PTS 7200A EMC Preselector

User manual

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1.   Introduction.

The PTS 7200A EMC Preselector unit is designed to enhance the 'small signal' sensitivity of Spectrum Analyser based measurement systems.

This unit covers the frequency range of 9 kHz to 1 GHz. The unit has eight switchable filter paths, between 150 kHz and 30 MHz, providing high level of out of band signal rejection, this being particularly suited to conducted measurements. And above 30 MHz, the low noise amplifier path provides the noise figure improvement necessary for many radiated measurements.

The Preselector may be used in either Manual mode, driven from the front panel, or in the Auto mode which allows the Preselector to be controlled remotely via its auxiliary port using a bit wide proprietary serial communication protocol.

Also included with this package is the Preselector downloadable program (DLP) which enables the Preselector to be controlled remotely using the HP 8590 series Spectrum Analysers. Using this combination, it is also possible to control the Preselector over the GPIB, (IEEE-488), interface using a host controller.

1.1 Conventions used in this manual.

The various front panel keys on the Preselector unit and the HP 8590 series Spectrum Analyser together with messages displayed on the Analyser screen are annotated, in this manual, using the following convention:

Key. | Key name with an outlined shaded box represent keys available on Preselector unit.

Key. | Key name with an outline box represent keys available on HP8590 series Spectrum Analysers.

Softkey. | Key name with shaded box represent available softkeys on HP8590 series Spectrum Analysers.

The Preselector DLP softkeys with the first letter capitalised will normally lead you to another menu. Whereas uppercase labelled keys will perform a specific task without leading you to any other menus.

MESSAGE. | Text printed using this typeface represents messages displayed on HP8590 series Spectrum Analyser display.

2. Configuring the Preselector unit.

This section of the manual describes the Preselector and outlines the necessary setting up procedures for the unit.

2.1 Description of the Preselector unit.

The PTS 7200A EMC Preselector is a cost effective measurement enhancement instrument for Spectrum Analyser based test systems.

The Preselector unit provides two measurement paths, the LF (over 9kHz - 30MHz) and HF (over 30MHz - 1GHz). The LF path comprises eight filter bands in addition to the *through path* and a low noise amplifier stage is provided across the HF path. Table 2.1 shows the frequency coverage for these filter bands.

Path	LF (Frequency Range)
LF filter band 1	150kHz - 400kHz
LF filter band 2	400kHz - 1MHz
LF filter band 3	1MHz - 2MHz
LF filter band 4	2MHz - 4MHz
LF filter band 5	4MHz - 7MHz
LF filter band 6	7MHz - 10MHz
LF filter band 7	10MHz - 15MHz
LF filter band 8	15MHz - 30MHz
LF *Through*	9kHz - 30MHz
HF *Amplifier*	30MHz - 1GHz

Table 2.1 Frequency range of the Preselector paths.

Please refer to Appendix C for the associated gain factors for each of these paths.

The HF path has a built in low-noise amplification stage, (gain of ~30dB), thus providing an increase in the Signal / Noise performance of the measurement system. The HF path is particularly suited to low signal level environments usually encountered during radiated measurements.

The LF filter paths exhibit insertion losses of approximately 4 dB and are more suited to conducted measurement environments where high signal levels are likely to be experienced.

CAUTION   Excessive signal input will damage the Preselector unit. An in-line limiter network should be used if signal levels are likely to exceed input power handling limits of the Preselector unit.

Both the HF and LF paths also include a switchable 10 dB attenuator which enables the user to easily seek out any gain compression distortion effects caused by the Preselector / Spectrum Analyser inputs.

2.2   Preselector unit front panel description.

This section of the manual describes the front panel features of the PTS 7200A EMC Preselector unit. See Figure 2.1.
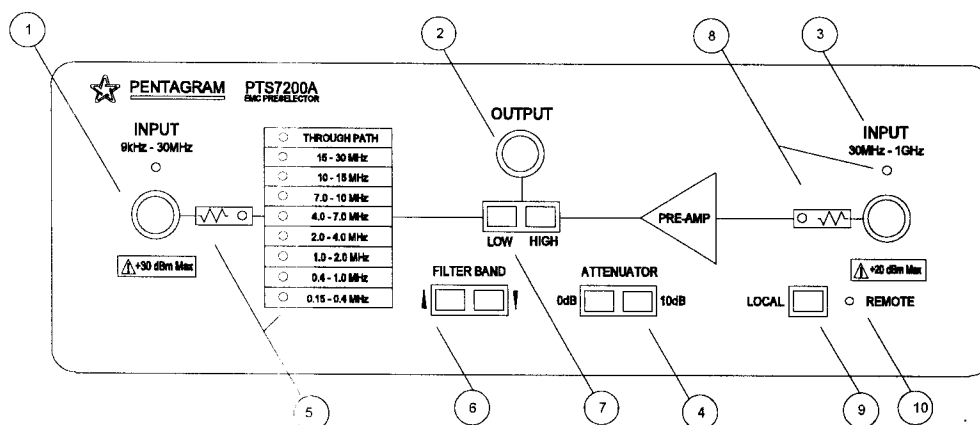
Figure 2.1 Preselector front panel schematic.

The following describes the Preselector front panel features as shown in Figure 2.1

1.   The LF signal input for the Preselector unit, (nominally 50Ω termination).

CAUTION   Excessive signal level, (beyond the limit stated under this input connector), will cause permanent damage to the unit.

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2.   The RF output for the Preselector unit, (nominally 50Ω termination).

3. The HF signal input for the Preselector unit, (nominally 50Ω termination). Note that excessive signal level, (beyond the limit stated under this input connector), will cause permanent damage to the unit.

4. The ⟨0 dB⟩ and ⟨10 dB⟩ keys, allow the user to *switch-out* and *switch-in* the 10dB attenuator in the currently selected Preselector input path.

5. The LF attenuator and filter path status indicators. When illuminated, the LED's indicate the currently selected path and the attenuator state.

6. The ⟨▲⟩ (up) and ⟨▼⟩ (down) keys, allow the user to cycle through available filter bands for the LF input path.

7. The ⟨LOW⟩ and ⟨HIGH⟩ keys, allow the user to switch between the LF and HF input paths for the Preselector unit.

8. The HF attenuator and path status indicators. When illuminated, the LED's indicate the currently selected path and the attenuator state.

9. The ⟨LOCAL⟩ key, enables the Preselector front panel keys after a remote session.

10. Remote / Error indicator. This remains illuminated during a remote session, (during which all the front panel keys except ⟨LOCAL⟩ locked out).

    The Preselector unit also uses this LED to highlight any operational errors. The LED flashes when the unit detects an error situation, (which can be cleared by pressing the ⟨LOCAL⟩ button).

2.3   Preselector unit rear panel description.

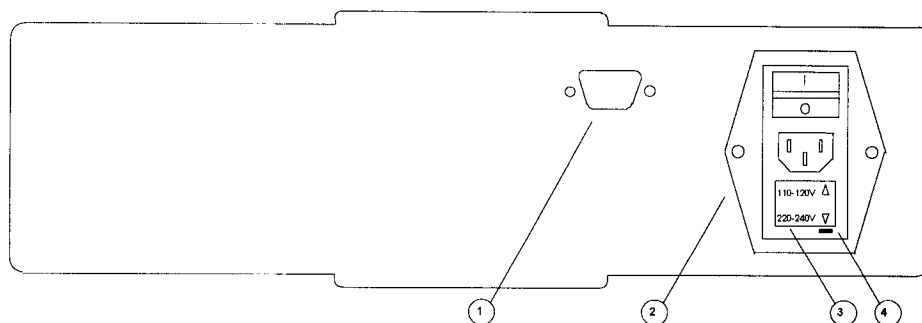This section of the manual describes the rear panel features of the PTS 7200A EMC Preselector unit. See Figure 2.2.

Figure 2.2 Preselector rear panel schematic.

The following describes the Preselector rear panel features as shown in Figure 2.2

1. This is the Auxiliary interface which enables the Preselector unit to be driven remotely by HP 8590 series Spectrum Analysers.

NOTE	Be sure to turn off the Spectrum Analyser and the Preselector before installing the auxiliary port remote link.

2. The AC power switch and inlet. (This switch module includes an AC voltage selector).

3. The AC voltage selector allows the Preselector unit to be powered from 110-120V or 220-240V source.

CAUTION	Incorrect voltage selector setting may cause permanent damage to the Preselector unit. Please ensure the correct setting before applying power to the unit. (Please refer to Appendix C for the Preselector AC voltage tolerance).

4. The alignment marker for the AC voltage selector setting. The voltage pointer aligned with this marker defines the input AC power source for the Preselector unit.

## 2.4 Setting up the Preselector ready for measurements.

The PTS 7200A Preselector package consists of:

⇒ This Manual, (PTS 7200A Instruction Manual).
⇒ The PTS 7200A Preselector unit.
⇒ Preselector DLP, (supplied on RAM Card).
⇒ Mains cable.
⇒ Auxiliary port interface cable.

Please ensure that all the components of the system, (listed above), are present before proceeding. If any parts are found to be missing then please contact either your supplier or the support staff at Pentagram Technical Services Limited for advice.

If the Preselector unit is to be used in Manual mode only, then only a modest amount of setting up is necessary before use. Simply connect the mains supply cable to the unit, apply power and turn on the unit.

Figure 2.3 shows an example test set-up using the Preselector in Manual mode, (see chapter 3 'Using the Preselector in manual mode' for more details).
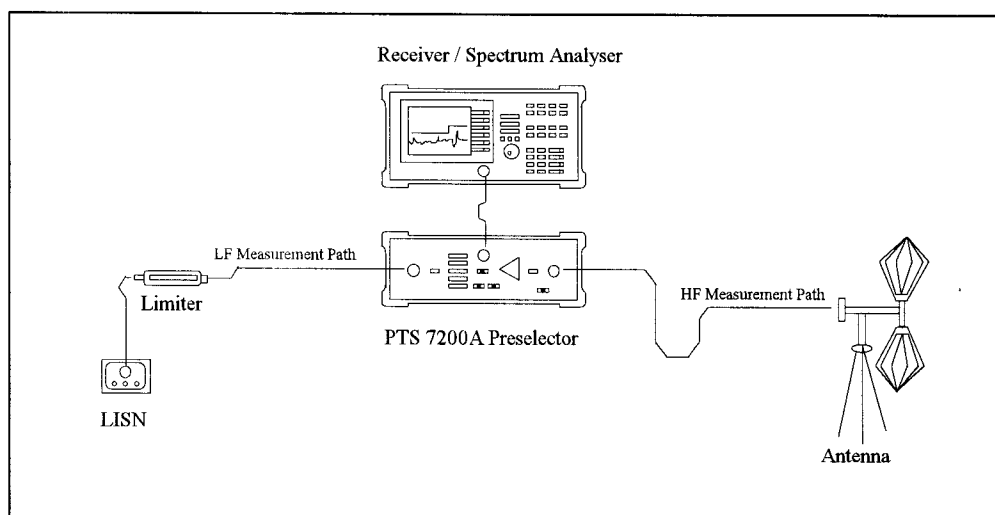
Figure 2.3 Example Test Set-up Using Preselector in Manual Mode

If you intend to use the unit with an HP 8590 series Analyser, then you may wish to use the Preselector DLP, (provided with this package), and take advantage of some remote control features of the Preselector unit. (This manual only covers the installation and use of the Preselector downloadable program (DLP), please refer to your Analyser's programming manual for general information on DLP's).

2.5   Installing the Preselector DLP.

The Preselector DLP enables an HP8590 series Spectrum Analyser to remotely control, via its Auxiliary port, the Preselector unit using a bit wide serial protocol.
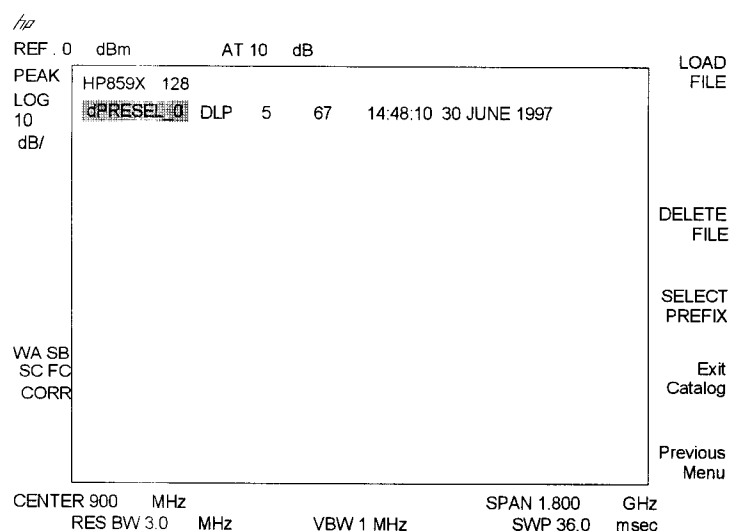
The DLP allows easy access to all the Preselector features using the Analyser's front panel softkeys. It provides automatic magnitude compensation for the various Preselector band settings together with any path gains / losses of the unit.

Please ensure that the Analyser has sufficient free memory before downloading the Preselector DLP. (The available Analyser memory can be determined by using the 'MEM ?;' command or by carrying out the Catalog Internal procedure. Please refer to the Spectrum Analyser documentation for details).

Note that the amount of memory required for the Preselector DLP is specified on the installation memory card provided. If the Preselector requirements exceed the available memory on the Analyser then it will be necessary to dispose of any unwanted variables, traces, keys and functions to free up sufficient memory.

Once the memory requirements are satisfied then carry out the following steps:

1.   Install the Preselector DLP memory card into the Analyser's card reader, (ensuring that the 'Insertion Arrow' is aligned with the raised arrow on the bezel of the card reader).

2.   Press the (SAVE) or (RECALL) key and the Analyser will display the INTERNAL CARD softkey. If INTERNAL is underlined then press the INTERNAL CARD key and CARD will be selected.

3.   Press the Catalog Card softkey. This exposes the CATALOG ALL softkey. The memory card contents will be displayed on the screen with the dPRESEL_0 DLP highlighted, see Figure 2.4.

4.   With the DLP selected, press the LOAD FILE softkey. The Analyser will begin to load the Preselector DLP. The loading will take approximately 30 seconds to complete.

5.   Press the (MEAS/USER) key. The Analyser will then expose the User Menus softkey. Select the User Menus key and the Preselector DLP softkey, (PTS7200A DLP), will be displayed.

```
/ni/
REF . 0    dBm              AT 10    dB                                          LOAD
PEAK   ┌─────────────────────────────────────────────────┐        FILE
       │ HP859X   128                                     │
LOG    │ ░dPRESEL░0░  DLP    5      67     14:48:10  30 JUNE 1997 │
10     │                                                  │
dB/    │                                                  │
       │                                                  │        DELETE
       │                                                  │        FILE
       │                                                  │
       │                                                  │        SELECT
       │                                                  │        PREFIX
WA SB  │                                                  │
SC FC  │                                                  │        Exit
CORR   │                                                  │        Catalog
       │                                                  │
       │                                                  │        Previous
       └─────────────────────────────────────────────────┘        Menu
CENTER 900    MHz                          SPAN 1.800    GHz
       RES BW 3.0    MHz        VBW 1 MHz   SWP 36.0    msec
```

Figure 2.4 Showing dPRESEL DLP selected.

Once loaded, the Preselector DLP will remain in the Analyser's battery-backed RAM and may be used repeatedly, (even after the Analyser power has been cycled).

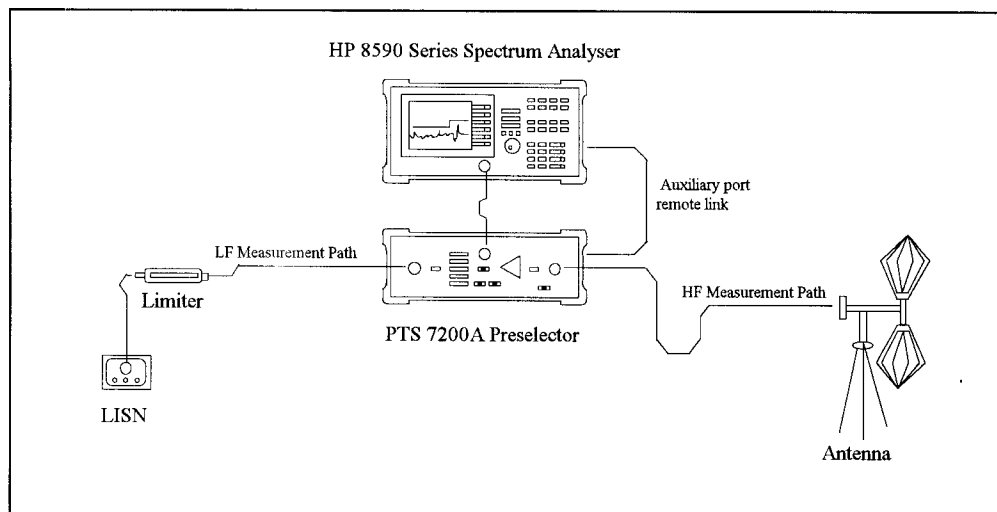## 2.6   Installing the Spectrum Analyser / Preselector remote link.

As mentioned, the remote communication between the Analyser and the Preselector unit is carried out using the Auxiliary ports on the respective units, (9 pin D-type connectors located on the rear panels of these units).

NOTE	Ensure that both the Analyser and the Preselector unit are powered down and use the auxiliary port remote interface cable provided, to connect the two instruments.

Figure 2.5 shows an example test set-up using the Preselector in the Auto mode, (see chapter 4 'Using the Preselector in Auto mode' for more details).

HP 8590 Series Spectrum Analyser

Auxiliary port
remote link

LF Measurement Path

Limiter

HF Measurement Path

LISN

PTS 7200A Preselector

Antenna

Figure 2.5 Example Test Set-up Using Preselector with the remote link.

3. Using the Preselector unit in Manual mode.

This section of the manual describes the various features of the Preselector unit and its operation in the Manual mode.

In this mode, all the Preselector functions are accessed from the unit's front panel keys and the instrument runs independently of the Preselector DLP. (This is its default power up state).

The magnitudes of any measurements made, in this mode, will need to be manually compensated for the relevant band together with any additional path losses or gains. (Please refer to Appendix C for the applicable magnitude compensation factors for the Preselector unit).

If you have not set up the Preselector unit then please refer to section 2.4 *'Setting up the Preselector ready for measurements'*, for details.

As mentioned, the Preselector unit has two signal measurement paths, the LF filtered path and HF amplifier path, these being selectable from the front panel keys.

In addition to this, the Preselector also includes, (for each of the signal inputs), a switchable 10 dB attenuator which enables you to easily detect any gain compression distortion effects caused by the Preselector / Spectrum Analyser inputs.

3.1 Selecting input signal path.

The Preselector unit powers up with the HF amplifier path selected together with the 10dB attenuator *switched-out*, by default.

The (LOW) and (HIGH) keys enable you to select the desired input signal path through the Preselector unit. Pressing the (LOW) key sets the unit to the LF path and selecting the (HIGH) key sets the unit to the HF path.

Both the LF and HF signal inputs have front panel status LED's and illuminate when the relevant input is selected.

3.2   Selecting LF filter bands.

Once the LF input signal path has been chosen, you can then cycle through the available LF filter bands, (including *through*), using the ▲ (up) and ▼ (down) front panel keys .

Pressing the ▲ key selects the next available higher frequency band, until the *through* path is selected. The ▼ key allows you to choose the next available lower frequency band until the lowest frequency band is selected.

The front panel band status LED's, when illuminated, indicate the currently selected band.

3.3   Switching the 10dB attenuator in / out.

The 10dB attenuator state is controlled by the 0dB and 10dB front panel keys. Pressing the 10dB key engages the 10dB attenuator in the currently selected input path and selecting the 0dB key *switches-out* the attenuator from the signal path.

Again, the LF and HF attenuator status LED's indicate the current state of the respective attenuator.

4. Using the Preselector unit in Automatic mode.

This section of the manual covers the operation of the Preselector unit in the Auto mode. This entails the Preselector being driven remotely by the Preselector DLP running on an HP 8590 series Analyser.

Whilst in Auto mode, the DLP keeps track of the Preselector unit's state and updates the status, (displayed on the Analyser screen), after each remote operation. The DLP uses the Analyser's EXTERNAL PREAMPG function to compensate for Preselector band gain / loss and any additional loss due to the attenuator. By default, the DLP will normally carry out magnitude compensation for the Preselector unit. However, you have the option to override this once the DLP is running.

NOTE   The Preselector DLP will require exclusive use of the Analyser
EXTERNAL PREAMPG function during execution.

Using the Preselector DLP, you can also make the Preselector unit track changes in the Analyser frequency whilst using Analyser features outside the DLP.

Having installed the DLP and if your Spectrum Analyser has a GPIB interface option fitted, then it is also possible to control the Preselector remotely, (via the Analyser), from a GPIB host controller.

You will need to have installed both the Preselector DLP and the auxiliary remote link before proceeding to use the unit in the Auto mode.

4.1 Preselector DLP Screen Annotations.

In addition to the normal annotations that appear on the HP 8590 series Spectrum Analyser display, during its execution, the Preselector DLP uses specific regions of the screen to provide Preselector status information. Figure 4.1 shows these annotations.


```
1  -    Status region, (provides Preselector Status).
2  -    Message region, (displays DLP messages).
```
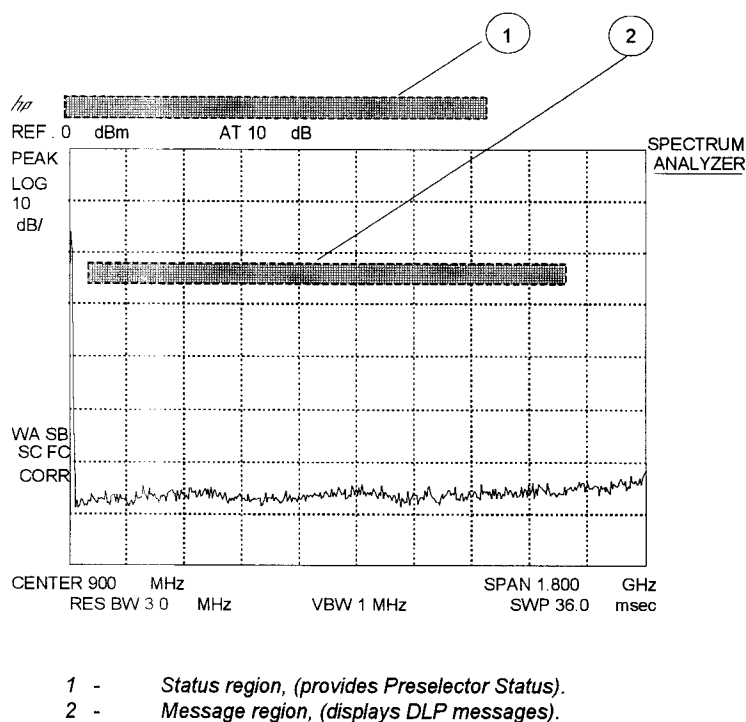
Figure 4.1 Additional Preselector DLP Screen annotations.

The status region normally provides information about the current state of the Preselector unit. The following is an example of the status message displayed when the unit is set to the HF *amplifier* path with the attenuator *switched-out*:

```
HF AMP  30MHz-1GHz  ATT:OUT
```

The DLP uses the Analyser start frequency to determine the most suitable Preselector band. If the Analyser stop frequency exceeds the selected filter band range then the DLP will highlight this by displaying the `'*'` character along side the band label within the status region.

If communication problems are encountered during a remote operation then the DLP displays the following message in the status region:

```
PRSL Status: Unknown!
```

The DLP uses the message region of the Analyser display to provide user prompts and other messages.

4.2   The Preselector DLP.

All the Preselector manual mode features, described previously, can be accessed using Preselector DLP. In addition to these, the DLP also allows you to turn on Preselector band tracking. This feature is particularly useful if you intend to carry out diagnostics type measurements outside the Preselector DLP and still maintain band control over the Preselector unit.

This section of the manual outlines the Preselector DLP menu structure and describes the functionality associated with the various softkeys.

If you would like to get a quick overview of the DLP menu structure before proceeding further then please refer to Appendix A, 'The Preselector DLP Menu Map'.

The rest of this section will guide you through each of the Preselector DLP menu screens, in the order in which you are most likely to encounter them. The conditional menu which you may encounter is described towards the end of this section.

4.2.1   Preselector DLP Menu Screens.

The DLP is accessed by pressing (MEAS / USER) key. The Analyser will then expose the User Menus softkey. Select the User Menus key and the Preselector DLP entry softkey, (PTS7200A DLP), will be displayed.

DLP Entry Screen.

Path: [MEAS / USER] User Menus

This menu screen allows you to enter the Preselector DLP, see Figure 4.2 .

NOTE	Selecting any Analyser keys other than those described in this section will terminate the Preselector DLP. Use the [MEAS / USER] User Menus keys to resume the execution of the Preselector DLP.
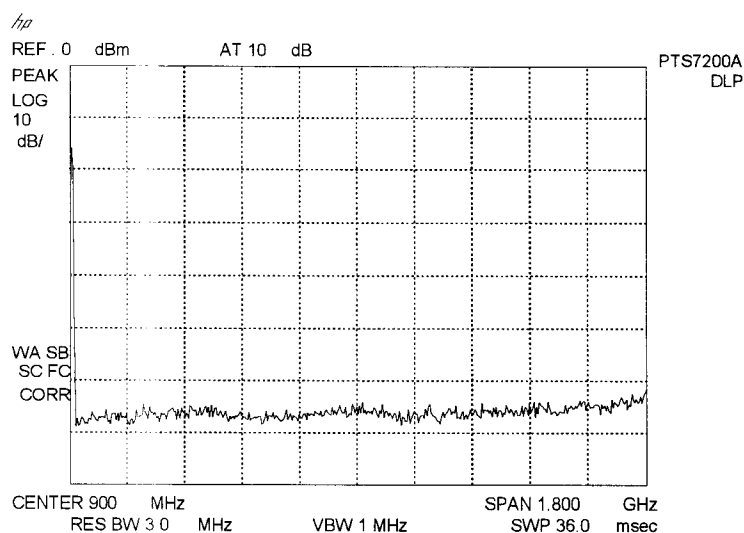
Figure 4.2 Showing the Preselector DLP softkey.

The following describes the features of the DLP Entry Screen softkey, (annotated in Figure 4.2).

PTS7200A DLP   This key allows entry to the Preselector DLP. When pressed, the DLP runs through its initialisation process which establishes remote communication with the Preselector unit and , if successful, it then proceeds to check whether the Preselector state matches the status defined by the DLP variables. If the states do not match then the DLP will prompt you, with the 'Initialise States' conditional menu, to select which set up you would like to proceed with, i.e. set the Analyser up as the Preselector or vice-versa.

Once the desired state has been established, the DLP checks the Analyser stop frequency for possible band over-run. If band over-run is detected then the DLP will highlight this by displaying the '*'

character along side the band label within the status region on the Analyser display.

C A U T I O N Any measurements made outside the Preselector filter band frequency range are uncalibrated.

Once initialised, the routine proceeds to display the 'Main Menu'.

If any problems are encountered during initialisation then the routine displays the following error message, (on the screen and stops):

```
Err: During the 'On-line' CMD!
```

The most likely cause for this error would be faulty remote cabling.

Main Menu.

Path: (MEAS / USER) User Menus   PTS7200A DLP

This is the top level menu screen which allows you to remotely access all the Preselector features via the Analyser's front panel softkeys, see Figure 4.3.
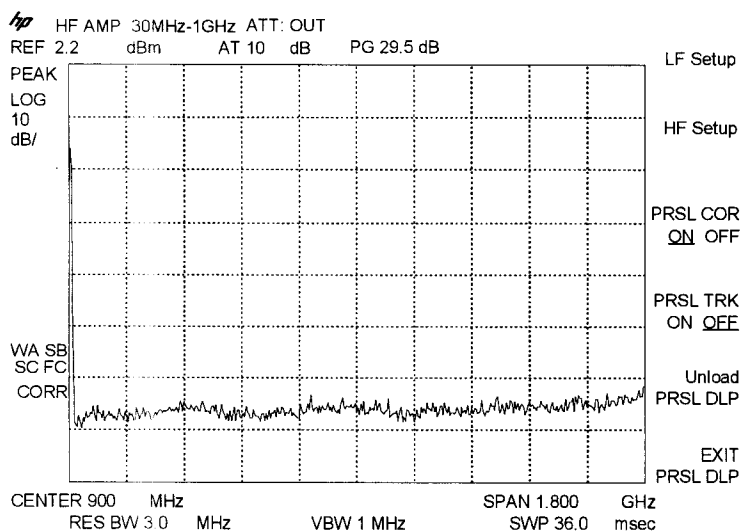
Figure 4.3 Showing the Main Menu screen.

The following describes the 'Main Menu' softkeys as annotated in Figure 4.3.

LF Setup   Gives you access to the 'LF Setup' screen and subsequent menus. These enable you control all the features associated with the LF path of the Preselector unit.

HF Setup   Gives you access to the 'HF Setup' screen and subsequent menus. These enable you control all the features associated with the HF path of the Preselector unit.

PRSL COR   Toggles the automatic band / attenuator magnitude compensation for
ON OFF   the Preselector unit. The DLP uses the EXTERNAL PREAMPG Analyser function to carry out the required magnitude compensation. This method will maintain any previously set reference level values on the Analyser. However, any previously set reference level offset values will be replaced by those used by the DLP.

On power up, the DLP sets the magnitude correction to 'ON'. However, if the Analyser power is not cycled then the previously set correction state is maintained for repeated entries into the DLP.

NOTE	If the correction is turned off, then the magnitudes of any measurements made will need to be manually compensated for.

PRSL TRK ON OFF

Toggles the Preselector band tracking w.r.t. Analyser start frequency. When selected, (ON underlined), the DLP continuously tracks frequency changes on the Analyser and selects the most appropriate Preselector path for the chosen frequency range.

The DLP uses the Analyser start frequency to determine the most suitable Preselector band. If the chosen stop frequency exceeds the selected filter band range then the DLP will highlight this by displaying the '*' character along side the band label within the status region on the Analyser display.

Once set, the tracking will remain active until the Analyser power is cycled.

This feature is particularly useful if you intend to carry out diagnostics type measurements outside the Preselector DLP and still maintain band control over the Preselector unit.

NOTE	Preselector band tracking is only supported for Analyser frequency changes made using the following keys:
	• CENTER FREQ, START FREQ and STOP FREQ softkeys accessed via the FREQUENCY key.
	• SPAN softkey accessed via the SPAN key.

Unload PRSL DLP

Allows you to erase the Preselector DLP from the Analyser's memory. When selected, the user is prompted to verify the unload by the 'Confirm Unload' menu screen.

NOTE	Once unloaded, the Preselector DLP will not be available until you re-install it.

`Exit`
`PRSL DLP`   Removes screen annotations and any reference level offset values set before leaving the Preselector DLP.

LF Setup.

Path from 'Main Menu': 　　　LF Setup

This menu screen enables you access all the features associated with the LF input of the Preselector unit.

Using the available softkeys (and subsequent menus) you can:

⇒　Set any one of the available Preselector LF filter bands (including *through*).

⇒　Set the Analyser frequency range and let the DLP select the most appropriate Preselector band.

⇒　Toggle the state of the LF attenuator.

Figure 4.4 shows the 'LF Setup' menu screen.

Figure 4.4 Showing the LF Setup screen.

The following describes the available softkeys for 'LF Setup' screen , (as shown in Figure 4.4).

LF Bands　　Leads you to the 'LF Bands' menu screen which enables you to select the desired LF filter band including *through*.

Freq Select'n

Leads you to the 'LF Frequency Selection' menu screen. Which allows you to set the Analyser's frequency range and once set the DLP will proceed to select the most appropriate LF filter path.

10dB ATT IN OUT

Toggles the state of the LF attenuator. This key allows you to *switch-in* or *switch-out* the LF attenuator as desired. If the Preselector unit is set up for the LF input then the new attenuator state will be set and displayed on the status line on the Analyser screen. However, if the Preselector unit is currently set up for the HF input then the newly selected LF attenuator state will not be reflected until the LF path is selected.

THR 9kHz -30MHz

Short cut key, which allows you to select the LF *through* path on the Preselector unit without going through the 'LF Bands' menu.

After setting the *through* path, the DLP updates the status region on the Analyser display.

Ret Main Menu

Takes you back to the Preselector DLP 'Main Menu'.

LF Bands.

Path from 'Main Menu' :   `LF Setup  Bands`

This menu screen allows you to select any of the available LF filter bands (including *through*) on the Preselector unit. See Figure 4.5.
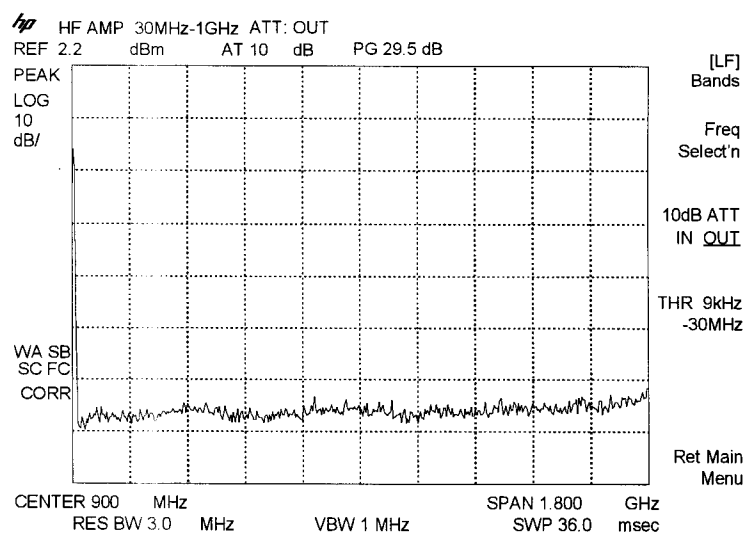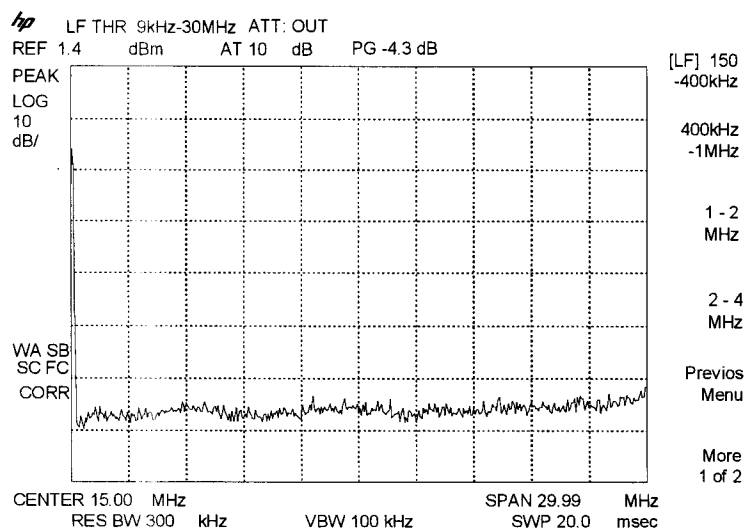

Figure 4.5 Showing the LF Bands menu screen.

The following describes the available softkeys for 'LF Bands' menu screen , (as shown in Figure 4.5).

`150 -400kHz`   Sets up the 150 kHz to 400 kHz filter band on the Preselector unit. The DLP automatically compensates for all the relevant magnitude factors, (if the band correction has been selected), and updates the status region on the Analyser display. In addition to this the DLP will also set the Analyser start and stop frequencies to match those of the selected filter band.

`400kHz -1MHz`   Sets up the 400 kHz to 1 MHz filter band on the Preselector unit. The DLP automatically compensates for all the relevant magnitude factors, (if the band correction has been selected), and updates the status region on the Analyser display. In addition to this the DLP will also set the Analyser start and stop frequencies to match those of the selected filter band.

1-2 MHz   Sets up the 1 MHz to 2 MHz filter band on the Preselector unit. The DLP automatically compensates for all the relevant magnitude factors, (if the band correction has been selected), and updates the status region on the Analyser display. In addition to this the DLP will also set the Analyser start and stop frequencies to match those of the selected filter band.
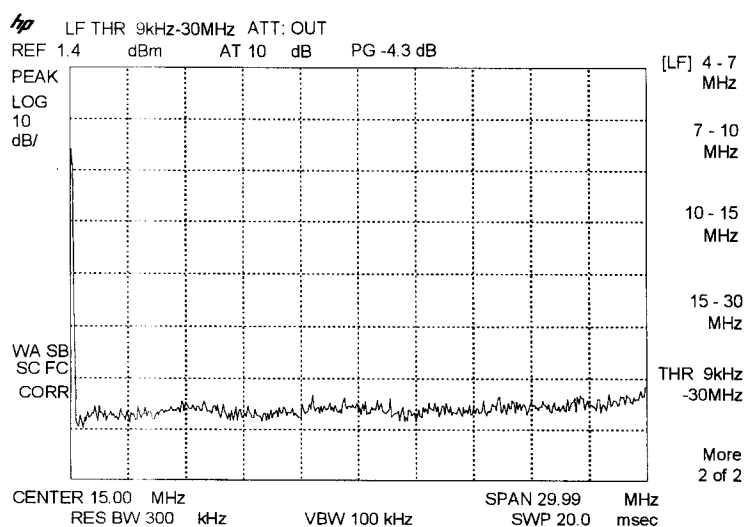
2-4 MHz   Sets up the 2 MHz to 4 MHz filter band on the Preselector unit. The DLP automatically compensates for all the relevant magnitude factors, (if the band correction has been selected), and updates the status region on the Analyser display. In addition to this the DLP will also set the Analyser start and stop frequencies to match those of the selected filter band.

Previous Menu   Returns you to the 'LF Setup' menu screen. Selects the LF *through* path on the Preselector, compensates for all the relevant magnitude factors. (if the band correction has been selected), and updates the status region on the Analyser display. The Analyser start and stop frequencies remain unchanged.

More 1 of 2   This key exposes the second group of the available options for this menu. See Figure 4.6 for details on these additional options.

```
hp     LF THR  9kHz-30MHz  ATT: OUT
REF 1.4      dBm        AT 10   dB      PG -4.3 dB
PEAK                                                    [LF]  4 - 7
LOG                                                            MHz
10
dB/                                                     7 - 10
                                                          MHz

                                                        10 - 15
                                                          MHz

                                                        15 - 30
                                                          MHz
WA SB
SC FC                                                   THR 9kHz
CORR                                                    -30MHz

                                                        More
                                                        2 of 2

CENTER 15.00   MHz                    SPAN 29.99    MHz
    RES BW 300    kHz     VBW 100 kHz    SWP 20.0   msec
```

Figure 4.6 Showing the additional LF Bands menu options.

The following describes the available softkeys for the additional 'LF Bands' menu options , (as shown in Figure 4.6).

|	
4-7 MHz	Sets up the 4 kHz to 7 kHz filter band on the Preselector unit. The DLP automatically compensates for all the relevant magnitude factors, (if the band correction has been selected), and updates the status region on the Analyser display. In addition to this the DLP will also set the Analyser start and stop frequencies to match those of the selected filter band.
7-10 MHz	Sets up the 7 MHz to 10 MHz filter band on the Preselector unit. The DLP automatically compensates for all the relevant magnitude factors, (if the band correction has been selected), and updates the status region on the Analyser display. In addition to this the DLP will also set the Analyser start and stop frequencies to match those of the selected filter band.
10-15 MHz	Sets up the 10 MHz to 15 MHz filter band on the Preselector unit. The DLP automatically compensates for all the relevant magnitude factors. (if the band correction has been selected), and updates the status region on the Analyser display. In addition to this the DLP will also set the Analyser start and stop frequencies to match those of the selected filter band.
15-30 MHz	Sets up the 15 MHz to 30 MHz filter band on the Preselector unit. The DLP automatically compensates for all the relevant magnitude factors. (if the band correction has been selected), and updates the status region on the Analyser display. In addition to this the DLP will also set the Analyser start and stop frequencies to match those of the selected filter band.
THR 9kHz -30MHz	Selects the LF *through* path on the Preselector, compensates for all the relevant magnitude factors, (if the band correction has been selected), and updates the status region on the Analyser display. The Analyser start and stop frequencies remain unchanged.
More 2 of 2	Returns you to the first 'LF Bands' menu screen, exposing the other available options.

LF Frequency Selection.

Path from 'Main Menu':   LF Setup   Freq Select'n

This menu screen allows you to set the Analyser frequency range under DLP control. Once set, the Preselector DLP will select the most appropriate LF band on the Preselector unit automatically.

The DLP uses the Analyser start frequency to determine the most suitable Preselector band. If the chosen stop frequency exceeds the selected filter band range then the DLP will highlight this by displaying the `*` character along side the band label within the status region on the Analyser display.

Figure 4.7 shows the 'LF Frequency Selection' menu screen.
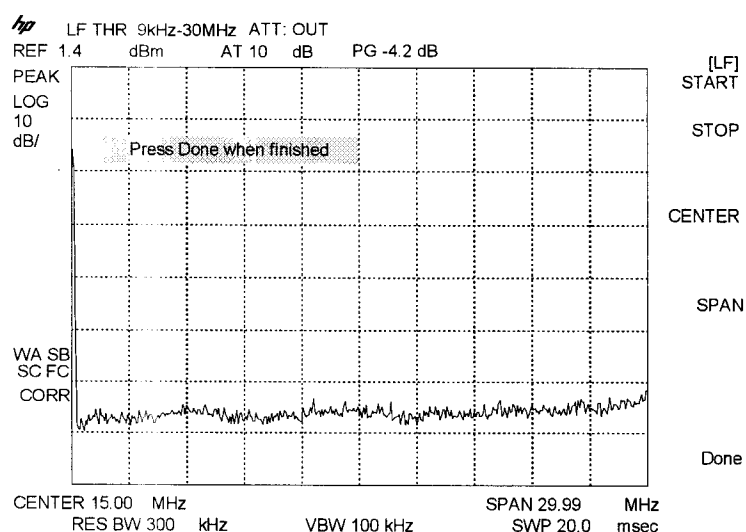
Figure 4.7 Showing the LF Frequency Selection menu screen.

The following describes the available softkeys for 'LF Frequency Selection' menu screen , (as shown in Figure 4.7).

START   Allows you to set the Analyser start frequency using the front panel numeric data entry keys. Once active, then each entry must be terminated by one of the available unit keys, (Hz, kHz, etc.).

STOP   Allows you to set the Analyser stop frequency using the front panel numeric data entry keys. Once active, then each entry must be terminated by one of the available unit keys, (Hz, kHz, etc.).

CENTER   Allows you to set the Analyser center frequency using the front panel numeric data entry keys. Once active, then each entry must be terminated by one of the available unit keys, ($\boxed{\text{Hz}}$, $\boxed{\text{kHz}}$, etc.).

SPAN   Allows you to set the Analyser frequency span using the front panel numeric data entry keys. Once active, then each entry must be terminated by one of the available unit keys, ($\boxed{\text{Hz}}$, $\boxed{\text{kHz}}$, etc.).

Done   Confirms any changes made to the Analyser frequency range, sets the relevant Preselector band and returns you to the 'LF Setup' menu screen.

As mentioned, the DLP uses the Analyser start frequency to determine the most suitable Preselector band. If the chosen stop frequency exceeds the selected filter band range then the DLP will highlight this by displaying the `*` character along side the band label within the status region on the Analyser display.

C A U T I O N   Any measurements made outside the Preselector filter band frequency range are uncalibrated.
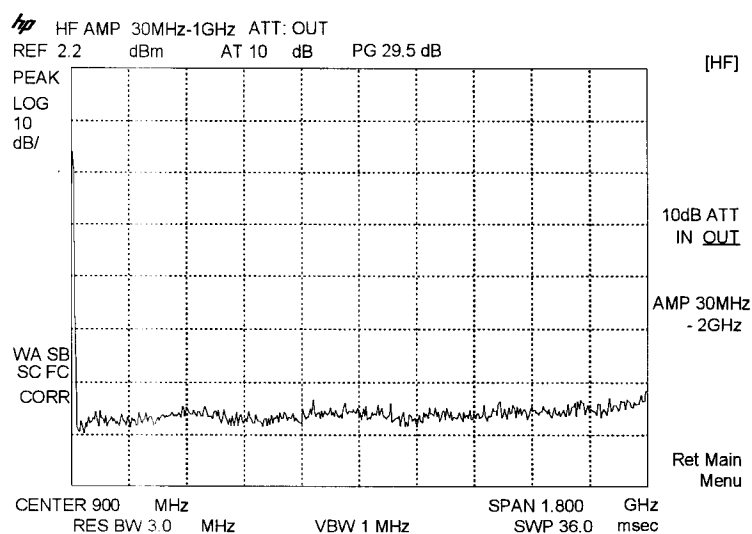

HF Setup.

Path from 'Main Menu': HF Setup

This menu screen enables you access all the features associated with the HF input of the Preselector unit.

Using the available softkeys (and subsequent menus) you can:

⇒ Set the Preselector HF *amplifier* path.
⇒ Toggle the state of the HF attenuator.

Figure 4.8 shows the 'HF Setup' menu screen.

Figure 4.8 Showing the HF Setup screen.

The following describes the available softkeys for 'HF Setup' screen , (as shown in Figure 4.8).

10dB ATT IN OUT — Toggles the state of the HF attenuator. This key allows you to *switch-in* or *switch-out* the HF attenuator as desired. If the Preselector unit is set up for the HF input then the new attenuator state will be set and displayed on the status line on the Analyser screen. However, if the Preselector unit is currently set up for the LF input then the newly

selected HF attenuator state will not be reflected until an HF path is selected.

AMP 30MHz
  -1GHz

Allows you to select the HF *amplifier* path on the Preselector unit.

After setting the *amplifier* path, the DLP updates the status region on the Analyser display.

Ret Main
   Menu

Takes you back to the Preselector DLP 'Main Menu'.

Confirm Unload.

Path from 'Main Menu': Unload PRSL DLP

This menu screen confirms deletion of the Preselector DLP from the Analyser memory. See Figure 4.9
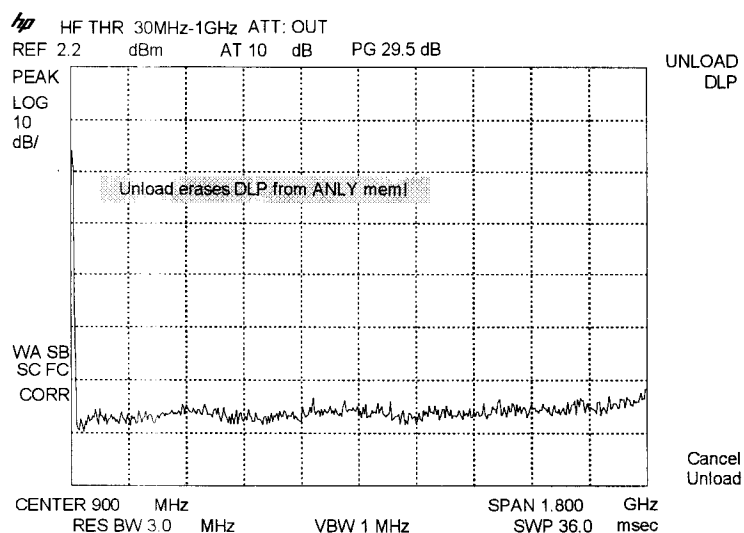
Figure 4.9 Showing the Confirm Unload menu screen.

The following describes the available softkeys for 'Confirm Unload' menu screen , (as annotated in Figure 4.9).

UNLOAD DLP — Removes screen annotations and any reference level offset values set before deleting the Preselector DLP form the Analyser memory.

NOTE	Once unloaded, the Preselector DLP will not be available until you re-install it.

Cancel Unload — Aborts the unload request and returns control to the 'Main Menu' screen.

Initialise States.

Path from 'Main Menu':   *Conditional menu.*

Normally encountered when the DLP detects that the Analyser and Preselector states do not match.
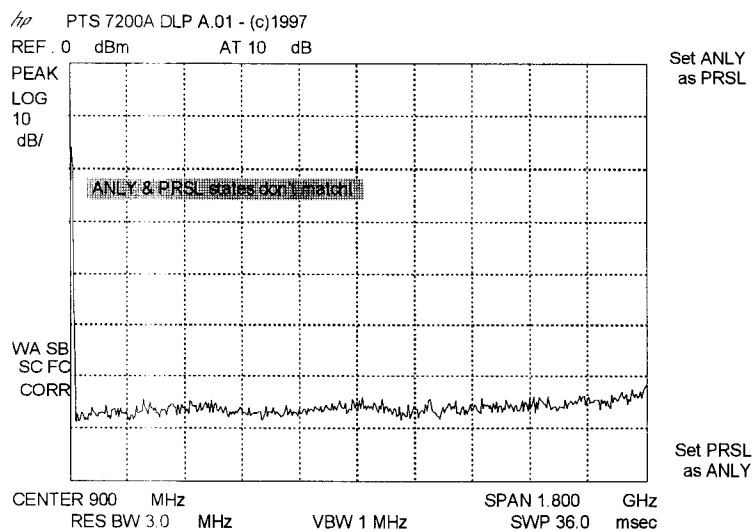


```
/hp      PTS 7200A DLP A.01 - (c)1997
REF . 0   dBm                AT 10   dB
PEAK                                              Set ANLY
LOG                                               as PRSL
10
dB/

         ANLY & PRSL states don't match

WA SB
SC FC
CORR

                                                  Set PRSL
                                                  as ANLY
CENTER 900    MHz
    RES BW 3.0    MHz        VBW 1 MHz      SWP 36.0   msec
                                           SPAN 1.800   GHz
```

Figure 4.10 Showing the Initialise States menu screen.

The following describes the available softkeys for 'Initialise States' menu screen , (as shown in Figure 4.10).

Set ANLY as PRSL   Allows you set up the Analyser state, (and the associated DLP variables), to match the Preselector status.

Set PRSL as ANLY   Allows you set up the Preselector state to match the Analyser, (and the associated DLP variables), status.

4.3 Using The Preselector Under GPIB Control.

The Preselector unit does not include a proprietary GPIB interface. However, it is possible to control the unit, over the GPIB interface, using the remote control features built into the Preselector DLP together with an HP 8590 series Spectrum Analyser, (with the GPIB option installed).

The Preselector DLP has specific functions, (together with associated variables), which are designed to allow access to all the Preselector features using a GPIB host controller. This entails remotely setting any relevant variable and calling the appropriate Preselector DLP function, (on the Spectrum Analyser), to execute the desired command.

You will need to have installed both the Preselector DLP and the auxiliary remote link before proceeding to use the unit under GPIB control.

Table 4.1 outlines the available DLP functions and associated variables, (if any). Note that all the Preselector DLP functions use the 'F_' prefix and all the variables use the 'V_' prefix.

DLP Function	Associated Variable	Remarks
F_PRSLINI	V_PADHF, V_PADLF, V_FRQBND, V_ERRCODE	Called during initialisation, the function F_PRSLINI establishes remote communication with the Preselector and, on success, it sets the associated variables to reflect the current state of the unit. The expected values for these are: V_PADHF - Set to "0" if HF attenuator is *switched-out* or "1" if the attenuator is *switched-in*. V_PADLF - Set to "0" if LF attenuator is *switched-out* or "1" if the attenuator is *switched-in*. V_FRQBND - Set between 1 to 9 for LF filter bands: 150-400kHz, .4-1MHz, 1-2MHz, 2-4MHz, 4-7MHz, 7-10 MHz, 10-15 MHz, 15-30MHz and 9kHz-30MHz (*through*) respectively. Set to 10 for HF, 30-1000MHz, *amplifier* band. A non-zero value for V_ERRCODE indicates problems in executing the above command.

Table 4.1 The available DLP functions associated variables (continued over).

DLP Function	Associated Variable	Remarks
F_SETOFFST	V_CORR	Depending on the value of V_CORR, the function F_SETOFFST toggles the Preselector magnitude compensation, (using EXTERNAL PREAMPG), on the Analyser.
		If V_CORR is set to zero then the magnitude compensation is turned off and a non-zero value (usually 1) enables the correction.
		Once set, the compensation mode will persist until the Analyser power is cycled.
F_SETBND	V_FRQBND, V_ERRCODE	The function F_SETBND sets the Preselector filter band (including *through*) as defined by the value of V_FRQBND. The valid values for V_FRQBND are as follows:
		1 to 9 for LF filter bands: 150-400kHz, .4-1MHz, 1-2MHz, 2-4MHz, 4-7MHz, 7-10 MHz, 10-15 MHz, 15-30MHz and 9kHz-30MHz (*through*) respectively.
		10 for HF, 30-1000MHz, *amplifier* band.
		A non-zero value for V_ERRCODE indicates problems in executing the above command.
F_SETBNDFRQ	V_FRQBND, V_ERRCODE	The function F_SETBNDFRQ performs as F_SETBND but in addition to this it also sets the Analyser frequency range to match the selected filter band.
		A non-zero value for V_ERRCODE indicates problems in executing the above command.
F_PADHF	V_PADHF, V_ERRCODE	Depending on the value of V_PADHF, the function F_PADHF toggles the state of HF attenuator.
		Setting V_PADHF to "1" *switches-in* the attenuator and setting a "0" value *switches-out* the attenuator.
		A non-zero value for V_ERRCODE indicates problems in executing the above command.
F_PADLF	V_PADLF, V_ERRCODE	Depending on the value of V_PADLF, the function F_PADLF toggles the state of LF attenuator.
		Setting V_PADLF to "1" *switches-in* the attenuator and setting a "0" value *switches-out* the attenuator.
		A non-zero value for V_ERRCODE indicates problems in executing the above command.

Table 4.1 The available DLP functions associated variables (continued).

4.3.1 GPIB Command Examples.

You may wish to establish the presence of the Preselector DLP (remotely) before proceeding to use the unit under GPIB control. This can be achieved by either making a dummy call to any of the available DLP functions, or by querying the value of any DLP variable and then checking 'bit 5' of the Analyser status byte for errors. Normally no errors will be reported if the Preselector DLP is available.

The rest of this section goes through some examples to illustrate the remote control features of the Preselector unit.

Task:

    Initialisation - establish remote communication with the Preselector and get the current state of the unit.

Command strings sent to the Analyser:

    "F_PRSLINI;"   *Verify remote communication with the Preselector unit.*

    "V_FRQBND?;"   *Returns the current Preselector band, (between 1 and 10).*

    "V_PADLF?;"   *Returns the current Preselector LF attenuator state, (1 or 0).*

    "V_PADHF?;"   *Returns the current Preselector HF attenuator state, (1 or 0).*

    "V_ERRCODE?;"   *Returns the value of V_ERRCODE, a non-zero value indicates an error situation.*

Task:

    Set the Preselector to the 80-200MHz filter band without affecting the Analyser start and stop frequencies.

Command strings sent to the Analyser:

    "MOV V_FRQBND,7;"   *Set the desired band number (7 represents the LF 10-15MHz filter band).*

    "F_SETBND;"   *Sets the Preselector unit to the LF 10-15MHz filter band.*

    "V_ERRCODE?;"   *Returns the value of V_ERRCODE, a non-zero value indicates an error situation.*

Task:

Set the Preselector to the 9-150kHz filter band and band limit the
Analyser start and stop frequencies.

Command strings sent to the Analyser:

"MOV V_FRQBND,1;"   *Set the desired band number (1 represents the*
                     LF 150-400kHz filter band).

"F_SETBNDFRQ;"   *Sets the Preselector unit to the LF 150-400kHz*
                     filter band and proceeds to set the Analyser
                     start and stop frequencies to match the
                     selected Preselector path.

"V_ERRCODE?;"   *Returns the value of V_ERRCODE, a non-zero*
                     value indicates an error situation.

Task:

Switch-in the HF attenuator on the Preselector unit.

Command strings sent to the Analyser:

"MOV V_PADHF,1;"   *Set the HF attenuator state (1 to switch-in the*
                     attenuator).

"F_PADHF;"   *Switches-in the HF attenuator on the*
                     Preselector unit .

"V_ERRCODE?;"   *Returns the value of V_ERRCODE, a non-zero*
                     value indicates an error situation.

NOTE   If the Preselector unit is currently set up for the LF input then
            the newly selected HF attenuator state will not be reflected until
            the HF path is selected.

Task:

Switch-out the LF attenuator on the Preselector unit.

Command strings sent to the Analyser:

"MOV V_PADLF,0;"   *Set the LF attenuator state (0 to switch-out*
                     the attenuator).

"F_PADLF;"   *Switches-out the LF attenuator on the*
                     Preselector unit .

"V_ERRCODE?;"   *Returns the value of V_ERRCODE, a non-zero value indicates an error situation.*

NOTE	If the Preselector unit is currently set up for the HF input then the newly selected LF attenuator state will not be reflected until the LF path is selected.

Appendix A. Preselector DLP Error Messages.

This section of the manual outlines the error messages generated by the Preselector DLP, (displayed in the message region of the Analyser display).

The messages are listed in alphabetical order below:

```
Err: During 'On-line' CMD!
```

Indicates that problems were encountered on sending the *On-line* command to the Preselector unit, during DLP initialisation. The causes are likely to be either missing Preselector unit or an unsecured remote link.

```
Err: During 'Set Freq Band' CMD!
```

Indicates that problems were encountered on sending the *Set Frequency Band* command to the Preselector unit, during DLP execution. This is probably due to an unsecured remote link.

```
Err: During 'Set HF Atten' CMD!
```

Indicates that problems were encountered on sending the *Set HF Attenuator* command to the Preselector unit, during DLP execution. This is probably due to an unsecured remote link.

```
Err: During 'Set LF Atten' CMD!
```

Indicates that problems were encountered on sending the *Set LF Attenuator* command to the Preselector unit, during DLP execution. This is probably due to an unsecured remote link.

```
Err: Unexpected Error!
```

Indicates that a unusual error situation was encountered during DLP execution. Please contact your supplier or staff at Pentagram Technical Services for advice.

Appendix B.   Preselector DLP Menu Map.

This section of the manual outlines the structure of the Preselector DLP. See Figure B.1.

Appendix C.   Specification.

RF Specification:

Input/Output Impedance	50 Ohm Nominal
Input/Output VSWR	<2:1
Input/Output Connections	N Type
Maximum Signal Input (LF input)	+20dBm
Maximum Signal Input (HF input)	+30dBm
Maximum Input/Output DC Voltage	50VDC

Low Input:	Typical Values
LF Band	Gain
150kHz - 400kHz	-4.2dB
400kHz - 1MHz	-4.2dB
1MHz - 2MHz	-4.2dB
2MHz - 4MHz	-4.1dB
4MHz - 7MHz	-4.3dB
7MHz - 10MHz	-4.3dB
10MHz - 15MHz	-4.3dB
15MHz - 30MHz	-4.4dB
LF Through (9kHz - 30MHz)	-4.3dB

Passband Flatness (including gain variation)	< ±1dB
Ultimate Stopband Rejection (9kHz -1GHz)	> 40dB
Switchable LF Input Attenuator	10.0dB Nominal
Noise Figure	< 5dB

High Input:	Typical Values
HF Band	Gain
HF Amplifier 30MHz - 1GHz	29.5dB

Passband Flatness (including gain variation)	< ±1dB
Ultimate Stopband Rejection (9kHz -2GHz)	> 40dB
Switchable HF Input Attenuator	10.0dB Nominal
Noise Figure	< 8dB