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BYEMAN
CONTROL SYSTEM

~~(S)~~ NATIONAL RECONNAISSANCE OFFICE
WASHINGTON, D.C.

4

THE NRO STAFF

29 JUN 1969

MEMORANDUM FOR CHAIRMAN, SIGINT OVERHEAD
RECONNAISSANCE SUBCOMMITTEE

SUBJECT: Description of SIGINT Mission 7239 (CONVOY II)

The mission description for CONVOY II is attached to this letter of transmittal. This SIGINT reconnaissance system is designed to meet the requirements of USIB-S-10.9/11 and USIB-S-10.9/13.

OY II is a special purpose technical intelligence payload designed to intercept signals from the DOG HOUSE, HEN HOUSE, and [redacted] radars. It will be launched into a 75-degree inclination, 270-nautical-mile circular orbit by a THOR/Agena booster from Vandenberg Air Force Base on 29 July 1969. CONVOY II is an integral part of the STRAWMAN II satellite which will also carry SIGINT missions 7165 (THRESHER) and 7234 (REAPER).

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SORS guidance to the NRO on the operation of CONVOY II should include desired signals and signal combinations for which recordings should be made, areas for CONVOY II operation, expected target signal amplitude levels, target priorities relative to THRESHER and REAPER targets, expected target operating times, and frequency of collection.

EDWIN F. SWEENEY
Colonel, USAF
Deputy Director for
Satellite Operations

Attachment
Mission Description - CONVOY II

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MISSION DESCRIPTION, CONVOY II

1. GENERAL.

CONVOY II is a special purpose payload designed to gather Technical Intelligence (TI) from the DOG HOUSE, HEN HOUSE, and [redacted] radars. CONVOY II is designed to provide high quality predetection data to the Data Storage Unit (DSU) of the STRAWMAN II satellite. In addition, digital data are generated to indicate payload time and status, and to provide measurement of the target signal frequency and amplitude.

The primary purpose of CONVOY II is to detect and recognize the signals of interest, then to track and record the signals on the DSU. The system is capable of simultaneously recording two separate signals in order to detect coherence or cooperation between the two emitters, or, in "dual-beam" cases, between individual beams of the same emitter. The payload is capable of tracking signals in both frequency and amplitude.

2. CONFIGURATION.

The CONVOY II payload consists of five sections, three which are directly applicable to system operation and two which are auxiliary in nature. The three operational sections are the RF and Conversion Section, the IF and Predetection Section, and the Control Logic Section. The auxiliary sections are Power Supply and Telemetry. The configurations of the three operational sections of the payload are discussed below.

2.1 RF and Conversion Section.

Figure 2-1 shows the configuration of the RF and Conversion Section of the payload. Three separate antennas are employed, one for each of the three frequency bands. The signals from the 400 MHz and 900 MHz antennas are each separated into two channels by the diplexers shown. This separates the two beams of the DOG HOUSE and [redacted] radars. The 160 MHz antenna signal is passed through an image filter to permit single conversion. Each of the five RF outputs is applied to a controllable attenuator, an RF amplifier, and a bandpass filter. The attenuators are controlled in three steps of 0, 30, and 60 db. This reduces the dynamic range requirement for the RF amplifiers to 42 db. The

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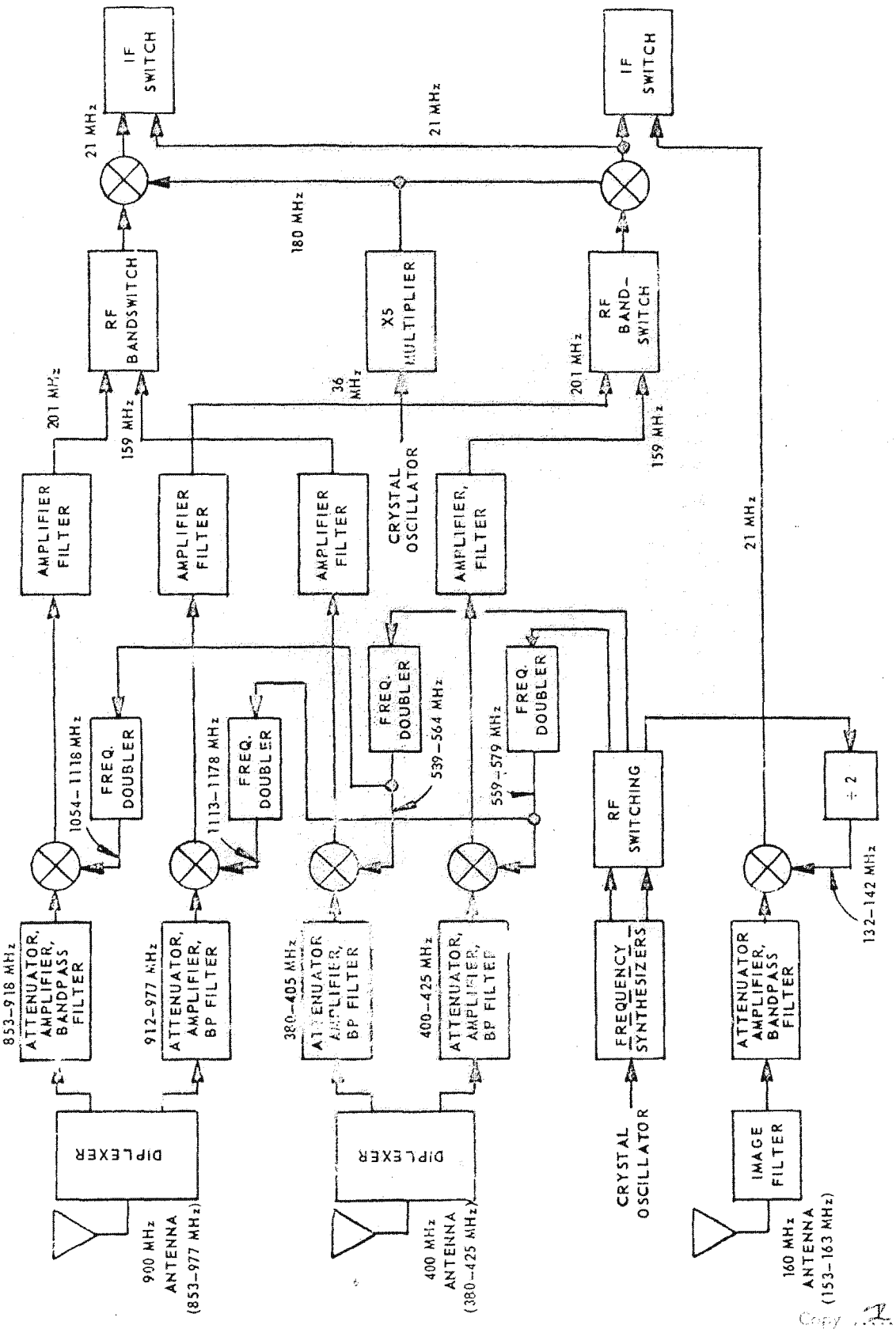

FIGURE 2-1. RF AND CONVERSION SECTION BLOCK DIAGRAM

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RF amplifier provides from 15 to 25 db gain depending on the channel and is primarily responsible for establishing the receiver noise figure.

Two separately controlled frequency synthesizers are used to generate the injection signals for the five mixers. The synthesizers are driven from a common crystal oscillator operating at 36 MHz. All injection frequencies, reference tones, and clocks are driven from this oscillator to maintain complete coherence through the processing channel. The synthesizers operate in the frequency range of approximately 260-300 MHz, with a resolution of 0.321 MHz. The RF switching selects the desired synthesizer output and routes it to either a frequency divider or a doubler. The divided output (132-142 MHz) is used for low-side conversion of the 160 MHz signal to the nominal 21 MHz IF. The doubler outputs (539-579 MHz) are employed for high-side conversion of the 400 MHz signals to a first IF of 159 MHz. These outputs are also doubled a second time to 1054-1178 MHz for high-side conversion of the 900 MHz signals to a first IF of 201 MHz.

The four outputs of the first mixers are routed through amplifier-filter combinations, then applied to the second mixers via mode-controlled RF switching. The second mixer injection frequency is 180 MHz, obtained by multiplying the 36 MHz oscillator by five. This results in high-side conversion of the 159 MHz signals, and low-side conversion of the 201 MHz signals, with the result at 21 MHz in all cases. The payload logic selects the appropriate combination of the available signals and routes them to the IF section.

2.2 IF and Predetection Section.

Figure 2-2 shows the IF and Predetection Section of the payload. The 21 MHz outputs from the Conversion Section are routed through bandpass filters to the preamplifiers, which are followed by controlled attenuators. The IF attenuators provide steps of 0, 10, 20, and 30 db, and are controlled by the payload logic to maintain the output signal level within a 10 db dynamic range. The outputs of the attenuators are applied to the signal processing channels via selectable bandwidth filters and to the predetection channels via a blanking switch. The blanking switch is controlled by the payload logic and inhibits the outputs of the predetection circuits until a valid signal is recognized.

The processing channels consist of an amplifier followed by AM and FM detectors and threshold circuits. The threshold outputs control the payload logic, indicating both the presence or absence of signals and whether the signal is centered in the IF bandpass and in the amplitude dynamic range.

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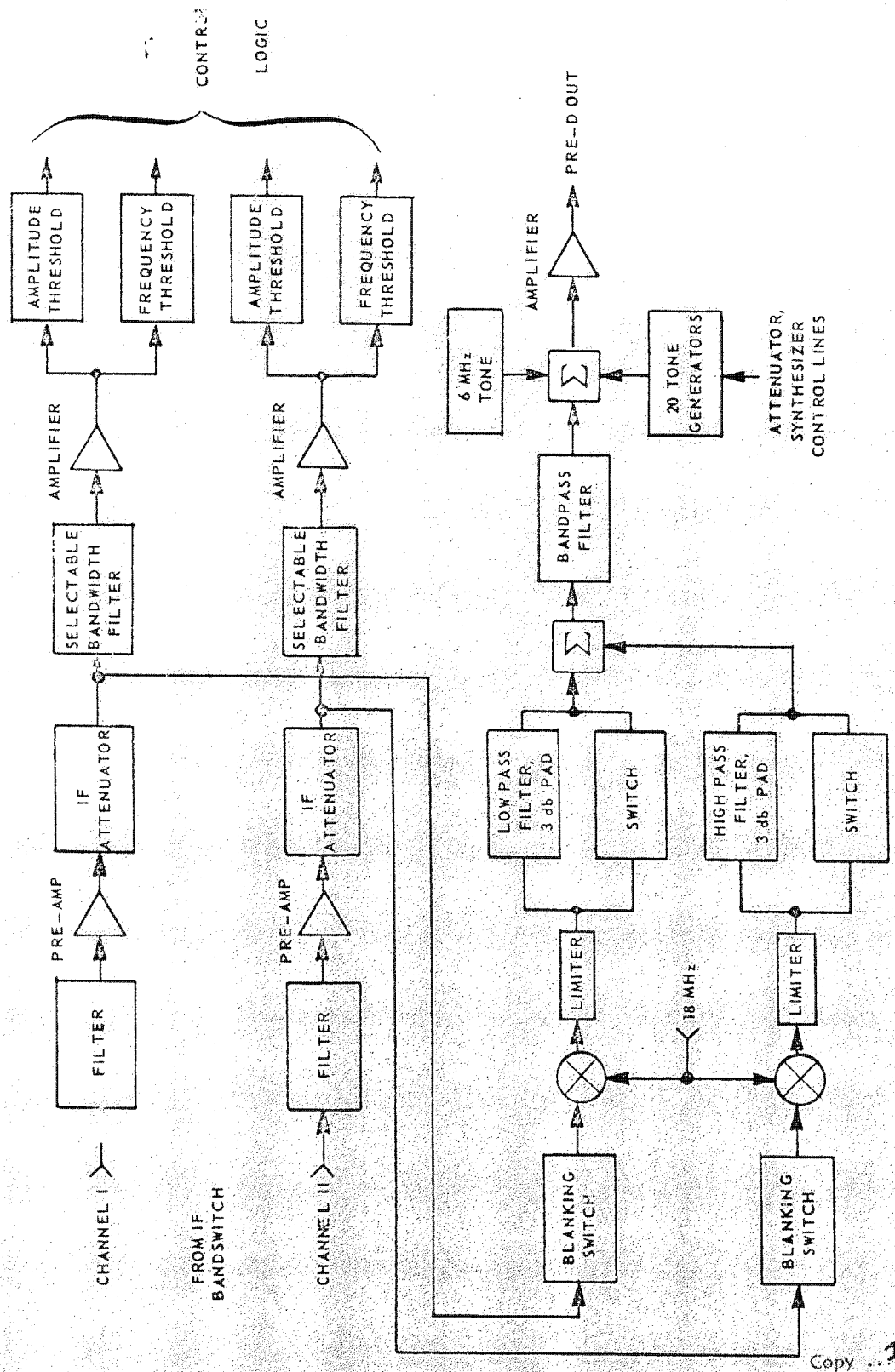

FIGURE 2-2. IF AND PRE-D SECTION BLOCK DIAGRAM

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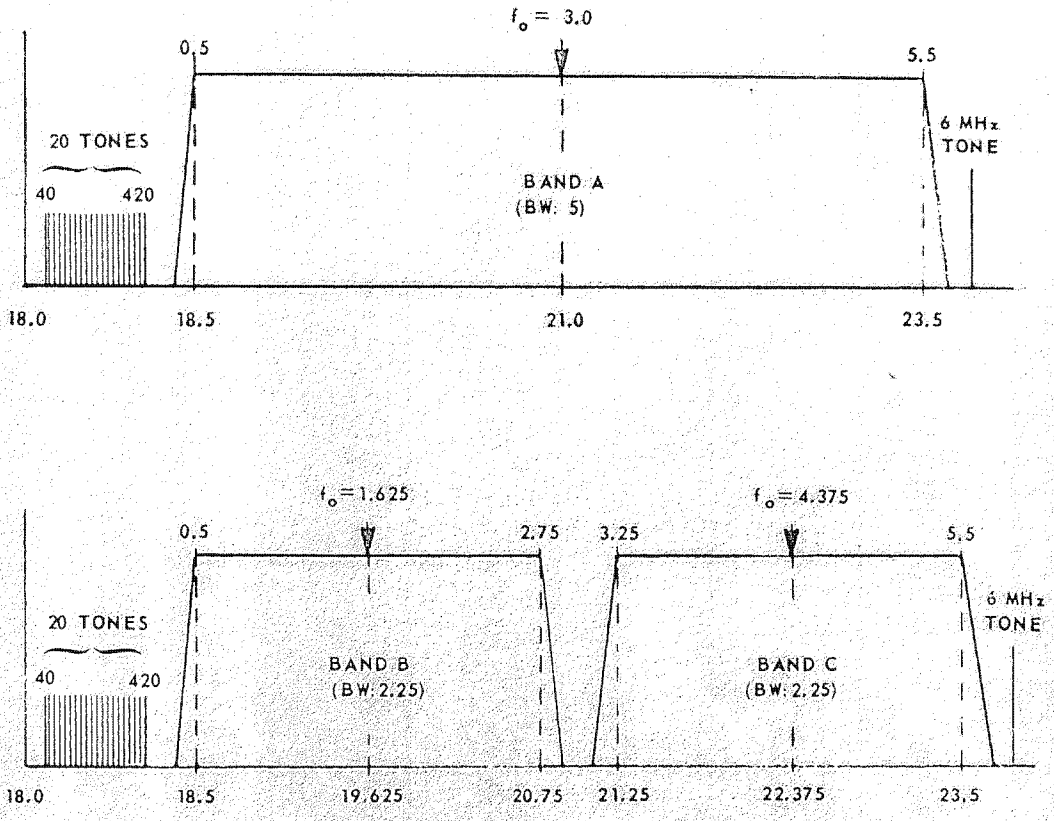
In the predetection channels, a mixer converts the IF signals down to the 0.5-5.5 MHz band for recording on the DSU. The 18 MHz injection frequency is obtained from the 36 MHz oscillator by means of a frequency divider. The mixers are followed by limiters, then filters and switches. In the single signal modes, one of the switches is energized, applying the limiter output directly to the summing network. In the dual-signal modes, the two channels are attenuated 3 db, filtered to half bandwidth, and summed. The output of the summing network is again filtered to remove harmonics from the limiting process, then summed again with a 6 MHz reference tone (obtained by dividing the 36 MHz output) and twenty keyed tones, which indicate the states of the control lines for the attenuators and frequency synthesizers. The composite signal is matched to the 75 ohm line of the buffer amplifier, which drives the DSU. The idealized spectrum of the composite signal is shown in Figure 2-3. The bandwidths and limits shown refer to the 3 db points. The numbers above the figures refer to the predetection output frequency, and the numbers below the figures show the corresponding frequency in the IF channel before the last conversion.

2.3 Control Logic Section.

The payload control logic, shown in simplified form in Figure 2-4, includes the receiver control logic, the recognition logic, and those parts of the payload associated with operating sequences and external digital interface. The timing-generator, operating from a 1 MHz clock derived from the master oscillator, provides the time reference for the various logic functions. The 10 KHz clock for the marker word generator is also produced by the payload logic.

The control logic relays are magnetic latching relays driven by the command programmer. The states of these relays condition the control logic to select the appropriate RF and IF signal channels and operating sequences. Two essentially identical recognition and processing channels are controlled by the mode relays. Each channel consists of recognition logic, scan and track control, frequency and amplitude threshold logic, and the control circuits for the frequency synthesizers and RF/IF attenuator control. Either or both channels may be operating independently.

The recognition logic consists of analog timing circuits and comparison logic that monitors the parameters of detected signals and compares those parameters with the preset limits to determine whether the signal is to be recorded. Once recognition is established, the system is conditioned to track the signal, and the DSU request logic is enabled to initiate recording. The recording continues as long as the recognition criteria are satisfied. The recognition and tracking sequences are discussed in detail in Section 4.



NOTE: BAND A: T MAX 500 mvp-p, T MIN 160 mvp-p.
BAND B & C: T MAX 350, T MIN 110.

FIGURE 2-3. ANALOG BASEBAND SPECTRUM

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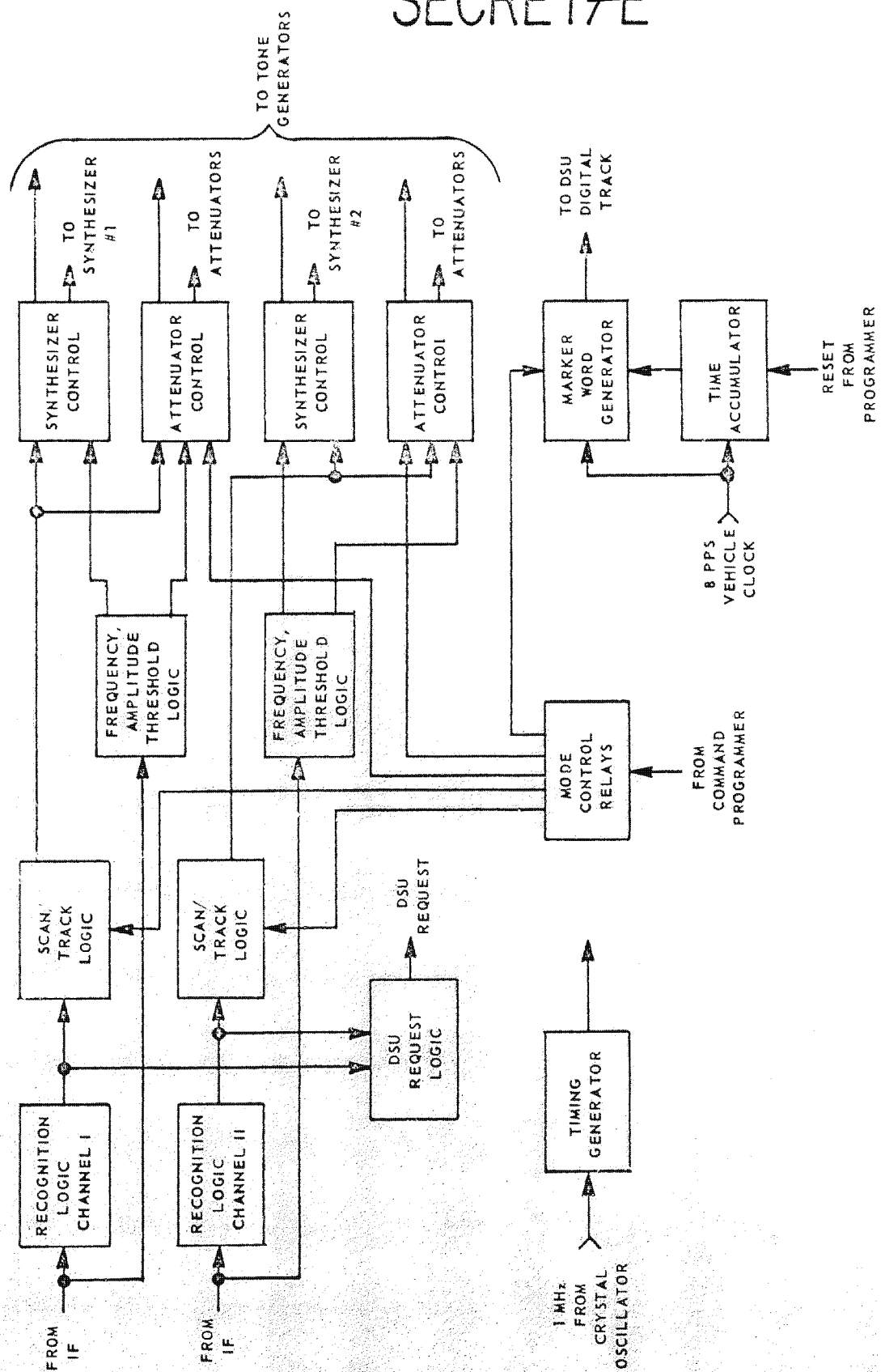

FIGURE 2-4. CONTROL LOGIC SECTION BLOCK DIAGRAM

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The marker word generator produces a serial, 48 bit status word to the DSU digital track each time the vehicle clock pulse is received. This word contains time from the resettable time accumulator, payload identification, and the status of the control relays.

3. CHARACTERISTICS.

3.1 Recognition Criteria.

When CONVOY II is searching for HEN HOUSE or [redacted] two recognition parameters are employed: pulse width (PW) and pulse repetition interval (PRI). Common limits are set for both pulsed emitters. These limits are 200 to 1200 usec on PW and 8 to 64 msec for PRI (15.6-125 pps). It is possible to bypass both criteria by ground command. 50X1

When searching for DOG HOUSE, CONVOY II employs different techniques. The search mode incorporates an environmental survey due to the presence of interfering CW signals in this band and because of the desirability of rapid reacquisition during the sweep retrace. This survey establishes the presence and stores the frequency of any non-sweeping CW emitters. These signals are ignored during search and reacquisition but are used when verifying a valid intercept as described in section 4.2.1. Initial recognition of DOG HOUSE requires that a signal be present for more than 200 usec. Final recognition is accomplished by a check of frequency sweep rate after tracking is initiated. This check requires a sweep rate in excess of 125 MHz/sec and a signal duration in excess of approximately 4 milliseconds for recognition. The 4-millisecond minimum duration criterion is employed to discriminate against BMEWS interference, which could result in false alarms under certain conditions. The recognition criteria can be bypassed by ground command.

3.2 Threshold Sensitivity.

The CONVOY system processing threshold for all frequency ranges is -87 dbm at the input to the payload. On the two dual-beam signals, this value is increased by 4 to 5 db in the beam overlap region. System sensitivity can be reduced by ground command in two steps of 30 db each if dense interference environments are encountered. The sensitivity control is independent for the two processing channels. The processing threshold signals level results in a predicted worst-case signal-to-noise ratio of 12 db at the predetection output. Target effective radiated power (ERP) of + 50 to + 90 dbm will produce a threshold signal level to CONVOY II.

3.3 Frequency Coverage.

The frequency bands which are monitored by CONVOY II are a function of the target(s) and whether the receiving channel is operating in scan or track. Specific frequency coverage is controlled by the Digital Command Programmer and consists of various combinations of the frequency bands of interest. The available combinations are as shown in Table 3.1. When searching for a single signal, the synthesizers are tuned to center the predetection signal at 3.0 MHz. In the dual signal modes, the two signals are frequency multiplexed into two 2.25 MHz bands centered at 1.625 MHz and 4.375 MHz. The 3 db scan and track frequency limits are shown in Table 3.2.

3.4 Inputs.

3.4.1 Antennas.

The three RF inputs to CONVOY II are similar in all characteristics except frequency range. Each input is designed to interface with a stub antenna, connected by means of RG-142 B/U, 50 ohm cable and OSM miniature connectors. Signal levels ranging from -87 to +6 dbm, referred to the input connectors, are detected and tracked over the frequency ranges shown in Table 4.1. In the diplexer crossover regions at 402.5 MHz and 915 MHz, this range is shifted upward by a maximum of 5 db. Antenna and feedline VSWR shall not exceed 3.0 to 1 over the indicated frequency ranges.

3.4.2 Power.

The CONVOY payload is designed to operate from an unregulated dc power source with a nominal output of 23 volts. The system is designed to accommodate variations from 22 to 29 volts while operating. Continuous application of input power as low as 19.0 volts shall not result in failure or permanent degradation of the system.

Two power supplies are employed. The auxiliary supply operates continuously and is used for the system time accumulator, the temperature monitors, and for certain critical logic circuits. The main power supply is controlled by external command and provides the internal voltages necessary for system operation.

MODE	CHANNEL I	CHANNEL II
1	--	H
2	D_U	--
3	D_L	--
4	[redacted]	--
5		--
6	D_U	H
7	D_L	H
8	[redacted]	H
9		H
10	D_L	D_U
11	[redacted]	
12	[redacted]	D_U
13	D_L	[redacted]

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CONVOY II Signal Receiving Combinations and Channel Assignments

TABLE 3.1

H - HEN HOUSE

[redacted] Frequency Band

Frequency Band

D_U - DOG HOUSE Upper Frequency Band

D_L - DOG HOUSE Lower Frequency Band

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TABLE 3.2

FREQUENCY COVERAGE, SEARCH PHASE

SIGNAL	FREQUENCY RANGE	STEP SIZE	NO. STEPS	CONFIRM BANDWIDTH
HEN HOUSE:				
DOG HOUSE (Upper):				
Mode 2		2.571	11	3.0
Mode 6		2.571	11	3.0
Mode 10		2.571	11	3.0
Mode 12		2.571	11	3.0
DOG HOUSE (Lower):				
Mode 3		2.571	11	3.0
Modes 7, 13		2.571	11	3.0
Mode 10		2.571	9	3.0
		5.143	14	5.55
		5.143	13	5.55
		5.143	14	5.55
		5.143	14	5.55
		5.143	12	5.55

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3.4.3 Commands.

Control of the CONVOY payload is accomplished by means of magnetic latching relays, driven by the Digital Command Programmer. These relays are capable of storing the last commanded state without consuming power, and are designed to be compatible with the command programmer outputs.

3.5 Outputs.

3.5.1 Analog Data.

Predetection signals and fixed-frequency tones are output on the analog track of the DSU. These signals are frequency-multiplexed onto the 30 Hz to 6 MHz passband of the DSU. The predetection data appears as either a single 5 MHz wide channel centered at 3.0 MHz or two 2.25 MHz wide channels centered at 1.625 and 4.375 MHz, respectively. A continuous reference tone is recorded at 6.0 MHz, and 20 keyed tone channels which are spaced at 20 KHz intervals from 40 KHz to 420 KHz are used to indicate receiving channel status. Six tones are used for each of the two frequency synthesizers, and four tones are used for the attenuator state in each of the two channels.

Signal levels are controlled to maintain the composite signal output within the dynamic range of the DSU. The output circuit is designed to match the 75 ohm nominal input impedance of the DSU.

3.5.2 Digital Data.

The data recorded on the DSU digital track consists of a 48 bit marker word which is generated at a bit rate of 10 kbps at intervals of 125 milliseconds and is synchronized to the 8 pps vehicle clock. The word contains payload identification, payload status, and vehicle time data. The word is generated in three-level RZ form.

3.5.3 DSU Request.

The DSU request line is used to switch the DSU input to the CONVOY II analog and digital outputs, via the STRAWMAN II priority assignment logic. The DSU request line also commands the DSU to initiate recording. The command consists of a relay contact closure connecting the line directly to the positive unregulated vehicle buss.

4. OPERATIONS.

4.1 Search Phase.

The search phase of system operation is initiated by commanding payload enable and is restarted following the reset interval which occurs whenever the selection of signals-of-interest is modified. The search operation consists of scanning the selected frequency bands in steps and sampling for a minimum threshold. Appropriate IF bandwidths and detector time constants are selected by the payload logic to be compatible with the frequency step size and dwell. During this phase, signal output from the predetection circuits is inhibited.

When DOG HOUSE is a target, a periodic presearch environmental survey is performed to minimize interference due to the presence of non-sweeping CW emitters in the frequency band. The band is scanned in steps as described in the following paragraph. Presence of a signal on the same frequency step for 25 msec shall cause that signal to be identified as non-sweeping CW and not a signal of interest. This survey is performed at intervals of approximately 5 seconds, unless a valid intercept has been detected. The results of the survey are stored and subsequently used to prevent acquisition of these interfering signals.

The search process is initiated after completion of the environmental survey when searching for DOG HOUSE or immediately after payload enable when searching for HEN HOUSE or [redacted] The payload continues to scan the band in steps as indicated in Table 3.2. At each step the system dwells for 6 usec to allow time for synthesizer stabilization and filter delay. During this interval, the processing channels are sampled and the presence of an in-band, over threshold signal is stored. If the signal is present on a step for a sufficient number of successive samples to total 200 usec, the minimum signal duration confirm is satisfied and, for DOG HOUSE signals, the acquisition phase shall be initiated. For HEN HOUSE and [redacted] he duration must be between 200 and 1200 usec in order to initiate the acquisition phase. In either case, the scan terminates on the confirmed frequency step. When searching for HEN HOUSE or [redacted] scan continues if detected signals are of either insufficient or excessive duration. 50X1

4.2 Acquisition Phase.

4.2.1 DOG HOUSE.

Initial recognition of a DOG HOUSE-type signal enables the automatic amplitude and frequency tracking sequence and unblanks the analog data output.

Six usec are allowed for stabilization, after which the tracking threshold circuits are sampled and the controls adjusted one step as required. A delay of 48 usec elapses before a second sampling is performed. After the first two samples, resamples are performed at 48 usec intervals. The acquisition/track phase frequency coverages, step size, number of steps, and correction thresholds are as shown in Table 4.1. The amplitude thresholds are spaced at approximately 10 db and the correction step size is 10 db in all modes.

Final recognition (acquisition) of the DOG HOUSE signal is made on the basis of minimum sweep rate and minimum signal duration by requiring a minimum of two frequency corrections, in the same direction, within 5 msec. Further, the signal must remain above threshold for a minimum of 4 msec before a final recognition is indicated. The minimum sweep rate requirement is approximately 128.6 MHz/sec, and, if the signal meets these requirements, the track phase is initiated.

If the sweep rate criterion has been satisfied, the CW survey storage is interrogated to determine whether the system has tracked into a step containing known CW. If it has, the search phase is immediately resumed with the receiver gain returned to maximum. If the step is not known to contain CW, a 25 msec interval is allowed for resumption of frequency sweep. If this interval expires, the CW storage is modified to reflect the newly detected CW, then search is resumed. Search is resumed immediately if at any time during the acquisition and confirmation process the signal drops below the signal indicate (SI) threshold, which is nominally 3 db below the minimum threshold level.

4.2.2 HEN HOUSE and [redacted]

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The acquisition and confirmation process for HEN HOUSE and [redacted] is not initiated until the PW confirm. This causes the scan to stop on the indicated frequency step, unblank the analog outputs, store the states of the attenuator and synthesizer control counters, and initiate an 8 to 64 msec PRI confirmation. No frequency or amplitude corrections are performed until receipt of a second SI. Reception of a second SI initiates the PW confirm check and also initiates frequency and amplitude samples and corrections 6 usec after the leading edge of SI and at 48 usec intervals thereafter as long as the SI remains. Disappearance of SI without a PW confirm causes the attenuator and synthesizer controls to be reset to the stored state. A PW confirm occurring prior to the minimum PRI limit shall result in immediate return to the search operation. Similarly, expiration of the maximum PRI without detection of a PW confirm results in resumption of the search operation. A PW confirm occurring within the permissible interval initiates the track phase.

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TABLE 4.1

FREQUENCY COVERAGE, ACQUISITION/TRACK PHASE

SIGNAL	FREQUENCY RANGE (3 db Points)	STEP SIZE	NO. STEPS	CONFIRM LIMITS (PRE-D)
HEN HOUSE:				
DOG HOUSE (Upper):				
Mode 2		0.643	63	2.0 - 4.0
Mode 6		0.643	63	0.625 - 2.625
Mode 10		0.643	50	3.375 - 5.375
Mode 12		0.643	63	3.375 - 5.375
DOG HOUSE (Lower):				
Mode 3		0.643	63	2.0 - 4.0
Modes 7, 13		0.643	63	0.625 - 2.625
Mode 10		0.643	56	0.625 - 2.625
		1.286	63	2.0 - 4.0
		1.286	63	0.625 - 2.625
		1.286	51	3.375 - 5.375
		1.286	63	3.375 - 5.375
		1.286	63	2.0 - 4.0
		1.286	63	0.625 - 2.625

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4.3 Track Phase.

Upon initiation of the track phase by either of the means described above, the payload logic immediately issues a DSU request to begin recording of the recognized intercept. This occurs in all modes except those which select the HEN HOUSE signal in combination with any of the other four. In these modes, recognition of the HEN HOUSE signal alone does not result in a DSU request.

In the track phase, amplitude and frequency continue to be sampled at 48 usec intervals as long as SI is present, and corrections are made as required. The action at the disappearance of SI is a function of the signal(s) being processed. When the DOG HOUSE signal is lost, CONVOY II immediately reverts to the search operation, full gain is commanded, and reacquisition is attempted. The analog is blanked, but the DSU request remains active for approximately five seconds after the last sweep rate confirm indication.

When HEN HOUSE and [redacted] are being tracked, SI disappearance is expected at the end of each pulse. In general, the procedure followed at this time is to hold the last frequency setting and increase the receiver gain by one step (10 db). In those modes in which the [redacted] signal is being processed in the lower predetection channel, the frequency control counter is advanced one step at the end of each pulse. This is done to accommodate a 0.8 or 1.6 MHz interpulse frequency shift of the [redacted] signal. This eliminates the possibility of losing lock due to the signal shifting out of the processing channel frequency limits. These settings are maintained until SI is again detected. If the SI is invalid, the original settings are reset. If the SI is valid, recording and tracking continue as above. Lack of a confirmed pulse within the maximum interval (i.e., loss of signal or LOS) initiates the search operations, increases receiver gain to maximum, and blanks the analog output until reacquisition occurs. The DSU request remains active for approximately five seconds after the last PRI confirm indication.

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4.4 Recognition Criteria Bypass.

The recognition criteria for PW, PRI, and frequency sweep rate can be bypassed on command. These bypass commands modify the search, acquisition, and track sequences as follows.

The PW confirm bypass eliminates the 200 to 1200 usec requirement for pulsed signals, such that any pulse greater than 4.5 usec is processible. When searching for DOG HOUSE, this bypass removes the minimum signal duration requirement from the search and reacquisition sequences.

The PRI bypass is applicable only to HEN HOUSE and [redacted] It eliminates the minimum and extends maximum PRI requirement. When the PRI recognition criteria is bypassed, CONVOY II will recognize any pulses of correct width with an interval not greater than 250 msec. When this bypass is actuated in conjunction with the PW bypass, the system recognizes any threshold signal, including CW. Signal disappearance causes immediate resumption of the search mode. 50X1

The sweep rate confirm bypass is applicable only to the search for DOG HOUSE, and eliminates the requirement for frequency variations in the signal. When the sweep rate confirm is bypassed, the system recognizes and records any signal with a duration in excess of 200 usec, including non-sweeping CW signals. When bypassed in conjunction with the PW bypass, any threshold signal with a duration greater than 55 usec generates a DSU request and is tracked and recorded.

In all cases described above, the DSU request line remains active for a period of approximately five seconds after the last recognition has occurred.

4.5 Reacquisition of Targets.

When the selected signal of interest disappears after recognition, reacquisition is attempted. Reacquisition differs from the normal search and acquisition phases only in that the DSU request is still present since the track phase had been selected prior to LOS. The time required to reacquire a signal is a function of the operating mode, the signal parameters, and the states of the recognition criteria bypass relays.

For normal operation against HEN HOUSE and [redacted] LOS is not detected until expiration of the maximum PRI timer (64 msec) without detection of a valid PW. Assuming that the LOS indication was caused by a frequency shift (as at the end of a scan period), detection of the first pulse after LOS could require an additional maximum pulse repetition period, followed by an additional period before a PRI check is obtained. A worst case value for reacquisition in normal operation is approximately 3 x 64 = 192 msec. 50X1

With the PW confirm requirement bypassed, the same reacquisition sequence is followed, and the same maximum 192 msec limit is valid. However, it is possible that the PW of the signal may be significant by comparison. A worst case delay would result if the last recognized pulse was very narrow, then no signal was detected and the maximum PRI timer expired. If the first detected signal was near the maximum width which would still be recognized as a pulse, the overall reacquisition time would approach 4 x 64, or 256 msec.

When the PRI confirm is bypassed, LOS is not detected until two 8 pps clocks have been received, or a maximum of almost 250 msec. Following that, the first valid PW detected would result in reacquisition, so the maximum time required would be 250 msec plus one PRI plus one PW. With both PW and PRI confirms bypassed, any threshold signal is recognized and search is initiated at the end of each detected signal. The maximum reacquisition time in this mode is equal to the intervals between detected signals, plus the delay due to the finite scan period (84 usec maximum).

When tracking DOG HOUSE, reacquisition is again a function of the signal parameters, the environment, and the status of the bypass relays. Two distinct phenomena can initiate the reacquisition process: LOS or loss of sweep rate confirm. LOS results in immediate initiation of the search phase. The first signal which remains above threshold for 200 usec, and which is not a logged CW signal, is acquired and tracked until a sweep rate confirm is received, 5 msec expires, or LOS again occurs. The time required to lock to the proper signal is highly dependent on the interference environment and upon the characteristics of the DOG HOUSE signal during the "retrace" interval.

When the PW confirm is bypassed, the 200 usec minimum signal duration requirement is deleted. This does not normally modify the time required for reacquisition of the desired signal.

With the sweep rate confirm bypassed, any signal present for 200 usec is acquired and recorded as long as it remains above the system processing threshold. Time required for reacquisition is thus 200 usec plus one scan interval (66 usec maximum). With both PW and sweep rate confirms bypassed, reacquisition time is determined solely by the environment, as each signal present is acquired and recorded until LOS.

4.6 Commands.

CONVOY II can be commanded into various operating modes. These modes control the combinations of signals-of-interest which are selected, allowable receiver gain ranges, and the types of recognition criteria and recording requirements which are employed. The mode control logic automatically selects the appropriate RF sections, local oscillators, and IF channel for the desired signal combinations.

The following functions are performed by ground command.

- Power On/Off
- Payload Enable/Disable

- Signal Selection
- Minimum Attenuation Control
- Recognition Criteria Bypass
- Search Phase Blanking Bypass

Power On/Off enables the internal main power supply by controlling the drive current for the switching transistors. The auxiliary power supply remains enabled at all times.

Payload Enable allows the system to begin searching for signals-of-interest, and to begin generating digital marker words for status indication and time correlation. During periods when this relay is released (payload disabled), the system generates the time reference code to indicate the disabled state. This time code occurs for 60 to 100 usec each time a time update pulse is received from the vehicle clock. The marker word is also generated at these times.

Signal Selection defines the combination of signals which shall be processed. Thirteen different combinations are available (see Table 3.1), selected by the states of the five relays. Each signal combination is commandable by either of two relay combinations. The two combinations are complementary to provide redundancy in the event of relay or command failure. Changing of the signal selection is possible with the payload enabled. Any change in relay states under these conditions produces a logic reset lasting for 125 to 250 msec. During this reset interval, the analog system outputs are blanked except for the generation of the time reference code.

Minimum Attenuation Control limits the maximum available receiver gain for each of the two independent processing channels. Zero, 30, or 60 db of attenuation can be selected. Automatic amplitude tracking is employed above the minimum commanded signal input level. Change in attenuation is possible during payload operation with no more than momentary interruption in the analog output data.

Recognition Criteria Bypass allows the payload logic to bypass any combination of the PRI, PW, or scan rate signal recognition criteria. Search Phase Blanking Bypass allows the payload logic to bypass blanking of DSU data when CONVOY II is not tracking a valid radar signal.