ASSEMBLY NUMBER: 086493-00 ISSUE: ECN:

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 001 | | TP7017-02 | MANUAL,7510 VID PROCESSING AMP | 1 |
| 005 | | 096398-00 | RECV PROC AMP 1RU VIDEO,7510T1 | 1 |
| 010 | | 076340-00 | FRONT COV RECV PROC AMP 1RU,7510T1 | 1 |
| 015 | | 066710-10 | 9500 A-PSM 120/240 POWER SUPPLY | 1 |
| 025 | | 053732-00 | ACCESSORY PACK,PAL 9500 SERIES | 1 |

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RECV PROC AMP 2RU PAL,7510T2
ASSEMBLY NUMBER: 086494-00 ISSUE: A ECN:

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 001 | | TP7017-02 | MANUAL,7510 VID PROCESSING AMP | 1 |
| 005 | | 096399-01 | RECV PROC AMP 2RU VIDEO,7510T2 | 1 |
| 010 | | 076341-00 | FRONT COV RECV PROC AMP 2RU,7510T2 | 1 |
| 015 | | 066710-10 | 9500 A-PSM 120/240 POWER SUPPLY | 1 |
| 025 | | 053732-00 | ACCESSORY PACK,PAL 9500 SERIES | 1 |

RECV PROC AMP 1RU VIDEO,7510T1
ASSEMBLY NUMBER: 096398-00 ISSUE: C ECN: S342

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION<br>MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 015 | | CF1472-00 | CONN,FEMALE SCRWLOCK .748L<br>AMP/207719-1 | 2 |
| 017 | | SA1282-00 | SCRW,MACH 4-40X.312L TX T10 SLT PNH<br>CAC/950-00095-010 | 8 |
| 020 | | NA4002-00 | NUT #4-40 1/16x3/16 H<br>NUT,4-40,.0625X.1875,HEX,ZINC PL | 2 |
| 025 | | SA1328-00 | SCRW,MACH 6-32X.220 TX T10 SLTD FLH<br>MACH 6-32X.220L TX T10 SLT FLH | 8 |
| 030 | | WA2009-00 | WSHR,#4 INTL STAR LOCK ZINC<br>WASHER,#4,INT STAR,ZINC PL | 10 |
| 035 | | 076349-01 | 9500A 1RU SUBASSY FRAME | 1 |
| 040 | | 066711-00 | MTHRBD RECV PROC AMP 1RU,7510T1 | 1 |
| 045 | | 066686-10 | 9500A AC POWER MODULE | 1 |
| 050 | | FB4058-00 | FUSE,5X20MM SLO BLO 1 AMP<br>BUS/GDC-1 | 1 |
| 060 | | 058645-00 | LABEL,WARNING | 1 |

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RECV PROC AMP 2RU VIDEO,7510T2
ASSEMBLY NUMBER: 096399-01 ISSUE: B ECN: S342

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION<br>MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 015 | | 076357-01 | 7500 2RU SUBASSEMBLY FRAME | 1 |
| 020 | | 066712-00 | MTHRBD RECV PROC AMP 2RU 7510T2 | 1 |
| 025 | | 066686-10 | 9500A AC POWER MODULE | 2 |
| 030 | | FB4058-00 | FUSE,5X20MM SLO BLO 1 AMP<br>BUS/GDC-1 | 1 |
| 035 | | NA4002-00 | NUT #4-40 1/16x3/16 H<br>NUT,4-40,.0625X.1875,HEX,ZINC PL | 4 |
| 040 | | SA1282-00 | SCRW,MACH 4-40X.312L TX T10 SLT PNH<br>CAC/950-00095-010 | 15 |
| 045 | | SA1328-00 | SCRW,MACH 6-32X.220 TX T10 SLTD FLH<br>MACH 6-32X.220L TX T10 SLT FLH | 15 |
| 050 | | WA2009-00 | WSHR,#4 INTL STAR LOCK ZINC<br>WASHER,#4,INT STAR,ZINC PL | 19 |
| 055 | | CF1472-00 | CONN,FEMALE SCRWLOCK .748L<br>AMP/207719-1 | 4 |
| 060 | | 058645-00 | LABEL,WARNING | 2 |

MTHRBD RECV PROC AMP 1RU,7510T1
ASSEMBLY NUMBER: 066711-00 ISSUE: B ECN: J906

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 010 | C1,C2,C4,C5 | CB0140-00 | CAP,CER 470PF 5% 200WV COG<br>GVG/A70-CB0140-00 A1 | 4 |
| 012 | C3,C6 | CB0138-00 | CAP,CER 4.7PF +/-.5PF 200WV COG<br>GVG/A70-CB0138-00 A2 | 2 |
| 015 | | CF0937-00 | CONN,PL HDR 12POS 2ROW PCB MNT<br>AMP/103233-5 | 1 |
| 020 | | CF0736-00 | CONN,RCPT BNC PCB MNT<br>AMP/222420-1 | 10 |
| 025 | J07,J08,J17,J18 | CF0939-00 | CONN,PL HDR 36POS 2ROW PCB MNT<br>AMP/102690-3 | 4 |
| 030 | J06,J16 | CF0511-00 | CONN,RCPT 15POS 2ROW HDP-20 PCB MNT<br>AMP/207827-6 | 2 |
| 035 | | RA7035-00 | RLY,DPDT 12V SINGLE SIDE STABLE<br>ARO/TQ2E-12V | 4 |
| 040 | | SH2063-00 | STDF,SWG 4-40 .25 RND .25L BRS<br>ASM/51120-R-B-.135-1 | 8 |
| 999 | D10-096398-00 | 000000-00 | REFERENCE DOCUMENTS | 0 |

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MTHRBD RECV PROC AMP 2RU 7510T2
ASSEMBLY NUMBER: 066712-00 ISSUE: B ECN: S018

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 010 | C1,C2,C4,C5,<br>C7,C8,C10,C11 | CB0140-00 | CAP,CER 470PF 5% 200WV COG<br>GVG/A70-CB0140-00 A1 | 8 |
| 012 | C3,C6,C9,C12 | CB0138-00 | CAP,CER 4.7PF +/-.5PF 200WV COG<br>GVG/A70-CB0138-00 A2 | 4 |
| 015 | | CF0736-00 | CONN,RCPT BNC PCB MNT<br>AMP/222420-1 | 20 |
| 020 | | CF0937-00 | CONN,PL HDR 12POS 2ROW PCB MNT<br>AMP/103233-5 | 2 |
| 025 | J07,J08,J17,J18,J27<br>J28,J37,J38 | CF0939-00 | CONN,PL HDR 36POS 2ROW PCB MNT<br>AMP/102690-3 | 8 |
| 030 | J06,J16,J26,J36 | CF0511-00 | CONN,RCPT 15POS 2ROW HDP-20 PCB MNT<br>AMP/207827-6 | 4 |
| 035 | | SH2063-00 | STDF,SWG 4-40 .25 RND .25L BRS<br>ASM/51120-R-B-.135-1 | 15 |
| 040 | | RA7035-00 | RLY,DPDT 12V SINGLE SIDE STABLE<br>ARO/TQ2E-12V | 8 |
| 999 | D10-096399-01 | 000000-00 | REFERENCE DOCUMENTS | 0 |

9500A AC POWER MODULE
ASSEMBLY NUMBER: 066686-10 ISSUE: B ECN: J999

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 010 | [J90] | CF1021-00 | CONN,AC PWR LINE FLTR RTANG PCB MNT<br>GVG/A70-CF1021-00 A2 | 1 |
| 015 | [P1] | CF0938-00 | CONN,RCPT 12POS 2ROW PCB MNT<br>AMP/534204-2 | 1 |
| 020 | [J92] | CF0936-00 | CONN,RCPT 36POS 2ROW PCB MNT<br>AMP/534204-3 | 1 |
| 025 | [F1] | FB4084-00 | FUSE,HLDR 5X20MM RTANG PCB<br>GVG/A70-FB4084-00 A1 | 1 |
| 035 | [S1] | SJ0129-00 | SW,AC PWR RTANG PCB MNT<br>GVG/A70-SJ0129-00 A2 | 1 |
| 999 | D10-096396-00 | 000000-00 | REFERENCE DOCUMENTS | 0 |

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ACCESSORY PACK 9500 SERIES
ASSEMBLY NUMBER: 053681-00 ISSUE: C ECN: S331

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 005 | | 003640-00 | RACK PLATE V-1 | 2 |
| 010 | | 003641-00 | SIDE PLATE V-1 | 2 |
| 012 | | FB4058-00 | FUSE,5X20MM SLO BLO 1 AMP<br>BUS/GDC-1 | 2 |
| 014 | | FB4063-00 | FUSE,5X20MM SLO BLO 1/2 AMP<br>BUS/GDC.50 | 2 |
| 015 | | FB4085-00 | FUSE,5X20MM FAST BLO 0.8A<br>BUS/GMA-8/10 | 2 |
| 020 | | FB4086-00 | FUSE,5X20MM FAST BLO 0.4A<br>BUS/GMA-4/10 | 2 |
| 025 | | LB8003-00 | LINE CD,3 CNDCT #18 7.5L W/PL&RCPT<br>BEL/17251 | 1 |
| 030 | | WA2010-00 | WSHR,#4 FLAT .2813X.032THK ZINC<br>WASHER,#4X.032,FLAT,ZINC PL | 2 |
| 035 | | CA6003-00 | CLMP,CBL NYL .25<br>GCE/34-378 | 2 |
| 040 | | SA1054-01 | SCRW,MACH 4-40X.3125L PH PNH W/NYL | 2 |

# R E P L A C E M E N T  P A R T S  L I S T

ACCESSORY PACK,PAL 9500 SERIES
ASSEMBLY NUMBER: 053732-00 ISSUE: ECN:

| ITM NO | REFERENCE DESIGNATOR | GVG PART NUMBER | DESCRIPTION<br>MFG CODE/PART NUMBER | QTY |
|---|---|---|---|---|
| 005 | | 003640-00 | RACK PLATE V-1 | 2 |
| 010 | | 003641-00 | SIDE PLATE V-1 | 2 |
| 012 | | FB4058-00 | FUSE,5X20MM SLO BLO 1 AMP<br>BUS/GDC-1 | 2 |
| 014 | | FB4063-00 | FUSE,5X20MM SLO BLO 1/2 AMP<br>BUS/GDC.50 | 2 |
| 025 | | LB8024-00 | LINE CD,W/RCPT USE W/CF1871-00<br>GVG/A70-LB8024-00 A1 | 1 |
| 030 | | WA2010-00 | WSHR,#4 FLAT .2813X.032THK ZINC<br>WASHER,#4X.032,FLAT,ZINC PL | 2 |
| 035 | | CA6003-00 | CLMP,CBL NYL .25<br>GCE/34-378 | 2 |
| 040 | | SA1054-01 | SCRW,MACH 4-40X.3125L PH PNH W/NYL | 2 |